CHAPTER 12 REGULATORY IMPACT ANALYSIS

This chapter addresses the EPA's responses to public comments on the regulatory impact analysis of the EPA's Proposed *Oil and Natural Gas Sector: Emission Standards for New , Reconstructed, and Modified Sources.*

Commenters also raised issues on topics that are not covered by this chapter. Please refer to the following chapters for responses specific to those issues:

- **Chapter 1**: Source Category
- **Chapter 2**: Regulation of Methane
- **Chapter 3**: Well Completions
- **Chapter 4**: Fugitives Monitoring
- **Chapter 5**: Pumps
- **Chapter 6**: Controllers
- **Chapter 7**: Compressors
- **Chapter 8**: Equipment Leaks at Natural Gas Processing Plants
- **Chapter 9**: Liquids Unloading
- **Chapter 10**: Storage Vessels
- **Chapter 11**: Compliance
- **Chapter 13**: Existing State, Local, and Federal Rules
- **Chapter 14**: Subpart OOOO
- **Chapter 15**: Miscellaneous
- **Chapter 16**: Comment Period Extension

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12.0 Regulatory Impact Analysis

Commenter Name: Mike Cantrell, Chairman
Commenter Affiliation: National Stripper Well Association (NSWA)
Document Control Number: EPA-HQ-OAR-2010-0505-6758
Comment Excerpt Number: 8

Comment: The EPA's Rulemaking works for Big Oil, but fails to protect small producers. In producing a rule to enforce capture and limit methane emissions from the oil and gas sector, EPA is drafting another rule that unintentionally places stripper oil and gas well owners and operators at a significant disadvantage to larger producers and multinational corporations. In this rulemaking there are a number of glaring discrepancies and EPA should look at these areas for opportunities to provide small producers exemptions from requirements which would harm their operations.

Response: As presented in the Regulatory Flexibility Act (RFA) section of the preamble and the Final Regulatory Flexibility Analysis (FRFA) in the RIA, the EPA considered all comments related to small entity impacts. The agency is unable to incorporate all suggestions without compromising the effectiveness of the final regulation. However, changes to the rule from proposal that may benefit small entities due to comments received include allowing both OGI and Method 21 as acceptable monitoring technology, replacing a performance based monitoring schedule with a fixed frequency, lengthening the time of initial fugitive monitoring, and simplified the third party verification of technical infeasibility requirements. Though these are

not monetized, we believe the flexibility and simplifications these changes have added to the rule result in a reduced burden on small entities.

Commenter Name: Howard J Feldman
Commenter Affiliation: American Petroleum Institute
Document Control Number: EPA-HQ-OAR-2010-0505-6884
Comment Excerpt Number: 19

Comment: Assessment Of EPA's Overall Benefit-Cost Analysis

Reviewing the benefit-cost analysis more closely identifies aspects of the regulation where EPA is pursuing regulation despite their own analysis indicating that the costs outweigh the benefits for specific elements of the regulation. Within the RIA, the EPA does not provide annualized benefits for reducing fugitive emissions at both oil and natural gas well sites separately; rather, it reports only a single annual value for fugitive emissions from well sites. In 2025, the RIA estimates annual costs will be $160 million and that annual benefits at a 3 percent discount rate will be $150 million. Thus, as a group, fugitive emission controls for well sites do not pass the benefit cost test (meaning that costs are higher than benefits), even using the EPA's benefit and cost numbers.

Addressing Errors In EPA's Overall Benefit-Cost Analysis

A review of EPA's analysis of baseline emissions, emission reductions, and cost estimates is detailed in Attachment E. A number of issues were found with the EPA cost estimates, as well as the assumptions underlying the emission reduction estimates. Table 21-1 presents the benefit cost analysis estimates for 2025 from EPA compared to the estimates that correct some of the issues identified. The second set of columns shown in Table 21-1 show the estimated benefits and costs after correcting the key issues found, including:

Oil well completions: EPA underestimated the cost of combustion controls for oil well completions. An adjustment was also made to reflect the fact that many hydraulically fractured development oil well completions are controlled in the baseline. It was assumed that 25% of oil well completions are controlled in the baseline as a conservatively low estimate. Adjusting the estimated costs and the emission reduction estimate to reflect the fact that many hydraulically fractured development oil well completions are controlled in the baseline, the costs are higher than benefits.

Fugitives from well pads: EPA overestimated the emission reductions for fugitive emissions in their analysis. The model plant baseline emissions for both oil and natural gas well sites were estimated by rounding up the counts of major equipment at a well site and then multiplying by the component counts per major equipment. The resulting estimate was an overstatement of baseline emissions and corresponding emission reductions of 30-35 percent. EPA also excluded many cost elements in their estimates for semi-annual OGI leak screening and repair for well sites. Table 21-1 shows the impact of correcting the major flaws with the EPA cost estimates and

correcting the estimated component counts for the model plants. These adjustments show that both oil and natural gas well sites fail the benefit cost test.

Pneumatic Pumps: Several corrections were made to the estimates for pneumatic pumps that significantly change the net benefits estimate. These corrections include: a) adjusting the annual operating time for diaphragm pumps to 4 months of the year, on average; and b) correcting the costs of routing the pump vent to an existing control device, consistent with the estimate EPA used for wet seal compressor vents.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 149.

Commenter Name: Howard J Feldman
Commenter Affiliation: American Petroleum Institute
Document Control Number: EPA-HQ-OAR-2010-0505-6884
Comment Excerpt Number: 148

Comment: ERM reviewed the assumptions, calculations and analysis used in the RIA to develop the cost and benefit estimates on behalf of API. This review shows that there are significant problems with the cost and benefit estimates contained in the RIA and with the treatment of uncertainty. Specifically, our review finds that:

- The RIA omits key cost categories and relies on inaccurate cost and emission information, which results in an underestimate of total costs and an overestimate of the emission reductions.
- The RIA does not provide adequate breakdowns of benefits and costs by source, which obscures important information about the cost effectiveness of the rule.
- The SC-CH4 has inherited all of the problems that plague the social cost of carbon estimates, and the EPA's own peer-review of the SC-CH4 does not demonstrate that it is economically and scientifically defensible.
- The uncertainty surrounding the benefits and costs is not adequately reflected in the RIA, which does not comply with EPA guidelines for conducting benefit–cost analysis.
- The RIA does not report the net benefits to the United States as required by Office of Management of the Budget (OMB), only global net benefits.

Overall, ERM concludes that the proposed rule has costs that are significantly greater than the benefits after the corrections are made. Specifically:

- After correcting for problems with the EPA cost estimates and emission reductions, the point estimate for total costs is $831 million and annual net benefits is -$452 million in 2025 (i.e., costs significantly greater than benefits).
- The most significant source affected by the revisions is fugitive emissions from well sites, where the net benefits are -$405 million in 2025.

- After formally accounting for the uncertainty, we estimate global net benefits will range from -$0.92 and $0.17 billion. There is nearly a 90 percent probability that the actual net benefits will be less than the EPA net benefit estimates.
- Expected annual net benefits for the U.S. will range from will range from -$1.07 billion to -$0.56 billion in 2025.

The remainder of this introduction (Section 1) provides an overview of these findings. Section 2 provides a detailed discussion of the cost analysis, Section 3 discusses the social cost of methane estimates, and Section 4 describes the impact of uncertainty on the analysis.

Response: With respect to the commenter's assertion that the EPA underestimates total costs, overestimates emissions reductions, and that the breakdowns of benefits and costs by source is inadequate, please refer to response to DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 149. With respect to the commenter's assertion that the use of the social cost of methane measures employed in the RIA are not scientifically defensible, please see response to DCN EPA-HQ-OAR-2010-0505-6884 Excerpt 22. With respect to the commenter's assertion that uncertainty is not adequately represented in the RIA and the RIA does not comply with OMB guidelines, please see response to DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 172. With respect to the commenter's statement that the RIA includes global benefits, see response to DCN EPA-HQ-OAR-2010-0505-7058, Excerpt 18.

Commenter Name: Cory Pomeroy, General Counsel
Commenter Affiliation: Texas Oil & Gas Association
Document Control Number: EPA-HQ-OAR-2010-0505-7058
Comment Excerpt Number: 7

Comment: The Proposed Rule's Benefit and Cost Estimates are Highly Uncertain and Conflict With the Administration's Guidelines on Estimating Benefits and Costs; EPA Cannot Rely on These Estimates in Making a Reasoned Decision Under Section 111.

Every aspect of EPA's assessment of the benefits and costs of the proposed rule is based on highly uncertain inputs and assumptions that render the final benefit and cost estimates unreliable and meaningless for decision-making. Key uncertainties are detailed below.

A. The Benefit and Cost Estimates are Based on Highly Uncertain Projections of the Number of Fractured and Re-fractured Oil Well Completions, Well Pads, Pneumatic Pumps, Compressors and Pneumatic Controllers that Will be in Place in 2020 and 2025.

1. The Projections are Based on Outdated Information Included in the U.S. Energy Information Agency's 2014 Annual Energy Outlook.

2. The Number of Facilities Impacted in 2020 and 2025 Will Vary Significantly Based on Oil and Gas Prices, Technology Development and Changes in Federal and State Policies.

B. While EPA Correctly Notes the Significant Changes in the 2015 Annual Energy Outlook, EPA Incorrectly Assumes that the Costs Per Facility and Broader U.S. Energy Market Impacts Would Remain the Same.

C. The Benefit and Cost Analysis is Also Based on Equally Uncertain Estimates of the Before and After-Control Emission Rates From These Sources.

1. EPA Admits a Critical Lack of Information on the Number of Leaks at Uncontrolled Facilities.

2. More Recent Data Show That the Actual Number of Leaks At Uncontrolled Facilities is Likely to be an Order of Magnitude Lower Than EPA Estimates.

D. EPA's Analysis Also Fails to Address the Regulatory Conflicts and Expected "Double Counting" of Reduced Emissions From the Department of Interior's Upcoming Rule to Address Venting, Flaring, and Leaks From Wells on Federal Lands.

E. EPA's Monetized Benefit Estimates Rely on a Flawed Social Cost of Methane (SC-CH4) Estimate at Odds With the Administration's Guidance on Benefit-Cost Analysis.

1. EPA's Estimate of the SC-CH4 Contains Many of the Same Flaws as the SCC.

2. Contrary to Administration Guidance, EPA Incorrectly Provides Only a Global Estimate of SC-CH4.

3. Relying on a Global Benefit Estimate Conflicts With the History of Section 111 and the Act's Requirements in Addressing International Air Pollution.

4. EPA's Benefit-Cost Analysis Also Conflicts With OMB Guidance by Failing to Include Benefit Estimates that are Based on a 7 Percent Discount Rate.

F. Many of the Uncertainties and Problems Raised by EPA's Benefit Analysis Could be Reduced by Relying on VOC a Surrogate for Methane.

G. The Cost Analysis to Support BSER Is Inadequate if EPA Adopts the Suggested "Next Generation" (Next-Gen) Compliance Options Described Conceptually in the Preamble.

H. Given the Significant Flaws in the Agency's Cost and Benefit Estimates, EPA Cannot Rely on These Estimates to Support a Final Rule and Doing So Would Constitute Both Arbitrary and Capricious Action and a Failure of Reasoned Decision making.

Response: With respect to comment part A, concerning uncertainty in the projection of affected units, please see response to DCN EPA-HQ-OAR-2010-0505-7058, Excerpt 8. With respect to comment Part B, regarding the assertion of incorrect assumptions surrounding changes to impacts due to the 2015 AEO, please see response to DCN EPA-HQ-OAR-2010-0505-7058, Excerpt 10. Regarding the comment on uncertainty in control emission rates (part C), see the

response to DCN EPA-HQ-OAR-2010-0505-7058, Excerpt 12. With respect to the commenter's concern about the potential of "double counting" emissions reductions with BLM's proposed rule regarding natural gas and oil production on Federal lands (part D), the EPA notes that its analysis of potential impacts of the final NSPS is the best and most complete accounting of potential impacts available to the agency at the time of promulgation. In addition, comments directed at BLM rulemakings are out of scope of this action.

With respect to the comments on the social cost of methane (part E), please see the response to this commenter's statements at DCN EPA-HQ-OAR-2010-0505-7058, Excerpts 17, 18, and 19.

Regarding the assertion that VOC standards are sufficient to control methane (part F), please see EPA's response to DCN EPA-HQ-OAR-2010-0505-6927, Excerpt 6 in Chapter 2 of this document, which includes reference to the preamble section IV.D (Establishing GHG standards in the form of limitations on methane emissions). See response to DCN EPA-HQ-OAR-2010-0505-7058, Excerpt 22 in Chapter 11 of this document for a response to the comment regarding the compliance costs on Next Generation compliance provisions (part G). Regarding to the commenter's assertion that the use of the benefit-cost analysis renders the rule arbitrary and capricious (part H), please see the response to DCN EPA-HQ-OAR-2010-0505-7058, Excerpt 24.

Commenter Name: Cory Pomeroy, General Counsel
Commenter Affiliation: Texas Oil & Gas Association
Document Control Number: EPA-HQ-OAR-2010-0505-7058
Comment Excerpt Number: 24

Comment: Given the Significant Flaws in the Agency's Cost and Benefit Estimates, EPA Cannot Rely on These Estimates to Support a Final Rule and Doing So Would Constitute Both Arbitrary and Capricious Action and a Failure of Reasoned Decision making.

Agency action will generally be found arbitrary and capricious by a reviewing court when the Agency has: (1) relied on factors that Congress did not intend it to consider; (2) failed to consider an important aspect of the issue at hand; or (3) offered an explanation for its decision that runs counter to the evidence before it.

Moreover, the CAA incorporates the same reasoned-decision making standard that serves as a pillar of the Administrative Procedure Act. Under this standard, "[n]ot only must an Agency's decreed result be within the scope of its lawful authority, but the process by which it reaches that result must be logical and rational." As a consequence, the D.C. Circuit has not hesitated to invalidate rules promulgated under the CAA that are "unsupported by adequately reasoned decision making."

The numerous problems with EPA's benefit and cost estimates render them highly misleading and meaningless as a tool for reasoned decision-making. The docketed analysis artificially inflates the overall benefits by consistently employing assumptions -- such as the exclusive use

of lower discount rates and the equally exclusive reliance on a global estimate of benefits –to present an overall conclusion that the potential benefits of the proposed rule will exceed the costs. An analysis of these assumptions, however, quickly demonstrates that one can only reach this conclusion by ignoring current Administration policies with regard to benefit-cost analysis, as reflected in OMB Circulars A-4 and A-94, as well as CAA Section 111's statutory/regulatory history and the requirements for reciprocity under CAA Section 115 to address international pollution.

Response: First, the EPA disagrees that the benefit-cost analysis is flawed. In particular, the EPA disagrees that the benefits estimates in the RIA are artificially inflated. See the response to DCN EPA-HQ-OAR-2010-0505-7058, Excerpt 18, for complete discussion about the validity and rigor of the Marten et al estimates of the SC-CH4, including the discount rates applied. See DCN EPA-HQ-OAR-2010-0505-7058, Excerpt 18, for complete discussion about the Clean Air Act and use of global estimates. See the EPA response to DCN EPA-HQ-OAR-2010-0505-6997, Excerpts 11-12, for discussion about the consistency of the approach used to estimate the benefits with OMB guidance.

Second, the EPA's standard-setting duties and authority are derived under section 111 of the CAA, and its decisions are made within the confines of that authority. Although the EPA must consider the costs of control, it may not base the setting of standards on a broad-ranging benefit-cost analysis. The RIA prepared by the EPA under Executive Order 12866 may inform the standard-setting process, but cannot provide the direct basis for the standards and does not "create any right or benefit, substantive or procedural, enforceable at law or equity by a party against the United States..." (Executive Order 12866, Section 10).

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:10 AM - 8:00 PM; Public Hearing #1 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 188

Comment: The first we are really looking at is the cost benefit analyses. Also, quantifying the benefits that will come from the reduced emissions of VOCs. The formation of smog and soot from those hazardous air pollutants were not included in the proposed draft rules, I believe.

Response: The EPA has not monetized the health benefits from reducing VOC emissions as a result of this rule, however, this does not imply that there will not be health benefits. Rather, this is a reflection of the complexities in modeling the changes in VOC emissions of the oil and gas sector with the limited data available, as described in Chapter 4 of the RIA. For this reason, we cannot yet monetize the health benefits from VOCs, but the realized benefits from this rule will likely exceed the estimates presented here.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:10 AM - 8:00 PM; Public Hearing #1 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 235

Comment: This is from the EPA -- from the Sierra Club, 9/14/15. Texas cities, specifically Dallas, Fort Worth, and San Antonio, will see enormous benefits from this rule in the efforts to clean up regional smog. The co-pollutant reductions achieved through the rule and the CTG portions of the rule are specifically important to Texas. Texas accounts for roughly 30 percent of all oil and gas production in the U.S., which means a significant amount of the 7 million tons of methane pollution that were vented, flared, leaked, and otherwise wasted from oil and gas operations occur in Texas, and I'm certain one of them is four blocks from my house.

Response: The EPA agrees that the final NSPS will reduce emissions from the oil and natural gas sector, and this rule will have significant health benefits due to reductions in HAPs, VOCs and ozone.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:10 AM - 8:00 PM; Public Hearing #1 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 238

Comment: But the irony of the opposition's position is striking. The regulations would require the oil and gas producers to operate more efficiently going forward, capturing more of the gases currently lost to the atmosphere. Less gas escaping means more gas to sell. The EPA estimates that the savings in additional gas captured and sold will exceed the cost of implementing the infrastructure necessary to comply with the regulations by 100- to $150 million. So these regulations would be the right thing to do from a business efficiency standpoint even if there were fewer environmental benefits.

However, the environmental benefits of implementing these regulations are real and will be significant. If you accept the fact, based on scientific consensus, that human greenhouse gas emissions must be lowered in order to slow the devastation that global warming continues to wreak on our planet, then you must ratify these regulations.

Response: The EPA agrees that the final NSPS will reduce emissions from the oil and natural gas sector and that this rule will have significant health benefits due to reductions in HAPs, VOCs and ozone.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:10 AM - 8:00 PM; Public Hearing #1 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 242

Comment: The restrictions on drilling would harm other important industries all across Texas. According to the American Chemistry Council, chemical manufacturers have announced more than $145 billion worth of new investments in the United States to take advantage of affordable natural gas, which is used as a feedstock. These investments, many of which would be in Texas, include expanded production of fertilizers and other products used by America's farmers.

Drilling restrictions would also mean less affordable energy, which is a key reason why many companies relocated abroad prior to the shale gas boom taking jobs with them. The proposed methane rules are also harmful from a social justice respective since affordable natural gas particularly helps the poor.

In 2012, cheap natural gas added an average of $1,200 in disposable income for U.S. households. Energy savings from natural gas in U.S. public elementary and secondary schools totaled almost half a billion dollars in the 2012-2013 fiscal year, equivalent to the salaries of 5,000 full-time teachers.

Needless to say, the mandates that undermine these benefits are highly regressive. While economic costs are a legitimate concern, they're compounded by the fact that the EPA's rule appears to be a solution in search of a problem. The EPA's own data shows that methane emissions are already decreasing. In the Permian and Gulf Coast Basins here in Texas, methane emissions decreased by 9 percent and 18 percent respectively between 2011 and 2013. Those regions include two of the largest oil fields in the entire world.

Response: As described in section 6.2 of the RIA, the EPA estimates the impact of the final regulation on U.S. energy markets. The EPA estimates that the final rule will have relatively small impacts on oil and natural gas drilling, production, and prices in the United States over the 2020 to 2025 period. As a result, the EPA expects minimal impacts on the broader economy as a result of this rule. In addition, the EPA disagrees with the information on methane emissions trends presented by the commenter. On this point, see response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 49.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Tuesday, September 29, 2015; 9:00 AM - 11:55 AM; Public Hearing #2 - Pittsburgh, Pennsylvania
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7338
Comment Excerpt Number: 52

Comment: In its analysis, the EPA should consider methane's actual effects as a greenhouse gas over both short and long time scales.

Response: The calculation of the SC-CH4 accounts for the greenhouse gas effects of a pulse of methane emissions over the full lifetime of methane in the atmosphere, taking into account the quantity of methane remaining at each point in time. Therefore, the analysis considers both short and long time scales.

12.1 Method to Project Activity Levels of New Facilities

Commenter Name: Howard J Feldman
Commenter Affiliation: American Petroleum Institute
Document Control Number: EPA-HQ-OAR-2010-0505-6884
Comment Excerpt Number: 170

Comment: *Overestimate of Pneumatic Device Baseline Emissions and Emission Reductions*

EPA estimated that all bleed devices installed at transmission and storage stations are high bleed, because vendor research did not have enough information to estimate the prevalence of high- versus low-bleed devices. This assumption overstates the number of high-bleed devices and consequently, the nationwide baseline emissions and potential emission reductions achievable by replacing them with low-bleed devices.

Uncertainty in the Projected Number of New Sources in 2020 and 2025

EPA projected the number of new and modified bleed pneumatic devices for 2020 and 2025 based on the same approach used for pneumatic pumps and compressors. Specifically, EPA estimated the number of new bleed devices based on a 10 year average of net increases from the inventory of US GHG Emissions and Sinks: 19902012. Only the years of positive net increase were averaged, neglecting the years of estimated decline in number of sources. This approach introduces significant uncertainty since a simple average over the same 10 year period (i.e., counting years of source declines) yields a negative change for bleed devices in the storage sector.

Response: The commenter makes two arguments that the number of pneumatic controllers affected by the rule is overestimated. First, the commenter states that the EPA has overestimated the proportion of newly installed continuous-bleed pneumatic controllers that are high-bleed in comparison to those that are low-bleed. Second, the commenter argues for a different averaging approach to estimating new affected facilities.

The EPA disagrees with the commenter's assertion that the impacts of the rule are overestimated. The EPA acknowledges uncertainty in the number of affected facilities and equipment in future years, but for the purposes of estimating national impacts has constructed its best estimate of those impacts.

The EPA did not estimate that all new controllers installed in transmission and storage stations are high bleed. The proportion was estimated using data available from the GHG Inventory. Comparisons to data on national counts of pneumatic controllers and the proportion of high-bleed pneumatic controllers in the transmission and storage segment indicate that the estimated count of affected controllers are unlikely to be underestimated. The estimate of affected controllers is less than one-half of one percent of total pneumatic controllers in the transmission and storage segment. Reporting program data, as used in the 2016 Inventory of U.S. GHG Emissions and Sinks: 1990-2014, indicates that approximately 9% of controllers in the

transmission segment are high-bleed and 35% of controllers in the storage segment are high-bleed.

Regarding the averaging approach, the EPA has modified its methodology for using historical inventory information to estimate new sources reflecting comments received, resulting in lower estimates of the number of new compressor stations, pumps, compressors, and pneumatic controllers constructed each year. Please see the response for DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 174 for more information on the averaging approach used in the final RIA.

Commenter Name: Howard J Feldman
Commenter Affiliation: American Petroleum Institute
Document Control Number: EPA-HQ-OAR-2010-0505-6884
Comment Excerpt Number: 174

Comment: ***PROJECTED SCOPE OF REGULATION***

Total costs and benefits associated with NSPS OOOOa increase with the number of new and modified emissions sources projected in 2020 and 2025. EPA projected growth of sectors and market segments within the oil and gas industry using historical data, but did not consider the considerable variability of annual growth and inventories of units subject to the regulation apparent from the very data utilized. For example, by choosing to exclude years of contraction, EPA projected 581 new pneumatic storage devices annually over 10-years when the actual average annual growth was -230 devices. Had they assumed growth was 0 during those years of contraction (i.e. included all years in the denominator but only positive values in the numerator), EPA would have projected 232 new devices annually. By failing to recognize uncertainty in annual growth within elements of the oil and gas industry, EPA has given a false sense of precision about the total cost impact and societal benefit associated with NSPS OOOOa.

Tables 4-4 [Range in Inputs for Projected Fracking Well Completions Used in ERM's Monte Carlo Model], 4-5 [Range in Inputs for Projected Oil & Gas Well Pads Subject to Fugitive Emissions Regulations Used in ERM's Monte Carlo Model] and 4-6 [Range in Inputs for Projected Pneumatic Pumps at Oil & Gas Well Pads Used in ERM's Monte Carlo Model] report the ranges in parameters ERM used to model uncertainty in the number of regulated units existing in 2020 and 2025. Unless otherwise noted, ERM used EPA's estimate as the most likely value and developed the range as +/-30 percent. ERM modeled the probability distribution of all but the parameters for new CIPs (pneumatic pumps) using the Beta-PERT distribution.

Response: Reflecting comments received, the EPA has modified its methodology for using historical inventory information to estimate new sources, resulting in lower estimates of the number of new compressor stations, pumps, compressors, and pneumatic controllers constructed each year. Newly constructed affected facilities are estimated based on averaging the year-to-year changes in the past 10 years of activity data in the Greenhouse Gas Inventory for compressor stations, pneumatic pumps, compressors, and pneumatic controllers. At proposal, this was done by averaging the increasing years only. The approach was modified to average the

number of newly constructed units in all years. In years when the total count of equipment decreased, there were assumed to be no newly constructed units. It would be inappropriate to estimate new affected sources using a simple average including negative values, because when sources are shut down, it is more likely that these are older existing units rather than newly constructed units subject to the NSPS.

The EPA acknowledges that the approaches to estimating new affected facilities described here does not account for modification or replacement of existing equipment. For this reason, the number of affected facilities may be underestimated.

Commenter Name: Don Anderson, Director of Environmental
Commenter Affiliation: MarkWest Energy Partners, L.P.
Document Control Number: EPA-HQ-OAR-2010-0505-6957
Comment Excerpt Number: 5

Comment: EPA estimates of methane emission reductions are flawed

EPA estimates that the methane reductions forecast to be achieved by the rule "represent about 2 percent in 2020 and 4 to 5 percent in 2025 of the baseline methane emissions for [the oil and natural gas sector] reported in the U.S. GHG Inventory for 2013." *80 Fed. Reg.* at 56,654, noting they are based on "predicted activities" and not estimated sector-level emissions or robust emissions inventories. *Id.* EPA also justifies the rule based on estimates that oil and gas production will grow by 25% over by 2025. *See* Methane Action Plan Press Release (January 14, 2015) ("Nevertheless, emissions from the oil and gas sector are projected to rise more than 25 percent by 2025 without additional steps to lower them."); see also Administration Takes Steps Forward on Climate Action Plan by Announcing Actions to Cut Methane Emissions (January 14, 2015), https://www.whitehouse.gov/the-press-office/2015/01/14/fact-sheet-administration-takes-steps-forward-climate-action-plan-anno-1. 80 *Fed. Reg.* at 56,599 (without further support, citing to "rapid growth of this industry"). These estimates are without substantial support in the record.

EPA has yet to provide any credible data supporting its 25% growth projection. To the contrary, methane emissions from oil and natural gas exploration and production ("E&P") are 1.07% of total U.S. GHG emissions and the natural gas sector alone has reduced methane emissions by 38% since 2005. *See* EPA, 2014 GHG Reporting Data (2014). In 2013, "reported methane emissions from petroleum and natural gas systems sector" decreased by 12% from 2011, and the largest reduction came from hydraulically fractured natural gas wells (resulting in a decrease of 73% in emissions). *Id.* According to a study by the University of Texas, Austin, methane emitted from all upstream source categories at natural gas production sites represents just 0.42% of gross natural gas production volumes.3 Thus, on a national scale, despite significant growth in production in this sector over the past several years, methane and other emissions have continued to decline, and EPA's own data bear this out. *See* 80 *Fed. Reg.* at 56,606-56,607, Tables 2, 3(a), and 3(b) (showing the significant decrease in methane emissions from the oil and gas sector since 1990). In short, EPA's projections about growth and further extrapolations about the significance of this rule are simply not supported by EPA's own data in the record, yet the rule

appears to be fundamentally grounded in the need to reign in emissions from such growth, and the purported benefits to be derived from doing so. This is false and misleading.

Response: The EPA disagrees with the commenter's assertion that the regulatory analysis is based on unjustified projections information. In particular, the analysis is not based on a 25% growth rate as specified in the comment. While projections always contain uncertainty, the analysis is based on the most recent long-range projections information available at the time the analysis was prepared. At proposal, it was based on the 2014 Annual Energy Outlook, and for the final rule the analysis has been updated to reflect the 2015 Annual Energy Outlook. The reference scenario of the 2015 Annual Energy Outlook projects long-term growth in both oil and gas production from 2012 through 2025.

Commenter Name: Cory Pomeroy, General Counsel
Commenter Affiliation: Texas Oil & Gas Association
Document Control Number: EPA-HQ-OAR-2010-0505-7058
Comment Excerpt Number: 8

Comment: The Benefit and Cost Estimates are Based on Highly Uncertain Projections of the Number of Fractured and Re-fractured Oil Well Completions, Well Pads, Pneumatic Pumps, Compressors and Pneumatic Controllers that Will be in Place in 2020 and 2025.

1. The Projections are Based on Outdated Information Included in the U.S. Energy Information Agency's 2014 Annual Energy Outlook.

Projecting the number of facilities in 2020 and 2025 that would be expected to change their emissions control activities as a result of this Proposed Rule is highly uncertain and will depend on market conditions. For instance, recent press reports indicate that the number of U.S. oil-drilling rigs – a proxy for drilling activity in the oil industry – has fallen by over 60 percent since October 2014. This drastic reduction, however, is not considered in the Agency's analysis of benefits and costs. As EPA states in its draft Regulatory Impact Analysis, the Agency's estimates of the number of new and modified hydraulically fractured oil well completions and well sites are based on projections and growth rates consistent with the drilling activity in the U.S. Energy Information Administration's (EIA's) 2014 Annual Energy Outlook. Reliance on these outdated projections severely undermines the validity of the resulting benefit and cost estimates for the Proposed Rule. The recent changes in market conditions are likely to have enduring impacts that could significantly alter production strategies and the likely number of affected facilities in the future even if energy prices recover.

2. The Number of Facilities Impacted in 2020 and 2025 Will Vary Significantly Based on Oil and Gas Prices, Technology Development and Changes in Federal and State Policies.

Even if EPA had relied on updated information regarding current trends in oil and gas well production, projecting the number of future affected facilities is highly uncertain. In addition to fluctuating market conditions, the number of affected facilities could vary significantly based on

technology developments. The dramatic increases in U.S. oil production from 2009 to 2014 reflect technology innovation and the rapid adoption of new drilling approaches on private lands. The resulting technology improvements unlocked oil from areas that were previously considered out of reach by most drillers less than a decade ago. Very few analysts predicted the significance of the technology change and the consequence of its rapid adoption in the U.S. Technology changes will continue to affect future production in unpredictable ways that may alter the number of affected facilities and the production process. EPA's analysis fails to account for these significant uncertainties.

Similarly, EPA has also not considered the potential impact of changes in federal and state policies affecting access to public and private resources. Policy changes at the federal, state and local level may have profound impacts on the number of affected facilities in 2020 and 2025. For instance, EPA's recent decision to revise the ozone NAAQS will result in a significant near-term increase in the number of nonattainment areas and potentially more stringent nonattainment regulatory classifications for existing nonattainment areas. Both outcomes could affect the projected number of affected facilities. Yet, according to the draft RIA, these impacts were not considered in developing the projections because the RIA control strategies for implementing NAAQS are "merely illustrative". Moreover, the background TSD supporting this Proposed Rule states that the number of "controlled" completions and recompletions was estimated based on existing state regulations. Because local ordinances were not included, EPA concludes that the calculated percentage of wells subject to state regulation should be considered a "conservative estimate."

Response: The commenter argues that the EPA projections of affected facilities are uncertain and do not reflect current market conditions. The EPA agrees with the general principle that projections of affected facilities contain uncertainty due to shifts in market conditions. However, the EPA has utilized the most recently available long-term projections of industry activities when analyzing estimated impacts. At the time of proposal, projections were based on the 2014 Annual Energy Outlook, and for the final have been updated to the 2015 Annual Energy Outlook. In addition, the RIA includes an uncertainty analysis reflecting different market condition scenarios. Due to the fast-changing nature of the oil and gas industry, changes taking place today are not necessarily indicative of market conditions in 2020 and 2025, the analysis years of the RIA.

Commenter Name: J. Roger Kelley
Commenter Affiliation: Domestic Energy Producer's Alliance (DEPA)
Document Control Number: EPA-HQ-OAR-2010-0505-6793
Comment Excerpt Number: 7

Comment: EPA's cost-benefit analysis is deficient because it arbitrarily fails to consider state flaring restrictions in its benefit calculation. Most oil producing states have multiple layers of regulations requiring emissions associated with flowback to be combusted. EPA's rule proposal acknowledges that these requirements achieve emission reductions that are comparable to the Proposed NSPS OOOOa. But EPA calculates the rule's benefits without taking them into

account by assuming that flowback emissions are completely uncontrolled. EPA does so even though it later credits reductions achieved from reduced emission completions ("REC") mandated by other states. EPA's choice to account for only some state control requirements artificially inflates the rule's benefits. The rule proposal is therefore contrary to law and should not be finalized in its current state.

The CAA requires that NSPS "shall reflect the degree of emission limitation and the percentage reduction achievable through application of the best technological system of continuous emission reduction which (taking into consideration the cost of achieving such emission reduction, any non-air quality health and environmental impact and energy requirements) the Administrator determines has been adequately demonstrated." Accordingly, EPA must choose an NSPS that "represents the best balance of economic, environmental, and energy considerations."

EPA calculated the benefits of the proposed rule by assuming that without the proposed NSPS, emissions during flowback would be "vented" to the atmosphere. EPA stated that "[t]he highest emissions are from venting of natural gas to the atmosphere during flowback." This assumption does not account for the fact that the vast majority of such emissions are flared in accordance with state law. EPA should have reduced the amount of emissions reductions it assumed and credited as a benefit by the amount of control achieved by state-mandated requirements. Indeed, EPA did exactly this by removing from its calculations the value of emissions captured by state-mandated RECs in Colorado and Wyoming. Crediting one form of state-mandated emission control and not another is arbitrary and capricious.

EPA found that both Colorado and Wyoming require RECs for oil and gas wells, so it removed these wells from its cost-benefit analysis. However, EPA made no reference to removing wells for states that require flaring during completion. Instead, EPA calculated the emissions reductions benefits for the rule by taking the number of wells that would be subject to the rule (minus the Colorado and Wyoming wells), and multiplying that number by the VOC and methane emissions that would occur "uncontrolled," without accounting for flaring. "The estimates in the table below represent emissions from that population of wells, in the absence of controls. To calculate emissions to the atmosphere using these values, additional information on gas that is not emitted (e.g. through use of RECs or flaring) is needed to reduce the potential value."

EPA found that for a three-day completion event, these "uncontrolled" methane emissions would be 9.72 tons and uncontrolled VOC emissions would be 8.14 tons. EPA multiplied these numbers by the number of wells to determine the total amount of methane and VOC emissions reductions. Then to quantify the methane emissions reductions as a dollar amount, it multiplied the "social cost of carbon" by the total amount of methane emissions reductions. EPA found that based on these emissions reduction benefits, the quantified benefits of the rule justified the costs of compliance.

However, EPA arbitrarily failed to consider that most state regulations require oil well completion emissions to be controlled with flares or other similar incineration devices during the flow-back stage. In addition, these same states require that, pending arrangements for disposition for some useful purpose, all vented casing-head gas be burned. These same flares are usually

equipped with an automatic ignitor or a continuous burning pilot, unless waived by the for good reason. Contrary to EPA's assumption, these multiple layers of requirements ensure that it would generally be illegal to allow emissions during flow-back to be "vented" to the atmosphere.

Comparing state requirements to the proposed NSPS, flow-back emissions do not go "uncontrolled" The proposed NSPS would require: (1) during the initial flowback stage, routing flowback into tanks and commencing operation of a separator unless technically infeasible; (2) during the separation phase, routing liquids into tanks, a collection system, or reinjecting the liquids into a well; (3) during the separation phase, routing gas into a gas flow line or collection system, reinjecting the gas into a well, or using the gas as an on-site fuel source or other useful purpose, unless infeasible; (4) routing of all salable quality gas to the gas flow line as soon as practicable, unless technically infeasible; and (5) capturing and directing gas that is not able to be directed to a flow line to a "completion combustion device." "Completion combustion device" is defined as "any ignition device, installed horizontally or vertically, used in exploration and production operations to combust otherwise vented emissions from completions." A "completion combustion device" includes a flare.

EPA acknowledges in the preamble that flaring alone achieves the same emissions reductions as the proposed NSPS, finding that "the emissions reduction would be equal." In the RIA, EPA finds that "completion combustion" (i.e., flaring) alone "would achieve direct emission reduction that are equivalent to requiring RECs and combustion, but at an approximately $70 million per year lower cost." If EPA were to consider the emissions reduction benefits that are already being achieved due to flaring requirements in most states, the emissions reduction amounts would be much lower, and the overall emission reduction benefits would also be lower.

There is no basis for EPA to consider the REC requirements in Colorado and Wyoming in its cost-benefit analysis but omit flaring requirements in DEPA's member states. EPA has made an arbitrary calculation of the benefits of the rule proposal, which does not meet the standard of "the best balance of economic, environmental, and energy considerations," as is required under the CAA. The rule proposal is therefore contrary to law and should not be finalized as proposed.

Response: The EPA agrees that to the extent feasible, the estimate of national impacts should account for interactions with other regulatory requirements. While the commenter asserts that most states already require flaring of oil well completion emissions, they do not reference specific state requirements to this effect. Other commenters have cited requirements in North Dakota. For the final RIA, the EPA has adjusted its approach to estimating national impacts to assume that oil well completions in North Dakota would have been flared in the absence of the rule.

Commenter Name: Howard J Feldman
Commenter Affiliation: American Petroleum Institute
Document Control Number: EPA-HQ-OAR-2010-0505-6884
Comment Excerpt Number: 156

Comment: *Omission of Costs for Well Sites in Regulated States*

EPA excluded well sites in regulated states from the cost analysis, but did not exempt those sites in the proposed Subpart OOOOa rule. Specifically, EPA excluded well sites in regulated states in their baseline and projections of affected oil and gas well sites in 2020 and 2025. The exclusion of well sites in regulated states has the effect of reducing both costs and emission reductions, so no net effect on cost effectiveness. However, the rule as proposed does not exclude well sites in regulated states, which is not consistent with EPA's cost analysis. If well sites in regulated states are not exempt from Subpart OOOOa requirements, those affected well sites would incur higher costs to implement the additional LDAR requirements, with little to no net emissions reductions. The resulting costs would be higher than EPA estimated if those regulated well sites are not exempt from the rule.

Response: The EPA agrees that new and modified well sites in all states are subject to OOOOa. Well sites located in states with requirements similar to the requirements of OOOOa would not have additional control costs or emissions reductions as a result of OOOOa, since they would otherwise be required to implement emissions controls by state law. For this reason, following standard procedure for regulatory impact analyses, they have been excluded from the estimates of control costs. While these facilities would not face control costs, they may face additional monitoring, recordkeeping, and reporting costs, to the extent that recordkeeping and reporting requirements differ from state requirements. Monitoring, recordkeeping, and reporting costs are included in burden estimates from the Information Collection Request supporting statement associated with the final rule.

Commenter Name: Howard J Feldman
Commenter Affiliation: American Petroleum Institute
Document Control Number: EPA-HQ-OAR-2010-0505-6884
Comment Excerpt Number: 159

Comment: *Growth Rate Inconsistency*

EPA used an inconsistent approach for projecting affected gas well sites for onshore production sector and the gathering and boosting sector. To estimate the number of affected gas well sites and gathering and boosting stations in 2020 and 2025, EPA used an estimated annual growth rate for gas wells. For gas well sites, EPA used a 6.45 percent annual growth rate based on the National Energy Modeling System (NEMS) model as the basis for projecting new gas well sites in the onshore production sector. In contrast, EPA used a 3 percent annual growth rate for new gas wells as the basis for projecting new gathering and boosting stations. If EPA used the same 3 percent growth rate for gas well site projections for the onshore production sector, the overall

benefit– cost analysis would be further impacted, meaning the net benefits would be even lower. To be conservative, ERM used 3 percent.

Response: The EPA adjusted the analysis reflected in this comment to use the 2015 Annual Energy Outlook. The growth rate used to estimate new gathering and boosting stations in the final RIA is 1.2 percent, reflecting the average annual growth in natural gas well drilling from 2012 to 2025 forecast by the 2015 AEO.

Commenter Name: Darin Schroeder, David McCabe, Lesley Fleishman and Conrad Schneider
Commenter Affiliation: Clean Air Task Force et al.
Document Control Number: EPA-HQ-OAR-2010-0505-7062
Comment Excerpt Number: 78

Comment: As discussed below, there is evidence from recent studies and reports that the GHGI estimate is probably too low, primarily because its data are based on studies that undercounted the number of pneumatic controllers in service in the oil and gas industries. These studies have also shown that pneumatic controllers often improperly emit more, or far more, than designed to emit. In order to prevent harmful pollution, EPA must consider this information and finalize standards that ensure pneumatic controller emissions are truly minimized.

1.Data for pneumatic controller counts and overall emissions

Data from the Reporting Program and several recent studies strongly suggest that the GHGI estimate for oil and gas production pneumatic controllers is too low due to an undercount of the number of controllers in service. As a result, the GHGI estimate for emissions from these controllers is also too low. While the GHGI reports that pneumatic controllers in the production segments of the oil and natural gas sector emitted 759,706 metric tons of methane in 2013,the Reporting Program reports 1,002,025 metric tons of emissions from pneumatic controllers in these segments in 2013. Both the Reporting Program and the GHGI use emissions factors derived from the EPA / Gas Research Institute study (EPA/GRI study) of natural gas industry methane emissions published in the 1990s. Since the GHGI and the Reporting Program use the same emissions factors but the Reporting Program reports larger emissions, the difference is in the underlying pneumatic controller count data. In this respect, the Reporting Program is more accurate than the GHGI, since the Reporting Program uses actual counts of controllers by oil and gas producers to calculate emissions, while the GHGI controller count estimates are based on extrapolation of a count from a small sample of facilities carried out as part of the EPA/GRI study some years ago. In addition, the counts from the Reporting Program – even though they are higher than the GHGI counts – are still an underestimate of pneumatic controllers in service in oil and gas production, because many oil and gas production facilities do not report data on pneumatic controller emissions to the Reporting Program.

Allen *et al.* (2013) reports results on measurements of emissions from 305 pneumatic controllers at 150 natural gas production sites, finding that emissions from these controllers were likely higher than reported in the GHGI: Allen *et al.* (2013) estimate nationwide emissions were 518 –

826 Gg methane from pneumatic controllers at natural gas well sites in 2012, while the latest edition of the GHGI reports net emissions of 557 Gg of methane from natural gas production in that year. Note that the figure from Allen *et al.* (2013) represents emissions only from natural gas well pads, while the GHGI figure represents emissions from natural gas well pads and natural gas gathering facilities. Alarmingly, Allen *et al.* reports that pneumatic controllers that site operators classified as "low-bleed controllers" and intermittent-bleed controllers emitted on average of 270% and 29%, respectively, more methane per controller than the emissions factor used by EPA to calculate emissions for the GHGI and the Reporting Program. If the Reporting Program count data is used along with the emission factors from Allen *et al.* (2013), the resulting estimate of emissions from pneumatic controllers at oil and natural gas production sites would increase by over 30% to 1,290,730 metric tons of methane for 2013.

A 2015 study by the same research team that produced the 2013 Allen study reports the results of a new set of measurements of emissions from 377 pneumatic controllers at 65 oil and natural gas production sites (largely natural gas sites). These measurements indicated a lower overall average emission rate for individual pneumatic controllers (5.5 scfh of whole gas) than reported by the earlier study, Allen *et al.* (2013), the GHGI or the Reporting Program. Allen *et al.* (2015) attribute the lower emissions per controller (as compared to Allen *et al.* (2013)) primarily to the large number of controllers they observed that did not emit. Allen *et al.* (2015) also reports that the well sites they surveyed had 2.7 pneumatic controllers per well, a much higher figure than the activity ratio used by the GHGI of 1.0 pneumatic controller per well. As Allen *et al.* (2015) discuss, it is possible that well site operators are often not counting intermittent-bleed pneumatic controllers that rarely actuate (such as controllers for emergency shut-off devices) in their counts of pneumatic controllers for such purposes as greenhouse gas reporting. Previous research efforts may have similarly undercounted these controllers. When these controllers are included, average emissions per controller decreases, but Allen et al. (2015)'s finding regarding pneumatic controller counts also suggests that nationwide pneumatic controller emissions are higher than reported in the GHGI, even considering the lower emissions per controller reported in that study. However, as we discuss below, emissions from controllers that rarely actuate can be quite significant due to improperly functioning equipment.

Response: The EPA agrees that recent data from the GHGRP have indicated higher national emissions from pneumatic controllers than was previously understood. However, the analysis in the final RIA properly estimates the impacts associated with the NSPS. The most recent 2016 Greenhouse Gas Inventory has incorporated changes reflecting new data from the GHGRP on pneumatic controller activity counts and has resulted in a large increase in emissions from this source. The largest portion of the increase occurred with respect to the counts for intermittent-bleed pneumatic controllers, which are not affected facilities under the proposed or finalized NSPS, and so are not included in the impacts analysis in the RIA. In addition, the new data on national counts for pneumatic controllers do not provide specific information on the number of new high-bleed pneumatic controllers typically installed, upon which the impacts analysis is based. With respect to strengthening the NSPS to regulate intermittent bleed controllers, see response to DCN EPA-HQ-OAR-2010-0505-7062, Excerpt 86 in Chapter 6 of this document.

Commenter Name: Howard J Feldman
Commenter Affiliation: American Petroleum Institute
Document Control Number: EPA-HQ-OAR-2010-0505-6884
Comment Excerpt Number: 169

Comment: *Uncertainty in the Projected Number of New Sources in 2020 and 2025*

EPA projected the number of new and modified reciprocating and centrifugal compressor sources for 2020 and 2025 based on the same approach used for pneumatic pumps. Specifically, EPA estimated the number of reciprocating and centrifugal compressor installations based on a 10 year average of compressor net increases from the inventory of US GHG Emissions and Sinks: 1990-2012. Only the years of positive net increase were averaged, neglecting the years of estimated decline in number of sources. This approach introduces significant uncertainty since a simple average over the same 10 year period (i.e., counting years of source declines) yields a negative change for centrifugal compressors in both transmission and storage segments and negligible increase for reciprocating compressors in the transmission segment. Table 7 [Table 2-5 - Number of New Compressors in a Typical Year Used in Analysis] shown below presents the difference between the approach EPA used and the simple 10 year average.

Response: The EPA has modified its methodology for using historical inventory information to estimate new sources reflecting comments received, resulting in lower estimates of the number of new compressor stations, pumps, compressors, and pneumatic controllers constructed each year. Please see the response for DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 174 for more information on the averaging approach used in the final RIA.

Commenter Name: Howard J Feldman
Commenter Affiliation: American Petroleum Institute
Document Control Number: EPA-HQ-OAR-2010-0505-6884
Comment Excerpt Number: 163

Comment: *Uncertainty in the Projected Number of New Sources in 2020 and 2025*

The projected number of new pneumatic pump sources in 2020 and 2025 was based on an estimated annual increase in the number of pumps using a 10 year average of pneumatic pump net increases from the Inventory of U.S. GHG Emissions and Sinks: 1990-2013. EPA only used the net increases from year to year (i.e., the positive net increase values), instead of the overall net change over the 10 year period. This approach would likely overstate the number of new pumps, because it is not reflective of a true change over the 10 year period.

Another source of uncertainty is EPA's estimate of the split between chemical injection and diaphragm pumps that EPA assumed in the projection of affected sources in 2020 and 2025. Specifically, EPA assumed that new and replaced pumps were evenly split 50/50 between diaphragm and piston pumps. This reference cited by EPA has no information on pump demographics in the O&G industry. Since the estimated baseline emissions from piston pumps

are a factor of 10 lower than diaphragm pumps, the baseline, emission reductions, and net benefits estimates are highly sensitive to this assumption. EPA used different assumptions of the pump type split between diaphragm and piston pumps for their analysis of an alternate control option (instrument air system), ranging from 25, 50, and 75 percent for each pump type.

Corrected Net Benefits Estimate for Pneumatic Pumps

ERM used the following corrections to estimate a revised net benefits estimate from pneumatic pumps at well sites:

- Annual cost of $3,308/well site;
- Methane composition for pneumatic pumps at oil well sites of 69.5 percent by volume (compared to 82.7% by EPA); and
- Diaphragm pumps operational 4 months per year, on average.

The comparison of benefits and costs estimated by EPA and corrected to account for the issues identified above are shown below.

[Table 2-3: Cost and Emissions Comparison for Pneumatic Pumps - well pads, methane emissions (Mt) EPA estimate 30,934 ERM estimate 11,1186, annualized 2025 cost ($M), EPA estimate $5.1, ERM estimate $57]

Response: With respect to the averaging approach used for projecting the number of new pumps, the EPA has modified its methodology for using historical inventory information to estimate new sources reflecting comments received, resulting in lower estimates of the number of new compressor stations, pumps, compressors, and pneumatic controllers constructed each year. Please see the response for DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 174 for more information on the averaging approach used in the final RIA.

With regard to the use of the split of 50 percent between diaphragm and piston pumps used in the analysis, we note in the proposal TSD, "Once the population counts of pneumatic pumps in each segment were established, the count of CIPs was split into diaphragm and piston. Similar to the assumption used in the EPA/GRI Report,[1] for new and replaced pumps for each segment we assumed 50 percent of the pumps to be diaphragm and 50 percent of the pumps to be piston pumps." Because we had no more current data in order to estimate the allocation of these pumps, we used the information from the 1996 GRI report."

With respect to the suggested corrected to the cost of pneumatic pump controls, see response to DCN EPA-HQ-OAR-2010-0505-6930, Excerpt 48 in Chapter 5 of this document.

[1] Gas Research Institute (GRI)/U.S. Environmental Protection Agency. *Research and Development, Methane Emissions from the Natural Gas Industry, Volume 13: Chemical Injection Pumps*. June 1996 (EPA-600/R -96-080m).

12.2 Method to Project Activity Levels of Modifications and Turnover Rates

Commenter Name: Darin Schroeder, David McCabe, Lesley Fleishman and Conrad Schneider
Commenter Affiliation: Clean Air Task Force et al.
Document Control Number: EPA-HQ-OAR-2010-0505-7062
Comment Excerpt Number: 73

Comment: Concerns about EPA's methodology for estimating emissions reductions

We note here two errors in the methodology EPA uses to calculate emissions reductions in future years resulting from the proposed standards. The errors we note do *not* affect the selection of regulatory options, but we believe the Agency should correct the methodology it uses moving forward.

The first is specific to the calculation of emissions reductions from control of pneumatic pumps. In order to estimate the number of new chemical injection pumps (CIPs) installed every year, EPA calculated both the growth in the population of CIPs in use and the rate of replacement of the CIP population. To calculate the rate of replacement, EPA used the following approach.

To forecast the count of CIPs replaced in a *typical* year, age and count of gas and oil wells for 2013 were extracted from DI Desktop®. The age of the pneumatic pump was assumed to be the age of the well. Based on expert judgment, the average lifetime of a pneumatic pump was assumed to be 10 years. *Therefore, a portion of CIPs that reached 10 years in a particular year were assumed to be replaced that year.*

EPA is therefore assuming that CIPs – and more importantly, oil and gas wells – have a fixed and certain ten year lifetime. One important implication of this is that it suggests that the whole fleet of wells and ancillary equipment in service today turns over entirely in ten years (and has half turned over in just five years). If true, this would mean that new source standards would lead to a cleanup of *all* oil and gas production sites in a fixed and certain time.

Unfortunately, this is not the case. Even if an "average" well lasts ten years, many last far longer. The population of wells drilled in a given year that are still in service declines over time in a more exponential fashion. This means that some portion of those wells will be in service many years into the future. Indeed, wells are in service today that were originally drilled decades ago. We urge EPA to use a more realistic approach to the calculation of turnover / decommissioning of oil and gas facilities.

The second concern is with the general methodology that the RIA uses to calculate the emissions reductions from equipment standards in 2020 and 2025. This concern applies to the calculation of emissions reductions due to the standards on other sources in addition to the standards for pneumatic pumps. In its RIA, EPA analyzes the emission reductions the proposed rule would achieve in 2020 and 2025, noting that 2020 "represent[s] the first full year of compliance" and that the rule's emission reduction benefits will accumulate over the period of 2020-2025.This is puzzling and incorrect: under section 111, a new source performance standard under section 111 applies to any source "the construction or modification of which is commenced after the

publication of regulations (or, if earlier, proposed regulations) prescribing a standard of performance under this section which will be applicable to such source." EPA published its proposed regulations in the Federal Register on September 18, 2015, so any source constructed or modified after that date will have to comply with the final performance standards. By analyzing 2020 as the "first full year of compliance," EPA appears to have omitted nearly four and a half years' worth of emission reductions from its calculation of the rule's benefits. We urge the agency to amend this error in its analysis of the final rule.

Response: Commenter states that the EPA analysis improperly assumes a fixed and certain 10-year lifetime for pneumatic pumps and wells. The EPA disagrees that the impacts analysis makes this assumption. In order to include an estimate of modified and reconstructed sources, in addition to new sources, the standard approach is to estimate a life span for the equipment or source. This is consistent with many approaches for depreciation of equipment and replacement forecasting strategies. We estimate an average number of pumps per well and then estimate the age of the wells in order to apply that age to the pump population. The analysis does not assume that wells will be reconstructed or modified within the 10 year life span, only that the pump population will, on average, turnover in that period. We believe that this approach is appropriate for estimating the number of pumps modified or reconstructed under the rule in order to include that estimate in the impacts for the rule.

Regarding the analysis years, commenter argues that the impacts analysis should include affected facilities constructed in 2016 through 2019 within the impacts for the analysis years 2020 and 2025. The EPA agrees that this approach more accurately represents the impacts of the NSPS, and has made this change to the analysis to national impacts analyses supporting the final rule.

12.3 Effects of Voluntary Industry Emission Reduction Efforts

Commenter Name: W. Michael Scott, General Counsel
Commenter Affiliation: Trilogy Operating, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6603
Comment Excerpt Number: 49

Comment: Finally, the Methane NSPS is unnecessary because the oil and gas industry is already effectively addressing methane and VOC emissions through voluntary programs. For example, many industry members have entered into the voluntary Natural Gas STAR Methane Challenge Program, which includes recommendations to repair detected leaks. In fact, EPA's own estimates indicate that methane emissions from the oil and gas sector have been steadily decreasing for more than a decade. The oil and gas sector has reduced emissions by more than 20 million metric tons of CO2 equivalent since 1990, despite the tremendous increases in production that occurred during this same period. The industry is continuing to find innovative and cost-effective ways to reduce emissions, but EPA's proposed regulations would stymie that innovation by forcing every business to comply with a one-size-fits-all approach. Instead of mandating a particular set of requirements, EPA should continue to monitor progress in the oil and gas sector to evaluate whether additional regulations are really necessary, and, if so, what form they should take.

Response: The EPA agrees that emissions reductions have been achieved over the past 10 years, including reductions from NSPS OOOO, state requirements, and as a result of voluntary actions such as those taken as part of the Natural Gas Star program. However, the EPA disagrees with the information on methane emissions trends presented by the commenter. The EPA tracks GHG emissions through two complementary programs. Both programs show that emissions of methane from the oil and natural gas sector are significant, as discussed in Section IV.C of the final rule preamble. The EPA's GHGRP, which includes reporting of emission by facilities meeting GHGRP thresholds, does show an overall decline in emissions from 2011-2014, with some sources showing declining emissions and others showing increasing emissions over that time period. The EPA's GHG Inventory, which tracks total national emissions and includes data from 1990-2014, shows an increase in emissions from natural gas and petroleum production and natural gas processing, transmission and storage of 7 percent from 2011-2014, also with emissions from some sources declining and others increasing. Over the full GHG Inventory time series, these emissions increase 16 percent from 1990-2014, and have shown a general increasing trend in more recent years, for example, an increase of 10 percent from 2005-2014. The EPA disagrees with the commenter that the NSPS is unnecessary. The final NSPS is needed to reduce emissions from the oil and natural gas sector, and the health, welfare, and environmental benefits of this action once implemented will be significant.

Commenter Name: W. Michael Scott, Vice President and General Counsel
Commenter Affiliation: CrownQuest Operating, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6703
Comment Excerpt Number: 44

Comment: Finally, the Methane NSPS is unnecessary because the oil and gas industry is already effectively addressing methane and VOC emissions through voluntary programs. For example, many industry members have entered into the voluntary Natural Gas STAR Methane Challenge Program, which includes recommendations to repair detected leaks. In fact, EPA's own estimates indicate that methane emissions from the oil and gas sector have been steadily decreasing for more than a decade. The oil and gas sector has reduced emissions by more than 20 million metric tons of CO2 equivalent since 1990, despite the tremendous increases in production that occurred during this same period. The industry is continuing to find innovative and cost-effective ways to reduce emissions, but EPA" s proposed regulations would stymie that innovation by forcing every business to comply with a one-size-fits-all approach. Instead of mandating a particular set of requirements, EPA should continue to monitor progress in the oil and gas sector to evaluate whether additional regulations are really necessary, and, if so, what form they should take.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 49.

Commenter Name: Bradley C. Cross, President/Partner
Commenter Affiliation: Big Star Oil & Gas, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6757
Comment Excerpt Number: 43

Comment: Finally, the Methane NSPS is unnecessary because the oil and gas industry is already effectively addressing methane and VOC emissions through voluntary programs. For example, many industry members have entered into the voluntary Natural Gas STAR Methane Challenge Program, which includes recommendations to repair detected leaks. In fact, EPA’s own estimates indicate that methane emissions from the oil and gas sector have been steadily decreasing for more than a decade. The oil and gas sector has reduced emissions by more than 20 million metric tons of CO2 equivalent since 1990, despite the tremendous increases in production that occurred during this same period. The industry is continuing to find innovative and cost-effective ways to reduce emissions, but EPA’s proposed regulations would stymie that innovation by forcing every business to comply with a one-size-fits-all approach. Instead of mandating a particular set of requirements, EPA should continue to monitor progress in the oil and gas sector to evaluate whether additional regulations are really necessary, and, if so, what form they should take.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 49.

Commenter Name: Glenn Prescott
Commenter Affiliation: RK Petroleum Corporation
Document Control Number: EPA-HQ-OAR-2010-0505-6788
Comment Excerpt Number: 44

Comment: Finally, the Methane NSPS is unnecessary because the oil and gas industry is already effectively addressing methane and VOC emissions through voluntary programs. For example, many industry members have entered into the voluntary Natural Gas STAR Methane Challenge Program, which includes recommendations to repair detected leaks. In fact, EPA's own estimates indicate that methane emissions from the oil and gas sector have been steadily decreasing for more than a decade. The oil and gas sector has reduced emissions by more than 20 million metric tons of CO2 equivalent since 1990, despite the tremendous increases in production that occurred during this same period. The industry is continuing to find innovative and cost-effective ways to reduce emissions, but EPA's proposed regulations would stymie that innovation by forcing every business to comply with a one-size-fits-all approach. Instead of mandating a particular set of requirements, EPA should continue to monitor progress in the oil and gas sector to evaluate whether additional regulations are really necessary, and, if so, what form they should take.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 49.

Commenter Name: W. Jeffrey Sparks
Commenter Affiliation: Discovery Operating, Inc
Document Control Number: EPA-HQ-OAR-2010-0505-6790
Comment Excerpt Number: 45

Comment: Finally, the Methane NSPS is unnecessary because the oil and gas industry is already effectively addressing methane and VOC emissions through voluntary programs. For example, many industry members have entered into the voluntary Natural Gas STAR Methane Challenge Program, which includes recommendations to repair detected leaks. In fact, EPA's own estimates indicate that methane emissions from the oil and gas sector have been steadily decreasing for more than a decade. The oil and gas sector has reduced emissions by more than 20 million metric tons of CO2 equivalent since 1990, despite the tremendous increases in production that occurred during this same period. The industry is continuing to find innovative and cost-effective ways to reduce emissions, but EPA's proposed regulations would stymie that innovation by forcing every business to comply with a one-size-fits-all approach. Instead of mandating a particular set of requirements, EPA should continue to monitor progress in the oil and gas sector to evaluate whether additional regulations are really necessary, and, if so, what form they should take.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 49.

Commenter Name: Rick D. Davis, Jr.
Commenter Affiliation: Midland Energy, Inc. and Petroplex Energy, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6801
Comment Excerpt Number: 44

Comment: Finally, the Methane NSPS is unnecessary because the oil and gas industry is already effectively addressing methane and VOC emissions through voluntary programs. For example, many industry members have entered into the voluntary Natural Gas STAR Methane Challenge Program, which includes recommendations to repair detected leaks. In fact, EPA's own estimates indicate that methane emissions from the oil and gas sector have been steadily decreasing for more than a decade. The oil and gas sector has reduced emissions by more than 20 million metric tons of CO2 equivalent since 1990, despite the tremendous increases in production that occurred during this same period. The industry is continuing to find innovative and cost effective ways to reduce emissions, but EPA's proposed regulations would stymie that innovation by forcing every business to comply with a one-size-fits-all approach. Instead of mandating a particular set of requirements, EPA should continue to monitor progress in the oil and gas sector to evaluate whether additional regulations are really necessary, and, if so, what form they should take.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 49.

Commenter Name: Rodney Sartor
Commenter Affiliation: Enterprise Products Partners L.P.
Document Control Number: EPA-HQ-OAR-2010-0505-6807
Comment Excerpt Number: 5

Comment: In addition, the industry has already taken a number of steps to reduce methane emissions, including through voluntary programs. In fact, EPA's own estimates indicate that methane emissions from the oil and gas sector have been steadily decreasing for more than a decade. The oil and gas sector has reduced emissions by more than 20 million metric tons of CO2 equivalent since 1990, despite the tremendous increases in production that occurred during this same period. Industry groups are actively developing "best practices" and programs designed to further reduce emissions. EPA's proposed regulations would stymie that innovation by forcing every business to comply with a one-size-fits-all approach. Instead of mandating a particular set of requirements, EPA should continue to monitor progress in the oil and gas sector to evaluate whether these issues truly need to be addressed through mandatory, bureaucratic programs. By allowing the industry to find innovative and cost-effective methods of addressing these problems, EPA could save both the companies and the taxpayers from the burden of an oversight program that has no environmentally meaningful impact.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 49.

Commenter Name: Ben Shepperd
Commenter Affiliation: Permian Basin Petroleum Association
Document Control Number: EPA-HQ-OAR-2010-0505-6849
Comment Excerpt Number: 95

Comment: Finally, the Methane NSPS is unnecessary because the oil and gas industry is already effectively addressing methane and VOC emissions through voluntary programs. For example, many industry members have entered into the voluntary Natural Gas STAR Methane Challenge Program, which includes recommendations to repair detected leaks. In fact, EPA's own estimates indicate that methane emissions from the oil and gas sector have been steadily decreasing for more than a decade. The oil and gas sector has reduced emissions by more than 20 million metric tons of CO_2 equivalent since 1990, despite the tremendous increases in production that occurred during this same period. The industry is continuing to find innovative and cost-effective ways to reduce emissions, but EPA's proposed regulations would stymie that innovation by forcing every business to comply with a one-size-fits-all approach. Instead of mandating a particular set of requirements, EPA should continue to monitor progress in the oil and gas sector to evaluate whether additional regulations are really necessary, and, if so, what form they should take.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 49.

Commenter Name: Will Whisenant, Safety and Security Operations Coordinator
Commenter Affiliation: Virginia Oil and Gas Association (VOGA)
Document Control Number: EPA-HQ-OAR-2010-0505-7047
Comment Excerpt Number: 16

Comment: These proposed regulations are unnecessary. Without government intervention the Gas and Oil sector has reduced methane emissions 16 percent since 1990, which includes the initial boom of the shale gases nationwide.

The natural gas industry should be credited with the capture and storage of methane, as described methane is 25 times greater threat to global warming – therefore it makes since to incentivize the burning of the gas.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 49.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:10 AM - 8:00 PM; Public Hearing #1 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 39

Comment: Third, according to EPA's own data, natural gas producers have reduced methane emissions by 35 percent since 2007 even as the production of natural gas has increased by more than 20 percent over the same period. EPA data also shows methane emissions from fracking have fallen 73 percent from 2011 to 2013, which is significant because over one-half of all natural gas produced in the United States is the result of hydraulic fracturing or fracking.

In fact, the enormous new supplies of clean-burning natural gas as unlocked by fracking have helped the energy-generating sector replace older coal-fired plants reducing carbon dioxide emissions to their lowest level in 20 years since natural gas emits about half the carbon of coal on the average.

The UN Intergovernmental Panel on Climate Change has also credited fracking with reducing emissions in the United States which has led the world in reducing CO2 in recent years. Simultaneously, technological innovation and enhanced regulations by the Texas Commission on Environmental Quality have allowed more produced gas to be captured reducing emissions in methane in one of the most heavily drilled parts of the Barnett Shale here in North Texas. Oil and gas producers have reduced methane emissions by 37 percent since 2011.

Instead of allowing these accomplishments to continue, the EPA has apparently decided to arbitrarily insert itself by unleashing a trifecta of unnecessary and costly regulations driving up the cost of energy and slowing new job creation. These include not only new mandates on methane emissions but also for ozone and carbon dioxide.

The primary reason why methane emissions are falling is because it is in the economic interest of the oil and natural gas industry to capture as much methane, the primary component of natural gas, as possible. The EPA baselessly claims that methane emissions will rise over the next decade even though the current trajectory is downward.

Response: With respect to the comment on historical trends in methane emissions from the oil and natural gas sector, see response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 49.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:10 AM - 8:00 PM; Public Hearing #1 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 52

Comment: My first point, our industry has voluntarily led the way in its pursuit of improved operations to safely maximize the recovery and capture of these valuable oil and gas resources. We're incentivized to do that, and many of these leading technologies have been broadly used by industry and were subsequently incorporated by EPA into its Natural Gas STAR Program.

My second point, even as U.S. oil and natural gas production has surged, methane emissions have declined significantly. For example, methane emissions from hydraulically fractured gas wells have fallen 79 percent since 2005, and total methane emissions from natural gas systems are down 11 percent over the same period. These reductions have occurred during a time when total U.S. gas production has increased 44 percent. This industry has also played a significant role in the 27-year lows in power sector CO2 emissions we see today. These trends are indicative of what our industry, when given the freedom to innovate, can achieve to improve the environment and our nation's energy security. What our industry has and will continue to achieve on the current regulatory system without directly regulating methane, dwarfs the emission reductions the EPA has estimated in these proposed rules.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 49. It is also worth noting that emissions from hydraulically fractured gas wells declined, in part, in response to the 2012 NSPS; reductions from this source are not fully attributable to voluntary actions.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:00 AM - 7:55 PM; Public Hearing #1 - Denver, Colorado
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7337
Comment Excerpt Number: 107

Comment: Primarily as a result of voluntary practices, the natural gas industry has dramatically decreased methane emissions while increasing production to the point now that we are able to export natural gas to other parts of the world. Technologies employed to date by our industry have reduced methane emissions from hydraulically fractured natural gas wells by almost 78 percent while natural gas production has increased by 38 percent.

Anadarko, alone, in the DJ Basin, has reduced volatile organic compound emissions by 98 percent from 2013 to 2014, while increasing our production by 10 million barrels over the year, all through voluntary efforts.

These constructive and collaborative efforts are reducing emissions and ensuring natural gas remains abundant and affordable and continues to be the most reliable and salable option allowing for U.S. carbon reduction targets.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 49.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:00 AM - 7:55 PM; Public Hearing #1 - Denver, Colorado
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7337
Comment Excerpt Number: 178

Comment: My second point: Even as U.S. oil and natural gas production has surged, methane emissions have declined significantly. For example, methane emissions from hydraulically fractured natural gas wells have fallen nearly 79 percent since 2005, and total methane emissions from natural gas systems are down 11 percent over the same period. These reductions have occurred during a time when total U.S. gas production has increased 44 percent. This industry has also played a significant role in the 27-year lows in power sector CO2 emissions we see today.

These trends are indicative of what our industry, when given the freedom to innovate, can achieve to improve the environment and our nation's energy security. What our industry has and will continue to achieve under the current regulatory system, without directly regulating methane, dwarfs the emission reductions EPA has estimated in these proposed rules.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 49.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:00 AM - 7:55 PM; Public Hearing #1 - Denver, Colorado
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7337
Comment Excerpt Number: 44

Comment: And interestingly enough, of the 475 oil and gas producers in New Mexico, fewer than ten have joined the EPA's voluntary methane reduction program. The voluntary program is not working. These need to be required rules.

Response: The EPA agrees with the commenter that regulations are needed to reduce emissions from the oil and gas sector. The final NSPS will reduce emissions from the oil and natural gas sector and the health, welfare, and environmental benefits of this action will be significant.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Tuesday, September 29, 2015; 9:05 AM - 8:00 PM; Public Hearing #1 - Pittsburgh, Pennsylvania
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7338
Comment Excerpt Number: 17

Comment: We have the technology to reduce this pollution by capturing methane that is released by oil and industry drilling. Drilling companies can benefit by being able to use or sell the captured methane if they comply with voluntary methane control standards. But voluntary compliance is not working in Pennsylvania. Of over 450 natural gas producers in the state, only ten percent end up doing the EPA's voluntary Natural Gas STAR Program.

The EPA has done a cost-benefit analysis of the effects of methane on public health and the environment. I urge the EPA to include all benefits to the drilling companies in this analysis, including the sale and use of captured methane.

Response: The EPA agrees with the commenter. Section 3.4.4 of the RIA for the final NSPS presents estimates of the revenues from product recovery predicted to result from emissions reductions. The EPA also agrees that the final NSPS, once implemented, will achieve significant health, welfare, and environmental benefits.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Tuesday, September 29, 2015; 9:00 AM - 11:55 AM; Public Hearing #2 - Pittsburgh, Pennsylvania
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7338
Comment Excerpt Number: 69

Comment: While the EPA did introduce voluntary guidelines for distribution policies, pipelines, the pipes carrying gas to customers at the city and community level, and their Natural Gas STAR Challenge to industry, voluntarily measures are not enough to fix the leaking pipes underneath our cities in a reasonable timeframe. Strong national methane standards are a win for our economy and our environment.

Response: The EPA agrees with the commenter that regulations are needed to reduce emissions from the oil and gas sector. The final NSPS will reduce emissions from the oil and natural gas sector, and the health, welfare, and environmental benefits of this action will be significant.

Commenter Name: Don Anderson, Director of Environmental
Commenter Affiliation: MarkWest Energy Partners, L.P.
Document Control Number: EPA-HQ-OAR-2010-0505-6957
Comment Excerpt Number: 6

Comment: Growth in production does not mean growth in emissions

Underlying these growth projections is a fundamental, yet incorrect, assumption by EPA that growth in production in this industry equates to a growth in methane or CO2- equivalent emissions. *See, e.g.,* 80 *Fed. Reg.* at 56,599 ("These emissions are expected to increase as a result of the rapid growth of this industry.") As we have noted elsewhere, technological and operational improvements in this sector continue to advance at remarkable rates and the emissions profile for new and modified facilities is declining and will only continue to do so, particularly as some operators move towards centralized gathering systems and tankless or pressurized tank facilities. For example, in Colorado, recent emissions inventories for the oil and gas sector demonstrate significant decreases *(i.e.,* more than 60% through 2017) in VOCs emitted even during significant growth in production. *See* Overview of 2011 and 2017 VOC and NOx Emission Inventories, Colorado Regional Air Quality Council, at 7 (November 19, 2015). These decreases are due to advances in technology, facility design, better emissions controls, and the inherent incentive to capture and sell as much methane as possible.

New facilities in combination with growing infrastructure and voluntary and state-led emission control efforts are already resulting in decreases in sector emissions. And unlike virtually any other industrial sector, production in upstream E&P sources *(i.e.,* well production facilities), declines unavoidably over time, bringing with it declining emissions (of both VOCs and methane). The rule appears to ignore these fundamental realities. Until these contradictions and errors are acknowledged and corrected, any decision to regulate in the face of such overwhelming data will be unsupported on this record, arbitrary and capricious, and therefore unlawful.

Response: Commenter states that the EPA analysis is improperly based on projected growth in production. The EPA disagrees. The impacts analysis in the RIA is based on estimates of new affected facilities, which are not based on production projections. New oil well completions and well sites are based on projections of drilling activity, and other affected sources are estimated based on year-to-year changes in historical activity counts. See the national impacts volume of the TSD for additional description of the approach for estimating affected sources.

Commenter Name: Mike Gibbons, Vice President – Production
Commenter Affiliation: CountryMark Energy Resources, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6241
Comment Excerpt Number: 18

Comment: Reviewing the data table provided in the proposed regulation (Table 2 below, Page 79) shows that the Oil and Natural Gas Production and Transmission sector accounts for 22%-23% (1990 data: (170.0/745.5) x 100% = 23%) of the emissions in any of the given years, not 29% of the emissions. Using EPA's data from Table 2 shows that Enteric Fermentation is the largest emitter of Methane Emissions (164.5 MMT CO2 in 2013), not the Oil and Natural Gas Production and Transmission sector (148.3 MMT CO2 in 2013).

Table 2-U.S. Methane Emissions by Sector (Million Metric Ton Carbon Dioxide Equivalent (MMT CO2 Eq.))

Sector	1990	2005	2013
Oil and Natural Gas Production, and Natural Gas Processing and Transmission	170.0	163.5	148.3
Enteric Fermentation	164.2	168.9	164.5
Landfills	186.2	165.5	114.6
Coal Mining	96.5	64.1	64.6
Manure Management	37.2	56.3	61.4
Other Methane Sources	91.4	89.5	82.9
Total Methane Emissions	745.5	707.8	636.3

Emissions from the U.S. GHG Inventory, calculated using GWP of 25.

Using EPA's data, the oil and gas sector has reduced emissions by more than a half percent per year ((170.0-148.3) / 23 years = 0.56%/year). Long term averages suggest that the industry will exceed the savings that this regulation is proposing between 2016 and 2020 (0.56%/year x 4 years = 2.25%), without implementation of a significant burden on our industry.

EIA data presented in Figure 1 shows that oil production is approximately the same in 1990 and 2013, and emissions have been reduced by 13% over the same time period ((1–148.3/170.0) x 100% = 13%). We do not agree with the assessment that emissions will continue to increase when EIA and EPA data shows that emissions have decreased as this segment has experienced rapid expansion.

Figure 1. US Oil Production 1990-2014

Furthermore, the Oil and Natural Gas Production and Transmission, Coal Mining, and the Landfill sectors have demonstrated the ability to reduce emissions over the given time period (1990 to 2013), as opposed to other emissions sectors. The Oil and Natural Gas Production and Transmission sector has reduced emissions by 13% over the 23 year period, Coal mining by

33%, and the Landfill sector by more than 38% over the same time period. Enteric Fermentation emissions have not changed and Manure Management emissions have increased by 65% over the same time period.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 49.

Commenter Name: Howard J Feldman
Commenter Affiliation: American Petroleum Institute
Document Control Number: EPA-HQ-OAR-2010-0505-6884
Comment Excerpt Number: 166

Comment: ***Oil Well Completion Emission Reduction Estimate***

Overestimate of Oil Well Completion Baseline Emissions and Emission Reductions

EPA's estimates of the baseline emissions and emission reductions from hydraulically fractured and refractured oil well controls are overstated. EPA incorrectly assumes that all hydraulically fractured oil well completions and recompletions are not controlled, except in Wyoming and Colorado. This assumption is not correct as many companies already use REC and/or combustion devices to control the flowback emissions from oil well completions. Therefore, EPA's baseline emissions are overstated and the resulting emission reductions achievable are also overstated.

Corrected Estimate for Oil Well Completions

ERM used the following corrections to estimate a revised net benefits estimate from oil well completions:

- Assumed 25 percent of developmental oil wells are already controlled. Note that the estimated controlled hydraulic fracturing at oil well sites is based on industry experience and is above and beyond the state control requirements.;
- Cost of combustion device for oil well completions estimated at $10,000.

Table 2-4 compares the benefits and costs estimated by EPA and the corrected values.

[Estimates for Hydraulic Fracturing – Development; Reduced CH4 Emissions (Mt) EPA Estimate of 117,934 and ERM estimate of 122,908, and Annualized 2025 Cost ($M) EPA estimate of $120 and ERM estimate of $208. Estimates for Hydraulic Fracturing – Exploration; Reduced CH4 Emissions (Mt) EPA Estimate of 9,979 and ERM estimate of 10,284, and Annualized 2025 Cost ($M) EPA estimate of $4 and ERM estimate of $12.]

Response: Commenter suggested an assumption that 25 percent of development oil wells are already controlled, but has not provided data to support this assumption. The EPA acknowledges that some oil well completions are already subject to control, but does not have data on this

control beyond Wyoming, Colorado, and North Dakota. With response to the cost of combustion for oil well completions, see response to DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 65 in Chapter 3 of this document.

12.4 Health Impacts of Ozone

Commenter Name: Emily E. Krafjack
Commenter Affiliation: Connection for Oil, Gas and Environment in the Northern Tier, Inc., (C.O.G.E.N.T)
Document Control Number: EPA-HQ-OAR-2010-0505-6787
Comment Excerpt Number: 57

Comment: The potential of not only health impacts of ozone generated by potent methane but also those related to harmful VOCs need to be included in future regulatory analysis. It is also necessary to include the consideration of health impacts of those who live within the immediate environs of well sites and compressor stations as compared to the community at large living and attending school at greater distances than less than 2,500 and 1,000 feet away. In other words, risk consideration needs to be determined at radius' 1,000 feet, 2,500 feet, 1 mile, and 3 miles.

Response: The EPA agrees that the monetized benefits in the RIA are underestimated because they do not include several categories of benefits, including the benefits from reducing emissions of VOCs (a precursor to formation of ozone and $PM_{2.5}$). As stated in the RIA, we expect that the avoided emissions will result in improvements in ambient air quality and reductions in health effects associated with exposure to HAP, ozone, and fine particulate matter ($PM_{2.5}$), but we have determined that quantification of those benefits cannot be accomplished for this rule. This is not to imply that there are no health benefits anticipated from the proposed rule; rather, it is a reflection of the difficulties in modeling the direct and indirect impacts of the reductions in emissions for this industrial sector with the data currently available.

Commenter Name: Theresa Pugh
Commenter Affiliation: Interstate Natural Gas Association of America (INGAA)
Document Control Number: EPA-HQ-OAR-2010-0505-6872
Comment Excerpt Number: 34

Comment: EPA Requests Comment on Whether Ozone Health Impacts from Methane Should Be Considered. INGAA Does Not Support Including this Analysis since Methane Is Not Defined as a VOC.

EPA requests comments on whether ozone health impacts should be considered. Several documents are listed in the docket (e.g., related studies), but those documents are not readily available due to copyright or other issues. The implication is that methane is a reactive hydrocarbon that significantly contributes to ozone atmospheric chemistry – i.e., methane is a volatile organic compound. Federal regulations include a clear definition of the hydrocarbon species that are considered VOCs. Methane is not considered a VOC. Thus, EPA should not embark on environmental analysis that contradicts long-established EPA definitions. Ozone impacts should not be included in the cost-benefit analysis. (See INGAA's Social Cost of Methane).

Response: Several commenters have objected to the inclusion of the ozone health impacts resulting from methane emissions. The two arguments commenters made are that relevant documents listed in the docket were not readily available due to copyright issues, and that methane does not contribute to ozone atmospheric chemistry because it is not a volatile organic carbon (VOC) as defined by federal regulations. Neither argument is correct.

First, the EPA cites four references in the preamble which discuss the fact that methane emissions lead to increases in tropospheric ozone formation. Of these references, two are publically available: the EPA *Integrated Science Assessment for Ozone and Related Photochemical Oxidants* (http://www.epa.gov/isa) and the IPCC 5th Assessment Report (www.ipcc.ch). These two references provide sufficient evidence that methane leads to increases in ozone formation. Moreover, the preamble references the RIA, which cites a number of additional references. Several of these references, in turn, are publically available. Importantly, the EPA specifically requested comment on the approach to estimating the ozone related mortality benefits of reductions provided by Sarofim et al. (2015), and Sarofim et al. (2015) is an open access article (http://link.springer.com/article/10.1007%2Fs10640-015-9937-6).

Second, the EPA is not arguing that methane should qualify as a VOC as defined by federal regulations. The low photochemical reactivity of compounds excluded from the VOC definition means that these compounds do not contribute greatly to local air pollution. However, this does not mean that compounds such as methane do not contribute to larger-scale air pollution, either through photochemical reactions in the atmosphere or through climate change. The fact that methane is defined not to be a VOC for the purposes of a given regulation does not change methane's actual atmospheric reactivity. The ISA and many other sources demonstrate that there is a clear scientific consensus that methane emissions do contribute to increased ozone concentrations (e.g., "It should also be noted that methane is an important contributor to NA background O3, accounting for slightly less than half of the increase in background since the preindustrial era and whose relative contribution is projected to grow in the future", ISA, pg. 2-6). And given that no regulation specifically directs the EPA to ignore the impact of methane on ozone, there is no regulatory barrier to the EPA including the health effects of methane-derived ozone in its benefits analysis.

However, because there are unresolved questions regarding several methodological choices necessary for an analysis of the impacts of methane-derived ozone, the EPA is not including a quantitative analysis of this effect in this rule.

Commenter Name: C. Wyman
Commenter Affiliation: American Gas Association
Document Control Number: EPA-HQ-OAR-2010-0505-6874
Comment Excerpt Number: 25

Comment: Consideration Of Health Impacts Of Ozone Generated By Methane Is Not Warranted. Although EPA suggests that methane is a precursor to ozone, AGA does not believe that the inclusion of health impacts of ozone generated by methane is warranted in future

regulatory analysis. As an initial matter, AGA notes that related documents listed in the docket are not available for download (e.g., due to copyright). However, EPA's proposal implies that methane significantly contributes to ozone atmospheric photochemistry – i.e., that methane allegedly is a volatile organic compound. This is not the case. EPA has clearly defined hydrocarbon species that are considered VOCs in 40 C.F.R. § 51.100(s) and methane is not listed. As a result, EPA should not undertake analysis that would contradict this long-established EPA definition. Ozone-related analysis is not warranted.

Response: The EPA disagrees with the commenter that methane does not contribute to ozone atmospheric photochemistry - see the response to DCN EPA-HQ-OAR-2010-0505-6872, Excerpt 34.

Commenter Name: Pamela Lacey, Chief Regulatory Counsel
Commenter Affiliation: American Gas Association (AGA)
Document Control Number: EPA-HQ-OAR-2010-0505-6936
Comment Excerpt Number: 21

Comment: Consideration Of Health Impacts Of Ozone Generated By Methane Is Not Warranted.

Although EPA suggests that methane is a precursor to ozone, AGA does not believe that the inclusion of health impacts of ozone generated by methane is warranted in future regulatory analysis. As an initial matter, AGA notes that related documents listed in the docket are not available for download (e.g., due to copyright). However, EPA's proposal implies that methane significantly contributes to ozone atmospheric photochemistry – i.e., that methane allegedly is a volatile organic compound. This is not the case. EPA has clearly defined hydrocarbon species that are considered VOCs in 40 C.F.R. § 51.100(s) and methane is not listed. As a result, EPA should not undertake analysis that would contradict this long-established EPA definition. Ozone-related analysis is not warranted.

Response: The EPA disagrees with the commenter that methane does not contribute to ozone atmospheric photochemistry - see the response to DCN EPA-HQ-OAR-2010-0505-6872, Excerpt 34.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:10 AM - 8:00 PM; Public Hearing #1 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 202

Comment: Large gas clouds have been documented escaping from these. These rules will provide substantial public health benefit which should be included in the cost benefit analysis. They will significantly reduce emissions of a major contributor to greenhouse gases and climate change.

Response: The EPA agrees that the avoided emissions will result in improvements in ambient air quality and reductions in health effects associated with exposure to HAP, ozone, and fine particulate matter ($PM_{2.5}$), but we have determined that quantification of those benefits cannot be accomplished for this rule. This is not to imply that there are no health benefits anticipated from the proposed rule; rather, it is a reflection of the difficulties in modeling the direct and indirect impacts of the reductions in emissions for this industrial sector with the data currently available.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:00 AM - 2:40 PM; Public Hearing #2 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 59

Comment: I know that I was playing with my nephew when he was a child and looked out of his window. He'd showed me a big, like, flare-off from a gas well. And at the time, he thought it was cool as a little boy. He's like, Oh, like an action movie. But little did he realize that that flare-off is why he had asthmatic problems and had to borrow, like, my grandmother's asthmatic machine to breathe.

And there's lots of stories like this all across North Texas. As a community organizer, I talk to people with a drill site 300 feet from their doorstep, one family in particular where a woman had five children, and all five of them had skin or breathing issues.

Now, that is far enough for a small child to run to and back in the time that it takes me to talk to you about this issue, except maybe not because they can't breathe in their own communities.

Response: The EPA recognizes the commenter's support of reducing emissions from the oil and gas sector. The final NSPS will reduce emissions from the oil and natural gas sector, and, once implemented, the health, welfare, and environmental benefits of this action will be significant.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:00 AM - 2:40 PM; Public Hearing #2 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 67

Comment: During the summertime, we can't take her outside because of the pollution in the air. She's had to be taken to the hospital three or four times for asthma attacks before she was three years of age. We know that African-American children suffer more from asthma and breathing problems than anyone else.

As I said, I'm not a scientist. I don't have all the EPA studies. But I do have a grandchild who I want to be able to secure a clear future for.

It's also noted that African-Americans who live in poverty-stricken areas who live near plants, highways, places near high emission of methane and things in the air is not good. We suffer from more of those things.

Response: The EPA recognizes the commenter's support of reducing emissions from the oil and gas sector. The final NSPS will reduce emissions from the oil and natural gas sector, and, once implemented, the health, welfare, and environmental benefits of this action will be significant.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:00 AM - 2:40 PM; Public Hearing #2 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 76

Comment: I have very mild asthma. But I can attest that on ozone alert days, I can feel the effects of the added pollution. And this past summer I did have to forego many daily walks in order to -- because of the air quality.

Response: The EPA recognizes the commenter's support of reducing emissions from the oil and gas sector. The final NSPS will reduce emissions from the oil and natural gas sector, and, once implemented, the health, welfare, and environmental benefits of this action will be significant.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:00 AM - 7:55 PM; Public Hearing #1 - Denver, Colorado
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7337
Comment Excerpt Number: 204

Comment: Also, in the final rule, EPA should fully represent and monetize the societal benefits in health cost savings from reduced methane pollution. These benefits are an important underpinning of the rule, and they need to be represented. The industry savings as well are a societal benefit, from conserved methane, and they need to be quantified in the final rule.

Response: The EPA agrees that the monetized benefits in the RIA are underestimated because they do not include several categories of benefits. For example, reducing methane emissions can reduce global background ozone concentrations, human exposure to ozone, and the incidence of ozone-related health effects (West et al., 2006, Anenberg et al., 2009, Sarofim et al. 2015), but these benefits are not included in the main benefit cost analysis. See RIA Section 4.3 for discussion. In addition, the response to DCN EPA-HQ-OAR-2010-0505-7338, Excerpt 38 discusses the non-monetized benefits from reducing emissions of HAPs and VOCs (a precursor to formation of ozone and PM2.5) expected from this rulemaking. The EPA's monetized estimates of climate benefits from methane reductions anticipated from the final rule can be found in Section 4.3 of the RIA. Also, Section 3.4.4 of the RIA for the final NSPS presents estimates of the revenues from product recovery predicted to result from emissions reductions.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Tuesday, September 29, 2015; 9:05 AM - 8:00 PM; Public Hearing #1 - Pittsburgh, Pennsylvania
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7338
Comment Excerpt Number: 38

Comment: In addition to threatening our climate, the public health threat posed by these emissions is staggering. For this reason, we also call on EPA to revise its cost-benefit analysis and include, in this revision, metrics that will monetize the public health benefit the standard will generate by reducing all of the volatile organic compounds, and thus smog and soot as well as hazardous air pollutants. Without this adjustment, the benefits of implementing the rule will remain understated and the cost-benefit analysis will be an inadequate assessment.

Public health benefits are not simply qualitative or experiential but have a quantifiable financial benefit that must be documented.

Response: The EPA agrees that the monetized benefits in the RIA are underestimated because they do not include several categories of benefits, including the benefits from reducing emissions of HAPs and VOCs (a precursor to formation of ozone and PM2.5). As stated in the RIA, we

expect that the avoided emissions will result in improvements in ambient air quality and reductions in health effects associated with exposure to HAP, ozone, and fine particulate matter (PM2.5), but we have determined that quantification of those benefits cannot be accomplished for this rule. This is not to imply that there are no health benefits anticipated from the proposed rule; rather, it is a reflection of the difficulties in modeling the direct and indirect impacts of the reductions in emissions for this industrial sector with the data currently available.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Tuesday, September 29, 2015; 9:05 AM - 8:00 PM; Public Hearing #1 - Pittsburgh, Pennsylvania
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7338
Comment Excerpt Number: 163

Comment: We also ask that you quantify and monetize the public health benefits of reducing emissions of VOCs and hazardous air pollutants. Without these metrics included, benefits of the rule are understated giving industry the excuses it seems to claim that they are too costly.

Response: See response to DCN EPA-HQ-OAR-2010-0505-7338, Excerpt 38.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Tuesday, September 29, 2015; 9:00 AM - 11:55 AM; Public Hearing #2 - Pittsburgh, Pennsylvania
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7338
Comment Excerpt Number: 26

Comment: And we'd like to encourage the EPA to quantify and monetize the public health benefits the methane standards will generate by also reducing emissions of volatile organic compounds, which form smog and soot and other hazardous air pollutants. Leaving these metrics out of the cost benefit analysis leaves some of the benefits of these important rules on the table.

Response: See response to DCN EPA-HQ-OAR-2010-0505-7338, Excerpt 38.

Commenter Name: Rachel Cleetus, Ph.D. Senior Climate Economist
Commenter Affiliation: Union of Concerned Scientists, et al. on behalf of Environmental Defense Fund (EDF), Institute for Policy Integrity at New York University School of Law, Natural Resources Defense Council, and Union of Concerned Scientists
Document Control Number: EPA-HQ-OAR-2010-0505-6945
Comment Excerpt Number: 10

Comment: Support for the Social Cost of Methane methodology, and recommendations on continued improvements.

EPA anticipates that its oil and gas standards will reduce significant amounts of methane. On the other hand, the regulation will slightly accelerate the production of some carbon dioxide, as methane is flared and immediately releases carbon dioxide, versus a more gradual oxidation into carbon dioxide of methane otherwise un-flared and emitted.98 EPA proposes directly estimating the Social Cost of Methane using an analysis conducted by Marten *et al.*, which is based on the same techniques the Interagency Working Group developed to estimate the SCC.99 The Marten *et al.* Social Cost of Methane methodology is well supported, and in the final emissions standards, EPA should monetize the benefits of methane reductions, to reflect the true benefits of the standards and to enhance the rigor and defensibility of the final rule.100 EPA also calls for comments on whether it should apply SCC estimates to measure the small disbenefit from the accelerate release of carbon dioxide; it should.

Response: The EPA acknowledges the support of the commenter and has used the Marten et al. SC-CH_4 estimates to monetize the climate-related methane impacts of this rulemaking in the final RIA. With respect to the comment on accounting for the earlier release of CO_2 due to combusting methane and VOC emissions from oil and gas sites, the EPA recognizes there are challenges and uncertainties related to estimation of these secondary emissions impacts for this rulemaking. See Section 4.7 of the final RIA for this discussion. As discussed in that section, the EPA notes that the agency will continue to study this issue and assess the complexities involved in estimating the net emissions effects associated with secondary fossil-based emissions, including differences in the timing of contributions to atmospheric CO_2 concentrations. Given these challenges and that the EPA has not yet received appropriate input and review on some aspects of these calculations, the EPA is not including monetized estimates of the impacts of small changes in the timing of atmospheric CO_2 concentration increases in the final benefits estimates in this RIA. The EPA will continue to follow the scientific literature on this topic and update its methodologies as warranted.

12.5 Cost Effectiveness Calculations for Multipollutant Controls

Commenter Name: Howard J Feldman
Commenter Affiliation: American Petroleum Institute
Document Control Number: EPA-HQ-OAR-2010-0505-6884
Comment Excerpt Number: 16

Comment: Multipollutant Cost Effectiveness Approach is Not Appropriate

Issue – In justifying the proposed requirements, EPA utilized a multipollutant approach to determine if costs were reasonable. EPA's reliance on the multipollutant methodology is arbitrary and capricious because it is inconsistent with EPA's own "rational basis" test for determining whether regulation of an additional pollutant from a source category is appropriate. As EPA clearly states, under its "rational basis" test, the Agency must have a rational basis for regulating *each* "pollutant." *See* 80 Fed. Reg. at 56601. EPA's multipollutant approach is inconsistent with that test because it allows the Agency to find that regulation of multiple "pollutants" is reasonable where regulation of each pollutant individually would not be. *See id.* at 56636.

Recommendation – EPA must re-evaluate and only assess the reasonableness of costs based on each pollutant.

EPA'S COST METHODOLOGY IS INCONSISTENT WITH ITS OWN "RATIONAL BASIS" TEST AND IS THEREFORE ARBITRARY AND CAPRICIOUS.

For some sources in the proposal, EPA finds that "cost-effective controls that can simultaneously reduce both methane and VOC emissions from . . . equipment . . . would *not occur* were we to focus solely on VOC reductions." 80 Fed. Reg. at 56599 (emphasis added). This methodological cost justification for regulating methane is inconsistent with EPA's own test for regulating an additional pollutant from a source category and is thus arbitrary and capricious.

In the proposal, EPA uses two different methodologies for assessing whether costs are reasonable. *Id.* at 56617. Under EPA's single pollutant approach, all of the costs are attributed to only one pollutant (i.e., methane or VOC) because the same controls are used for VOC and methane. *Id.* Under the second approach—known as the "multipollutant cost-effectiveness" approach—the annualized costs are apportioned based on the relative reduction of each pollutant by a control. *Id.* If application of either the individual pollutant approach or the multipollutant cost-effectiveness approach results in a determination that regulation imposes reasonable costs, EPA concludes that control is cost-justified. For at least certain sources, EPA justifies controls based on the multipollutant approach alone, as the costs evaluated under the single pollutant approach would not be reasonable.

EPA's reliance on the multipollutant methodology is arbitrary and capricious because it is inconsistent with EPA's own "rational basis" test for determining whether regulation of an additional pollutant from a source category is appropriate. As EPA clearly states, under its "rational basis" test, the Agency must have a rational basis for regulating *each* "pollutant." *See*

80 Fed. Reg. at 56601. EPA's multipollutant approach is inconsistent with that test because it allows the Agency to find that regulation of multiple "pollutants" is reasonable where regulation of each pollutant individually would not be. *See id.* at 56636.

Response: In this rulemaking, pursuant to section 111(b), the EPA is establishing standards of performance for both GHG (in the form of limitations on methane) and VOC. "Standard of performance," as defined in section 111(a)(1), means:

> "a standard for emissions of air pollutants which reflects the degree of emission limitations achievable through the application of achievable through the application of the best system of emission reduction which (taking into the cost of achieving such reduction and any nonair quality health and environmental impact and energy requirements) the Administrator determines has been adequately demonstrate."

The above provision requires, in relevant part, that the EPA consider a number of factors, including cost, in determining the "best system of emission reduction" based on which the standards are to be set. As explained in both the proposal and this final rule preamble, the EPA has employed a number of approaches in evaluating the control costs in this rulemaking.

The commenter claims that one of the approaches - the multipollutant cost effectiveness approach- is per se unreasonable because it is inconsistent with the EPA's "rational basis" test. The commenter appears to interpret the so-called "rational basis" test as requiring a pollutant by pollutant analysis in developing standards, including evaluating control costs. For the reasons stated below, the commenter is incorrect in both its interpretation and application of the "rational basis" test.
By the "rational basis test," the commenter appears to be referring the EPA's interpretation of section 111(b)(1)(B) in determining what pollutants will be regulated with respect to a given source category. While section 111(b)(1)(A) requires that the EPA make certain findings when listing a source category, section 111(b)(1)(B) provides no criteria regarding what pollutants from a listed source category must be subject to standards. In the absence of any such criteria, and consistent with the general principle of administrative law that agencies provide a rationale for their actions, the EPA interprets section 111(b)(1)(B) to provide authority to set standards for an additional pollutant from a source category that was previously listed and regulated for other pollutants as long as there is a rational basis for regulating the additional pollutant. In other words, if the EPA decides to regulate an additional pollutant, the "rational basis" test simply means that the EPA needs to provide a rationale for such action. Nothing in section 111(b)(1)(B) or EPA's presentation of the rational basis for regulating a given pollutant states how standards are to be set, let alone requires evaluating control costs on a pollutant specific basis.

Further, the commenter's claim is unsupported by the definition of "standard of performance" in section 111(a)(1) provided above. Specifically, section 111(a)(1) defines the standard of performance to be "a standard of emissions of *air pollutants*," not pollutant; as such, it does not require that the EPA evaluate and set standards on a pollutant specific basis, as the commenter appears to suggest.

The commenter's claim is also unreasonable because it fails to recognize the simultaneity of the reductions achieved by the application of the multipollutant controls. In this rulemaking, the EPA is establishing standards of performance for both GHG (in the form of limitations on methane) and VOC, and there are available control options that can achieve simultaneous reduction of both. As the EPA explained in the proposal, the conventional methods of evaluating control cost for each pollutant separately would artificially inflate the cost of multi-pollutant controls.

For the reasons stated above, the EPA rejects the commenter's application of the "rational basis" test to the EPA's control cost analysis and its resulting claim that the multipollutant cost effectiveness approach is arbitrary and capricious.

Commenter Name: Darin Schroeder, David McCabe, Lesley Fleishman and Conrad Schneider
Commenter Affiliation: Clean Air Task Force et al.
Document Control Number: EPA-HQ-OAR-2010-0505-7062
Comment Excerpt Number: 23

Comment: EPA's Approach to Considering Costs is Reasonable

EPA has assessed cost as part of its BSER determination in several ways. The agency evaluated the cost-effectiveness of each available control technology under both a single pollutant approach and a multi-pollutant approach, considering a device cost-effective if it was cost-effective under either of the two approaches. The agency also evaluated industry wide costs as a percentage of capital expenditures. EPA has provided a reasonable explanation for its chosen approaches.

EPA's use of a single pollutant approach to considering costs is appropriately limited in the proposed rule. This approach, which allocates all costs to each individual pollutant, double-counts costs or ignores entirely the benefits of reducing one of the two pollutants. As EPA notes, the single pollutant approach "over-estimates the cost of obtaining emissions reductions with a multipollutant control as it does not recognize the simultaneity of the reductions achieved." 80 Fed. Reg. at 56,617. Moreover, courts have held that, when conducting a cost-benefit analysis for a multi-pollutant emission control measure, an agency cannot attach zero value to the reduction of one of the pollutants, where such reduction is difficult to quantify. *Ctr. for Biological Diversity v. NHTSA*, 538 F.3d 1172 (9th Cir. 2008). Similarly, the agency cannot attach the entire cost to the reduction of each individual pollutant, where it is difficult to assign cost among multiple pollutants. It must choose an approach that most closely recognizes the relative costs and benefits of reducing each pollutant. The single pollutant approach misses this mark.

In contrast, a multi-pollutant approach apportions the total cost of an emission control option among all of the pollutants reduced by that control option. Although there are several plausible ways in which such apportionment might be effectuated, EPA's proposed approach for this rulemaking - which apportions cost evenly to methane and VOCs based on the relative

percentage abatement of these two pollutants – is a sensible one. Multi-pollutant cost-effectiveness calculations better approximate the true costs of pollution reduction. Multi-pollutant cost sharing is particularly warranted where, as here, both pollutants, methane and VOC, are directly regulated under section 111. Recognizing this, EPA adopted both approaches, but opted to utilize the single pollutant approach only as a lower threshold test of the reasonableness of a control option – "if the cost is reasonable for reducing any of the targeted emissions alone, the cost of such control is clearly reasonable for the concurrent emission reduction of all the other pollutants because they are being reduced at no additional cost." 80 Fed. Reg. at 56,617. EPA has adopted a multi-pollutant approach in past rulemakings, *see, e.g.*, National Emission Standards for Hazardous Air Pollutants From the Portland Cement Manufacturing Industry and Standards of Performance for Portland Cement Plant, 75 Fed. Reg. 54,970; *see also* cost analysis in proposed rule, 74 Fed. Reg. 21,136 (May 6, 2009), and even issued a report in 2008 addressing the need for regulations to recognize shared emissions sources, and the multi-pollutant effects of control technologies.

Response: Comment is a supportive comment to which no response is required.

12.6 General Cost Impacts

Commenter Name: John Robitaille
Commenter Affiliation: Petroleum Association of Wyoming (PAW)
Document Control Number: EPA-HQ-OAR-2010-0505-6854
Comment Excerpt Number: 11

Comment: Cost Analysis: EPA's benefit and cost estimates are extremely uncertain and conflict with EPA's own guidelines. For example, EPA significantly underestimated the cost estimates for re-surveys and incorrectly underestimated the capital costs of routing the emissions to a control device.

EPA uses highly uncertain projections of the number of fractured and re-fractured oil well competitions, fugitive emissions, pneumatic pumps, compressors and pneumatic controllers that will be in place in 2020 and 2025. These projections will vary significantly based on oil and gas prices, technology development and changes in federal and state policies. The benefit and cost analysis is also based on uncertain estimates of the before and after-control emissions rates from various sources. EPA cannot rely on such uncertain, fluctuating estimates in making regulatory decisions.

Response: Regarding the EPA's cost estimates for re-surveys, see response to DCN EPA-HQ-OAR-2010-0505-7336, Excerpt 26 in Chapter 4 of this document. Regarding the costs for routing emissions to an existing control device, see response to DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 72 in Chapter 5 of this document. The EPA acknowledges that projections of future oil and gas industry activity contain uncertainties and that changes in activity would result in changes to the estimated impacts of the rule. The EPA disagrees that this uncertainty means that EPA cannot rely on the analysis. The RIA analysis relies on the most up-to-date long term projections available. In the final RIA, they reflect projections from the 2015 Annual Energy Outlook, which were updated from the 2014 Annual Energy Outlook which was used at proposal. The RIA includes a discussion of changes in expected industry activity since the 2015 AEO was released in section 3.4 of the RIA.

Commenter Name: Steven A. Buffone
Commenter Affiliation: CONSOL Energy Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6859
Comment Excerpt Number: 3

Comment: EPA has utilized an inflated price for gas to perform the economic analysis associated with the proposed rule. The use of $4.00 per thousand standard cubic foot (Mcf) does not reflect current or projected market trends. The average NYMEX price of natural gas in October of 2015 was $2.56/Mcf and dropped even lower in November 2015 reaching $1.92/Mcf according to the Henry Hub. This price does not account for additional costs related to regional price variability and gathering contracts that may reduce revenue even further. These variables must be taken into consideration when regulating methane for new and modified sources under

Section 111(d), as it is required after a New Source Review (NSR) pollutant has been established under 111(b). Not taking these variables into consideration leads EPA to overestimate the cost effectiveness of controls by using an incorrect valuation for the price of natural gas. This in turn could lead to the premature shutdown of marginal wells and, in some cases, prevent new wells from ever being drilled. EPA also overestimates the volume of methane that will be recovered and marketed based on the capture of fugitive gases as outlined in the proposed rule. The small volume of recovered methane anticipated from this proposed rule per facility will not likely be quantifiable and fall within the industry margin of error for calculating sales. This would mean that there may be no realized revenue generated as outlined in the proposed rule. EPA also underestimates the cost related to training and labor associated with new monitoring and record keeping. We request that EPA perform a new cost benefit analysis of controls and regulatory impact based on more realistic values for natural gas.

Response: The EPA disagrees with the commenter that the natural gas price used in the final rule is inflated, for more information please see response to DCN EPA-HQ-OAR-2010-0505-6847, Excerpt 3. Regarding the specific comment on what the EPA must consider in a section 111(d) rule, the present action is not a 111(d) rule and therefore the comment is considered out of scope. With respect to the commenter's assertion that the EPA overestimates the volume of methane that will be recovered, by implementing the emission reduction measures examined in the rulemaking, natural gas that otherwise would be emitted will be captured. The EPA believes this capture will be measurable. These estimate provided in the analysis supporting the rulemaking are our best estimates of natural gas capture under the rule. With respect to the commenter's assertion that the EPA underestimated record keeping and reporting costs, please see response to DCN EPA-HQ-OAR-2010-0505-6857, Excerpt 60 in Chapter 11 of this document.

Commenter Name: Michael Hollis
Commenter Affiliation: Diamondback E&P LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6869
Comment Excerpt Number: 7

Comment: EPA's cost benefit analysis is fundamentally flawed to the point that neither the agency nor the public can actually assess the impacts of the Methane NSPS.

EPA made a number of faulty assumptions in its calculations of the Methane NSPS's costs and benefits. First, EPA estimated the total costs to the oil and gas industry to implement the Methane NSPS. EPA then reduced those costs by the value of the natural gas that EPA estimates that operators will recover from repairing leaks and otherwise complying with the Methane NSPS. EPA asserted that operators would gain revenues of $4/thousand cubic feet (mcf) for this recovered gas. By using this recovered-gas-revenue figure, EPA was able to reduce its calculation of the total annual engineering costs of complying with the Methane NSPS by tens of millions of dollars, from a range of $180 to $200 million in 2020 and $370 to $500 million in 2025, down to $150 to $170 million in 2020 and $320 to $420 million in 2025.

By including these "cost savings," which the industry will never actually realize, EPA has skewed its cost analysis and prevented the public from understanding the actual costs associated with this rule. This problem is further exacerbated by the fact that EPA failed to consider the potentially costly equipment upgrades necessary to comply with this rule. As detailed in the discussion of atmospheric tanks, if the Methane NSPS or CTG require operators to replace their atmospheric tanks with pressurized tanks in order to meet fugitive emissions survey requirements, then the industry will eventually bear a far heavier financial burden. EPA has not considered these costs in its analysis, and must either reevaluate its cost analysis or clarify that the ordinary breathing from atmospheric tanks are not "fugitive emissions" under the Rules.

EPA's estimates on the cost of labor for compliance are also wholly unreasonable. The Methane NSPS is a highly complex and technical rule with a number of overlapping requirements. Upstream oil and gas operations frequently fall beneath the air emissions thresholds for permitting requirements. As a result, this portion of the industry has not historically been subject to similar federal air regulations, and their staff is largely unfamiliar with the monitoring, reporting, and recordkeeping requirements that accompany such rules. This means that these entities will have to expend far more resources either training their own personnel, or hiring personnel with expertise in federal air regulatory matters. This is particularly true for operators in states that already have overlapping state air regulations, as the businesses will need to understand and convey to personnel the differences between the two sets of requirements. For example, the Texas Railroad Commission places limits on the venting or flaring of gas, and Colorado, Wyoming, Ohio, and Pennsylvania have state regulations regarding natural gas emissions and leaks. Differentiating between the requirements from state and federal regimes-particularly when those requirements conflict or overlap-will take additional time and resources.

For most upstream companies, well sites are spread out over a large geographic area. This dispersion of activities across a large geographic area is significantly different from the physical set up of larger facilities, such as natural gas processing plants or refineries, where EPA has imposed these kinds of monitoring requirements in the past. Unlike those larger sites, which have full-time personnel dedicated to one particular facility, most E&P companies assign one employee to multiple small sites. Well sites simply do not have the concentration of activity (including activity that would give rise to air emissions) to justify dedicating a single air compliance employee to each well site. Instead, the air compliance employee will have to spend substantial amounts of time traveling in order to visit each site semi-annually or quarterly, and will then have to keep up with the continual recordkeeping and reporting requirements for each of these small sites. Some operators estimate that they will need to hire one full-time employee or contractor dedicated to implementing the requirements of the Methane NSPS for every 25 affected well sites operated. Given that there are almost 200,000 producing wells in Texas alone, this means the industry will eventually need to hire thousands of new employees merely to track and fix small equipment leaks.

According to EPA's analysis, "[t]he annual public reporting and recordkeeping burden for this collection of information is estimated to average 3.9 hours per response. Respondents must monitor all specified criteria at each affected facility and maintain these records for 5

years." Some operators estimate that the actual annual burden imposed by these Rules will be closer to 40-60 hours per affected well site, which will result in an additional cost of $3,500-$5,000 in labor per well site per year. Given that there are hundreds of thousands, if not more than a million, well sites around the nation, these reporting and recordkeeping requirements will eventually balloon into tremendous industry-wide compliance costs.

EPA is also relying on revenue estimates that no longer reflect the reality of the oil and gas market. For oil prices, EPA "estimated revenues using two alternative prices, $70/bbl and $50/bbl. In the results, EPA refers to the case using $70/bbl the 'primary scenario' and the case using the $50/bbl as the 'low oil price scenario." In contrast to EPA's estimates, the U.S. Energy Information Administration ("EIA") expects the price of Brent Crude Oil to average $53.96 for the year and the West Texas Intermediate spot average is expected to be $53.57 for the year. Prices have fallen below EPA's "low oil price scenario" of $50/bbl, and many industry experts predict that this trend will continue. For example, Brent crude prices remained below $50/bbl for 20 consecutive days in September 2015, and the West Texas Intermediate price fell to $44.74/bbl on October 1, 2015. Goldman Sachs has forecasted that crude prices will average around $45/bbl in 2016, and has even predicted that oil could fall as low as $20/bbl. EPA's cost analysis fails to consider the reality that many industry analysts have repeatedly voiced: lower oil and gas prices are likely to continue for the foreseeable future. EPA should therefore reevaluate its cost estimates based on more realistic revenue figures of the oil and gas sector. As discussed above, natural gas prices are likewise lower than EPA's estimates.

In addition, the model that EPA used to estimate the economic benefits for the reductions in methane emissions associated with this rule is deeply flawed and has not been subject to public notice and comment. In the past, EPA has used a model known as the "social cost of carbon" or "SCC" to place a dollar value on the reduction of carbon dioxide emissions resulting from regulations. This SCC model has come under criticism by those arguing that flaws in the modeling technique and use of discount rates result in inaccurate and inflated estimates of the value of reducing emissions. The SCC model used by EPA has been the subject of Congressional oversight hearings, and is currently under review by the National Academies of Sciences, Engineering, and Medicine. Indeed, some-including Robert Pindyck of the Massachusetts Institute of Technology-have argued that these types of models are so flawed that they are "close to useless as tools for policy analysis." Worse yet, the inclusion of these models "create a perception of knowledge and precision that is illusory, and can fool policy-makers into thinking that the forecasts the models generate have some kind of scientific legitimacy." These models "can be misleading-and are inappropriate-as guides for policy, and yet they have been used by the government to estimate the social cost of carbon (SCC) and evaluate tax and abatement policies."

"Because the modeler has so much freedom in choosing functional forms, parameter values, and other inputs, the model can be used to obtain almost any result one desires, and thereby legitimize what is essentially a subjective opinion about climate policy." In fact, EPA acknowledges some of these shortcomings with the SCC model in the Methane NSPS preamble.

While the SCC model used by EPA has many of its own flaws, it has, at least, been used by EPA and other federal agencies for many years, and repeatedly re-evaluated by the Office

of Management and Budget ("OMB"). By contrast, the "social cost of methane" model used by EPA to estimate the benefits of methane reductions for the Methane NSPS was developed by an outside organization, has not been vetted for accuracy by the OMB, and has not been subjected to public scrutiny through the notice and comment process. The public has not had the chance to review the accuracy of the inputs or the results of this highly complex climate model, and is therefore unable to meaningfully evaluate the resulting figures that EPA used in its analysis. EPA also notes in the preamble of the Methane NSPS proposal that the social cost of methane model used to evaluate this rulemaking was the first set of published social cost of methane estimates in the peer-reviewed literature that are consistent with the modeling assumptions underlying the SCC model used by federal agencies. This statement indicates both that social cost of methane model is likely to share many of the same flaws as the SCC model used by EPA, and that methane modeling is still very new and untested. These are two good reasons why EPA should not rely on these models to estimate the benefits of the emission reductions from the Methane NSPS.

This is particularly true when the magnitude of the "benefits" resulting from the use of this model is considered. EPA used this social cost of methane model to calculate an estimated benefit range of$200 to $210 million in 2020 and $460 to $550 million in 2025. These numbers eclipse the total estimated cost ranges associated with the rule of $150 to $170 million in 2020 and $320 to $420 million, and creates the public impression that this costly rule actually has a net economic benefit of hundreds of millions of dollars. In addition, EPA selected a three percent discount rate to apply to the modeling result associated with this social cost of methane model, while simultaneously applying a much higher (seven percent) discount rate to the costs that the industry will incur. Economists have noted that these models are very sensitive to the discount rate that is applied, which can have huge impacts on the resulting value placed on the reduction of a ton of emissions. As one economist explained, there is no scientific justification for using the monetary values that result from a three percent discount rate for these reductions. Indeed, the federal interagency working group tasked with selecting the SCC model used by the EPA did not try to determine the "correct" values for the discount rate. Instead, they used middle of the road assumptions .... But other well-known studies have deviated from using these middle of-the-road assumptions and arrived at very different estimates of the SCC .... The problem here is that there is no consensus regarding the "correct" discount rate .... Because reasonable arguments can be made for a low discount rate or for a high rate, the modeler simply has too much flexibility.

While EPA includes the modeling results and cost estimates at additional discount rates, this information is tucked away in the text of the Methane NSPS and supporting technical documents, while the costs to industry at a seven percent discount rate, and benefits from the model at a three percent discount rate are used to reach the EPA's net-benefit estimate. As a result, the public is unable to fairly compare the costs and benefits associated with this rule.

Recommendations: EPA should re-conduct its cost assessment, and do so in a way which:

1. Takes into account the full costs of compliance that the industry will bear, and removes the cost savings which the industry will never recover;

2. Incorporates a more realistic estimate of the amount of time and labor the Methane NSPS will require;

3. Considers the reduced revenue from oil and natural gas under current market conditions; and

4. Removes the comparison to a social cost of methane model that has not yet been reviewed by the Science Advisory Board; National Academies of Sciences, Engineering, and Medicine, or OMB.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6978, Excerpt 7.

Commenter Name: Howard J Feldman
Commenter Affiliation: American Petroleum Institute
Document Control Number: EPA-HQ-OAR-2010-0505-6884
Comment Excerpt Number: 149

Comment: ***OVERVIEW OF ISSUES WITH EPA'S COST AND EMISSION REDUCTION ESTIMATE***S

Table 1-1 [Comparison of 2025 Annual Benefits and Costs - Option 2, Low Impact Discount Rate 3%, provides by source; including well completions fugitive emissions, pneumatic pumps, pneumatic controllers, and compressors; a comparison of EPA and commenter estimates for methane emissions, methane benefits, annualized cost and net benefits.] summarizes the source-specific estimates for the 2025 benefits and costs using EPA numbers compared with revised and corrected estimates developed by ERM. While EPA does not provide a breakdown of the benefit-cost analysis in the RIA by regulated source and industry sector, ERM re-created the source-specific estimates based on the input data provided in Tables 3-16 and 4-3 of the RIA, and supporting technical documentation provided by EPA. Evaluating the source-specific estimates is critical to evaluating overall value of the rule. For example, Resources for the future

(RFF) recently conducted a retrospective analysis of RIAs and found that analyses based on average costs and/or benefits will often obscure important differences in impacts across the groups affected by the regulation. (Morgenstern 2015). The heterogeneity of net benefits across sources is clearly evident in this RIA and affects the cost-effectiveness of the rule.

For completeness, Table 1-1 shows all of the sources and sectors included in the RIA. However, this review focuses only on well completions, fugitive emissions from oil and gas wells and pneumatic pumps at well sites. Combined, these sources and sectors account for approximately 80 percent of EPA's estimated methane gas emission reductions and over 90 percent of EPA's estimated costs.

The first set of columns in Table 1-1 show the benefits, costs and net benefits based on EPA assumptions and calculations. Within the RIA, the EPA does not provide annualized benefits for reducing emissions from fugitives at both oil and gas well sites separately; it reports only a single

annual value for fugitive emissions from well sites. In 2025, the RIA estimates annual costs for well site fugitive controls will be $160 million and that annual benefits will be $150 million (using a 3 percent discount rate). Thus, as a group, fugitive emission controls for well sites do not pass the benefit cost test, with net benefits of negative $10 million, even when using the EPA benefit and cost numbers.

The second set of columns in Table 1-1 correct a number of other issues that were identified with EPA's benefit cost analysis. These include:

- Oil well completions: EPA underestimated the cost of combustion controls for oil well completions. An adjustment was also made to reflect the fact that many hydraulically fractured development oil well completions are controlled in the baseline scenario. Adjusting the estimated costs and the emission reduction estimates to reflect the fact that many hydraulically fractured development oil well completions are already being controlled in the baseline results in costs that are higher than benefits.
- Fugitives from well pads: EPA overestimated the emission reductions for fugitive emissions in their analysis. The model plant baseline emissions for both oil and gas well sites were estimated by rounding up the counts of major equipment at a well site and then multiplying by the component counts per major equipment. The resulting estimate was an overstatement of baseline emissions and corresponding emission reductions of 30-35 percent.
- EPA also excluded many cost elements in their estimates for semi-annual OGI leak screening and repair for well sites. Table 1-1 shows the impact of correcting these major flaws in the EPA cost estimates and correcting the estimated component counts for the model plants. These adjustments show that both oil and gas well sites fail the benefit-cost test. Correcting the issues identified changes the outcome of the benefit-cost analysis for fugitive emissions alone.
- Pneumatic Pumps: Several corrections were made to the estimates for pneumatic pumps that significantly change the net benefits estimate. These corrections include: a) adjusting the annual operating time for diaphragm pumps to 4 months of the year, on average; and b) correcting the costs of routing the pump vent to an existing control device, consistent with the estimate EPA used for wet seal compressor vents.

The ERM estimates address various deficiencies in the RIA cost estimates. In Sections 3 and 4 we describe the numerous problems with the EPA's SC-CH4. Putting aside those problems for a moment, even using the EPA's SC-CH4 estimates, our analysis shows that overall net benefits are negative. The total benefits in 2025 are around $400 million (vs. EPA's $460 million) and the costs are over $810 million (vs. EPA's $310 million) for EPA's preferred regulatory approach (Option 2). Therefore, the overall proposed regulatory program results in a net benefit of -$410 million, and does not pass a benefit-cost test. In addition, virtually all of the source-specific net benefit estimates are also negative.

Based on the analyses, the total benefits in 2025 are around $400 million (vs. EPA's $460 million) and the costs are $810 million (vs. EPA's $310 million) for EPA's preferred regulatory approach (Option 2). Therefore, the overall proposed regulatory program results in a net benefit of around -$410 million, and would not pass a benefit-cost test. Stated differently, the societal

costs are significantly higher than the societal benefits from the methane reductions, even using the EPA's estimated SC-CH4 of $1,500/metric tonne in 2025, which as noted, is inappropriate for use in this analysis as stated below. Additionally, independent review by NERA found that the social net costs could be greater when specific factors ignored by EPA were included in the estimate of the social cost of methane. API used NERA's calculation of the social cost of methane and applied that to the revised emission reductions estimated by ERM and ERM's corrected cost estimates of the proposed regulation. This calculation showed that the net costs to society of the proposed regulation could exceed $1 billion in 2025.

Response: The RIA for the proposed and final rule focuses on developing estimates of benefits and costs at the level of the action to inform the public and stakeholders of the aggregate regulatory impacts of the rule, not the costs and benefits individual requirements within the final rule, which are many.

The commenter is correct in that impacts are heterogeneous across sources and impacts are likely to be heterogeneous across entities affected by the regulation. This heterogeneity results from the various sources regulated under the final NSPS have different emissions profiles. For example, emissions from hydraulically fractured oil well completions are different in composition and volume than fugitive emissions from a gathering and boosting station, as are emissions mitigation measures. Because of the emissions differ across sources, the determination of BSER and cost-effectiveness is performed at the level of the emissions source. With respect to the commenter's proposal-based assessment of the net benefits of the fugitive emissions requirements at well sites and, later in the excerpt with respect to the net benefits of the proposal as a whole, the EPA notes that the EPA's standard-setting duties and authority are derived under section 111 of the CAA, and its decisions are made within the confines of that authority. Although the EPA must consider the costs of control, it may not base the setting of standards on a broad-ranging benefit-cost analysis. The RIA prepared by the EPA under Executive Order 12866 may inform the standard-setting process, but cannot provide the direct basis for the standards and does not "create any right or benefit, substantive or procedural, enforceable at law or equity by a party against the United States..." (Executive Order 12866, Section 10). The EPA also notes that the RIA highlights that the emissions reductions from implementation of the NSPS will lead to numerous important health, welfare, and environmental benefits and co-benefits from methane, VOC, and HAP emissions reductions.

With respect to the commenter's assertion that the EPA underestimated the cost of combustion for oil well completions, please see the response to DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 65 of Chapter 4 of this document. In addition, for the response to the assertion that the EPA's baseline does not account for completions that are already controlled, please see the response to DCN EPA-HQ-OAR-2010-0505-6983, Excerpt 18 in Chapter 3 of this document.

With respect to the commenter's assertion that the EPA overestimates emission reductions from well sites, please see the response to DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 122 in Chapter 4 of this document.

With respect to the commenter's assertion that the EPA underestimated OGI cost elements, please see the response to DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 111 in Chapter 4 of this document.

With respect to the commenter's assertion that the EPA incorrectly estimated the cost of control for pneumatic pumps, please see the response to DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 72.

Regarding the commenter's conclusion that the SC-CH4 estimates are inappropriate: see EPA's response to the commenter's more detailed statements on the SC-CH4 at DCN EPA-HQ-OAR-2010-0505-6884, Excerpts 17, 20, 21, 22, 150, 152, 171, and 173. In addition, the EPA has reviewed the NERA analysis of the SC-CH_4, which was referenced by this commenter, and has responded to those comments at DCN EPA-HQ-OAR-2010-0505-6969, Excerpts 6 through 10, 13, 14, 15, and 17. In particular, the EPA responded to the alternative SC-CH_4 estimates developed by NERA, see the EPA response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 17.

Commenter Name: Kevin J. Moody, General Counsel
Commenter Affiliation: Pennsylvania Independent Oil & Gas Association (PIOGA)
Document Control Number: EPA-HQ-OAR-2010-0505-6943
Comment Excerpt Number: 12

Comment: In addition to the above cost factors, there are certain geographic regions where natural gas producers, in essence, discount their product to get it to market. That is, they are not able to sell their product at current market price due to their location. This process is referred to as "basis differential" and represents the difference between the NYMEX gas price and the gas sale price for deliveries into major interstate pipelines. The basis differential is dynamic and changes based on market conditions from at or near par with the NYMEX to discounts as much as 50% or more. The cost basis for the proposed regulations does not account for this differential making it unreliable.

Response: The EPA disagrees with this comment. See response to comment DCN EPA-HQ-OAR-2010-0505-6803, Excerpt 15.

Commenter Name: Brandon M. Black, Vice President
Commenter Affiliation: BC Operating, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6968
Comment Excerpt Number: 18

Comment: EPA's cost benefit analysis is fundamentally flawed to the point that neither the agency nor the public can actually assess the impacts of the Methane NSPS.

EPA made a number of faulty assumptions in its calculations of the Methane NSPS's costs and benefits. First, EPA estimated the total costs to the oil and gas industry to implement the Methane NSPS. EPA then reduced those costs by the value of the natural gas that EPA estimates that operators will recover from repairing leaks and otherwise complying with the Methane NSPS. EPA asserted that operators would gain revenues of $4/thousand cubic feet (met) for this recovered gas. By using this recovered-gas-revenue figure, EPA was able to reduce its calculation of the total annual engineering costs of complying with the Methane NSPS by tens of millions of dollars, from a range of $180 to $200 million in 2020 and $370 to $500 million in 2025, down to $150 to $170 million in 2020 and $320 to $420 million in 2025.

EPA is incorrect in concluding that owners and operators will be able to recover any amount, let alone $4/mcf, for the captured fugitive gases because the amount of gas captured is within the industry margin of error for gas measurement and, therefore, will not be valued in any sale. EPA's cost estimate simply misunderstands the way that natural gas is measured and sold. Orifice meters are the most common and economic measuring equipment used in the industry today. Oil wells typically produce gas at variable rates that create uncertainty in the operating ranges of orifice meters, which increases the margin of error above the perfect condition error of 0.55% inherent to best condition orifice measurement. These differences result in a variance that puts the small volumes per facility anticipated to be captured by compliance with this rule within the error measurement range of the custody transfer equipment. The result of this is that there will be no additional revenue from gas sales generated by compliance with this rule. The EPA's high estimates of 12,000,000 Mcf that might be recovered by compliance with this rule is only 0.04% of the 2014 U.S. gas production. EPA's estimates indicate that gas captured at most exploration and production ("E&P") facilities as a result of the Methane NSPS will fall beneath the meter's margin of error, and, therefore, will not result in any incremental revenue. Even if the industry could generate revenue from the recovered gas, EPA's $4/mcf estimate ignores the current market realities. According to the Henry Hub Natural Gas Futures Quotes, natural gas is currently valued around $2/mcf, and is predicted to stay below $4/mcf until then end of 2024.

By including these "cost savings," which the industry will never actually realize, EPA has skewed its cost analysis and prevented the public from understanding the actual costs associated with this rule. This problem is further exacerbated by the fact that EPA failed to consider the potentially costly equipment upgrades necessary to comply with this rule. As detailed in the discussion of atmospheric tanks, if the Methane NSPS or CTG require operators to replace their atmospheric tanks with pressurized tanks in order to meet fugitive emissions survey requirements, then the industry will eventually bear a far heavier financial burden. EPA has not considered these costs in its analysis, and must either reevaluate its cost analysis or clarify that the ordinary breathing from atmospheric tanks are not "fugitive emissions" under the Rules.

EPA's estimates on the cost of labor for compliance are also wholly unreasonable. The Methane NSPS is a highly complex and technical rule with a number of overlapping requirements. Upstream oil and gas operations frequently fall beneath the air emissions thresholds for permitting requirements. As a result, this portion of the industry has not historically been subject to similar federal air regulations, and their staff is largely unfamiliar with the monitoring, reporting, and recordkeeping requirements that accompany such rules. This means that these

entities will have to expend far more resources either training their own personnel, or hiring personnel with expertise in federal air regulatory matters. This is particularly true for operators in states that already have overlapping state air regulations, as the businesses will need to understand and convey to personnel the differences between the two sets of requirements. For example, the Texas Railroad Commission places limits on the venting or flaring of gas, and Colorado, Wyoming, Ohio, and Pennsylvania have state regulations regarding natural gas emissions and leaks. Differentiating between the requirements from state and federal regimes-particularly when those requirements conflict or overlap will take additional time and resources.

For most upstream companies, well sites are spread out over a large geographic area. This dispersion of activities across a large geographic area is significantly different from the physical set up of larger facilities, such as natural gas processing plants or refineries, where EPA has imposed these kinds of monitoring requirements in the past. Unlike those larger sites, which have full-time personnel dedicated to one particular facility, most E&P companies assign one employee to multiple small sites. Well sites simply do not have the concentration of activity (including activity that would give rise to air emissions) to justify dedicating a single air compliance employee to each well site. Instead, the air compliance employee will have to spend substantial amounts of time traveling in order to visit each site semi-annually or quarterly, and will then have to keep up with the continual recordkeeping and reporting requirements for each of these small sites. BC estimates that operators will need to hire one full-time employee or contractor dedicated to implementing the requirements of the Methane NSPS for every 25 affected well sites operated. Given that there are almost 200,000 producing wells in Texas alone, this means the industry will eventually need to hire thousands of new employees merely to track and fix small equipment leaks.

According to EPA's analysis, "[t]he annual public reporting and recordkeeping burden for this collection of information is estimated to average 3.9 hours per response. Respondents must monitor all specified criteria at each affected facility and maintain these records for 5 years." BC estimates that the actual annual burden imposed by these Rules will be closer to 40-60 hours per affected well site, which will result in an additional cost of $3,500-$5,000 in labor per well site per year. Given that there are hundreds of thousands, if not more than a million, well sites around the nation, these reporting and recordkeeping requirements will eventually balloon into tremendous industry-wide compliance costs.

EPA is also relying on revenue estimates that no longer reflect the reality of the oil and gas market. For oil prices, EPA "estimated revenues using two alternative prices, $70/bbl and $50/bbl. In the results, EPA refers to the case using $70/bbl the 'primary scenario' and the case using the $50/bbl as the 'low oil price scenario.'" In contrast to EPA's estimates, the U.S. Energy Information Administration ("EIA") expects the price of Brent Crude Oil to average $53.96 for the year and the West Texas Intermediate spot average is expected to be $53.57 for the year. Prices have fallen below EPA's "low oil price scenario" of $50/bbl, and many industry experts predict that this trend will continue. For example, Brent crude prices remained below $50/bbl for 20 consecutive days in September 2015, and the West Texas Intermediate price fell to $44.74/bbl on October 1, 2015. Goldman Sachs has forecasted that crude prices will average around $45/bbl in 2016, and has even predicted that oil could fall as low as $20/bbl. EPA's cost analysis fails to consider the reality that many industry analysts

have repeatedly voiced: lower oil and gas prices are likely to continue for the foreseeable future. EPA should therefore reevaluate its cost estimates based on more realistic revenue figures of the oil and gas sector. As discussed above, natural gas prices are likewise lower than EPA's estimates.

In addition, the model that EPA used to estimate the economic benefits for the reductions in methane emissions associated with this rule is deeply flawed and has not been subject to public notice and comment. In the past, EPA has used a model known as the "social cost of carbon" or "SCC" to place a dollar value on the reduction of carbon dioxide emissions resulting from regulations. This sec model has come under criticism by those arguing that flaws in the modeling technique and use of discount rates result in inaccurate and inflated estimates of the value of reducing emissions. The SCC model used by EPA has been the subject of Congressional oversight hearings, and is currently under review by the National Academies of Sciences, Engineering, and Medicine. Indeed, some-including Robert Pindyck of the Massachusetts Institute of Technology-have argued that these types of models are so flawed that they are "close to useless as tools for policy analysis." Worse yet, the inclusion of these models "create a perception of knowledge and precision that is illusory, and can fool policy-makers into thinking that the forecasts the models generate have some kind of scientific legitimacy." These models "can be misleading-and are inappropriate-as guides for policy, and yet they have been used by the government to estimate the social cost of carbon (SCC) and evaluate tax and abatement policies." "Because the modeler has so much freedom in choosing functional forms, parameter values, and other inputs, the model can be used to obtain almost any result one desires, and thereby legitimize what is essentially a subjective opinion about climate policy." In fact, EPA acknowledges some of these shortcomings with the SCC model in the Methane NSPS preamble.

While the SCC model used by EPA has many of its own flaws, it has, at least, been used by EPA and other federal agencies for many years, and repeatedly re-evaluated by the Office of Management and Budget ("OMB"). By contrast, the "social cost of methane" model used by EPA to estimate the benefits of methane reductions for the Methane NSPS was developed by an outside organization, has not been vetted for accuracy by the OMB, and has not been subjected to public scrutiny through the notice and comment process. The public has not had the chance to review the accuracy of the inputs or the results of this highly complex climate model, and is therefore unable to meaningfully evaluate the resulting figures that EPA used in its analysis.

EPA also notes in the preamble of the Methane NSPS proposal that the social cost of methane model used to evaluate this rulemaking was the first set of published social cost of methane estimates in the peer-reviewed literature that are consistent with the modeling assumptions underlying the sec model used by federal agencies. This statement indicates both that social cost of methane model is likely to share many of the same flaws as the SCC model used by EPA, and that methane modeling is still very new and untested. These are two good reasons why EPA should not rely on these models to estimate the benefits of the emission reductions from the Methane NSPS.

This is particularly true when the magnitude of the "benefits" resulting from the use of this model is considered. EPA used this social cost of methane model to calculate an estimated benefit range of $200 to $210 million in 2020 and $460 to $550 million in 2025. These numbers eclipse the total estimated cost ranges associated with the rule of $150 to $170 million in 2020 and $320 to $420 million, and creates the public impression that this costly rule actually has a net economic benefit of hundreds of millions of dollars.

In addition, EPA selected a three percent discount rate to apply to the modeling result associated with this social cost of methane model, while simultaneously applying a much higher (seven percent) discount rate to the costs that the industry will incur. Economists have noted that these models are very sensitive to the discount rate that is applied, which can have huge impacts on the resulting value placed on the reduction of a ton of emissions. As one economist explained, there is no scientific justification for using the monetary values that result from a three percent discount rate for these reductions. Indeed, the federal interagency working group tasked with selecting the SCC model used by the EPA did not try to determine the "correct" values for the discount rate. Instead, they used middle of the road assumptions. . . . But other well-known studies have deviated from using these middle of-the-road assumptions and arrived at very different estimates of the sec .... The problem here is that there is no consensus regarding the "correct" discount rate. . . . Because reasonable arguments can be made for a low discount rate or for a high rate, the modeler simply has too much flexibility.

While EPA includes the modeling results and cost estimates at additional discount rates, this information is tucked away in the text of the Methane NSPS and supporting technical documents, while the costs to industry at a seven percent discount rate, and benefits from the model at a three percent discount rate are used to reach the EPA's net-benefit estimate. As a result, the public is unable to fairly compare the costs and benefits associated with this rule.

Recommendations: EPA should re-conduct its cost assessment, and do so in a way which:

1. Takes into account the full costs of compliance that the industry will bear, and removes the cost savings which the industry will never recover;
2. Incorporates a more realistic estimate of the amount of time and labor the Methane NSPS will require;
3. Considers the reduced revenue from oil and natural gas under current market conditions; and
4. Removes the comparison to a social cost of methane model that has not yet been reviewed by the Science Advisory Board; National Academies of Sciences, Engineering, and Medicine, or OMB.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6978, Excerpt 7.

Commenter Name: Joe Strickling, Operations Manager
Commenter Affiliation: Patriot Resources, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6978
Comment Excerpt Number: 7

Comment: EPA's cost benefit analysis is fundamentally flawed to the point that neither the agency nor the public can actually assess the impacts of the Methane NSPS.

EPA made a number of faulty assumptions in its calculations of the Methane NSPS's costs and benefits. First, EPA estimated the total costs to the oil and gas industry to implement the Methane NSPS. EPA then reduced those costs by the value of the natural gas that EPA estimates that operators will recover from repairing leaks and otherwise complying with the Methane NSPS. EPA asserted that operators would gain revenues of $4/thousand cubic feet (met) for this recovered gas. By using this recovered-gas-revenue figure, EPA was able to reduce its calculation of the total annual engineering costs of complying with the Methane NSPS by tens of millions of dollars, from a range of $180 to $200 million in 2020 and $3 70 to $500 million in 2025, down to $150 to $170 million in 2020 and $320 to $420 million in 2025.

EPA is incorrect in concluding that owners and operators will be able to recover any amount, let alone $4/mcf, for the captured fugitive gases because the amount of gas captured is within the industry margin of error for gas measurement and, therefore, will not be valued in any sale. EPA's cost estimate simply misunderstands the way that natural gas is measured and sold.

Orifice meters are the most common and economic measuring equipment used in the industry today. Oil wells typically produce gas at variable rates that create uncertainty in the operating ranges of orifice meters, which increases the margin of error above the perfect condition error of 0.55% inherent to best condition orifice measurement. These differences result in a variance that puts the small volumes per facility anticipated to be captured by compliance with this rule within the error measurement range of the custody transfer equipment. The result of this is that there will be no additional revenue from gas sales generated by compliance with this rule. The EPA's high estimates of 12,000,000 Mcf that might be recovered by compliance with this rule is only 0.04% of the 2014 U.S. gas production. EPA's estimates indicate that gas captured at most exploration and production ("E&P") facilities as a result of the Methane NSPS will fall beneath the meter's margin of error, and, therefore, will not result in any incremental revenue. Even if the industry could generate revenue from the recovered gas, EPA's $4/mcf estimate ignores the current market realities. According to the Henry Hub Natural Gas Futures Quotes, natural gas is currently valued around $2/mcf, and is predicted to stay below $4/mcf until the end of 2024.

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considered these costs in its analysis, and must either reevaluate its cost analysis or clarify that the ordinary breathing from atmospheric tanks are not "fugitive emissions" under the Rules.

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For most upstream companies, well sites are spread out over a large geographic area. This dispersion of activities across a large geographic area is significantly different from the physical set up of larger facilities, such as natural gas processing plants or refineries, where EPA has imposed these kinds of monitoring requirements in the past. Unlike those larger sites, which have full-time personnel dedicated to one particular facility, most E&P companies assign one employee to multiple small sites. Well sites simply do not have the concentration of activity (including activity that would give rise to air emissions) to justify dedicating a single air compliance employee to each well site. Instead, the air compliance employee will have to spend substantial amounts of time traveling in order to visit each site semi-annually or quarterly, and will then have to keep up with the continual recordkeeping and reporting requirements for each of these small sites. Patriot Resources estimates that operators will need to hire one full-time employee or contractor dedicated to implementing the requirements of the Methane NSPS for every 25 affected well sites operated. Given that there are almost 200,000 producing wells in Texas alone, this means the industry will eventually need to hire thousands of new employees merely to track and fix small equipment leaks.

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using the $50/bbl as the 'low oil price scenario.'" In contrast to EPA's estimates, the U.S. Energy Information Administration ("EIA") expects the price of Brent Crude Oil to average $53.96 for the year and the West Texas Intermediate spot average is expected to be $53.57 for the year. Prices have fallen below EPA's "low oil price scenario" of $50/bbl, and many industry experts predict that this trend will continue. For example, Brent crude prices remained below $50/bbl for 20 consecutive days in September 2015, and the West Texas Intermediate price fell to $44.74/bbl on October 1, 2015. Goldman Sachs has forecasted that crude prices will average around $45/bbl in 2016, and has even predicted that oil could fall as low as $20/bbl. EPA's cost analysis fails to consider the reality that many industry analysts have repeatedly voiced: lower oil and gas prices are likely to continue for the foreseeable future. EPA should therefore reevaluate its cost estimates based on more realistic revenue figures of the oil and gas sector. As discussed above, natural gas prices are likewise lower than EPA's estimates.

In addition, the model that EPA used to estimate the economic benefits for the reductions in methane emissions associated with this rule is deeply flawed and has not been subject to public notice and comment. In the past, EPA has used a model known as the "social cost of carbon" or "SCC" to place a dollar value on the reduction of carbon dioxide emissions resulting from regulations. This SCC model has come under criticism by those arguing that flaws in the modeling technique and use of discount rates result in inaccurate and inflated estimates of the value of reducing emissions. The SCC model used by EPA has been the subject of Congressional oversight hearings, and is currently under review by the National Academies of Sciences, Engineering, and Medicine. Indeed, some-including Robert Pindyck of the Massachusetts Institute of Technology-have argued that these types of models are so flawed that they are "close to useless as tools for policy analysis." Worse yet, the inclusion of these models "create a perception of knowledge and precision that is illusory, and can fool policy-makers into thinking that the forecasts the models generate have some kind of scientific legitimacy." These models "can be misleading-and are inappropriate-as guides for policy, and yet they have been used by the government to estimate the social cost of carbon (SCC) and evaluate tax and abatement policies." "Because the modeler has so much freedom in choosing functional forms, parameter values, and other inputs, the model can be used to obtain almost any result one desires, and thereby legitimize what is essentially a subjective opinion about climate policy." In fact, EPA acknowledges some of these shortcomings with the SCC model in the Methane NSPS preamble.

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of methane model is likely to share many of the same flaws as the SCC model used by EPA, and that methane modeling is still very new and untested. These are two good reasons why EPA should not rely on these models to estimate the benefits of the emission reductions from the Methane NSPS.

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While EPA includes the modeling results and cost estimates at additional discount rates, this information is tucked away in the text of the Methane NSPS and supporting technical documents, while the costs to industry at a seven percent discount rate, and benefits from the model at a three percent discount rate are used to reach the EPA's net-benefit estimate. As a result, the public is unable to fairly compare the costs and benefits associated with this rule.

Recommendations: EPA should re-conduct its cost assessment, and do so in a way which:

1. Takes into account the full costs of compliance that the industry will bear, and removes the cost savings which the industry will never recover;

2. Incorporates a more realistic estimate of the amount of time and labor the Methane NSPS will require;

3. Considers the reduced revenue from oil and natural gas under current market conditions; and

4. Removes the comparison to a social cost of methane model that has not yet been reviewed by the Science Advisory Board; National Academies of Sciences, Engineering, and Medicine, or OMB.

Response: With respect to the use of a $4/Mcf gas price to estimate revenue from gas recovery, see response to DCN EPA-HQ-OAR-2010-0505-6847, Excerpt 3

With respect to the comments on the EPA's oil price assumptions, see response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 17.

By implementing the emission reduction measures examined in the rulemaking, natural gas that otherwise would be emitted will be captured. The EPA believes this capture will be measurable. Under the rule, many sources, not just oil wells, are anticipated to capture natural gas, adding to the sums mentioned by the commenter. These estimate provided in the analysis supporting the rulemaking are our best estimates of natural gas capture under the rule.

With respect to the comment regarding replacing atmospheric storage tanks, see response to DCN EPA-HQ-OAR-2010-0505-6857, Excerpt 6.

With respect to the comment that the EPA underestimated the labor required to comply with the rule, see response to DCN EPA-HQ-OAR-2010-0505-6857, Excerpt 60 in Chapter 11 of this document.

Regarding the estimate of climate benefits from methane emissions reductions: EPA disagrees that the estimates of the economic benefits of methane reductions, based on the Marten et al. (2014) social cost of methane estimates, are not ready for application to rulemaking analysis. As discussed in the RIA, Section 4.3, the Marten et al. (2014) estimates have been subject to extensive review. EPA determined that the Marten et al. estimates are scientifically defensible for valuing methane impacts in regulatory analyses and improve upon prior treatment of methane impacts in regulatory analysis. See EPA response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18, for discussion about the extensive reviews conducted before the estimates were applied to the RIA and for discussion about EPA's conclusions regarding the validity and rigor of the Marten et al (2014) SC-CH4 estimates as well as the interagency working group's SC-CO2 estimates. EPA also disagrees that its estimates of the economic benefits of methane reductions have not been subject to public notice and comments; see EPA's response to DCN EPA-HQ-OAR-2010-0505-5425, Excerpt 4, for complete discussion on that point. Regarding the commenter's statement about the high magnitude of the Marten et al. SC-CH4 estimates, see EPA's response to DCN EPA-HQ-OAR-2010-0505-6997, Excerpt 18.

EPA disagrees that the Marten et al. SC-CH4 estimates should be withdrawn because of the ongoing National Academies process. See EPA's response to DCN EPA-HQ-OAR-2010-0505-6919, Excerpt 2.

Regarding the commenter's reference to Pindyck (2013), which discussed the application of IAMs to policy analysis, see EPA's response to DCN EPA-HQ-OAR-2010-0505-6997, Excerpt 8.

Regarding the comments about the discounting approach used for the SC-CH4 estimates, in particular the sensitivity of estimates to discount rate and the difficulties in selecting an appropriate rate, see EPA response to DCN EPA-HQ-OAR-2010-0505-6997, Excerpts 2 and 6.

Regarding the comment about not discounting the benefits at 7 percent, see EPA's response to DCN EPA-HQ-OAR-2010-0505-6997, Excerpt 12.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:10 AM - 8:00 PM; Public Hearing #1 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 106

Comment: However, what is clear from our initial review is that the cost of the rules as proposed far outweighs the environmental gains.

Response: The EPA disagrees with the comment. As can be seen in the final RIA, the benefits exceed the cost for the final NSPS.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:00 AM - 2:40 PM; Public Hearing #2 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 19

Comment: What about cost? That's always something we want to consider. The U.S. loses over $1 billion worth of natural gas every year through methane leaks and intentional releases, such as flaring throughout the oil and gas system, enough natural gas to meet the heating and cooling needs of over five million American homes.

A recent ICF International study estimated companies could cut methane emissions 40 percent or more for about a quarter of 1 percent of the price of the gas they're selling. So an additional penny on about $3 worth of gas. So it's not free, but it's relatively insignificant. And we would have much better air to breathe.

Response: The EPA acknowledges your comment and concerns. The final rule is expected to recover natural gas that would otherwise be emitted to the atmosphere, as outlined in Section 3.4 of the final RIA. In addition, there will be significant health, environmental and climate benefits achieved through this rule.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:00 AM - 2:40 PM; Public Hearing #2 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 48

Comment: And also, this is the first-ever methane controls for the oil and gas industry. So the proposed control methods are sensible and cost-effective. But the one thing that I really want to encourage is that the regulations go further by covering existing sources, which are by far the major source of the problem.

Response: The EPA agrees with the commenter that the final NSPS will reduce emissions from the oil and natural gas sector in sensible and cost effective ways. With respect to comments on regulating existing sources, see response to DCN EPA-HQ-OAR-2010-0505-7338, Excerpt 49 in Chapter 15 of this document.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:00 AM - 7:55 PM; Public Hearing #1 - Denver, Colorado
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7337
Comment Excerpt Number: 10

Comment: We're the beneficiaries of innovative technology in Colorado resulting in increased production of oil and gas, while at the same time achieving sizable emission reductions. For example, in the Denver-Julesburg Basin north of the Denver area, oil production has gone up since 2002 but emissions have gone down with the development of state-of-the-art emission controls employed to meet Colorado air quality standards.

We have a significant concern about the cost benefits and technology proposed in your rulemaking. For example, we urge you to compare the actual compliance costs with Regulation 7 as compared to those that were proposed, and hopefully they'll inform your decision.

Response: In developing the proposed and final NSPS, the EPA closely examined a variety of state regulations, including Colorado's Regulation 7. The EPA stands behind its economic analysis and technology assessments as reasonable and accurate.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:00 AM - 7:55 PM; Public Hearing #1 - Denver, Colorado
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7337
Comment Excerpt Number: 185

Comment: And, number three, there are readily available low-cost technologies that can substantially cut these emissions. A study by ICF International concluded that the industry can cut methane emissions by 40 percent or more for only one penny per thousand cubic feet of natural gas produced. Because these measures capture gas that would otherwise be wasted, while they reduce pollution, they also have an important -- save an important domestic energy resource. And at the same time, these same technologies also capture other ozone-forming and cancer-causing pollutants.

Response: The EPA agrees that there are many cost-effective measures that will reduce emissions from the oil and natural gas sector, particularly measures that capture natural gas that would otherwise be emitted to the atmosphere. In addition, the EPA agrees that there will be significant health, environmental and climate benefits achieved through this rule.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Tuesday, September 29, 2015; 9:05 AM - 8:00 PM; Public Hearing #1 - Pittsburgh, Pennsylvania
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7338
Comment Excerpt Number: 121

Comment: Fortunately, there are readily available low-cost solutions that can substantially reduce emissions. Methane emissions can be cut by 40 percent for only one penny per thousand cubic feet of natural gas produced. States like Colorado, Wyoming and Ohio have already employed common sense solutions that help protect the environment and promote economic development.

Industrial areas like Pittsburgh stand to benefit immensely from the reduction in regional methane emissions and associated air pollutants that lead to health-harming ozone. More than four million Pennsylvanians live in areas where ozone levels exceed national clean air standards. These are areas that contain over 17,000 oil and gas wells. Applying common sense measures here in Pennsylvania, the second – nation's second largest natural producing state will capture valuable natural gas for sale while reducing methane emissions. In fact, many Pennsylvania companies are producing equipment that can help reduce methane waste and pollution.

Response: The EPA agrees that there are many cost-effective measures that will reduce emissions from the oil and natural gas sector, and that the development and manufacture of emissions control technologies can provide employment opportunities in the environmental

protection sector. In addition, the EPA agrees that there will be significant health, environmental and climate benefits achieved through this rule.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Tuesday, September 29, 2015; 9:00 AM - 11:55 AM; Public Hearing #2 - Pittsburgh, Pennsylvania
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7338
Comment Excerpt Number: 53

Comment: Furthermore, in its cost benefit analysis, EPA should include the public health co-benefits of VOC and have control that would accrue under the methane standard. And it should credit socio-societal benefits of conserving gas for sale.

Response: The EPA agrees that the avoided emissions will result in improvements in ambient air quality and reductions in health effects associated with exposure to HAP, ozone, and fine particulate matter ($PM_{2.5}$), but we have determined that quantification of those benefits cannot be accomplished for this rule. This is not to imply that there are no health benefits anticipated from the proposed rule; rather, it is a reflection of the difficulties in modeling the direct and indirect impacts of the reductions in emissions for this industrial sector with the data currently available. Also, Section 3.4.4 of the RIA for the final NSPS presents estimates of the revenues from product recovery predicted to result from emissions reductions. Conserving gas for sale is treated as an offset to compliance costs in the analysis supporting the rulemaking.

Commenter Name: Domestic Energy Producers Alliance
Commenter Affiliation: Domestic Energy Producers Alliance
Document Control Number: EPA-HQ-OAR-2010-0505-5425
Comment Excerpt Number: 6

Comment: DEPA would therefore question the need for additional regulations that will cause the energy industry to incur hundreds of millions of dollars in operating costs in any economic climate, with no measurable benefit to human health or the environment, VOC and methane emissions have been declining in spite of the phenomenal increase in oil and gas production volumes across the nation. And the effect of these reductions on the environment as GHG impacts on climate change cannot be measured in time, but rather can only be evaluated by models that are designed to test these theories and predict outcomes. And these models are constantly being tweaked and adjusted to account for outcomes that fail to match the actual climatic conditions. Climate scientists appear to be developing and modifying solutions that do not have an apparent cause except in theory.

The regulatory costs of the requirements proposed by this action do not affect energy companies alone. They represent an impact on jobs in all walks of life and on energy costs for hospitals,

schools, businesses and government; in effect, for any person or activity that requires energy to function in life. The security of this nation depends on energy. And any regulatory restraint that we place on the production, development and transmission of energy must be founded in real data based on actual impact, and must also have a real and measurable impact on the injury that it is designed to cure. We cannot afford to base government regulations and laws upon theoretical scenarios that have questionable application in science.

Response: The commenter provides no credible evidence of flaws in the EPA's approach of relying upon the synthesis conclusions of the major assessments. As discussed in the preamble, the EPA relies "primarily upon the major assessments by the USGCRP, IPCC, and the NRC to provide the technical and scientific information to inform the Administrator's judgment regarding the question of whether GHGs endanger public health and welfare". The science is clear that humans are the root cause of the increasing concentrations of greenhouse gases, that elevated concentrations of greenhouse gases contribute to warming, and that warming has been observed. When considering the existing body of science regarding climate change and its impacts, the Administrator found in 2009 that these elevated concentrations of greenhouse gases are reasonably anticipated to endanger public health and welfare. As described in the preamble, the EPA has reviewed scientific assessments that have been released since 2009 and found that they "confirm and strengthen the conclusion that GHGs endanger public health, now and in the future". Please also see Section IV.B of the preamble to the final rule which details the impacts of GHG emissions on public health and welfare.

Commenter Name: Mike Gibbons, Vice President – Production
Commenter Affiliation: CountryMark Energy Resources, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6241
Comment Excerpt Number: 9

Comment: We believe that the cost of compliance will be considerably greater than the cost that EPA has documented in the proposed regulation.

For a $500,000 well drilled by an operator, EPA is estimating that the compliance cost will be $405 ($500,000 x 0.081 percent). Subcategory 1 wells (as defined on Page 197) are non-exploratory, non-delineation wells and require Reduced Emission Completions (RECs) or "green completions" as specified on Page 16. The cost to purchase and install equipment may exceed 100 times the estimated cost ($40,000 to install compliance driven equipment at each well location).

The 0.033 percent is very low, by most standards; but is not a realistic estimate of the compliance cost for this proposed regulation. Using this percentage for an oil production company with an annual revenue of $50 million will result in annual compliance cost of $16,500 ($50 million x 0.033 percent). Our compliance cost for a single well will greatly exceed $16,500.

EPA is expecting an operator with a $25 million capital program and $50 million in revenue to invest $40,000 ($25 million x 0.16 percent) to $65,000 ($50 million x 0.13 percent) annually into compliance cost.

We solicited quotes for 95% combustion devices to meet compliance with this regulation. Certified combustion devices are more expensive than devices that do not carry the certification, which is contrary to EPA's expectation that certified devices may be economically favorable. Page 333 states, "The EPA continues to encourage the option to use listed devices and believes that operators have an incentive to do so, in lessened initial and on-going compliance demonstration costs." A certified combustion device that will meet our gas flow rate requirements and gas quality will cost owners/operators $12,000 – $22,000 to purchase and an additional $8,000 to install, for a total installed cost of $20,000 – $30,000 per well.

In section VIII.A EPA cites several cases where the courts have provided guidance to consider costs under the Clean Air Act. Essex Chemical Corp v. Ruckelshaus provides the following guidance (Page 131) "the system must be "reasonably reliable, reasonably efficient, and … reasonably expected to serve the interests of pollution control without becoming exorbitantly costly in an economic or environmental way". Lignite Energy Council v. EPA states, "EPA's choice will be sustained unless the environmental or economic costs of using the technology are exorbitant." Portland Cement Ass'n v. EPA provides the following guidance "the costs of the standard are 'greater than the industry could bear and survive'". Page 208 EPA states, "Furthermore, we believe that the industry can bear the costs and survive".

If the cost of compliance for a subcategory 1 well was only $405, we would agree with EPA that the costs are not exorbitant, or more than the industry can bear and survive. We are finding that compliance costs will be considerably greater than the estimates that have been provided. As noted above, installation of a certified combustor will cost $20,000 – $30,000. This cost does not include the cost to purchase and install a separator, install piping, complete the required surveys, and complete the required reporting for each well that is drilled. We estimate that the compliance costs could exceed 10% of the capital cost to drill a well. These costs are significant, and could drive many small operators out of business. We disagree with EPA's assessment that the industry can bear the cost and survive.

Many of the operators in the upstream segment are operating at a loss in the current low oil price environment. Low oil and gas prices are expected to continue for an undetermined period of time; but our research indicates that this low price environment could last for several years. All of the owners/operators and their contractors have cut operating costs by 10% or greater over the past year, and are searching for areas to further reduce costs.

At a time when owners/operators are searching for ways to reduce operating costs to survive, EPA will be implementing this new regulation that will measurably add to our cost of doing business. We believe that owners/operators will be required to employ additional staff for field surveys/maintenance activities and documentation burdens. We further expect that this regulation will result in a net loss in jobs from our industry because expenditures will be required for compliance activities, not new revenue generation.

Response: The EPA believes the commenter misunderstood the analysis presented in the preamble of the proposed rule. For example, the preamble stated:

> "We also identified in section VIII.A two additional approaches, based on new capital expenditures and annual revenues, for evaluating whether the costs are reasonable. For the capital expenditure analysis, we used the capital expenditures for 2012 for NAICS 2111, 213111 and 213112 as reported in the U.S. Census data, which we believe are representative of the production segment. The total capital costs of complying with the proposed standards for subcategory 1 wells is 0.081 percent of the total capital expenditures, which is well below the percentage capital increase that courts have previously upheld as reasonable as discussed in Section VIII.A." 80 FR 56630.

This comparison of compliance costs to industry expenditures is performed at the industry sector level, not at the level of an individual capital costs. The commenter, however, interpreted the analysis to be at the level of a representative drilling project that costs $500,000, as indicated in the second paragraph of the comment excerpt. This is an erroneous interpretation. This mistake is repeated in other analysis presented in this excerpt.

Additionally, the EPA disagrees with the conclusion of that commenter that the costs of compliance are more than the industry can bear and survive. It is reasonable to assume that a small number of drilling projects might not be pursued as a result of increased regulatory costs. However, these economic adjustments are much different than costs that pose threats to the "survival of the industry". The EPA does not believe that the final rules are overly burdensome or will harm the U.S. economy or, specifically, oil and natural gas production. The final NSPS will reduce emissions from the oil and natural gas sector in sensible and cost effective ways. On these points, see response to DCN EPA-HQ-OAR-2010-0505-7336, Excerpt 98.

Commenter Name: W. Michael Scott, General Counsel
Commenter Affiliation: Trilogy Operating, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6603
Comment Excerpt Number: 17

Comment: EPA is also relying on revenue estimates that no longer reflect the reality of the oil and gas market. For oil prices, EPA "estimated revenues using two alternative prices, $70/bbl and $50/bbl. In the results, EPA refers to the case using $70/bbl the 'primary scenario' and the case using the $50/bbl as the 'low oil price scenario.'" In contrast to EPA's estimates, the U.S. Energy Information Administration ("EIA") expects the price of Brent Crude Oil to average $53.96 for the year and the West Texas Intermediate spot average is expected to be $53.57 for the year. Prices have fallen below EPA's "low oil price scenario" of $50/bbl, and many industry experts predict that this trend will continue. For example, Brent crude prices remained below $50/bbl for 20 consecutive days in September 2015, and the West Texas Intermediate price fell

to $44.74/bbl on October 1, 2015. Goldman Sachs has forecasted that crude prices will average around $45/bbl in 2016, and has even predicted that oil could fall as low as $20/bbl. EPA's cost analysis fails to consider the reality that many industry analysts have repeatedly voiced: lower oil and gas prices are likely to continue for the foreseeable future. EPA should therefore reevaluate its cost estimates based on more realistic revenue figures of the oil and gas sector. As discussed above, natural gas prices are likewise lower than EPA's estimates.

Response: Similar to the EPA's belief that is in reasonable to rely upon the EIA's Annual Energy Outlook for forecasts of natural gas prices in 2020 and 2025, it is reasonable to also rely upon the Annual Energy Outlook for projections of oil prices used in the small entity analyses supporting the Initial Regulatory Flexibility Analysis and Final Regulatory Flexibility Analysis. In fact, by using is 2020 and 2025 oil prices from the Annual Energy Outlook "low oil price" case, the EPA recognized the low oil price environment mentioned by the commenter. With respect to natural gas price assumptions, see response to DCN EPA-HQ-OAR-2010-0505-6847, Excerpt 3.

Commenter Name: W. Michael Scott, General Counsel
Commenter Affiliation: Trilogy Operating, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6603
Comment Excerpt Number: 58

Comment: By increasing compliance costs on natural gas production and transmission under the current market conditions, EPA could exacerbate grid reliability issues and increase greenhouse gas emissions from the electric generation sector. Meeting future domestic energy demands will require an ample supply of natural gas. According to the U.S. Energy Information Administration's ("EIA") Annual Energy Outlook 2015, natural gas consumption is expected to increase from "26.9 quadrillion Btu (26.2 Tcf) in 2013 to 30.5 quadrillion Btu (29.7 Tcf) in 2040. The largest share of the growth is for electricity generation in the electric power sector, where demand for natural gas grows from 8.4 quadrillion Btu (8.2 Tcf) in 2013 to 9.6 quadrillion Btu (9.4 Tcf) in 2040." This projection does not take into account EPA's own Clean Power Plan, which will further increase the demand for natural gas by incentivizing electric power generation from natural gas rather than coal.

The fact that EPA recently issued a final rule, known as the Clean Power Plan, to reduce greenhouse gas emissions from existing electric generation units, makes the oil and gas industry's ability to provide large quantities of natural gas at affordable prices even more critical. The Clean Power Plan sets limits on the greenhouse gas emissions that these power plants can emit in each state. One of the three "building blocks" the EPA proposes that states use to craft plans to cut emissions is to increase the use of natural gas combined cycle ("NGCC") units, and decrease the use of fossil-fuel fired steam generation units. This will require increasing the annual utilization rates of NGCC units, on average and within each region, to 75 percent on a net summer capacity basis. Meeting this goal will depend in large part on the ability to delivery natural gas to these units. In many cases this will involve building additional transmission infrastructure to transport the natural gas to the NGCC units.

> According to the North American Electric Reliability Corporation, the implementation of the [Clean Power Plan] final rule is expected to accelerate an ongoing shift toward greater use of natural-gas-fired generation. Increased dependence on natural gas use will require pipeline capacity, particularly during the winter season when natural gas use for electric power competes with residential heating. Approximately 60 GW of additional gas-fired capacity is estimated to be in service by 2020, and approximately 80 GW by 2030. The additional capacity plus the higher use of gas-fired generation is expected to increase gas demand in the United States from 39 Bcf/d to 50 Bcf/d—an increase of approximately 30 percent. Local and regional pipeline infrastructure will be needed to relieve pipeline constraints and fuel firming for the electric industry.

Moving gas requires midstream operators to build compressor stations as well as lay pipeline. Given the low natural gas prices under current market conditions, the additional burden of these proposed Rules may deter midstream operators from undertaking such construction. While some segments of the natural gas industry were already subject to control requirements under Subpart OOOO, the Methane NSPS expands these requirements for the first time to the midstream segment, and also adds costly and time consuming fugitive emissions monitoring, reporting, and recordkeeping requirements to both well sites and compressor stations. The Methane NSPS may also deter upstream operators from drilling or refracturing activities necessary to supply natural gas to these units.

A number of groups have already raised concerns about the potential grid reliability issues that could result from the Clean Power Plan, particularly because the renewable energy sources, such as wind and solar power, with which EPA contemplates replacing fossil fuels are not yet, and may never be, available in sufficient quantities to provide for the nation's current electric demands. In addition, many renewables cannot be reliably used to meet electric needs during peak demand times. When power plants are unable to meet the demand, blackouts can occur. As a result, the ability to use natural gas to power these electric generation units will continue to be critical to ensuring a reliable source of electric power. If natural gas is not available to supply power plants, then there may be shortages of electric generation as fossil-fuel fired plants are forced to retire, or states may not be able to meet their emission reductions targets.

EPA has already touted the major reductions in greenhouse gas emissions that it expects to gain from the Clean Power Plan. Indeed, EPA has stated that "[p]ower plants are the largest source of carbon dioxide emissions in the United States, making up roughly one-third of all domestic greenhouse gas emissions" and that "[w]hen the Clean Power Plan is fully in place in 2030, carbon pollution from the power sector will be 32 percent below 2005 levels – or 870 million tons less carbon pollution." These reductions far outweigh the modest 3 percent of domestic greenhouse gas emissions from methane that EPA attributes to the oil and gas sector. EPA would jeopardize the reductions that it hopes to achieve from the Clean Power Plan if it simultaneously imposes costly compliance requirements on natural gas operators. As a result, EPA should not attempt to implement these two sets of regulations at the same time.

Recommendations:

1. EPA should postpone consideration of the Methane NSPS and CTG until after 2025.
2. Alternatively, EPA should remove the fugitive emissions monitoring requirements from the Rules in order to ease the compliance burden on operators.

Response: The EPA disagrees with this comment. As presented in the final RIA for the Emission Standards for New and Modified Sources in the Oil and Natural Gas Sector, natural gas produced in the lower 48 states is projected to change very little relative to the baseline in terms of production and prices. As a result, the EPA does not anticipate that the final NSPS will negatively impact natural gas deliverability or otherwise threaten electricity reliability. With respect to comments related to CTGs, the final rule establishes standards for new, modified, and reconstructed sources. The CTGs are outside the scope of the final rule.

Commenter Name: W. Michael Scott, General Counsel
Commenter Affiliation: Trilogy Operating, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6603
Comment Excerpt Number: 59

Comment: By increasing compliance costs on natural gas production and transmission under the current market conditions, EPA could exacerbate grid reliability issues and increase greenhouse gas emissions from the electric generation sector. Meeting future domestic energy demands will require an ample supply of natural gas. According to the U.S. Energy Information Administration's ("EIA") Annual Energy Outlook 2015, natural gas consumption is expected to increase from "26.9 quadrillion Btu (26.2 Tcf) in 2013 to 30.5 quadrillion Btu (29.7 Tcf) in 2040. The largest share of the growth is for electricity generation in the electric power sector, where demand for natural gas grows from 8.4 quadrillion Btu (8.2 Tcf) in 2013 to 9.6 quadrillion Btu (9.4 Tcf) in 2040." This projection does not take into account EPA's own Clean Power Plan, which will further increase the demand for natural gas by incentivizing electric power generation from natural gas rather than coal.

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> According to the North American Electric Reliability Corporation, the implementation of the [Clean Power Plan] final rule is expected to accelerate an ongoing shift toward greater use of natural-gas-fired generation. Increased

> dependence on natural gas use will require pipeline capacity, particularly during the winter season when natural gas use for electric power competes with residential heating. Approximately 60 GW of additional gas-fired capacity is estimated to be in service by 2020, and approximately 80 GW by 2030. The additional capacity plus the higher use of gas-fired generation is expected to increase gas demand in the United States from 39 Bcf/d to 50 Bcf/d—an increase of approximately 30 percent. Local and regional pipeline infrastructure will be needed to relieve pipeline constraints and fuel firming for the electric industry.

Moving gas requires midstream operators to build compressor stations as well as lay pipeline. Given the low natural gas prices under current market conditions, the additional burden of these proposed Rules may deter midstream operators from undertaking such construction. While some segments of the natural gas industry were already subject to control requirements under Subpart OOOO, the Methane NSPS expands these requirements for the first time to the midstream segment, and also adds costly and time consuming fugitive emissions monitoring, reporting, and recordkeeping requirements to both well sites and compressor stations. The Methane NSPS may also deter upstream operators from drilling or refracturing activities necessary to supply natural gas to these units.

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EPA has already touted the major reductions in greenhouse gas emissions that it expects to gain from the Clean Power Plan. Indeed, EPA has stated that "[p]ower plants are the largest source of carbon dioxide emissions in the United States, making up roughly one-third of all domestic greenhouse gas emissions" and that "[w]hen the Clean Power Plan is fully in place in 2030, carbon pollution from the power sector will be 32 percent below 2005 levels – or 870 million tons less carbon pollution." These reductions far outweigh the modest 3 percent of domestic greenhouse gas emissions from methane that EPA attributes to the oil and gas sector. EPA would jeopardize the reductions that it hopes to achieve from the Clean Power Plan if it simultaneously imposes costly compliance requirements on natural gas operators. As a result, EPA should not attempt to implement these two sets of regulations at the same time.

Recommendations:

1. EPA should postpone consideration of the Methane NSPS and CTG until after 2025.
2. Alternatively, EPA should remove the fugitive emissions monitoring requirements from the Rules in order to ease the compliance burden on operators.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 58.

Commenter Name: W. Michael Scott, Vice President and General Counsel
Commenter Affiliation: CrownQuest Operating, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6703
Comment Excerpt Number: 13

Comment: EPA's estimates on the cost of labor for compliance are also wholly unreasonable. The Methane NSPS is a highly complex and technical rule with a number of overlapping requirements. Upstream oil and gas operations frequently fall beneath the air emissions thresholds for permitting requirements. As a result, this portion of the industry has not historically been subject to similar federal air regulations, and their staff is largely unfamiliar with the monitoring, reporting, and recordkeeping requirements that accompany such rules. This means that these entities will have to expend far more resources either training their own personnel, or hiring personnel with expertise in federal air regulatory matters. This is particularly true for operators in states that already have overlapping state air regulations, as the businesses will need to understand and convey to personnel the differences between the two sets of requirements. For example, the Texas Railroad Commission places limits on the venting or flaring of gas, and Colorado, Wyoming, Ohio, and Pennsylvania have state regulations regarding natural gas emissions and leaks. Differentiating between the requirements from state and federal regimes-particularly when those requirements conflict or overlap-will take additional time and resources.

For most upstream companies, well sites are spread out over a large geographic area. This dispersion of activities across a large geographic area is significantly different from the physical set up of larger facilities, such as natural gas processing plants or refineries, where EPA has imposed these kinds of monitoring requirements in the past. Unlike those larger sites, which have full-time personnel dedicated to one particular facility, most E&P companies assign one employee to multiple small sites. Well sites simply do not have the concentration of activity (including activity that would give rise to air emissions) to justify dedicating a single air compliance employee to each well site. Instead, the air compliance employee will have to spend substantial amounts of time traveling in order to visit each site semi-annually or quarterly, and will then have to keep up with the continual recordkeeping and reporting requirements for each of these small sites. CrownQuest estimates that operators will need to hire two full-time employee or contractor dedicated to implementing the requirements of the Methane NSPS for every 25 affected well sites operated. Given that there are almost 200,000 producing wells in Texas alone, this means the industry will eventually need to hire thousands of new employees merely to track and fix small equipment leaks.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6857, Excerpt 60.

Commenter Name: W. Michael Scott, Vice President and General Counsel
Commenter Affiliation: CrownQuest Operating, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6703
Comment Excerpt Number: 15

Comment: EPA is also relying on revenue estimates that no longer reflect the reality of the oil and gas market. For oil prices, EPA "estimated revenues using two alternative prices, $70/bbl and $50/bbl. In the results, EPA refers to the case using $70/bbl the 'primary scenario' and the case using the $50/bbl as the 'low oil price scenario.'" In contrast to EPA's estimates, the U.S. Energy Information Administration ("EIA") expects the price of Brent Crude Oil to average $53.96 for the year and the West Texas Intermediate spot average is expected to be $53.57 for the year. Prices have fallen below EPA's "low oil price scenario" of $50/bbl, and many industry experts predict that this trend will continue. For example, Brent crude prices remained below $50/bbl for 20 consecutive days in September 2015, and the West Texas Intermediate price fell to $44.74/bbl on October 1, 2015. Goldman Sachs has forecasted that crude prices will average around $45/bbl in 2016, and has even predicted that oil could fall as low as $20/bbl. EPA's cost analysis fails to consider the reality that many industry analysts have repeatedly voiced: lower oil and gas prices are likely to continue for the foreseeable future. EPA should therefore reevaluate its cost estimates based on more realistic revenue figures of the oil and gas sector. As discussed above, natural gas prices are likewise lower than EPA's estimates.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 17.

Commenter Name: W. Michael Scott, Vice President and General Counsel
Commenter Affiliation: CrownQuest Operating, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6703
Comment Excerpt Number: 50

Comment: By increasing compliance costs on natural gas production and transmission under the current market conditions, EPA could exacerbate grid reliability issues and increase greenhouse gas emissions from the electric generation sector.

Meeting future domestic energy demands will require an ample supply of natural gas. According to the U.S. Energy Information Administration's ("EIA") Annual Energy Outlook 2015, natural gas consumption is expected to increase from "26.9 quadrillion Btu (26.2 Tcf) in 2013 to 30.5 quadrillion Btu (29.7 Tcf) in 2040. The largest share of the growth is for electricity generation in the electric power sector, where demand for natural gas grows from 8.4 quadrillion Btu (8.2 Tcf) in 2013 to 9.6 quadrillion Btu (9.4 Tcf) in 2040." This projection does not take into account EPA's own Clean Power Plan, which will further increase the demand for natural gas by incentivizing electric power generation from natural gas rather than coal.

The fact that EPA recently issued a final rule, known as the Clean Power Plan, to reduce greenhouse gas emissions from existing electric generation units, makes the oil and gas industry's ability to provide large quantities of natural gas at affordable prices even more critical.

The Clean Power Plan sets limits on the greenhouse gas emissions that these power plants can emit in each state. One of the three "building blocks" the EPA proposes that states use to craft plans to cut emissions is to increase the use of natural gas combined cycle ("NGCC") units, and decrease the use of fossil-fuel fired steam generation units. This will require increasing the annual utilization rates of NGCC units, on average and within each region, to 75 percent on a net summer capacity basis. Meeting this goal will depend in large part on the ability to delivery natural gas to these units. In many cases this will involve building additional transmission infrastructure to transport the natural gas to the NGCC units.

According to the North American Electric Reliability Corporation,

The implementation of the [Clean Power Plan] final rule is expected to accelerate an ongoing shift toward greater use of natural-gas-fired generation. Increased dependence on natural gas use will require pipeline capacity, particularly during the winter season when natural gas use for electric power competes with residential heating. Approximately 60 GW of additional gas-fired capacity is estimated to be in service by 2020, and approximately 80 GW by 2030. The additional capacity plus the higher use of gas-fired generation is expected to increase gas demand in the United States from 39 Bcf/d to 50 Bcf/d - an increase of approximately 30 percent. Local and regional pipeline infrastructure will be needed to relieve pipeline constraints and fuel firming for the electric industry.

Moving gas requires midstream operators to build compressor stations as well as lay pipeline. Given the low natural gas prices under current market conditions, the additional burden of these proposed Rules may deter midstream operators from undertaking such construction. While some segments of the natural gas industry were already subject to control requirements under Subpart OOOO, the Methane NSPS expands these requirements for the first time to the midstream segment, and also adds costly and time consuming fugitive emissions monitoring, reporting, and recordkeeping requirements to both well sites and compressor stations. The Methane NSPS may also deter upstream operators from drilling or refracturing activities necessary to supply natural gas to these units.

A number of groups have already raised concerns about the potential grid reliability issues that could result from the Clean Power Plan, particularly because the renewable energy sources, such as wind and solar power, with which EPA contemplates replacing fossil fuels are not yet, and may never be, available in sufficient quantities to provide for the nation's current electric demands. In addition, many renewables cannot be reliably used to meet electric needs during peak demand times. When power plants are unable to meet the demand, blackouts can occur. As a result, the ability to use natural gas to power these electric generation units will continue to be critical to ensuring a reliable source of electric power. If natural gas is not available to supply power plants, then there may be shortages of electric generation as fossil-fuel fired plants are forced to retire, or states may not be able to meet their emission reductions targets.

EPA has already touted the major reductions in greenhouse gas emissions that it expects to gain from the Clean Power Plan. Indeed, EPA has stated that "[p]ower plants are the largest source of carbon dioxide emissions in the United States, making up roughly one-third of all domestic greenhouse gas emissions" and that "[w]hen the Clean Power Plan is fully in place in 2030,

carbon pollution from the power sector will be 32 percent below 2005 levels - or 870 million tons less carbon pollution." These reductions far outweigh the modest 3 percent of domestic greenhouse gas emissions from methane that EPA attributes to the oil and gas sector. EPA would jeopardize the reductions that it hopes to achieve from the Clean Power Plan if it simultaneously imposes costly compliance requirements on natural gas operators. As a result, EPA should not attempt to implement these two sets of regulations at the same time.

Recommendations:

1. EPA should postpone consideration of the Methane NSPS and CTG until after 2025.

2. Alternatively, EPA should remove the fugitive emissions monitoring requirements from the Rules in order to ease the compliance burden on operators.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 58.

Commenter Name: Bradley C. Cross, President/Partner
Commenter Affiliation: Big Star Oil & Gas, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6757
Comment Excerpt Number: 12

Comment: EPA's estimates on the cost of labor for compliance are also wholly unreasonable. The Methane NSPS is a highly complex and technical rule with a number of overlapping requirements. Upstream oil and gas operations frequently fall beneath the air emissions thresholds for permitting requirements. As a result, this portion of the industry has not historically been subject to similar federal air regulations, and their staff is largely unfamiliar with the monitoring, reporting, and recordkeeping requirements that accompany such rules. This means that these entities will have to expend far more resources either training their own personnel, or hiring personnel with expertise in federal air regulatory matters. This is particularly true for operators in states that already have overlapping state air regulations, as the businesses will need to understand and convey to personnel the differences between the two sets of requirements. For example, the Texas Railroad Commission places limits on the venting or flaring of gas, and Colorado, Wyoming, Ohio, and Pennsylvania have state regulations regarding natural gas emissions and leaks. Differentiating between the requirements from state and federal regimes—particularly when those requirements conflict or overlap—will take additional time and resources.

For most upstream companies, well sites are spread out over a large geographic area. This dispersion of activities across a large geographic area is significantly different from the physical set up of larger facilities, such as natural gas processing plants or refineries, where EPA has imposed these kinds of monitoring requirements in the past. Unlike those larger sites, which have full-time personnel dedicated to one particular facility, most E&P companies assign one employee to multiple small sites. Well sites simply do not have the concentration of activity (including activity that would give rise to air emissions) to justify dedicating a single air

compliance employee to each well site. Instead, the air compliance employee will have to spend substantial amounts of time traveling in order to visit each site semi-annually or quarterly, and will then have to keep up with the continual recordkeeping and reporting requirements for each of these small sites. Big Star estimates that operators will need to hire one full-time employee or contractor dedicated to implementing the requirements of the Methane NSPS for every 25 affected well sites operated. Given that there are almost 200,000 producing wells in Texas alone, this means the industry will eventually need to hire thousands of new employees merely to track and fix small equipment leaks.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6857, Excerpt 60.

Commenter Name: Bradley C. Cross, President/Partner
Commenter Affiliation: Big Star Oil & Gas, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6757
Comment Excerpt Number: 14

Comment: EPA is also relying on revenue estimates that no longer reflect the reality of the oil and gas market. For oil prices, EPA "estimated revenues using two alternative prices, $70/bbl and $50/bbl. In the results, EPA refers to the case using $70/bbl the 'primary scenario' and the case using the $50/bbl as the 'low oil price scenario.'" In contrast to EPA's estimates, the U.S. Energy Information Administration ("EIA") expects the price of Brent Crude Oil to average $53.96 for the year and the West Texas Intermediate spot average is expected to be $53.57 for the year. Prices have fallen below EPA's "low oil price scenario" of $50/bbl, and many industry experts predict that this trend will continue. For example, Brent crude prices remained below $50/bbl for 20 consecutive days in September 2015, and the West Texas Intermediate price fell to $44.74/bbl on October 1, 2015. Goldman Sachs has forecasted that crude prices will average around $45/bbl in 2016, and has even predicted that oil could fall as low as $20/bbl. EPA's cost analysis fails to consider the reality that many industry analysts have repeatedly voiced: lower oil and gas prices are likely to continue for the foreseeable future. EPA should therefore reevaluate its cost estimates based on more realistic revenue figures of the oil and gas sector. As discussed above, actual natural gas prices are likewise lower than EPA's estimates.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 17.

Commenter Name: Bradley C. Cross, President/Partner
Commenter Affiliation: Big Star Oil & Gas, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6757
Comment Excerpt Number: 49

Comment: By increasing compliance costs on natural gas production and transmission under the current market conditions, EPA could exacerbate grid reliability issues and increase greenhouse gas emissions from the electric generation sector.

Meeting future domestic energy demands will require an ample supply of natural gas. According to the U.S. Energy Information Administration's ("EIA") Annual Energy Outlook 2015, natural gas consumption is expected to increase from "26.9 quadrillion Btu (26.2 Tcf) in 2013 to 30.5 quadrillion Btu (29.7 Tcf) in 2040. The largest share of the growth is for electricity generation in the electric power sector, where demand for natural gas grows from 8.4 quadrillion Btu (8.2 Tcf) in 2013 to 9.6 quadrillion Btu (9.4 Tcf) in 2040." This projection does not take into account EPA's own Clean Power Plan, which will further increase the demand for natural gas by incentivizing electric power generation from natural gas rather than coal.

The fact that EPA recently issued a final rule, known as the Clean Power Plan, to reduce greenhouse gas emissions from existing electric generation units, makes the oil and gas industry's ability to provide large quantities of natural gas at affordable prices even more critical. The Clean Power Plan sets limits on the greenhouse gas emissions that these power plants can emit in each state. One of the three "building blocks" the EPA proposes that states use to craft plans to cut emissions is to increase the use of natural gas combined cycle ("NGCC") units, and decrease the use of fossil-fuel fired steam generation units. This will require increasing the annual utilization rates of NGCC units, on average and within each region, to 75 percent on a net summer capacity basis. Meeting this goal will depend in large part on the ability to delivery natural gas to these units. In many cases this will involve building additional transmission infrastructure to transport the natural gas to the NGCC units.

According to the North American Electric Reliability Corporation,

The implementation of the [Clean Power Plan] final rule is expected to accelerate an ongoing shift toward greater use of natural-gas-fired generation. Increased dependence on natural gas use will require pipeline capacity, particularly during the winter season when natural gas use for electric power competes with residential heating. Approximately 60 GW of additional gas-fired capacity is estimated to be in service by 2020, and approximately 80 GW by 2030. The additional capacity plus the higher use of gas-fired generation is expected to increase gas demand in the United States from 39 Bcf/d to 50 Bcf/d—an increase of approximately 30 percent. Local and regional pipeline infrastructure will be needed to relieve pipeline constraints and fuel firming for the electric industry.

Moving gas requires midstream operators to build compressor stations as well as lay pipeline. Given the low natural gas prices under current market conditions, the additional burden of these proposed Rules may deter midstream operators from undertaking such construction. While some segments of the natural gas industry were already subject to control requirements under Subpart OOOO, the Methane NSPS expands these requirements for the first time to the midstream segment, and also adds costly and time consuming fugitive emissions monitoring, reporting, and recordkeeping requirements to both well sites and compressor stations. The Methane NSPS may also deter upstream operators from drilling or refracturing activities necessary to supply natural gas to these units.

A number of groups have already raised concerns about the potential grid reliability issues that could result from the Clean Power Plan, particularly because the renewable energy sources, such as wind and solar power, with which EPA contemplates replacing fossil fuels are not yet, and

may never be, available in sufficient quantities to provide for the nation's current electric demands. In addition, many renewables cannot be reliably used to meet electric needs during peak demand times. When power plants are unable to meet the demand, blackouts can occur. As a result, the ability to use natural gas to power these electric generation units will continue to be critical to ensuring a reliable source of electric power. If natural gas is not available to supply power plants, then there may be shortages of electric generation as fossil-fuel fired plants are forced to retire, or states may not be able to meet their emission reductions targets.

EPA has already touted the major reductions in greenhouse gas emissions that it expects to gain from the Clean Power Plan. Indeed, EPA has stated that "[p]ower plants are the largest source of carbon dioxide emissions in the United States, making up roughly one-third of all domestic greenhouse gas emissions" and that "[w]hen the Clean Power Plan is fully in place in 2030, carbon pollution from the power sector will be 32 percent below 2005 levels – or 870 million tons less carbon pollution." These reductions far outweigh the modest 3 percent of domestic greenhouse gas emissions from methane that EPA attributes to the oil and gas sector. EPA would jeopardize the reductions that it hopes to achieve from the Clean Power Plan if it simultaneously imposes costly compliance requirements on natural gas operators. As a result, EPA should not attempt to implement these two sets of regulations at the same time.

Recommendations:

1. EPA should postpone consideration of the Methane NSPS and CTG until after 2025.

2. Alternatively, EPA should remove the fugitive emissions monitoring requirements from the Rules in order to ease the compliance burden on operators.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 58.

Commenter Name: Mike Cantrell, Chairman
Commenter Affiliation: National Stripper Well Association (NSWA)
Document Control Number: EPA-HQ-OAR-2010-0505-6758
Comment Excerpt Number: 5

Comment: EPA Rulemaking is a misguided attempt to combat climate change that will harm domestic production. The idea that establishing New Source Performance Standards (NSPS) to specifically target the exploration and production (E&P) segment of the oil and natural gas industry as an effort to combat climate change is the height of foolishness, wasteful governmental bureaucracy and ineffective federal regulation. This action ignores the fact that by EPA's own calculations, U.S. gas production has quadrupled since the mid-2000s, while at the same time methane emissions from oil and gas operations have declined by more than 13-percent. All these emissions reductions have taken place at the same time as U.S. production of natural gas has grown more than 40 percent. One would imagine that in a world where production is up and emissions were down that EPA would spend their time and energy focusing on other priorities. However that is not the case. There should be no doubt that the regulations

EPA is proposing will have a serious negative economic impact on American oil and natural gas production while providing limited environmental benefit, and could result in trade and industry harm if they drive out existing small producers.

Response: The EPA disagrees with the commenter that the rule will have serious negative economic impacts on U.S. crude oil and natural gas production, as well as on the economy as a whole. Please see the response to DCN EPA-HQ-OAR-2010-0505-7336, Excerpt 242 for more information. The EPA also disagrees that the rule will provide limited environmental benefit due to increasing production coupled with decreasing methane emissions. For more information, please refer to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 49.

Commenter Name: Glenn Prescott
Commenter Affiliation: RK Petroleum Corporation
Document Control Number: EPA-HQ-OAR-2010-0505-6788
Comment Excerpt Number: 13

Comment: EPA's estimates on the cost of labor for compliance are also wholly unreasonable. The Methane NSPS is a highly complex and technical rule with a number of overlapping requirements. Upstream oil and gas operations frequently fall beneath the air emissions thresholds for permitting requirements. As a result, this portion of the industry has not historically been subject to similar federal air regulations, and their staff is largely unfamiliar with the monitoring, reporting, and recordkeeping requirements that accompany such rules. This means that these entities will have to expend far more resources either training their own personnel, or hiring personnel with expertise in federal air regulatory matters. This is particularly true for operators in states that already have overlapping state air regulations, as the businesses will need to understand and convey to personnel the differences between the two sets of requirements. For example, the Texas Railroad Commission places limits on the venting or flaring of gas, and Colorado, Wyoming, Ohio, and Pennsylvania have state regulations regarding natural gas emissions and leaks. Differentiating between the requirements from state and federal regimes—particularly when those requirements conflict or overlap—will take additional time and resources.

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affected well sites operated. Given that there are almost 200,000 producing wells in Texas alone, this means the industry will eventually need to hire thousands of new employees merely to track and fix small equipment leaks.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6857, Excerpt 60 in Chapter 11 of this document.

Commenter Name: Glenn Prescott
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Document Control Number: EPA-HQ-OAR-2010-0505-6788
Comment Excerpt Number: 15

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Commenter Name: Glenn Prescott
Commenter Affiliation: RK Petroleum Corporation
Document Control Number: EPA-HQ-OAR-2010-0505-6788
Comment Excerpt Number: 50

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a result, the ability to use natural gas to power these electric generation units will continue to be critical to ensuring a reliable source of electric power. If natural gas is not available to supply power plants, then there may be shortages of electric generation as fossil-fuel fired plants are forced to retire, or states may not be able to meet their emission reductions targets.

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Recommendations:

1. EPA should postpone consideration of the Methane NSPS and CTG until after 2025.

2. Alternatively, EPA should remove the fugitive emissions monitoring requirements from the Rules in order to ease the compliance burden on operators.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 58.

Commenter Name: Kari Cutting
Commenter Affiliation: North Dakota Petroleum Council (NDPC)
Document Control Number: EPA-HQ-OAR-2010-0505-6789
Comment Excerpt Number: 20

Comment: The Administration's Executive Order 12866 requires each agency to write regulations that are simple and easy to understand. As described in these comments, the Proposed NSPS OOOOa requirements raise multiple questions without resolution, lack clarity and potentially create significant limitations for future oil and gas development in North Dakota due to requiring infeasible standards and practices.

In addition, Federal Executive Order 13211 requires that the Proposed NSPS OOOOa not have a substantial direct effect on the nation's energy costs. NDPC disagrees with EPA's determination that Proposed NSPS OOOOa would not have "a significant adverse effect on the supply, distribution, or use of energy" due to its burdensome and infeasible requirements. This proposed rule is likely to have significant adverse effects on the supply of our nation's energy. It will significantly increase the cost of producing domestic natural gas and crude oil, consequently driving down production and increase America's dependence on foreign oil, primarily from areas of the world that are currently experiencing substantial cultural upheaval and political turmoil.

Response: The EPA agrees that E.O. 12866 directs federal agencies to develop regulations that are "simple and easy to understand, with the goal of minimizing the potential for uncertainty and litigation arising from such uncertainty." (Exec. Order No. 12866 (1993), Section 1, paragraph (b)(12)) While we believe we have followed the directives of E.O. 12866 to the extent possible, we point out to the commenter that subpart OOOOa must deal with a very complex industry spread across diverse geographic areas that often have competing interests. Therefore, we are under an obligation to address the concerns of stakeholders throughout the country, not just those within North Dakota. Addressing this complexity necessarily carried over somewhat into the rule itself as we attempted to answer the concerns of all stakeholders. During the public comment period, we received input from other commenters who also expressed concern about the rule's complexity. We took all of those comments very seriously and made substantial changes to the final rule to address as many of the concerns as was reasonable. Those changes are discussed in more detail in the various chapters of this Response to Comments document and are too numerous to list in this response.

However, below are some examples of how we amended the proposed rule to conform to the requirements of E.O. 12866, as well as to improve the final rule with greater clarity, consistency, and simplicity:

- In section VII of the preamble to the final rule, we have provided a thorough explanation of NSR and title V permitting issues and the applicable changes we made in the final rule to address concerns raised by commenters.
- In the final rule, we accounted for the flaring that is required for wells in North Dakota. Details of our analysis can be found in the well completions chapter of this document as well as in the TSD for the final rule.
- We have expanded recordkeeping requirements in the final rule to include: (1) the reasons for the claim of technical infeasibility with respect to all four options provided in §60.5375a(a)(1)(ii), including but not limited to, name and location of the nearest gathering line; capture, re-injection, and reuse technologies considered; aspects of gas or equipment prohibiting use of recovered gas as a fuel onsite; and (2) technical considerations prohibiting any other beneficial use of recovered gas on site.
- In the final rule, we are requiring that the initial monitoring survey for well sites must take place within 180 days after the date of publication of the final rule in the Federal Register or within 60 days of the startup of production, whichever is later. For compressor stations, the initial monitoring survey must take place within one year after the date of publication of the final rule in the Federal Register or within 60 days of the startup, whichever is later. See sections VI.F.1.g and VI.F.2.f of the preamble to the final rule for more detail regarding this issue.

In addition to these specific issues, the EPA made other changes to the final rule to simplify and clarify the requirements. For example, one area in which we believe we provided a substantial simplification of the final rule is the proposed corporate-wide and site-specific monitoring plans. In the final rule, we are replacing the proposed corporate-wide and site-specific monitoring plan requirements with a requirement for owners or operators to develop a corporate monitoring plan for each company-defined area that would cover the collection of fugitive emissions components at the well sites or compressor stations located within that company-defined area. This will allow

owners and operators flexibility in developing monitoring plans for well sites and compressor stations by allowing owners and operators to determine which company-defined area can be covered under the specifications outlined in one monitoring plan, for ease of implementation and compliance.

We did not finalize proposed requirements for third-party auditors and verification. We did finalize the proposed electronic reporting requirements, which we believe will ultimately reduce the time required to prepare and submit annual reports. We also reviewed other recordkeeping and reporting requirements throughout the rule to assure that they are the minimum necessary to verify compliance.

Although this is just a portion of the changes we made to the rule for the purpose of simplicity and reducing burden, we believe these examples indicate the EPA's commitment to promulgate rules consistent with the requirements of E.O. 12866

As described in section 6.2 of the RIA, the EPA estimates the impact of the final regulation on U.S. energy markets. The EPA estimates that the final rule will have relatively small impacts on oil and natural gas drilling, production, and prices in the United States over the 2020 to 2025 period. None of these impacts are anticipated to rise above the thresholds described in OMB's Memoranda 01-27 (Guidance for Implementing E.O. 13211).[2] As a result, the EPA determined this action is not a significant energy action. For more information, please see response to DCN EPA-HQ-OAR-2010-0505-7336, Excerpt 98.

Commenter Name: W. Jeffrey Sparks
Commenter Affiliation: Discovery Operating, Inc
Document Control Number: EPA-HQ-OAR-2010-0505-6790
Comment Excerpt Number: 12

Comment: EPA's estimates on the cost of labor for compliance are also wholly unreasonable. The Methane NSPS is a highly complex and technical rule with a number of overlapping requirements. Upstream oil and gas operations frequently fall beneath the air emissions thresholds for permitting requirements. As a result, this portion of the industry has not historically been subject to similar federal air regulations, and their staff is largely unfamiliar with the monitoring, reporting, and recordkeeping requirements that accompany such rules. This means that these entities will have to expend far more resources either training their own personnel, or hiring personnel with expertise in federal air regulatory matters. This is particularly true for operators in states that already have overlapping state air regulations, as the businesses will need to understand and convey to personnel the differences between the two sets of requirements. For example, the Texas Railroad Commission places limits on the venting or flaring of gas, and Colorado, Wyoming, Ohio, and Pennsylvania have state regulations regarding natural gas emissions and leaks. Differentiating between the requirements from state and federal

[2] https://www.whitehouse.gov/omb/memoranda_m01-27/

regimes—particularly when those requirements conflict or overlap—will take additional time and resources.

For most upstream companies, well sites are spread out over a large geographic area. This dispersion of activities across a large geographic area is significantly different from the physical set up of larger facilities, such as natural gas processing plants or refineries, where EPA has imposed these kinds of monitoring requirements in the past. Unlike those larger sites, which have full-time personnel dedicated to one particular facility, most E&P companies assign one employee to multiple small sites. Well sites simply do not have the concentration of activity (including activity that would give rise to air emissions) to justify dedicating a single air compliance employee to each well site. Instead, the air compliance employee will have to spend substantial amounts of time traveling in order to visit each site semi-annually or quarterly, and will then have to keep up with the continual recordkeeping and reporting requirements for each of these small sites. Discovery estimates that operators will need to hire one full-time employee or contractor dedicated to implementing the requirements of the Methane NSPS for every 25 affected well sites operated. Given that there are almost 200,000 producing wells in Texas alone, this means the industry will eventually need to hire thousands of new employees merely to track and fix small equipment leaks.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6857, Excerpt 60 in Chapter 11 of this document.

Commenter Name: W. Jeffrey Sparks
Commenter Affiliation: Discovery Operating, Inc
Document Control Number: EPA-HQ-OAR-2010-0505-6790
Comment Excerpt Number: 13

Comment: According to EPA's analysis, "[t]he annual public reporting and recordkeeping burden for this collection of information is estimated to average 3.9 hours per response. Respondents must monitor all specified criteria at each affected facility and maintain these records for 5 years." Discovery estimates that the actual annual burden imposed by these Rules will be closer to 40-60 hours per affected well site, which will result in an additional cost of $3,500-$5,000 in labor per well site per year. Given that there are hundreds of thousands, if not more than a million, well sites around the nation, these reporting and recordkeeping requirements will eventually balloon into tremendous industry-wide compliance costs.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6857, Excerpt 60 in Chapter 11 of this document.

Commenter Name: W. Jeffrey Sparks
Commenter Affiliation: Discovery Operating, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6790
Comment Excerpt Number: 15

Comment: EPA is also relying on revenue estimates that no longer reflect the reality of the oil and gas market. For oil prices, EPA "estimated revenues using two alternative prices, $70/bbl and $50/bbl. In the results, EPA refers to the case using $70/bbl the 'primary scenario' and the case using the $50/bbl as the 'low oil price scenario.'" In contrast to EPA's estimates, the U.S. Energy Information Administration ("EIA") expects the price of Brent Crude Oil to average $53.96 for the year and the West Texas Intermediate spot average is expected to be $53.57 for the year. Prices have fallen below EPA's "low oil price scenario" of $50/bbl, and many industry experts predict that this trend will continue. For example, Brent crude prices remained below $50/bbl for 20 consecutive days in September 2015, and the West Texas Intermediate price fell to $44.74/bbl on October 1, 2015. Goldman Sachs has forecasted that crude prices will average around $45/bbl in 2016, and has even predicted that oil could fall as low as $20/bbl. EPA's cost analysis fails to consider the reality that many industry analysts have repeatedly voiced: lower oil and gas prices are likely to continue for the foreseeable future. EPA should therefore reevaluate its cost estimates based on more realistic revenue figures of the oil and gas sector. As discussed above, natural gas prices are likewise lower than EPA's estimates.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 17.

Commenter Name: W. Jeffrey Sparks
Commenter Affiliation: Discovery Operating, Inc
Document Control Number: EPA-HQ-OAR-2010-0505-6790
Comment Excerpt Number: 50

Comment: By increasing compliance costs on natural gas production and transmission under the current market conditions, EPA could exacerbate grid reliability issues and increase greenhouse gas emissions from the electric generation sector.

Meeting future domestic energy demands will require an ample supply of natural gas. According to the U.S. Energy Information Administration's ("EIA") Annual Energy Outlook 2015, natural gas consumption is expected to increase from "26.9 quadrillion Btu (26.2 Tcf) in 2013 to 30.5 quadrillion Btu (29.7 Tcf) in 2040. The largest share of the growth is for electricity generation in the electric power sector, where demand for natural gas grows from 8.4 quadrillion Btu (8.2 Tcf) in 2013 to 9.6 quadrillion Btu (9.4 Tcf) in 2040." This projection does not take into account EPA's own Clean Power Plan, which will further increase the demand for natural gas by incentivizing electric power generation from natural gas rather than coal.

The fact that EPA recently issued a final rule, known as the Clean Power Plan, to reduce greenhouse gas emissions from existing electric generation units, makes the oil and gas industry's ability to provide large quantities of natural gas at affordable prices even more critical.

The Clean Power Plan sets limits on the greenhouse gas emissions that these power plants can emit in each state. One of the three "building blocks" the EPA proposes that states use to craft plans to cut emissions is to increase the use of natural gas combined cycle ("NGCC") units, and decrease the use of fossil-fuel fired steam generation units. This will require increasing the annual utilization rates of NGCC units, on average and within each region, to 75 percent on a net summer capacity basis. Meeting this goal will depend in large part on the ability to delivery natural gas to these units. In many cases this will involve building additional transmission infrastructure to transport the natural gas to the NGCC units.

> According to the North American Electric Reliability Corporation, the implementation of the [Clean Power Plan] final rule is expected to accelerate an ongoing shift toward greater use of natural-gas-fired generation. Increased dependence on natural gas use will require pipeline capacity, particularly during the winter season when natural gas use for electric power competes with residential heating. Approximately 60 GW of additional gas-fired capacity is estimated to be in service by 2020, and approximately 80 GW by 2030. The additional capacity plus the higher use of gas-fired generation is expected to increase gas demand in the United States from 39 Bcf/d to 50 Bcf/d—an increase of approximately 30 percent. Local and regional pipeline infrastructure will be needed to relieve pipeline constraints and fuel firming for the electric industry.

Moving gas requires midstream operators to build compressor stations as well as lay pipeline. Given the low natural gas prices under current market conditions, the additional burden of these proposed Rules may deter midstream operators from undertaking such construction. While some segments of the natural gas industry were already subject to control requirements under Subpart OOOO, the Methane NSPS expands these requirements for the first time to the midstream segment, and also adds costly and time consuming fugitive emissions monitoring, reporting, and recordkeeping requirements to both well sites and compressor stations. The Methane NSPS may also deter upstream operators from drilling or refracturing activities necessary to supply natural gas to these units.

A number of groups have already raised concerns about the potential grid reliability issues that could result from the Clean Power Plan, particularly because the renewable energy sources, such as wind and solar power, with which EPA contemplates replacing fossil fuels are not yet, and may never be, available in sufficient quantities to provide for the nation's current electric demands. In addition, many renewables cannot be reliably used to meet electric needs during peak demand times. When power plants are unable to meet the demand, blackouts can occur. As a result, the ability to use natural gas to power these electric generation units will continue to be critical to ensuring a reliable source of electric power. If natural gas is not available to supply power plants, then there may be shortages of electric generation as fossil-fuel fired plants are forced to retire, or states may not be able to meet their emission reductions targets.

EPA has already touted the major reductions in greenhouse gas emissions that it expects to gain from the Clean Power Plan. Indeed, EPA has stated that "[p]ower plants are the largest source of carbon dioxide emissions in the United States, making up roughly one-third of all domestic greenhouse gas emissions" and that "[w]hen the Clean Power Plan is fully in place in 2030, carbon pollution from the power sector will be 32 percent below 2005 levels – or 870 million

tons less carbon pollution." These reductions far outweigh the modest 3 percent of domestic greenhouse gas emissions from methane that EPA attributes to the oil and gas sector. EPA would jeopardize the reductions that it hopes to achieve from the Clean Power Plan if it simultaneously imposes costly compliance requirements on natural gas operators. As a result, EPA should not attempt to implement these two sets of regulations at the same time.

Recommendations:
1. EPA should postpone consideration of the Methane NSPS and CTG until after 2025.
2. Alternatively, EPA should remove the fugitive emissions monitoring requirements from the Rules in order to ease the compliance burden on operators.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 58.

Commenter Name: J. Roger Kelley
Commenter Affiliation: Domestic Energy Producer's Alliance (DEPA)
Document Control Number: EPA-HQ-OAR-2010-0505-6793
Comment Excerpt Number: 16

Comment: Executive Order 12866 requires each agency to write regulations that are simple and easy to understand. As described in these comments, the proposed regulations raise multiple questions without resolution, lack clarity and potentially create significant limitations for future oil and gas development due to requiring infeasible standards and practices.

In addition, Executive Order 13211 requires that the proposed rule not have a substantial direct effect on the nation's energy costs. DEPA disagrees with EPA's determination that Proposed NSPS OOOOa would not have "a significant adverse effect on the supply, distribution, or use of energy" due to its burdensome and infeasible requirements. This proposed rule is likely to have significantly adverse effects on the supply of our nation's energy. It will significantly increases the cost of producing domestic natural gas and crude oil, consequently driving down production and increase America's dependence on foreign oil, primarily from areas of the world that are currently experiencing substantial cultural upheaval and political turmoil.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6789, Excerpt 20.

Commenter Name: Josh W. Luig
Commenter Affiliation: Veritas Energy, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6797
Comment Excerpt Number: 14

Comment: Upstream oil and gas operations frequently fall beneath the air emissions thresholds for permitting requirements. As a result, this portion of the industry has not historically been subject to similar federal air regulations, and their staff is largely unfamiliar with the monitoring,

reporting, and recordkeeping requirements that accompany such rules. This means that these entities will have to expend far more resources either training their own personnel, or hiring personnel with expertise in federal air regulatory matters. This is particularly true for operators in states that already have overlapping state air regulations, as the businesses will need to understand and convey to personnel the differences between the two sets of requirements. For example, the Texas Railroad Commission places limits on the venting or flaring of gas, and Colorado, Wyoming, Ohio, and Pennsylvania have state regulations regarding natural gas emissions and leaks. Differentiating between the requirements from state and federal regimes—particularly when those requirements conflict or overlap—will take additional time and resources.

For most upstream companies, well sites are spread out over a large geographic area. This dispersion of activities across a large geographic area is significantly different from the physical set up of larger facilities, such as natural gas processing plants or refineries, where EPA has imposed these kinds of monitoring requirements in the past. Unlike those larger sites, which have full-time personnel dedicated to one particular facility, most E&P companies assign one employee to multiple small sites. Well sites simply do not have the concentration of activity (including activity that would give rise to air emissions) to justify dedicating a single air compliance employee to each well site. Instead, the air compliance employee will have to spend substantial amounts of time traveling in order to visit each site semi-annually or quarterly, and will then have to keep up with the continual recordkeeping and reporting requirements for each of these small sites. Veritas estimates that operators will need to hire one full-time employee or contractor dedicated to implementing the requirements of the Methane NSPS for every 25 affected well sites operated. Given that there are almost 200,000 producing wells in Texas alone, this means the industry will eventually need to hire thousands of new employees merely to track and fix small equipment leaks.

Response: Please see response to DCN EPA-HQ-OAR-2010-0505-6857, Excerpt 60 in Chapter 11 of this document.

Commenter Name: Josh W. Luig
Commenter Affiliation: Veritas Energy, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6797
Comment Excerpt Number: 51

Comment: By increasing compliance costs on natural gas production and transmission under the current market conditions, EPA could exacerbate grid reliability issues and increase greenhouse gas emissions from the electric generation sector.

Meeting future domestic energy demands will require an ample supply of natural gas. According to the U.S. Energy Information Administration's ("EIA") Annual Energy Outlook 2015, natural gas consumption is expected to increase from "26.9 quadrillion Btu (26.2 Tcf) in 2013 to 30.5 quadrillion Btu (29.7 Tcf) in 2040. The largest share of the growth is for electricity generation in the electric power sector, where demand for natural gas grows from 8.4 quadrillion Btu (8.2 Tcf)

in 2013 to 9.6 quadrillion Btu (9.4 Tcf) in 2040." This projection does not take into account EPA's own Clean Power Plan, which will further increase the demand for natural gas by incentivizing electric power generation from natural gas rather than coal.

The fact that EPA recently issued a final rule, known as the Clean Power Plan, to reduce greenhouse gas emissions from existing electric generation units, makes the oil and gas industry's ability to provide large quantities of natural gas at affordable prices even more critical. The Clean Power Plan sets limits on the greenhouse gas emissions that these power plants can emit in each state. One of the three "building blocks" the EPA proposes that states use to craft plans to cut emissions is to increase the use of natural gas combined cycle ("NGCC") units, and decrease the use of fossil-fuel fired steam generation units. This will require increasing the annual utilization rates of NGCC units, on average and within each region, to 75 percent on a net summer capacity basis. Meeting this goal will depend in large part on the ability to delivery natural gas to these units. In many cases this will involve building additional transmission infrastructure to transport the natural gas to the NGCC units.

According to the North American Electric Reliability Corporation, the implementation of the [Clean Power Plan] final rule is expected to accelerate an ongoing shift toward greater use of natural-gas-fired generation. Increased dependence on natural gas use will require pipeline capacity, particularly during the winter season when natural gas use for electric power competes with residential heating. Approximately 60 GW of additional gas-fired capacity is estimated to be in service by 2020, and approximately 80 GW by 2030. The additional capacity plus the higher use of gas-fired generation is expected to increase gas demand in the United States from 39 Bcf/d to 50 Bcf/d—an increase of approximately 30 percent. Local and regional pipeline infrastructure will be needed to relieve pipeline constraints and fuel firming for the electric industry.

Moving gas requires midstream operators to build compressor stations as well as lay pipeline. Given the low natural gas prices under current market conditions, the additional burden of these proposed Rules may deter midstream operators from undertaking such construction. While some segments of the natural gas industry were already subject to control requirements under Subpart OOOO, the Methane NSPS expands these requirements for the first time to the midstream segment, and also adds costly and time consuming fugitive emissions monitoring, reporting, and recordkeeping requirements to both well sites and compressor stations. The Methane NSPS may also deter upstream operators from drilling or refracturing activities necessary to supply natural gas to these units.

A number of groups have already raised concerns about the potential grid reliability issues that could result from the Clean Power Plan, particularly because the renewable energy sources, such as wind and solar power, with which EPA contemplates replacing fossil fuels are not yet, and may never be, available in sufficient quantities to provide for the nation's current electric demands. In addition, many renewables cannot be reliably used to meet electric needs during peak demand times. When power plants are unable to meet the demand, blackouts can occur. As a result, the ability to use natural gas to power these electric generation units will continue to be critical to ensuring a reliable source of electric power. If natural gas is not available to supply

power plants, then there may be shortages of electric generation as fossil-fuel fired plants are forced to retire, or states may not be able to meet their emission reductions targets.

EPA has already touted the major reductions in greenhouse gas emissions that it expects to gain from the Clean Power Plan. Indeed, EPA has stated that "[p]ower plants are the largest source of carbon dioxide emissions in the United States, making up roughly one-third of all domestic greenhouse gas emissions" and that "[w]hen the Clean Power Plan is fully in place in 2030, carbon pollution from the power sector will be 32 percent below 2005 levels – or 870 million tons less carbon pollution." These reductions far outweigh the modest 3 percent of domestic greenhouse gas emissions from methane that EPA attributes to the oil and gas sector. EPA would jeopardize the reductions that it hopes to achieve from the Clean Power Plan if it simultaneously imposes costly compliance requirements on natural gas operators. As a result, EPA should not attempt to implement these two sets of regulations at the same time.

Recommendations:
1. EPA should postpone consideration of the Methane NSPS and CTG until after 2025.
2. Alternatively, EPA should remove the fugitive emissions monitoring requirements from the Rules in order to ease the compliance burden on operators.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 58.

Commenter Name: Rick D. Davis, Jr.
Commenter Affiliation: Midland Energy, Inc. and Petroplex Energy, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6801
Comment Excerpt Number: 13

Comment: EPA's estimates on the cost of labor for compliance are also wholly unreasonable. The Methane NSPS is a highly complex and technical rule with a number of overlapping requirements. Upstream oil and gas operations frequently fall beneath the air emissions thresholds for permitting requirements. As a result, this portion of the industry has not historically been subject to similar federal air regulations, and their staff is largely unfamiliar with the monitoring, reporting, and recordkeeping requirements that accompany such rules. This means that these entities will have to expend far more resources either training their own personnel, or hiring personnel with expertise in federal air regulatory matters. This is particularly true for operators in states that already have overlapping state air regulations, as the businesses will need to understand and convey to personnel the differences between the two sets of requirements. For example, the Texas Railroad Commission places limits on the venting or flaring of gas, and Colorado, Wyoming, Ohio, and Pennsylvania have state regulations regarding natural gas emissions and leaks. Differentiating between the requirements from state and federal regimes-particularly when those requirements conflict or overlap--will take additional time and resources.

For most upstream companies, well sites are spread out over a large geographic area. This dispersion of activities across a large geographic area is significantly different from the physical

set up of larger facilities, such as natural gas processing plants or refineries, where EPA has imposed these kinds of monitoring requirements in the past. Unlike those larger sites, which have full-time personnel dedicated to one particular facility, most E&P companies assign one employee to multiple small sites. Well sites simply do not have the concentration of activity (including activity that would give rise to air emissions) to justify dedicating a single air compliance employee to each well site. Instead, the air compliance employee will have to spend substantial amounts of time traveling in order to visit each site semi-annually or quarterly, and will then have to keep up with the continual recordkeeping and reporting requirements for each of these small sites. MEI estimates that operators will need to hire one full-time employee or contractor dedicated to implementing the requirements of the Methane NSPS for every 25 affected well sites operated. Given that there are almost 200,000 producing wells in Texas alone, this means the industry will eventually need to hire thousands of new employees merely to track and fix small equipment leaks.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6857, Excerpt 60 in Chapter 11 of this document.

Commenter Name: Rick D. Davis, Jr.
Commenter Affiliation: Midland Energy, Inc. and Petroplex Energy, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6801
Comment Excerpt Number: 15

Comment: EPA is also relying on revenue estimates that no longer reflect the reality of the oil and gas market. For oil prices, EPA "estimated revenues using two alternative prices, $70/bbl and $50/bbl. In the results, EPA refers to the case using $70/bbl the 'primary scenario' and the case using the $50/bbl as the 'low oil price scenario.'" In contrast to EPA's estimates, the U.S. Energy Information Administration ("EIA") expects the price of Brent Crude Oil to average $53.96 for the year and the West Texas Intermediate spot average is expected to be $53.57 for the year. Prices have fallen below EPA's "low oil price scenario" of $50/bbl, and many industry experts predict that this trend will continue. For example, Brent crude prices remained below $50/bbl for 20 consecutive days in September 2015, and the West Texas Intermediate price fell to $44.74/bbl on October 1, 2015. Goldman Sachs has forecasted that crude prices will average around $45/bbl in 2016, and has even predicted that oil could fall as low as $20/bbl. EPA's cost analysis fails to consider the reality that many industry analysts have repeatedly voiced: lower oil and gas prices are likely to continue for the foreseeable future. EPA should therefore reevaluate its cost estimates based on more realistic revenue figures of the oil and gas sector. As discussed above, natural gas prices are likewise lower than EPA's estimates.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 17.

Commenter Name: Rick D. Davis, Jr.
Commenter Affiliation: Midland Energy, Inc. and Petroplex Energy, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6801
Comment Excerpt Number: 50

Comment: By increasing compliance costs on natural gas production and transmission under the current market conditions, EPA could exacerbate grid reliability issues and increase greenhouse gas emissions from the electric generation sector.

Meeting future domestic energy demands will require an ample supply of natural gas. According to the U.S. Energy Information Administration's ("EIA") Annual Energy Outlook 2015, natural gas consumption is expected to increase from "26.9 quadrillion Btu (26.2 Tcf) in 2013 to 30.5 quadrillion Btu (29.7 Tcf) in 2040. The largest share of the growth is for electricity generation in the electric power sector, where demand for natural gas grows from 8.4 quadrillion Btu (8.2 Tcf) in 2013 to 9.6 quadrillion Btu (9.4 Tcf) in 2040." This projection does not take into account EPA's own Clean Power Plan, which will further increase the demand for natural gas by incentivizing electric power generation from natural gas rather than coal.

The fact that EPA recently issued a final rule, known as the Clean Power Plan, to reduce greenhouse gas emissions from existing electric generation units, makes the oil and gas industry's ability to provide large quantities of natural gas at affordable prices even more critical. The Clean Power Plan sets limits on the greenhouse gas emissions that these power plants can emit in each state. One of the three "building blocks" the EPA proposes that states use to craft plans to cut emissions is to increase the use of natural gas combined cycle ("NGCC") units, and decrease the use of fossil-fuel fired steam generation units. This will require increasing the annual utilization rates of NGCC units, on average and within each region, to 75 percent on a net summer capacity basis. Meeting this goal will depend in large part on the ability to delivery natural gas to these units. In many cases this will involve building additional transmission infrastructure to transport the natural gas to the NGCC units.

According to the North American Electric Reliability Corporation,

The implementation of the [Clean Power Plan] final rule is expected to accelerate an ongoing shift toward greater use of natural-gas-fired generation. Increased dependence on natural gas use will require pipeline capacity, particularly during the winter season when natural gas use for electric power competes with residential heating. Approximately 60 GW of additional gas-fired capacity is estimated to be in service by 2020, and approximately 80 GW by 2030. The additional capacity plus the higher use of gas-fired generation is expected to increase gas demand in the United States from 39 Bcf/d to 50 Bcf/d-an increase of approximately 30 percent. Local and regional pipeline infrastructure will be needed to relieve pipeline constraints and fuel firming for the electric industry.

Moving gas requires midstream operators to build compressor stations as well as lay pipeline. Given the low natural gas prices under current market conditions, the additional burden of these proposed Rules may deter midstream operators from undertaking such construction. While some segments of the natural gas industry were already subject to control requirements under Subpart

OOOO, the Methane NSPS expands these requirements for the first time to the midstream segment, and also adds costly and time consuming fugitive emissions monitoring, reporting, and recordkeeping requirements to both well sites and compressor stations. The Methane NSPS may also deter upstream operators from drilling or refracturing activities necessary to supply natural gas to these units.

A number of groups have already raised concerns about the potential grid reliability issues that could result from the Clean Power Plan, particularly because the renewable energy sources, such as wind and solar power, with which EPA contemplates replacing fossil fuels are not yet, and may never be, available in sufficient quantities to provide for the nation's current electric demands. In addition, many renewables cannot be reliably used to meet electric needs during peak demand times. When power plants are unable to meet the demand, blackouts can occur. As a result, the ability to use natural gas to power these electric generation units will continue to be critical to ensuring a reliable source of electric power. If natural gas is not available to supply power plants, then there may be shortages of electric generation as fossil-fuel fired plants are forced to retire, or states may not be able to meet their emission reductions targets.

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Recommendations:

1. EPA should postpone consideration of the Methane NSPS and CTG until after 2025.

2. Alternatively, EPA should remove the fugitive emissions monitoring requirements from the Rules in order to ease the compliance burden on operators.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 58.

Commenter Name: Urban Obie O'Brien
Commenter Affiliation: Apache Corporation
Document Control Number: EPA-HQ-OAR-2010-0505-6808
Comment Excerpt Number: 4

Comment: Scope of Regulated Facilities: Upon evaluating the requirements of the proposed rule, it is apparent the EPA has not adequately understood or properly addressed the geographic

scope, extensive number of facilities, and the time and distance involved in travelling between assets that comprise the Oil and Gas Industry. Records indicate there are approximately 1.1 million oil and natural gas wells in the United States. Apache Corporation has three operating regions in the United States that encompass approximately 132,000 square miles (see Attachment 1). [Attachment 1 provides a map of the NM, OK and TX operations for Apache] Within those regions there are approximately 17,300 wells and 5,400 associated production facilities on leases held by the company. These assets are not typically contiguous or consolidated but rather are dispersed, individually or in clusters, within the boundaries of our operating regions. In performing our exploration and production activities associated with these assets, Apache workers drove 28 million miles in 2014. We anticipate that the proposed rule will increase the driving mileage significantly as the number of affected facilities grows over time. Each additional mile has a corresponding vehicle emission and further exposes workers to the travel risks found on the roads and highways of rural and remote areas. Statistically, from a safety standpoint, vehicle travel is the most risky activity our workers undertake. When the view of these impacts are expanded to include all operators in the industry, the travel implications of the proposed rule are immense and are not reflected in the cost analysis of the rulemaking.

Response: The EPA is well aware of the remote and dispersed nature of at least some of the facilities subject to the final rule. We are also aware that many of these facilities are unmanned for extended periods, and that compliance with the final rule will require an occasional physical presence at each facility. However, industry commenters have also previously stated that personnel visit these remote sites at least once per month. Indeed, the commenter here states that their personnel travel 28 million miles a year. Regardless of how dispersed the commenter's facilities are, if they are driving that many miles, it would appear that they are visiting each facility on a somewhat regular basis. Based on our discussions with industry representatives, we believe that many companies will conduct activities that require an on-site presence using their own personnel rather than hiring a third-party contractor. For these companies, we do not anticipate that they will incur additional vehicle miles traveled due to the final rule requirements. Rather, the on-site activities will be conducted during regularly scheduled on-site visits that would occur even in the absence of the final rule.

We acknowledge that some companies, particularly smaller companies, will employ third-party contractors to conduct some of the on-site activities such as conducting fugitive emissions monitoring surveys. In these cases, there will be an increase in vehicle miles traveled due to the final rule requirements. However, we do not have sufficient data to estimate how many companies will hire third-party contractors or will experience an increase in vehicle miles traveled by their own employees as a result of the final rule. In response to this and other commenters, we have added an analysis in the TSD for the final rule to quantify the combustion emissions for two additional visits to a site to conduct semiannual fugitive emissions monitoring. We are not able, however, to extend these estimates to a nationwide level because of insufficient information as mentioned above.

We also point out that we have changed the fugitive emissions monitoring requirements in the final rule to allow the use Method 21 monitoring in addition to OGI monitoring. Commenters indicated that many smaller companies already conduct Method 21 monitoring and are more likely to perform Method 21 monitoring using their own personnel, as opposed to hiring a third-

party contractor for OGI monitoring. We believe this change will further reduce the need for third-party contractors and will further reduce any additional vehicle miles traveled caused by the requirements of the final rule.

Commenter Name: Urban Obie O'Brien
Commenter Affiliation: Apache Corporation
Document Control Number: EPA-HQ-OAR-2010-0505-6808
Comment Excerpt Number: 8

Comment: Cost of the Implementation: The EPA has not fully considered the financial burden represented by the proposed rule. Over time, as more wells are fractured, Apache expects that existing facilities that are subsequently connected to new facilities (tie-ins) will fall within the mandates of the rule until essentially all infrastructure is included. Emissions associated with oil and natural gas operations represent safety concerns we strive to control and are wasteful of the very product the industry seeks to produce and capture. Industry operations have long relied on the audible, visual, and olfactory observations (not as a primary detection device due to health and safety concerns) of operating personnel to evaluate the operating status of production facilities. These routine observations by experienced operators, which occur on a daily basis, are now being formalized and overwhelmed with administrative requirements for training, recordkeeping, and reporting. The net effect of these rules will be to reduce the vigor and flexibility in operational observations, thereby frustrating the opportunity for identifying and correcting minor leakage and will add unnecessary and wasteful administrative burdens. Rough estimates for implementation of the rule as written are shown below. The analysis indicates a Year 1 cost to Apache of 525,432,000 with costs escalating to $63,936,000 in the 5th year; for a cumulative five year cost of $221,916,000 to Apache alone. All other industry participants will also be similarly burdened with significant costs. (See Table 1 for additional details regarding Apache's costs. All values were calculated with the inclusion of 750 additional facilities each year - 500 new facilities and 250 existing facilities that become affected facilities due to tie-ins.

[The commenter provides a table (Table 1) that lists the fugitive monitoring costs, routine monitoring and reporting costs, and capital costs for Year 1 through 5 using the assumptions listed below]

1 Driving: 184 hours (based on GIS route analysis) x 3 trips/monitoring cycle x 2 monitoring cycles/year x 2 people= 2,208 hours LDAR program: 750 facilities x (1 hour LDAR + 1 hour repair + 1 hour confirm + 1 hour reporting)/monitoring cycle x 2 monitoring cycles/year x 2 people (writer and reviewer) = 12,660 hours

Annual cost: (12,000 hours + 2,208 hours) x 125 $/hour= $1,776,000

2 Annual cost: 750 facilities x 1.5 hours facility per month x 12 months/year x 125 $/hour= $1,687,500

3 Annual cost: (750 hatch covers +750 closed vent systems) x 1 hour monitoring/item per month x 12 months/year x 125 $/hour = $2,250,000

4 Affected facilities report: (750 flares + 750 hatch covers + 750 closed vent systems) x 1 observation report/month x 12 months/year+ 300 reciprocating compressor rod packing replacement reports/year = 27,300 affected facility reports x 1 hour/report = 27,300 hours

New facility reports: 750 facilities x 8 hours/facility demonstration report= 6,000 hours

Annual cost: (27,300 hours + 6,000 hours) x 125 $/hour= $4,162,500

5 Annual cost: 300 units x $3,600/unit= $1,080,000

6 Annual cost: 75 facilities (85,000 $/VRU + 80,000 $/flare + 8(1,000 $/pneumatic device)) = $12,975,000

7 Calculated using addition of 75 affected facilities each year that require equipment updates to remain in compliance. The count of facilities requiring equipment updates could easily double depending activity levels and facility locations. Potentially adding $64.9 MM to the cumulative value estimated above.

Response: We believe that the commenter has far overestimated the number of reports that will be required for their covers and closed vent systems. First of all, the commenter has stated that the 750 facilities consist of 500 new facilities and 250 existing facilities "that become affected facilities due to tie-ins." We believe that it is unlikely that the 250 existing facilities will be storage vessels that will be modified or reconstructed such that they will be subject to the cover and closed vent system requirements. Of the remaining new "facilities," even assuming that they are all storage vessels, we believe that the commenter will take advantage of the provisions of §60.5365a(e) that allows the owner or operator to take into account requirements under a legally and practically enforceable limit in an operating permit or other requirement established under a Federal, State, local or tribal authority when determining the PTE of the storage vessel. We have also added provisions in the final rule at §60.5365a(e)(5) clarifying that certain storage vessels used for water recycling are not affected facilities. Thus, we believe that the actual number of facilities that will be subject to the final rule will be a small fraction of the 750 facilities and the burden of the monthly cover and closed vent system inspections will not be unduly burdensome. As for the other specifics, the EPA also believes the commenter has overestimated costs in a similar manner.

We also reviewed other recordkeeping and reporting requirements throughout the rule to assure that they are the minimum necessary to verify compliance. In response to comments that the EPA underestimated the recordkeeping and reporting burden, we revised the ICR and Supporting Statement (available in the docket) for the final rule to more thoroughly document this burden. In the end, we believe the burden imposed by the final rule is reasonable. A summary of the estimated burden is presented in section X.B of the preamble to the final rule.

Commenter Name: Urban Obie O'Brien
Commenter Affiliation: Apache Corporation
Document Control Number: EPA-HQ-OAR-2010-0505-6808
Comment Excerpt Number: 21

Comment: §60.5413a: Performance Testing Procedures for Control Devices: To illustrate the magnitude of the visible emissions testing program prescribed in this section, Apache's U.S. operations reported 890 flares to the GHGRP reporting system for calendar year 2014. It is likely that the first year of testing required under Paragraph (e)(3) of this section, Apache will have approximately 750 or more new flares requiring visible emissions testing, nearly doubling previous reporting obligations. Conducting a monthly Method 22 visible emissions tests on 750 flares results in 9,000 tests per calendar year, or about 173 tests per week. All of these emissions test reports are required to be developed, retained, and supplied to EPA or the state regulator. Additionally, in subsequent years as new facilities continue to come on production, the number of annual tests will increase. The resulting avalanche of reporting requirements is therefore untenable, and should be deleted or reduced significantly.

Response: The EPA notes that paragraph §60.5413a(e)(3) refers to enclosed combustion devices tested by the manufacturer, although there are similar visible emissions observation requirements for flares. Please see the response to DCN EPA-HQ-OAR-2010-0505-6930, Excerpt 61 in Chapter 11 of this document, explaining that the EPA standardized monthly Method 22 observation for a 15-minute period across enclosed combustors.

We further note that recordkeeping and reporting are essential components of compliance assurance, and this is especially true in this sector. Because of the large number of sites and the remoteness of sites, it is unlikely that the delegated agencies will be able to visit all sites. We believe that the information that we are requiring owners and operators to document are necessary in order to determine that a visible emissions observation took place, the results of that observation and whether owners and operators are in compliance with the obligations of the final rule. While we do not believe it is necessary to report all recorded data to the agency, we do believe that it is imperative to report data that allows a delegated agency to determine whether further review of records is necessary. We believe that the final rule captures the necessary information in the required reports.

Commenter Name: C. William Giraud
Commenter Affiliation: Concho Resources Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6847
Comment Excerpt Number: 3

Comment: EPA's wellhead natural gas price assumption of $4 per thousand cubic feet (Mcf) is outdated by at least four years. According to the U.S. Energy Information Administration, U.S. Natural Gas Wellhead price has not been near $4/Mcf since August 2011. Therefore, the costs associated with this rule by the EPA are not actual and fail to consider the current market environment. The costs are also not reflective of the volatility and uncertainty in the market.

Concho urges the EPA to recalculate its costs using the current market prices to reflect an operator's reality of $2.56/Mcfl.

Additional problems with EPA's $4/Mcf assumption include the timeline for finalization of the rule. First of all, EPA has repeatedly stated that the Proposed Methane Standards will be finalized by the summer of 2016. The likelihood a dramatic price increase will occur in the next 8 to 10 months has not been predicted by economists or expected by industry. Secondly, while Concho acknowledges that the EPA's valuation of gas saved by the proposed regulation occurs over the life of the well the reality is the greatest production, and therefore greatest potential emissions, occurs early in the life of a well. For wells drilled in the next year or two the gas saved will be valued far less than $4/Mcf, which is not reflected by EPA's cost-effectiveness analysis. Concho encourages the EPA to adopt a cost-effective analysis based on a price of natural gas that (1) accurately reflects the current price of gas and (2) accounts for gas produced from wells drilled in the next year or two at a value less than $4/Mcf.

Response: Some commenters have argued that the $4/Mcf gas price used in the EPA's cost analysis is unreasonable because recent prices have been lower than this level, can change rapidly, and can vary by region. The EPA disagrees. As explained in the final RIA, the $4/Mcf price is intended to reflect prices for the years 2020 and 2025, based in projections for the EIA's 2015 Annual Energy Outlook, while being conservatively low and accounting for the markup on the natural gas between the wellhead price and the Henry Hub price for processing and transportation. The 2015 AEO projects the Henry Hub natural gas price to be $4.94/Mcf in 2020 and $5.52/Mcf in 2025. Also, though the Henry Hub Natural Gas Spot Price was reported lower in 2015, the Short Term Energy Outlook (STEO) forecast prices are projected to be between $1.41 and $5.10/Mcf in 2017, with a 95% confidence interval. A discussion on the STEO, as well as an analysis on the sensitivity of compliance costs to natural gas prices can be found in section 3.5.2 of the RIA.

Commenter Name: Ben Shepperd
Commenter Affiliation: Permian Basin Petroleum Association
Document Control Number: EPA-HQ-OAR-2010-0505-6849
Comment Excerpt Number: 12

Comment: EPA's estimates on the cost of labor for compliance are also wholly unreasonable. The Methane NSPS is a highly complex and technical rule with a number of overlapping requirements. Upstream oil and gas operations frequently fall beneath the air emissions thresholds for permitting requirements. As a result, this portion of the industry has not historically been subject to similar federal air regulations, and their staff is largely unfamiliar with the monitoring, reporting, and recordkeeping requirements that accompany such rules. This means that these entities will have to expend far more resources either training their own personnel, or hiring personnel with expertise in federal air regulatory matters. This is particularly true for operators in states that already have overlapping state air regulations, as the businesses will need to understand and convey to personnel the differences between the two sets of requirements. For example, the Texas Railroad Commission places limits on the venting or

flaring of gas, and Colorado, Wyoming, Ohio, and Pennsylvania have state regulations regarding natural gas emissions and leaks. Differentiating between the requirements from state and federal regimes—particularly when those requirements conflict or overlap—will take additional time and resources.

For most upstream companies, well sites are spread out over a large geographic area. This dispersion of activities across a large geographic area is significantly different from the physical set up of larger facilities, such as natural gas processing plants or refineries, where EPA has imposed these kinds of monitoring requirements in the past. Unlike those larger sites, which have full-time personnel dedicated to one particular facility, most E&P companies assign one employee to multiple small sites. Well sites simply do not have the concentration of activity (including activity that would give rise to air emissions) to justify dedicating a single air compliance employee to each well site. Instead, the air compliance employee will have to spend substantial amounts of time traveling in order to visit each site semi-annually or quarterly, and will then have to keep up with the continual recordkeeping and reporting requirements for each of these small sites. The PBPA estimates that operators will need to hire one full-time employee or contractor dedicated to implementing the requirements of the Methane NSPS for every 25 affected well sites operated. Given that there are almost 200,000 producing wells in Texas alone, this means the industry will eventually need to hire thousands of new employees merely to track and fix small equipment leaks.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6857, Excerpt 60 in Chapter 11 of this document.

Commenter Name: Ben Shepperd
Commenter Affiliation: Permian Basin Petroleum Association
Document Control Number: EPA-HQ-OAR-2010-0505-6849
Comment Excerpt Number: 14

Comment: EPA is also relying on revenue estimates that no longer reflect the reality of the oil and gas market. For oil prices, EPA "estimated revenues using two alternative prices, $70/bbl and $50/bbl. In the results, EPA refers to the case using $70/bbl the 'primary scenario' and the case using the $50/bbl as the 'low oil price scenario.'" In contrast to EPA's estimates, the U.S. Energy Information Administration ("EIA") expects the price of Brent Crude Oil to average $53.96 for the year and the West Texas Intermediate spot average is expected to be $53.57 for the year. Prices have fallen below EPA's "low oil price scenario" of $50/bbl, and many industry experts predict that this trend will continue. For example, Brent crude prices remained below $50/bbl for 20 consecutive days in September 2015, and the West Texas Intermediate price fell to $44.74/bbl on October 1, 2015. Goldman Sachs has forecasted that crude prices will average around $45/bbl in 2016, and has even predicted that oil could fall as low as $20/bbl. EPA's cost analysis fails to consider the reality that many industry analysts have repeatedly voiced: lower oil and gas prices are likely to continue for the foreseeable future. EPA should therefore reevaluate its cost estimates based on more realistic revenue figures of the oil and gas sector. As discussed above, natural gas prices are likewise lower than EPA's estimates.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 17.

Commenter Name: Ben Shepperd
Commenter Affiliation: Permian Basin Petroleum Association
Document Control Number: EPA-HQ-OAR-2010-0505-6849
Comment Excerpt Number: 101

Comment: Meeting future domestic energy demands will require an ample supply of natural gas. According to the U.S. Energy Information Administration's ("EIA") Annual Energy Outlook 2015, natural gas consumption is expected to increase from "26.9 quadrillion Btu (26.2 Tcf) in 2013 to 30.5 quadrillion Btu (29.7 Tcf) in 2040. The largest share of the growth is for electricity generation in the electric power sector, where demand for natural gas grows from 8.4 quadrillion Btu (8.2 Tcf) in 2013 to 9.6 quadrillion Btu (9.4 Tcf) in 2040." This projection does not take into account EPA's own Clean Power Plan, which will further increase the demand for natural gas by incentivizing electric power generation from natural gas rather than coal.

The fact that EPA recently issued a final rule, known as the Clean Power Plan, to reduce greenhouse gas emissions from existing electric generation units, makes the oil and gas industry's ability to provide large quantities of natural gas at affordable prices even more critical. The Clean Power Plan sets limits on the greenhouse gas emissions that these power plants can emit in each state. One of the three "building blocks" the EPA proposes that states use to craft plans to cut emissions is to increase the use of natural gas combined cycle ("NGCC") units, and decrease the use of fossil-fuel fired steam generation units. This will require increasing the annual utilization rates of NGCC units, on average and within each region, to 75 percent on a net summer capacity basis. Meeting this goal will depend in large part on the ability to delivery natural gas to these units. In many cases this will involve building additional transmission infrastructure to transport the natural gas to the NGCC units.

According to the North American Electric Reliability Corporation, the implementation of the [Clean Power Plan] final rule is expected to accelerate an ongoing shift toward greater use of natural-gas-fired generation. Increased dependence on natural gas use will require pipeline capacity, particularly during the winter season when natural gas use for electric power competes with residential heating. Approximately 60 GW of additional gas-fired capacity is estimated to be in service by 2020, and approximately 80 GW by 2030. The additional capacity plus the higher use of gas-fired generation is expected to increase gas demand in the United States from 39 Bcf/d to 50 Bcf/d—an increase of approximately 30 percent. Local and regional pipeline infrastructure will be needed to relieve pipeline constraints and fuel firming for the electric industry.

Moving gas requires midstream operators to build compressor stations as well as lay pipeline. Given the low natural gas prices under current market conditions, the additional burden of these proposed Rules may deter midstream operators from undertaking such construction. While some segments of the natural gas industry were already subject to control requirements under Subpart OOOO, the Methane NSPS expands these requirements for the first time to the midstream

segment, and also adds costly and time consuming fugitive emissions monitoring, reporting, and recordkeeping requirements to both well sites and compressor stations. The Methane NSPS may also deter upstream operators from drilling or refracturing activities necessary to supply natural gas to these units.

A number of groups have already raised concerns about the potential grid reliability issues that could result from the Clean Power Plan, particularly because the renewable energy sources, such as wind and solar power, with which EPA contemplates replacing fossil fuels are not yet, and may never be, available in sufficient quantities to provide for the nation's current electric demands. In addition, many renewables cannot be reliably used to meet electric needs during peak demand times. When power plants are unable to meet the demand, blackouts can occur. As a result, the ability to use natural gas to power these electric generation units will continue to be critical to ensuring a reliable source of electric power. If natural gas is not available to supply power plants, then there may be shortages of electric generation as fossil-fuel fired plants are forced to retire, or states may not be able to meet their emission reductions targets.

EPA has already touted the major reductions in greenhouse gas emissions that it expects to gain from the Clean Power Plan. Indeed, EPA has stated that "[p]ower plants are the largest source of carbon dioxide emissions in the United States, making up roughly one-third of all domestic greenhouse gas emissions" and that "[w]hen the Clean Power Plan is fully in place in 2030, carbon pollution from the power sector will be 32 percent below 2005 levels – or 870 million tons less carbon pollution." These reductions far outweigh the modest 3 percent of domestic greenhouse gas emissions from methane that EPA attributes to the oil and gas sector. EPA would jeopardize the reductions that it hopes to achieve from the Clean Power Plan if it simultaneously imposes costly compliance requirements on natural gas operators. As a result, EPA should not attempt to implement these two sets of regulations at the same time.

Recommendations:
1. EPA should postpone consideration of the Methane NSPS and CTG until after 2025.
2. Alternatively, EPA should remove the fugitive emissions monitoring requirements from the Rules in order to ease the compliance burden on operators.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 58.

Commenter Name: Michael Hollis
Commenter Affiliation: Diamondback E&P LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6869
Comment Excerpt Number: 13

Comment: By increasing compliance costs on natural gas production and transmission under the current market conditions, EPA could exacerbate grid reliability issues and increase greenhouse gas emissions from the electric generation sector.

Meeting future domestic energy demands will require an ample supply of natural gas. According to the U.S. Energy Information Administration's ("EIA") Annual Energy Outlook 2015, natural gas consumption is expected to increase from "26.9 quadrillion Btu (26.2 Tcf) in 2013 to 30.5 quadrillion Btu (29.7 Tcf) in 2040. The largest share of the growth is for electricity generation in the electric power sector, where demand for natural gas grows from 8.4 quadrillion Btu (8.2 Tcf) in 2013 to 9.6 quadrillion Btu (9.4 Tcf) in 2040."40 This projection does not take into account EPA's own Clean Power Plan, which will further increase the demand for natural gas by incentivizing electric power generation from natural gas rather than coal.

The fact that EPA recently issued a final rule, known as the Clean Power Plan, to reduce greenhouse gas emissions from existing electric generation units, makes the oil and gas industry's ability to provide large quantities of natural gas at affordable prices even more critical. The Clean Power Plan sets limits on the greenhouse gas emissions that these power plants can emit in each state. One of the three "building blocks" the EPA proposes that states use to craft plans to cut emissions is to increase the use of natural gas combined cycle ("NGCC") units, and decrease the use of fossil-fuel fired steam generation units. This will require increasing the annual utilization rates of NGCC units, on average and within each region, to 75 percent on a net summer capacity basis. Meeting this goal will depend in large part on the ability to delivery natural gas to these units. In many cases this will involve building additional transmission infrastructure to transport the natural gas to the NGCC units.

According to the North American Electric Reliability Corporation,

The implementation of the [Clean Power Plan] final rule is expected to accelerate an ongoing shift toward greater use of natural-gas-fired generation. Increased dependence on natural gas use will require pipeline capacity, particularly during the winter season when natural gas use for electric power competes with residential heating. Approximately 60 GW of additional gas-fired capacity is estimated to be in service by 2020, and approximately 80 GW by 2030. The additional capacity plus the higher use of gas-fired generation is expected to increase gas demand in the United States from 39 Bcf/d to 50 Bcf/d-an increase of approximately 30 percent. Local and regional pipeline infrastructure will be needed to relieve pipeline constraints and fuel firming for the electric industry.

Moving gas requires midstream operators to build compressor stations as well as lay pipeline. Given the low natural gas prices under current market conditions, the additional burden of these proposed Rules may deter midstream operators from undertaking such construction. While some segments of the natural gas industry were already subject to control requirements under Subpart OOOO, the Methane NSPS expands these requirements for the first time to the midstream segment, and also adds costly and time consuming fugitive emissions monitoring, reporting, and recordkeeping requirements to both well sites and compressor stations. The Methane NSPS may also deter upstream operators from drilling or refracturing activities necessary to supply natural gas to these units.

A number of groups have already raised concerns about the potential grid reliability issues that could result from the Clean Power Plan, particularly because the renewable energy sources, such as wind and solar power, with which EPA contemplates replacing fossil fuels are not yet,

and may never be, available in sufficient quantities to provide for the nation's current electric demands. In addition, many renewables cannot be reliably used to meet electric needs during peak demand times. When power plants are unable to meet the demand, blackouts can occur. As a result, the ability to use natural gas to power these electric generation units will continue to be critical to ensuring a reliable source of electric power. If natural gas is not available to supply power plants, then there may be shortages of electric generation as fossil-fuel fired plants are forced to retire, or states may not be able to meet their emission reductions targets.

EPA has already touted the major reductions in greenhouse gas emissions that it expects to gain from the Clean Power Plan. Indeed, EPA has stated that "[p]ower plants are the largest source of carbon dioxide emissions in the United States, making up roughly one-third of all domestic greenhouse gas emissions" and that "[w]hen the Clean Power Plan is fully in place in 2030, carbon pollution from the power sector will be 32 percent below 2005 levels - or 870 million tons less carbon pollution." These reductions far outweigh the modest 3 percent of domestic greenhouse gas emissions from methane that EPA attributes to the oil and gas sector. EPA would jeopardize the reductions that it hopes to achieve from the Clean Power Plan if it simultaneously imposes costly compliance requirements on natural gas operators. As a result, EPA should not attempt to implement these two sets of regulations at the same time.

Recommendations:

1. EPA should postpone consideration of the Methane NSPS and CTG until after 2025.
2. Alternatively, EPA should remove the fugitive emissions monitoring requirements from the Rules in order to ease the compliance burden on operators.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 58.

Commenter Name: Dan G. LeRoy
Commenter Affiliation: Legacy Reserves Operating LP
Document Control Number: EPA-HQ-OAR-2010-0505-6882
Comment Excerpt Number: 4

Comment: EPA's estimates on the cost of labor for compliance are also wholly unreasonable. The Methane NSPS is a highly complex and technical rule with a number of overlapping requirements. Upstream oil and gas operations frequently fall beneath the air emissions thresholds for permitting requirements. As a result, this portion of the industry has not historically been subject to similar federal air regulations, and their staff is largely unfamiliar with the monitoring, reporting, and recordkeeping requirements that accompany such rules. This means that these entities will have to expend far more resources either training their own personnel, or hiring personnel with expertise in federal air regulatory matters. This is particularly true for operators in states that already have overlapping state air regulations, as the businesses will need to understand and convey to personnel the differences between the two sets of requirements. For example, the Texas Railroad Commission places limits on the venting or

flaring of gas, and Colorado, Wyoming, Ohio, and Pennsylvania have state regulations regarding natural gas emissions and leaks. Differentiating between the requirements from state and federal regimes-particularly when those requirements conflict or overlap-will take additional time and resources.

For most upstream companies, well sites are spread out over a large geographic area. This dispersion of activities across a large geographic area is significantly different from the physical set up of larger facilities, such as natural gas processing plants or refineries, where EPA has imposed these kinds of monitoring requirements in the past. Unlike those larger sites, which have full-time personnel dedicated to one particular facility, most E&P companies assign one employee to multiple small sites. Well sites simply do not have the concentration of activity (including activity that would give rise to air emissions) to justify dedicating a single air compliance employee to each well site. Instead, the air compliance employee will have to spend substantial amounts of time traveling in order to visit each site semi-annually or quarterly, and will then have to keep up with the continual recordkeeping and reporting requirements for each of these small sites.

According to EPA's analysis, "[t]he annual public reporting and recordkeeping burden for this collection of information is estimated to average 3.9 hours per response. Respondents must monitor all specified criteria at each affected facility and maintain these records for 5 years."

EPA is also relying on revenue estimates that no longer reflect the reality of the oil and gas market. For oil prices, EPA "estimated revenues using two alternative prices, $70/bbl and $50/bbl. In the results, EPA refers to the case using $70/bbl the 'primary scenario' and the case using the $50/bbl as the 'low oil price scenario.'" In contrast to EPA's estimates, the U.S. Energy Information Administration ("EIA") expects the price of Brent Crude Oil to average $53.96 for the year and the West Texas Intermediate spot average is expected to be $53.57 for the year. Prices have fallen below EPA's "low oil price scenario" of $50/bbl, and many industry experts predict that this trend will continue. For example, Brent crude prices remained below $50/bbl for 20 consecutive days in September 2015, and the West Texas Intermediate price fell to $44.74/bbl on October 1, 2015. Goldman Sachs has forecasted that crude prices will average around $45/bbl in 2016, and has even predicted that oil could fall as low as $20/bbl. EPA's cost analysis fails to consider the reality that many industry analysts have repeatedly voiced: lower oil and gas prices are likely to continue for the foreseeable future. EPA should therefore reevaluate its cost estimates based on more realistic revenue figures of the oil and gas sector. As discussed above, natural gas prices are likewise lower than EPA's estimates.

Recommendations: EPA should re-conduct its cost assessment, and do so in a way which:

1. Takes into account the full costs of compliance that the industry will bear, and removes the cost savings which the industry will never recover;

2. Incorporates a more realistic estimate of the amount of time and labor the Methane NSPS will require;

3. Considers the reduced revenue from oil and natural gas under current market conditions; and

4. Removes the comparison to a social cost of methane model that has not yet been reviewed by the Science Advisory Board; National Academies of Sciences, Engineering, and Medicine, or OMB.

Response: With respect to the comment that the EPA underestimated the labor required to comply with the rule, see response to DCN EPA-HQ-OAR-2010-0505-6857, Excerpt 60 in Chapter 11 of this document. With respect to the comments on the EPA's oil price assumptions, see response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 17.

Commenter Name: Dan G. LeRoy
Commenter Affiliation: Legacy Reserves Operating LP
Document Control Number: EPA-HQ-OAR-2010-0505-6882
Comment Excerpt Number: 15

Comment: By increasing compliance costs on natural gas production and transmission under the current market conditions, EPA could exacerbate grid reliability issues and increase greenhouse gas emissions from the electric generation sector.

Meeting future domestic energy demands will require an ample supply of natural gas. According to the U.S. Energy Information Administration's ("EIA") Annual Energy Outlook 2015, natural gas consumption is expected to increase from "26.9 quadrillion Btu (26.2 Tcf) in 2013 to 30.5 quadrillion Btu (29.7 Tcf) in 2040. The largest share of the growth is for electricity generation in the electric power sector, where demand for natural gas grows from 8.4 quadrillion Btu (8.2 Tcf) in 2013 to 9.6 quadrillion Btu (9.4 Tcf) in 2040." This projection does not take into account EPA's own Clean Power Plan, which will further increase the demand for natural gas by incentivizing electric power generation from natural gas rather than coal.

The fact that EPA recently issued a final rule, known as the Clean Power Plan, to reduce greenhouse gas emissions from existing electric generation units, makes the oil and gas industry's ability to provide large quantities of natural gas at affordable prices even more critical. The Clean Power Plan sets limits on the greenhouse gas emissions that these power plants can emit in each state. One of the three "building blocks" the EPA proposes that states use to craft plans to cut emissions is to increase the use of natural gas combined cycle ("NGCC") units, and decrease the use of fossil-fuel fired steam generation units. This will require increasing the annual utilization rates of NGCC units, on average and within each region, to 75 percent on a net summer capacity basis. Meeting this goal will depend in large part on the ability to delivery natural gas to these units. In many cases this will involve building additional transmission infrastructure to transport the natural gas to the NGCC units.

According to the North American Electric Reliability Corporation,

The implementation of the [Clean Power Plan] final rule is expected to accelerate an ongoing shift toward greater use of natural-gas-fired generation. Increased dependence on natural gas use will require pipeline capacity, particularly during the winter season when natural gas use for

electric power competes with residential heating. Approximately 60 GW of additional gas-fired capacity is estimated to be in service by 2020, and approximately 80 GW by 2030. The additional capacity plus the higher use of gas-fired generation is expected to increase gas demand in the United States from 39 Bcf/d to 50 Bcf/d-an increase of approximately 30 percent. Local and regional pipeline infrastructure will be needed to relieve pipeline constraints and fuel firming for the electric industry.

Moving gas requires midstream operators to build compressor stations as well as lay pipeline. Given the low natural gas prices under current market conditions, the additional burden of these proposed Rules may deter midstream operators from undertaking such construction. While some segments of the natural gas industry were already subject to control requirements under Subpart OOOO, the Methane NSPS expands these requirements for the first time to the midstream segment, and also adds costly and time consuming fugitive emissions monitoring, reporting, and recordkeeping requirements to both well sites and compressor stations. The Methane NSPS may also deter upstream operators from drilling or refracturing activities necessary to supply natural gas to these units.

A number of groups have already raised concerns about the potential grid reliability issues that could result from the Clean Power Plan, particularly because the renewable energy sources, such as wind and solar power, with which EPA contemplates replacing fossil fuels are not yet, and may never be, available in sufficient quantities to provide for the nation's current electric demands. In addition, many renewables cannot be reliably used to meet electric needs during peak demand times. When power plants are unable to meet the demand, blackouts can occur. As a result, the ability to use natural gas to power these electric generation units will continue to be critical to ensuring a reliable source of electric power. If natural gas is not available to supply power plants, then there may be shortages of electric generation as fossil-fuel fired plants are forced to retire, or states may not be able to meet their emission reductions targets.

EPA has already touted the major reductions in greenhouse gas emissions that it expects to gain from the Clean Power Plan. Indeed, EPA has stated that "[p]ower plants are the largest source of carbon dioxide emissions in the United States, making up roughly one-third of all domestic greenhouse gas emissions" and that "[w]hen the Clean Power Plan is fully in place in 2030, carbon pollution from the power sector will be 32 percent below 2005 levels- or 870 million tons less carbon pollution." These reductions far outweigh the modest 3 percent of domestic greenhouse gas emissions from methane that EPA attributes to the oil and gas sector. EPA would jeopardize the reductions that it hopes to achieve from the Clean Power Plan if it simultaneously imposes costly compliance requirements on natural gas operators. As a result, EPA should not attempt to implement these two sets of regulations at the same time.

Recommendations:

1. EPA should postpone consideration of the Methane NSPS and CTG until after 2025.

2. Alternatively, EPA should remove the fugitive emissions monitoring requirements from the Rules in order to ease the compliance burden on operators.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 58.

Commenter Name: Denzil R. West, Vice President
Commenter Affiliation: Reliance Energy, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6915
Comment Excerpt Number: 13

Comment: By increasing compliance costs on natural gas production and transmission under the current market conditions, EPA could exacerbate grid reliability issues and increase greenhouse gas emissions from the electric generation sector.

Meeting future domestic energy demands will require an ample supply of natural gas. According to the U.S. Energy Information Administration's ("EIA") Annual Energy Outlook 2015, natural gas consumption is expected to increase from "26.9 quadrillion Btu (26.2 Tcf) in 2013 to 30.5 quadrillion Btu (29.7 Tcf) in 2040. The largest share of the growth is for electricity generation in the electric power sector, where demand for natural gas grows from 8.4 quadrillion Btu (8.2 Tcf) in 2013 to 9.6 quadrillion Btu (9.4 Tcf) in 2040." This projection does not take into account EPA's own Clean Power Plan, which will further increase the demand for natural gas by incentivizing electric power generation from natural gas rather than coal.

The fact that EPA recently issued a final rule, known as the Clean Power Plan, to reduce greenhouse gas emissions from existing electric generation units, makes the oil and gas industry's ability to provide large quantities of natural gas at affordable prices even more critical. The Clean Power Plan sets limits on the greenhouse gas emissions that these power plants can emit in each state. One of the three "building blocks" the EPA proposes that states use to craft plans to cut emissions is to increase the use of natural gas combined cycle ("NGCC") units, and decrease the use of fossil-fuel fired steam generation units. This will require increasing the annual utilization rates of NGCC units, on average and within each region, to 75 percent on a net summer capacity basis. Meeting this goal will depend in large part on the ability to delivery natural gas to these units. In many cases this will involve building additional transmission infrastructure to transport the natural gas to the NGCC units.

According to the North American Electric Reliability Corporation,

The implementation of the [Clean Power Plan] final rule is expected to accelerate an ongoing shift toward greater use of natural-gas-fired generation. Increased dependence on natural gas use will require pipeline capacity, particularly during the winter season when natural gas use for electric power competes with residential heating. Approximately 60 GW of additional gas-fired capacity is estimated to be in service by 2020, and approximately 80 GW by 2030. The additional capacity plus the higher use of gas-fired generation is expected to increase gas demand in the United States from 39 Bcf/d to 50 Bcf/d-an increase of approximately 30 percent. Local and regional pipeline infrastructure will be needed to relieve pipeline constraints and fuel firming for the electric industry.

Moving gas requires midstream operators to build compressor stations as well as lay pipeline. Given the low natural gas prices under current market conditions, the additional burden of these proposed Rules may deter midstream operators from undertaking such construction. While some segments of the natural gas industry were already subject to control requirements under Subpart OOOO, the Methane NSPS expands these requirements for the first time to the midstream segment, and also adds costly and time consuming fugitive emissions monitoring, reporting, and recordkeeping requirements to both well sites and compressor stations. The Methane NSPS may also deter upstream operators from drilling or refracturing activities necessary to supply natural gas to these units.

A number of groups have already raised concerns about the potential grid reliability issues that could result from the Clean Power Plan, particularly because the renewable energy sources, such as wind and solar power, with which EPA contemplates replacing fossil fuels are not yet, and may never be, available in sufficient quantities to provide for the nation's current electric demands. In addition, many renewables cannot be reliably used to meet electric needs during peak demand times. When power plants are unable to meet the demand, blackouts can occur. As a result, the ability to use natural gas to power these electric generation units will continue to be critical to ensuring a reliable source of electric power. If natural gas is not available to supply power plants, then there may be shortages of electric generation as fossil-fuel fired plants are forced to retire, or states may not be able to meet their emission reductions targets.

EPA has already touted the major reductions in greenhouse gas emissions that it expects to gain from the Clean Power Plan. Indeed, EPA has stated that "[p]ower plants are the largest source of carbon dioxide emissions in the United States, making up roughly one-third of all domestic greenhouse gas emissions" and that "[w]hen the Clean Power Plan is fully in place in 2030, carbon pollution from the power sector will be 32 percent below 2005 levels - or 870 million tons less carbon pollution." These reductions far outweigh the modest 3 percent of domestic greenhouse gas emissions from methane that EPA attributes to the oil and gas sector. EPA would jeopardize the reductions that it hopes to achieve from the Clean Power Plan if it simultaneously imposes costly compliance requirements on natural gas operators. As a result, EPA should not attempt to implement these two sets of regulations at the same time.

Recommendations:

1. EPA should postpone consideration of the Methane NSPS and CTG until after 2025.
2. Alternatively, EPA should remove the fugitive emissions monitoring requirements from the Rules in order to ease the compliance burden on operators.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 58.

Commenter Name: Lindel Fowler, Acting Executive Director
Commenter Affiliation: Railroad Commission of Texas
Document Control Number: EPA-HQ-OAR-2010-0505-6917
Comment Excerpt Number: 3

Comment: EPA continues to underestimate the number of sources that will be affected and the regulatory impact and burden of the rule. Also, EPA overestimates the industry's ability to meet the compliance schedule because EPA does not take into account the availability of control equipment.

The proposed NSPS Subparts OOOO and OOOOa cover all aspects of oil and gas production, processing, transmission and storage and as such, the Commission shares TCEQ's concern that these proposed rules greatly expand the regulatory requirements, review, need for inspections and agency effort necessary to implement compliance, without sufficient associated funding and without sufficiently demonstrating significant or even proportional gains in public health and environmental protection.

Response: The EPA has updated the approach used to estimate the number of affected sources. Please see the response to DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 174. In addition, we have updated our projections of growth rate to reflect the 2015 Annual Energy Outlook. Please see the response to DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 159.

In response to the commenter's concerns about planning for future compliance, we note that we have updated the compliance schedule for all entities. For more information, please see the response to DCN EPA-HQ-OAR-2010-0505-6852, Excerpt 4 in Chapter 11 of this document. In addition, see the preamble for more information on final compliance schedules for each type of affected facility.

The EPA disagrees with the commenter that the agency has not demonstrated the final NSPS will lead to gains in public health and environmental protection. As demonstrated in the final RIA for the rule, the monetized benefits of the rule exceed the costs of the rule, even though substantial health, welfare, and climate benefits likely to be produced by implementation of the rule are not monetized. The EPA also believes that the burdens placed on state agencies by the final agency are reasonable.

Commenter Name: Jennifer Fordham, Senior Vice President, Government Affairs
Commenter Affiliation: Natural Gas Supply Association (NGSA)
Document Control Number: EPA-HQ-OAR-2010-0505-6920
Comment Excerpt Number: 1

Comment: The Natural Gas Supply Association (NGSA) cautions the Environmental Protection Agency (EPA) to carefully consider the unintended consequences the proposed rules for source determination for certain emissions units and emission standards for new and modified sources

in the oil and natural gas sectors ("Proposed Methane Regulations") might have on the achievement of U.S. carbon reduction.

EPA Methane Regulations could unnecessarily limit cost-effective natural gas production that is essential to U.S. economic growth and achievement of U.S. environmental objectives that are successfully poised to work hand-in-hand. Considering the big picture, natural gas use reduces carbon dioxide emissions, the most prevalent greenhouse gas, and other pollutants. NGSA urges continued reliance on existing, effective voluntary emissions reductions programs to achieve methane emissions reductions.

Response: The EPA disagrees with the comment that the final NSPS will limit production of natural gas in the U.S or otherwise produce unreasonable negative impacts on the national economy. On this point, see response to DCN EPA-HQ-OAR-2010-0505-7336, Excerpt 98. The EPA also does not agree that the final NSPS will lead to the unintended consequence of making national environmental objectives more difficult to accomplish. With respect to the role of voluntary action in mitigating methane emissions, see response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 49. Finally, the comments regarding the proposed rule on source determination are out of scope of the document, as this document pertains to the proposed and final NSPS.

Commenter Name: Shawn Bennett, Executive Vice President
Commenter Affiliation: Ohio Oil & Gas Association (OOGA)
Document Control Number: EPA-HQ-OAR-2010-0505-6921
Comment Excerpt Number: 3

Comment: The Association writes to express its deep concerns regarding EPA's proposed rules to broaden the scope of the NSPS provisions for the Oil and Natural Gas Sector, to aggregate sources under the Source Determination rules, and to establish industry CTGs. While the Association strongly supports efforts to improve air quality and protect public health, it is concerned that the stringent standards proposed by EPA will burden the oil and gas industry at a time when the industry is facing some of the lowest commodity prices in recent history. The proposed rules will significantly increase operating costs and will render marginal production wells uneconomical, thereby inhibiting commercial and industrial activity not only vital to creating jobs, but also providing tax revenue to support important local services like public safety and education. Worse, this verifiable hardship will be endured for the sake of uncertain benefits.

Response: The comments regarding the CTGs proposed rule on source determination are out of scope of the document, as this document pertains to the NSPS. The EPA disagrees with the comment that the final NSPS will impose unreasonable costs on oil and natural gas producers. On this point, see response to DCN EPA-HQ-OAR-2010-0505-7336, Excerpt 98. The EPA also disagrees with the comment that the benefits of this final action are uncertain. Regarding the estimates of climate benefits produced by the emissions reductions expected from implementing the final NSPS, see Section 12.9 of this chapter of the response to comments document. In

addition, as discussed in Section 4 of the final RIA, there are numerous additional health, welfare, and climate benefits the agency was unable to monetize for the benefit-cost analysis. The results of these analyses and considerations lead the EPA to be confident that the benefits greatly exceed the costs of this action.

Commenter Name: Shawn Bennett, Executive Vice President
Commenter Affiliation: Ohio Oil & Gas Association (OOGA)
Document Control Number: EPA-HQ-OAR-2010-0505-6921
Comment Excerpt Number: 5

Comment: According to EPA's GHG reporting data, methane emissions from oil or natural gas exploration comprise a very small fraction of the GHG inventory. As acknowledged by EPA in the proposed rules, methane emissions from oil and gas production are already decreasing as a result of U.S. EPA's promulgation of 40 C.F.R. 60, subpart OOOO. These reductions will continue as the NSPS requirements impact a larger percentage of wells. This is in addition to the fact that every operator tries to utilize all of its natural gas as it is a valuable product, rather than lose it through fugitive emissions or process inefficiencies. In light of the continuing decreases in methane emissions from the oil and gas production industry, changes to existing NSPS regulations are unnecessary and are not cost-effective.

Response: The EPA does not agree that the rule is not unnecessary due to declining methane emissions. For a response to this comment, please see DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 49. In addition, the final NSPS will reduce emissions from the oil and natural gas sector in sensible and cost effective ways and will not place an unreasonable burden on oil and natural gas producers. On this point, see response to DCN EPA-HQ-OAR-2010-0505-7336, Excerpt 98.

Commenter Name: Brandon M. Black, Vice President
Commenter Affiliation: BC Operating, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6968
Comment Excerpt Number: 13

Comment: By increasing compliance costs on natural gas production and transmission under the current market conditions, EPA could exacerbate grid reliability issues and increase greenhouse gas emissions from the electric generation sector.

Meeting future domestic energy demands will require an ample supply of natural gas. According to the U.S. Energy Information Administration's ("EIA") Annual Energy Outlook 2015, natural gas consumption is expected to increase from "26.9 quadrillion Btu (26.2 Tcf) in 2013 to 30.5 quadrillion Btu (29.7 Tcf) in 2040. The largest share of the growth is for electricity generation in the electric power sector, where demand for natural gas grows from 8.4 quadrillion Btu (8.2 Tcf) in 2013 to 9.6 quadrillion Btu (9.4 Tct) in 2040." This projection does not take into account

EPA's own Clean Power Plan, which will further increase the demand for natural gas by incentivizing electric power generation from natural gas rather than coal.

The fact that EPA recently issued a final rule, known as the Clean Power Plan, to reduce greenhouse gas emissions from existing electric generation units, makes the oil and gas industry's ability to provide large quantities of natural gas at affordable prices even more critical. The Clean Power Plan sets limits on the greenhouse gas emissions that these power plants can emit in each state. One of the three "building blocks" the EPA proposes that states use to craft plans to cut emissions is to increase the use of natural gas combined cycle ("NGCC") units, and decrease the use of fossil-fuel fired steam generation units. This will require increasing the annual utilization rates of NGCC units, on average and within each region, to 75 percent on a net summer capacity basis. Meeting this goal will depend in large part on the ability to delivery natural gas to these units. In many cases this will involve building additional transmission infrastructure to transport the natural gas to the NGCC units.

According to the North American Electric Reliability Corporation, The implementation of the [Clean Power Plan] final rule is expected to accelerate an ongoing shift toward greater use of natural-gas-fired generation. Increased dependence on natural gas use will require pipeline capacity, particularly during the winter season when natural gas use for electric power competes with residential heating. Approximately 60 GW of additional gas-fired capacity is estimated to be in service by 2020, and approximately 80 GW by 2030. The additional capacity plus the higher use of gas-fired generation is expected to increase gas demand in the United States from 39 Bcf/d to 50 Bcf/d-an increase of approximately 30 percent. Local and regional pipeline infrastructure will be needed to relieve pipeline constraints and fuel firming for the electric industry.

Moving gas requires midstream operators to build compressor stations as well as lay pipeline. Given the low natural gas prices under current market conditions, the additional burden of these proposed Rules may deter midstream operators from undertaking such construction. While some segments of the natural gas industry were already subject to control requirements under Subpart OOOO, the Methane NSPS expands these requirements for the first time to the midstream segment, and also adds costly and time consuming fugitive emissions monitoring, reporting, and recordkeeping requirements to both well sites and compressor stations. The Methane NSPS may also deter upstream operators from drilling or refracturing activities necessary to supply natural gas to these units.

A number of groups have already raised concerns about the potential grid reliability issues that could result from the Clean Power Plan, particularly because the renewable energy sources, such as wind and solar power, with which EPA contemplates replacing fossil fuels are not yet, and may never be, available in sufficient quantities to provide for the nation's current electric demands. In addition, many renewables cannot be reliably used to meet electric needs during peak demand times. When power plants are unable to meet the demand, blackouts can occur. As a result, the ability to use natural gas to power these electric generation units will continue to be critical to ensuring a reliable source of electric power. If natural gas is not available to supply power plants, then there may be shortages of electric generation as fossil-fuel fired plants are forced to retire, or states may not be able to meet their emission reductions targets.

EPA has already touted the major reductions in greenhouse gas emissions that it expects to gain from the Clean Power Plan. Indeed, EPA has stated that "[p]ower plants are the largest source of carbon dioxide emissions in the United States, making up roughly one-third of all domestic greenhouse gas emissions" and that "[w]hen the Clean Power Plan is fully in place in 2030, carbon pollution from the power sector will be 32 percent below 2005 levels - or 870 million tons less carbon pollution." These reductions far outweigh the modest 3 percent of domestic greenhouse gas emissions from methane that EPA attributes to the oil and gas sector.

EPA would jeopardize the reductions that it hopes to achieve from the Clean Power Plan if it simultaneously imposes costly compliance requirements on natural gas operators. As a result, EPA should not attempt to implement these two sets of regulations at the same time.

Recommendations:

I. EPA should postpone consideration of the Methane NSPS and CTG until after 2025.

2. Alternatively, EPA should remove the fugitive emissions monitoring requirements from the Rules in order to ease the compliance burden on operators.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 58.

Commenter Name: Joe Strickling, Operations Manager
Commenter Affiliation: Patriot Resources, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6978
Comment Excerpt Number: 14

Comment: By increasing compliance costs on natural gas production and transmission under the current market conditions, EPA could exacerbate grid reliability issues and increase greenhouse gas emissions from the electric generation sector.

Meeting future domestic energy demands will require an ample supply of natural gas. According to the U.S. Energy Information Administration's ("EIA") Annual Energy Outlook 2015, natural gas consumption is expected to increase from "26.9 quadrillion Btu (26.2 Tcf) in 2013 to 30.5 quadrillion Btu (29.7 Tcf) in 2040. The largest share of the growth is for electricity generation in the electric power sector, where demand for natural gas grows from 8.4 quadrillion Btu (8.2 Tcf) in 2013 to 9.6 quadrillion Btu (9.4 Tcf) in 2040." This projection does not take into account EPA's own Clean Power Plan, which will further increase the demand for natural gas by incentivizing electric power generation from natural gas rather than coal.

The fact that EPA recently issued a final rule, known as the Clean Power Plan, to reduce greenhouse gas emissions from existing electric generation units, makes the oil and gas industry's ability to provide large quantities of natural gas at affordable prices even more critical.

The Clean Power Plan sets limits on the greenhouse gas emissions that these power plants can emit in each state. One of the three "building blocks" the EPA proposes that states use to craft plans to cut emissions is to increase the use of natural gas combined cycle ("NGCC") units, and decrease the use of fossil-fuel fired steam generation units. This will require increasing the annual utilization rates of NGCC units, on average and within each region, to 75 percent on a net summer capacity basis. Meeting this goal will depend in large part on the ability to delivery natural gas to these units. In many cases this will involve building additional transmission infrastructure to transport the natural gas to the NGCC units.

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Approximately 60 GW of additional gas-fired capacity is estimated to be in service by 2020, and approximately 80 GW by 2030. The additional capacity plus the higher use of gas-fired generation is expected to increase gas demand in the United States from 39 Bcf/d to 50 Bcf/d-an increase of approximately 30 percent. Local and regional pipeline infrastructure will be needed to relieve pipeline constraints and fuel firming for the electric industry.

Moving gas requires midstream operators to build compressor stations as well as lay pipeline. Given the low natural gas prices under current market conditions, the additional burden of these proposed Rules may deter midstream operators from undertaking such construction. While some segments of the natural gas industry were already subject to control requirements under Subpart OOOO, the Methane NSPS expands these requirements for the first time to the midstream segment, and also adds costly and time consuming fugitive emissions monitoring, reporting, and recordkeeping requirements to both well sites and compressor stations. The Methane NSPS may also deter upstream operators from drilling or refracturing activities necessary to supply natural gas to these units.

A number of groups have already raised concerns about the potential grid reliability issues that could result from the Clean Power Plan, particularly because the renewable energy sources, such as wind and solar power, with which EPA contemplates replacing fossil fuels are not yet, and may never be, available in sufficient quantities to provide for the nation's current electric demands. In addition, many renewables cannot be reliably used to meet electric needs during peak demand times. When power plants are unable to meet the demand, blackouts can occur. As a result, the ability to use natural gas to power these electric generation units will continue to be critical to ensuring a reliable source of electric power. If natural gas is not available to supply power plants, then there may be shortages of electric generation as fossil-fuel fired plants are forced to retire, or states may not be able to meet their emission reductions targets.

EPA has already touted the major reductions in greenhouse gas emissions that it expects to gain from the Clean Power Plan. Indeed, EPA has stated that "[p]ower plants are the largest source of carbon dioxide emissions in the United States, making up roughly one-third of all domestic greenhouse gas emissions" and that "[w]hen the Clean Power Plan is fully in place in 2030,

carbon pollution from the power sector will be 32 percent below 2005 levels - or 870 million tons less carbon pollution." These reductions far outweigh the modest 3 percent of domestic greenhouse gas emissions from methane that EPA attributes to the oil and gas sector.

EPA would jeopardize the reductions that it hopes to achieve from the Clean Power Plan if it simultaneously imposes costly compliance requirements on natural gas operators. As a result, EPA should not attempt to implement these two sets of regulations at the same time

Recommendations:

1. EPA should postpone consideration of the Methane NSPS and CTG until after 2025.

2. Alternatively, EPA should remove the fugitive emissions monitoring requirements from the Rules in order to ease the compliance burden on operators.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 58.

Commenter Name: Will Whisenant, Safety and Security Operations Coordinator
Commenter Affiliation: Virginia Oil and Gas Association (VOGA)
Document Control Number: EPA-HQ-OAR-2010-0505-7047
Comment Excerpt Number: 14

Comment: Unnecessary Actions & Possible Credits

Natural gas prices are at decades-long lows, enforcement of these regulations should be phased in to allow for implementation and EPA should avoid crippling all of the energy industry.

Response: With respect to the comment regarding natural gas prices, see the response to DCN EPA-HQ-OAR-2010-0505-6847, Excerpt 3.

In response to the commenter's concerns about planning for future compliance, we note that we have changed the beginning of the initial compliance period in the final rule as follows. For well completion operations of subcategory 1 wells that commence up to 180 days after the date of publication of the final rule in the Federal Register, flowback gases must be routed to a completion combustion device. Well completion operations commencing on or after 180 days after the date the final rule is published in the Federal Register must perform a REC if technically feasible. See section VI.E.5 of the preamble to the final rule for more detail regarding this issue. For pneumatic pumps, the initial compliance period begins 180 days after the date of publication of the final rule in the Federal Register. See section VI.D.6 of the preamble to the final rule for more detail regarding this issue. The initial monitoring survey of the fugitive emissions monitoring program must take place by one year after the date the final rule is published in the Federal Register or within 60 days of the startup of production for well sites or 60 days after the startup of a new compressor, whichever is later. See sections VI.F.1.g and VI.F.2.f of the preamble to the final rule for more detail regarding this issue.

With respect to the commenter's concern that this regulation will cripple the energy industry, please see the response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 58 for an explanation on the impact of the rule on natural gas deliverability and the electricity system reliability. Also, see DCN EPA-HQ-OAR-2010-0505-7336, Excerpt 242 and DCN EPA-HQ-OAR-2010-0505-7336, Excerpt 98 for discussions of the rule's projected effects on oil and natural gas drilling, production and price.

Commenter Name: Kelly Guertin, Senior Environmental Engineer, Environmental Management and Resources
Commenter Affiliation: DTE Energy (DTE Gas Company)
Document Control Number: EPA-HQ-OAR-2010-0505-7052
Comment Excerpt Number: 13

Comment: In addition, DTE Energy agrees that EPA's cost-benefit analysis over-estimates emissions reductions and under-estimates costs.

Response: With respect to the commenter's assertion that the EPA underestimates total costs, overestimates emissions reductions, and that the breakdowns of benefits and costs by source is inadequate, please refer to response to DCN EPA-HQ-OAR_2010-0505-6884, excerpt 149.

Commenter Name: Cory Pomeroy, General Counsel
Commenter Affiliation: Texas Oil & Gas Association
Document Control Number: EPA-HQ-OAR-2010-0505-7058
Comment Excerpt Number: 11

Comment: In addition, EPA has also failed to evaluate the fuller impact of this rule on U.S. energy production in a long-term lower-energy price environment. Lower prices will mean smaller profit margins that will be increasingly sensitive to changes in cost structure. The increased cost of complying with this rule [resulting from the reduction in the offsetting value in the recovered product] may make more production assets uneconomical in a low-margin, competitive environment. By failing to fully analyze this scenario, EPA is underestimating the potential impact of this rulemaking on U.S. energy production.

Response: While it is reasonable to assume that a small number of drilling projects might not be pursued as a result of increased regulatory costs, the EPA disagree with the commenter's allegation that the EPA has failed to consider the impact of the final rule of U.S. energy production. We used the National Energy Modeling System (NEMS) to estimate the impacts of the final NSPS on the U.S. oil and natural gas drilling, production, prices, and trade. The NEMS is a publically available model of the U.S. energy economy developed and maintained by the Energy Information Administration of the U.S. DOE and is used to produce the Annual Energy Outlook, a reference publication that provides detailed forecasts of the United States energy

economy. As presented in Section 6 of the final RIA, the EPA's estimates of impacts to oil and natural gas markets are relatively small relative to the baseline.

Commenter Name: Darin Schroeder, David McCabe, Lesley Fleishman and Conrad Schneider
Commenter Affiliation: Clean Air Task Force et al.
Document Control Number: EPA-HQ-OAR-2010-0505-7062
Comment Excerpt Number: 24

Comment: EPA separately compares control costs to annual capital expenditures and revenue, a crucial factor in evaluating the economic impact that the cost of control measures may have on the industry. EPA uses U.S. Census data to determine what percentage the capital costs incurred by facilities to comply with the proposed standards represent of capital expenditures, and what percentage such capital costs represent of annual revenues. This analysis closely aligns with the case law and with past regulatory precedents which focus either on the costs of achieving emission reductions relative to the amount of reductions achieved, or impacts on the industry or the economy. *See Portland Cement Ass'n v. EPA*, 513 F.2d 506, 508 (D.C. Cir. 1975).

Response: Comment is a supportive comment to which no response is required.

Commenter Name: Darin Schroeder, David McCabe, Lesley Fleishman and Conrad Schneider
Commenter Affiliation: Clean Air Task Force et al.
Document Control Number: EPA-HQ-OAR-2010-0505-7062
Comment Excerpt Number: 35

Comment: Applying LDAR at Lower-Producing Wells Will Not Result in Hardship. We analyzed the economics of requiring semi-annual inspections at low producing wells by comparing the cost of LDAR to the total revenue produced from the single low-producing well. For this analysis, we used EPA's assumed cost of LDAR and calculated revenue assuming different oil and natural gas prices. We assumed three different levels of low-producing wells: the proposed 15 BOE/d level; a 10 BOE/d level; and a 5 BOE/d level. Tables 3 and 4 below set forth our results, showing that for all levels of low-producing wells, LDAR costs are a mere fraction of that well's annual revenue. Our estimates are also highly conservative, since it assumes that an operator only owns one low producing well, when operators are actually often likely to own a mix of higher- and lower-producing wells across which costs can be shared.

[Table 3: LDAR Cost as a Percentage of Revenue at Six Price Points for Crude Oil and Table 4: LDAR Cost as percentage of Revenue at Five Price Points for Natural Gas]

Response: In response to comments received, we have removed the exemption from fugitive survey requirements for low producing well sites in the final rule.

Commenter Name: C. E. Venditti
Commenter Affiliation: Citizen
Document Control Number: EPA-HQ-OAR-2010-0505-7256
Comment Excerpt Number: 2

Comment: Reviewing EPA's cost / benefit analysis leads me to believe that the regulation is going to cost the industry more than EPA estimates and provide less benefit that EPA hopes. I cannot see how oil and gas companies will meet compliance requirements within the cost estimates that EPA discussed in Section VIII.F, starting on Page 197 of the preamble. This portion of the discussion leads me to believe that the authors of this section have little experience in the oil and gas industry. Everything that the oil and gas industry does is capital intensive.

I believe that we all carry a responsibility to take care of the environment that we have been given. I don't believe that this regulation will deliver meaningful results, but will only add significant burden to the US energy industry.

Response: The comment regarding the cost estimates in the preamble is very general; please see responses to comments elsewhere in this document that pertain to cost estimates for reducing emissions from the various sources regulated by the final NSPS. The EPA disagrees with the commenter's assertion that the final NSPS will not deliver meaningful results. As explained in the preamble to the final rule and in the final RIA, the final rule will result in significant health, environmental and climate benefits.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:10 AM - 8:00 PM; Public Hearing #1 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 37

Comment: The American economic system has made the United States a world leader in abundant and low-cost energy thanks in no small part to contributions from Texas. The proposed EPA rules pose a direct threat to the shale energy revolution that is strengthening U.S. energy security while reducing energy costs for Americans. Even worse, the EPA rules you're proposing are largely a Washington-designed solution that is searching for a problem. EPA's own data shows that methane emissions from oil and gas exploration are only 1.07 percent of total greenhouse emissions, meaning that methane regulations would impose significant new costs for minimal benefit.

Response: The EPA disagrees with the commenter's allegation that the final NSPS will threaten production of natural gas in the U.S or otherwise produce unreasonable negative impacts on the national economy. On this point, see response to DCN EPA-HQ-OAR-2010-0505-7336, Excerpt 98. With respect to the comment of the EPA's estimates of methane emissions, see the response to DCN EPA-HQ-OAR-2010-0505-5425, Excerpt 2.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:10 AM - 8:00 PM; Public Hearing #1 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 139

Comment: Industry says these rules are too burdensome to bear, that it will cost some $420 million over the next two years, but that's -- next ten years, but that's small change for these companies. Some of the larger players in the Eagle Ford Shale make that amount of money per year in a single day of sales. For example, Apache sold assets in Australia in April for a cool 2.1 billion. In December 2014, EOG made a joint sale of assets in Canada raising 410 million for the company in one fell swoop. And this summer, S.M. Energy sold gas-producing assets in Oklahoma for a cool $270 million, and now these guys are coming to Laredo.

Response: The EPA acknowledges the commenter's support of the rule. The final rule will result in significant health, environmental and climate benefits, at a net benefit to society as discussed in the final RIA.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:10 AM - 8:00 PM; Public Hearing #1 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 226

Comment: These goals would reduce an estimated 340- to 400,000 short tons of methane, which equate to 7.7 to 2 million metric tons of carbon dioxide. EPA estimates that the proposal will have a climate benefit of 460 million to 550 million, outweighing the proposed cost of 320- to $420 million. As the benefits outweigh the costs, the oil and gas industry will benefit, therefore, we certainly support this approach.

Response: The EPA acknowledges the commenter's support of this rule. The final rule will result in significant health, environmental and climate benefits, at a net benefit to society as discussed in the final RIA.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:00 AM - 2:40 PM; Public Hearing #2 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 72

Comment: One of the ways that government ensures that we take care of God's creation is through the use of regulations. Unfortunately, in our present political climate, especially here in the of Texas, there are many politicians who bemoan regulations of any kind, often using the false argument that they are job killers.

Their argument, which is based on false logic, I believe, claims that unregulated industry of all kinds will create more jobs and have a greater economic benefit. But regulations exist for the primary purpose of balancing economic benefit with the public good, especially as it pertains to health for all citizens, and more specifically those that are vulnerable: children, the elderly, those with chronic respiratory conditions.

Response: The EPA agrees with the commenter that this regulation will result in reduced emissions from the oil and natural gas sector, and will lead to significant health, welfare and environmental benefits. While the EPA is unable to estimate the net change in employment as a result of this rule due to methodological and data limitations, we do present estimates of the labor required to comply with the rule in section 6.4.2 of the final RIA.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:00 AM - 7:55 PM; Public Hearing #1 - Denver, Colorado
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7337
Comment Excerpt Number: 6

Comment: EPA's proposal can significantly affect the ability of operators to successfully develop oil and -- oil and natural gas operations, as the EPA proposed regulations will impose significant new costs at a time when energy companies are already suffering from a difficult commodity market.

In Colorado, sustained low natural gas prices since 2008 have had a long-term effect on production in certain oil and gas phases. The number of oil -- of drilling rigs operating in Colorado is half of what it was a year ago. Western Colorado in particular has seen a high unemployment rate and very few wells have been drilled.

The rules will have significant impacts on domestic energy development, which will also affect our ability to supply affordable oil and natural gas, which will affect energy costs for struggling families in the United States.

Response: The EPA disagrees with this comment. See response to DCN EPA-HQ-OAR-2010-0505-6789, Excerpt 20.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:00 AM - 7:55 PM; Public Hearing #1 - Denver, Colorado
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7337
Comment Excerpt Number: 103

Comment: We are confident that an industry which has figured out horizontal drilling techniques will also be able to find a way to comply with this rule while remaining profitable.

Response: The EPA acknowledges your support of this rule. The final rule will result in significant health, environmental and climate benefits, at a net benefit to society.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:00 AM - 7:55 PM; Public Hearing #1 - Denver, Colorado
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7337
Comment Excerpt Number: 160

Comment: Because of the Alliance's demographic, the regulatory burdens imposed by the recent onslaught of federal and state regulations have had a particularly acute impact. In this extremely challenging price environment, the Alliance strongly encourages the EPA to carefully consider not only the cost and burdens associated with NSPS Quad O, Rule a, and the rest of this rulemaking package, but also the cumulative impacts from all the various rulemakings, either ongoing or pending. This includes the 2012 NSPS, which is just now being implemented, the BLM venting and flaring rule, the upcoming new ozone standard, and the myriad non-air- quality federal rulemakings such as the BLM hydraulic fracturing rules and ongoing issues surrounding access to public lands and overly stringent resource management plans. There's also significant regulatory activity facing the Alliance's members at the state level, including air quality rulemakings in Colorado and Utah.

In short, the current regulatory and price environment is posing substantial concerns for the western oil and natural gas industry, and the Alliance urges EPA to narrowly tailor this and future regulations with this operating environment in mind.

Response: Consistent with Executive Order 12866, the proposal and final RIAs appropriately evaluate the incremental regulatory impacts of the NSPS OOOOa regulatory action. Comments

on the regulatory impacts of the other regulatory actions mentioned by the commenter are out of scope for this response to comments document.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:00 AM - 7:55 PM; Public Hearing #1 - Denver, Colorado
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7337
Comment Excerpt Number: 183

Comment: To close, CPI and its members recognize the importance of developing these valuable resources responsibly; however, the last thing we need is more duplicative and costly regulations that would increase the cost for energy for Americans and undermine our competitiveness when the operations that will bear the brunt of these regulatory impacts represent only 1.4 percent of total U.S. greenhouse gas emissions.

CPI remains committed to working with the EPA and the Administration to identify additional cost- effective control opportunities when, which implemented, do not hinder our ability to provide the energy our nation will continue to demand for many years to come. Thank you.

Response: The EPA agrees that there are many cost effective opportunities to reduce emissions from the oil and natural gas sector. The final NSPS will reduce emissions from the oil and natural gas sector in sensible and cost effective ways. The EPA disagrees with the commenter's allegation that the final NSPS will be duplicative or produce unreasonable negative impacts on energy prices or the national economy as whole. On this point, see response to DCN EPA-HQ-OAR-2010-0505-7336, Excerpt 98. With respect to the comment of the EPA's estimates of methane emissions, see the response to DCN EPA-HQ-OAR-2010-0505-5425, Excerpt 2.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Tuesday, September 29, 2015; 9:05 AM - 8:00 PM; Public Hearing #1 - Pittsburgh, Pennsylvania
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7338
Comment Excerpt Number: 49

Comment: An independent analysis conducted by ICF International has determined that the U.S. oil and gas industry sector can significantly reduce emissions of methane using currently-available technologies and at a low cost. By adopting proven emissions control technologies, industry could cut methane emissions by 40 percent below projected 2018 levels at a cost of less than one cent per thousand cubic feet of produced natural gas. Some of these measures pay for themselves over time through the sale of captured natural gas.

The health benefits from a reduction in methane emissions are quite astonishing. According to a study reported at the 2011 proceedings of the National Academy of Sciences reducing emission by 20 percent, starting in 2010, would prevent 30,000 premature mortalities globally in 2030 and 370,000 between 2010 and 2030. It's already 2015. So we've lost the opportunity to prevent some of those deaths.

The study continues that the cost-effectiveness of this 20 percent reduction in methane emissions is estimated to be 420,000 per avoided mortality. Think about that for a minute. If we started to reduce methane emissions in 2010, that's a cost-effectiveness of $12,600,000,000 worldwide.

Your proposal provides a unique opportunity to improve air quality and can be a cost-effective part of ozone management and result in the benefits of better air quality, improve public health, and mitigate climate change.

Response: The EPA agrees with the commenter that the final NSPS will reduce emissions from the oil and natural gas sector in sensible and cost effective ways. In addition, the EPA agrees that health, environmental and climate benefits will be achieved through implementing this rule.

12.7 Cost Impacts on Small Businesses

Commenter Name: Domestic Energy Producers Alliance
Commenter Affiliation: Domestic Energy Producers Alliance
Document Control Number: EPA-HQ-OAR-2010-0505-5425
Comment Excerpt Number: 2

Comment: The methane rule will have disproportionately detrimental impacts on America's domestic oil and gas producers, 95% of whom are small businesses who are already fighting for survival due to the collapse in commodity prices. This rule targets methane on the basis of its designation as a greenhouse gas (GHG). Methane has heretofore not been included under Clean Air Act authority as a pollutant (not a health hazard or a precursor to photo-chemical oxidants). And even as a GHG, data from, the EPA's Greenhouse Gas Inventory show that methane emissions form the oil and gas exploration and production industry are a mere 1.07 percent of the total national GHG emissions. Energy in Depth has reported that, "These new rules will hit small producers – the biggest economic engine the country has had over the past five years – the hardest. Instead of imposing onerous costs, especially at a time when market forces are already creating economic challenges, EPA should have worked with industry to develop a less burdensome and more cost-effective program." As a result of the controls put in place under the 2013 Quad "O" NSPS Rule for VOC's, the methane emissions in many of the producing basins were consequently reduced to meet the 45% of 2012 levels goal. Energy in Depth reported that Based on data from the U.S. Environmental Protection Agency's (EPA) Greenhouse Gas Reporting Program, EID's report shows that methane emissions from some of the most prolific shales in the United States have fallen considerably."

Response: The EPA disagrees with the information on methane emissions trends presented by the commenter. The EPA tracks GHG emissions through two complementary programs. Both programs show that emissions of methane from the oil and natural gas sector are significant, as discussed in section IV.C of the final preamble. The EPA's GHGRP, which includes reporting of emission by facilities meeting GHGRP thresholds, does show an overall decline in emissions from 2011-2014, with some sources showing declining emissions and others showing increasing emissions over that time period. The EPA's GHG Inventory, which tracks total national emissions and includes data from 1990-2014, shows an increase in emissions from natural gas and petroleum production and natural gas processing, transmission and storage of 7 percent from 2011-2014, also with emissions from some sources declining and others increasing. Over the full GHG Inventory time series, these emissions increase 16 percent from 1990-2014, and have shown a general increasing trend in more recent years, for example, an increase of 10 percent from 2005-2014. Emissions from production of natural gas and petroleum were 176 $MMTCO_2e$ in 2014, or 2.5% of total national emissions, and emissions from natural gas and petroleum production and natural gas processing, transmission, and storage were 3.4% of total national emissions in 2014. The EPA disagrees with the comment that the final NSPS will limit production of natural gas in the U.S or otherwise produce unreasonable negative impacts on the national economy. On this point, see response to DCN EPA-HQ-OAR-2010-0505-7336, Excerpt 98.

Commenter Name: Mike Gibbons, Vice President – Production
Commenter Affiliation: CountryMark Energy Resources, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6241
Comment Excerpt Number: 16

Comment: As discussed throughout this response, the average annual burden estimates that have been developed by EPA greatly underestimate owner and operator cost and manpower to implement this regulation. This regulation will impose significant economic penalties on our business; potentially driving many small operators out of business because they cannot afford to comply with the regulation (implementation or reporting requirements).

Response: With respect to comments on burden estimates, see response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8. On the commenter's point on economic impacts of the regulation, see response to DCN EPA-HQ-OAR-2010-0505-7336, Excerpt 98.

Commenter Name: W. Michael Scott, General Counsel
Commenter Affiliation: Trilogy Operating, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6603
Comment Excerpt Number: 19

Comment: The cost associated with these Rules would be particularly onerous for small E&P entities, and EPA has failed to fully consider these impacts**.** EPA is required by the Regulatory Flexibility Act ("RFA") and subsequent amendments to determine—to the extent feasible—the Methane NSPS's economic impact on small entities, explore regulatory options for reducing any significant economic impact on a substantial number of such entities, and explain its ultimate choice of regulatory approach.

By EPA's own estimation, 98 percent of the firms in the industries affected by the Methane NSPS are considered small entities. While many members of the public envision giant international conglomerates when they call to mind the oil and gas industry, this figure demonstrates that in reality, the industry is made up of a mosaic of small players, many of whom cannot shoulder the kind of recordkeeping and compliance burden that these Rules would impose. Because the industry is overwhelmingly made up of small entities, the impact of these Rules will be primarily felt by those small businesses. EPA determined that it could not certify that this Rule does not have a significant economic impact on a substantial number of small entities. EPA then convened a Small Business Review Panel and published an Initial Regulatory Flexibility Analysis of the Methane NSPS. This analysis has a number of shortcomings and fails to meet the statutory requirements.

First, the RFA requires EPA to include "a description of the projected reporting, recordkeeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record." Each initial regulatory flexibility analysis must also contain:

a description of any significant alternatives to the proposed rule which accomplish the stated objectives of applicable statutes and which minimize any significant economic impact of the proposed rule on small entities. Consistent with the stated objectives of applicable statutes, the analysis shall discuss significant alternatives such as —

1. the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities;
2. the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities;
3. the use of performance rather than design standards; and
4. an exemption from coverage of the rule, or any part thereof, for such small entities.

The analysis for the Methane NSPS is wholly inadequate in addressing these issues.

As discussed in the previous section, EPA's projections grossly understate the amount of time and resources that will have to be devoted to the reporting and recordkeeping aspects of this rule. The Methane NSPS is a highly complex and technical rule with a number of overlapping requirements and upstream oil and gas operations in particular are unlikely to be familiar with federal air regulations. This means that these small entities will have to expend far more resources either training their own personnel, or hiring personnel with expertise in federal air regulatory matters than EPA estimated.

Trilogy's own experience with these proposed Rules is a good example of what many other small upstream entities are also encountering as they analyze the requirements imposed by the Rules. Trilogy has 8 employees. Presently, Trilogy has to employee consultants full time currently for already existing regulatory compliance issues, if we are required to employ additional consultants then the total man hours required would severely harm our ability to continue in the oil and gas business. Trilogy does not have the resources to continue competing in an already highly regulated industry especially if these new regulations are enforced by the EPA. Trilogy estimates that it will need to hire at least one additional full-time employee dedicated to complying with the Methane Proposal. In other words, our small entity will have to *double* the man-hours that it devotes to compliance just to meet the requirements of the Methane NSPS. This sharp increase is due in part to the complexity of these Rules, as well as the continual nature of the monitoring, reporting, and recordkeeping requirements associated with the fugitive surveys. Like most other upstream companies, Trilogy's well sites are dispersed over a large geographic area, and an employee will have to do substantial amounts of travel in order to visit each site semi-annually or quarterly, and will then have to keep up with the continual recordkeeping and reporting requirements for each of these small sites. EPA's analysis and Methane NSPS fail to take into account the resources available to a small entity like Trilogy, or to provide a simplified or consolidated method of compliance reporting for small entities. As a result, the analysis does not comply with the RFA.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: W. Michael Scott, General Counsel
Commenter Affiliation: Trilogy Operating, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6603
Comment Excerpt Number: 20

Comment: EPA also failed to consider the devastating financial impact that these Rules could have on small entities. If small entities are required to replace their atmospheric tanks in order to comply with the Methane NSPS, then the cost of those storage vessel replacements could be more than many small businesses can bear, especially in the current economic environment. Even if EPA clarifies that the storage vessels will not need to be replaced, the cost of compliance with fugitive survey requirements will impose a serious burden on small businesses. As discussed above, oil and gas prices have fallen during the past year, and many industry experts expect crude oil prices to remain depressed—around $50/bbl or less. The "break-even" point for the average company that operates in the Midland Verticals portion of the Permian Basin, as Trilogy does, is around $59/bbl. The break-even point ranges within the Permian Basin but is generally between $50-$152/bbl, depending on the percent of liquids in the particular area of drilling. Estimates suggest that the break-even points for other major shale plays are also above the current market prices for oil. For example, the break-even point has been estimated at $65/bbl for the Eagle Ford and at $68/bbl for the Bakken. Increased compliance costs will raise these break-even amounts further and make it difficult, if not impossible, for small entities like Trilogy to stay competitive in current market conditions.

EPA estimates that the annual cost of compliance will be less than two percent of the revenue for the oil and gas industry per year, but did so based on outdated data that suggests far higher revenue for the oil and gas industry than current market rates. As a result, EPA has underestimated the degree to which these Rules will impact revenues. EPA's estimate also ignores the fact that these costs will be disproportionately felt by upstream oil and gas businesses, which tend to be some of the smallest players in the industry. For example, if E&P companies were required to replace atmospheric tanks with pressurized tanks, the costs for a single onshore facility would increase by $200,000, which translates into a ten percent capital cost increase for the tanks alone.

Even if EPA's estimate were accurate, a two percent cut in revenues is a meaningful decrease for small entities and, under current market conditions, could result in reduced operators, limit employee hours, and even lay-offs. These are the exact types of measures that will stretch small entities even thinner, and are, therefore, more likely to hinder, rather than help, efforts to improve environmental oversight. While EPA may view the impact of each of its regulatory programs in a vacuum, the reality for the entities that EPA regulates is that they have to find a way to comply with all of the rules that EPA creates. Two percent here, and two percent there may not sound like much in the abstract, but these compliance costs quickly add up and can quickly make it impossible for businesses to operate profitably.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: W. Michael Scott, General Counsel
Commenter Affiliation: Trilogy Operating, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6603
Comment Excerpt Number: 23

Comment: The costs associated with these Rules will be particularly devastating to these small businesses, because the costs primarily take the form of up-front capital costs that they must expend when they begin drilling a new well or refracturing an existing well, and before the well is generating any revenue for the company. The need for additional up-front capital can hurt a small entity's ability to borrow money on favorable terms, which can in turn impact whether or not a particular project is actually profitable. Small entities need to procure the capital for these projects from outside sources, and the need to borrow additional amounts, before knowing how profitable a particular well will be, will inhibit the ability of these small entities to borrow on terms that make it economically feasible to pursue these projects. These added expenses will create serious barriers to entry for smaller players in the oil and gas industry. Because these smaller players are often the source of significant innovations, this will prevent the introduction and development of new engineering methods, operating techniques and technologies, including environmentally beneficial innovations.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: W. Michael Scott, General Counsel
Commenter Affiliation: Trilogy Operating, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6603
Comment Excerpt Number: 27

Comment: Recommendations: EPA should revise its regulatory impact statement to consider the financial impact on small businesses. EPA should consider:

1. Exempting small entities; or
2. Alternatively, EPA should consider exempting well sites with less than four affected wells;
3. Giving small entities 60 days from start-up or modification to perform an initial survey, and 30 days for repairs and follow up surveys;
4. Allowing small entities to use alternative, performance-based methods to demonstrate they are monitoring and repairing natural gas leaks in a timely manner; and
5. Allowing compliance with state leak detection and repair programs to create a presumption of compliance with the Methane NSPS; or
6. Alternatively, only requiring surveys to be performed annually unless two or more consecutive surveys reveal leaks in more than 50 of the fugitive emission components at a well site or compressor station, in which case surveys should be performed semi-annually.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: W. Michael Scott, Vice President and General Counsel
Commenter Affiliation: CrownQuest Operating, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6703
Comment Excerpt Number: 17

Comment: The cost associated with these Rules would be particularly onerous for small E&P entities, and EPA has failed to fully consider these impacts. EPA is required by the Regulatory Flexibility Act ("RF A") and subsequent amendments to determine-to the extent feasible-the Methane NSPS's economic impact on small entities, explore regulatory options for reducing any significant economic impact on a substantial number of such entities, and explain its ultimate choice of regulatory approach.

By EPA's own estimation, 98 percent of the firms in the industries affected by the Methane NSPS are considered small entities. While many. members of the public envision giant international conglomerates when they call to mind the oil and gas industry, this figure demonstrates that in reality, the industry is made up of a mosaic of small players, many of whom cannot shoulder the kind of recordkeeping and compliance burden that these Rules would impose. Because the industry is overwhelmingly made up of small entities, the impact of these Rules will be primarily felt by those small businesses. EPA determined that it could not certify that this Rule does not have a significant economic impact on a substantial number of small entities. EPA then convened a Small Business Review Panel and published an Initial Regulatory Flexibility Analysis of the Methane NSPS. This analysis has a number of shortcomings and fails to meet the statutory requirements.

First, the RFA requires EPA to include "a description of the projected reporting, recordkeeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record." Each initial regulatory flexibility analysis must also contain:

a description of any significant alternatives to the proposed rule which accomplish the stated objectives of applicable statutes and which minimize any significant economic impact of the proposed rule on small entities. Consistent with the stated objectives of applicable statutes, the analysis shall discuss significant alternatives such as-

(1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities;

(2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities;

(3) the use of performance rather than design standards; and

(4) an exemption from coverage of the rule, or any part thereof, for such small entities.

The analysis for the Methane NSPS is wholly inadequate in addressing these issues.

As discussed in the previous section, EPA's projections grossly understate the amount of time and resources that will have to be devoted to the reporting and recordkeeping aspects of this rule. The Methane NSPS is a highly complex and technical rule with a number of overlapping requirements and upstream oil and gas operations in particular are unlikely to be familiar with federal air regulations. This means that these small entities will have to expend far more resources either training their own personnel, or hiring personnel with expertise in federal air regulatory matters than EPA estimated.

CrownQuest's own experience with these proposed Rules is a good example of what many other small upstream entities are also encountering as they analyze the requirements imposed by the Rules. CrownQuest has 165 employees. Presently, CrownQuest has only one employee dedicated full time to regulatory compliance issues, and employs several contract employees to assist with state regulatory compliance requirements. Some other employees spend a portion of their time on regulatory compliance issues, and CrownQuest estimates that the total man-hours spent on compliance each year is at least the equivalent of about 4 full-time employees. CrownQuest estimates that it will need to hire at least four additional full-time employees dedicated to complying with the Methane Proposal. In other words, our small entity will have to double the man-hours that it devotes to compliance just to meet the requirements of the Methane NSPS. This sharp increase is due in part to the complexity of these Rules, as well as the continual nature of the monitoring, reporting, and recordkeeping requirements associated with the fugitive surveys. Like most other upstream companies, CrownQuest's well sites are dispersed over a large geographic area, and an employee will have to do substantial amounts of travel in order to visit each site semi-annually or quarterly, and will then have to keep up with the continual recordkeeping and reporting requirements for each of these small sites. EPA's analysis and Methane NSPS fail to take into account the resources available to a small entity like CrownQuest, or to provide a simplified or consolidated method of compliance reporting for small entities. As a result, the analysis does not comply with the RFA.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: W. Michael Scott, Vice President and General Counsel
Commenter Affiliation: CrownQuest Operating, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6703
Comment Excerpt Number: 18

Comment: EPA also failed to consider the devastating financial impact that these Rules could have on small entities. If small entities are required to replace their atmospheric tanks in order to comply with the Methane NSPS, then the cost of those storage vessel replacements could be more than many small businesses can bear, especially in the current economic environment. Even if EPA clarifies that the storage vessels will not need to be replaced, the cost of compliance with fugitive survey requirements will impose a serious burden on small businesses. As discussed above, oil and gas prices have fallen during the past year, and many industry experts

expect crude oil prices to remain depressed-around $50/bbl or less. The "break-even" point for the average company that operates in the Midland Verticals portion of the Permian Basin, as Crown Quest does, is around $59/bbl. The break-even point ranges within the Permian Basin but is generally between $50- $152/bbl, depending on the percent of liquids in the particular area of drilling. Estimates suggest that the break-even points for other major shale plays are also above the current market prices for oil. For example, the break-even point has been estimated at $65/bbl for the Eagle Ford and at $68/bbl for the Bakken. Increased compliance costs will raise these break-even amounts further and make it difficult, if not impossible, for small entities like Crown Quest to stay competitive in current market conditions.

EPA estimates that the annual cost of compliance will be less than two percent of the revenue for the oil and gas industry per year, but did so based on outdated data that suggests far higher revenue for the oil and gas industry than current market rates. As a result, EPA has underestimated the degree to which these Rules will impact revenues. EPA's estimate also ignores the fact that these costs will be disproportionately felt by upstream oil and gas businesses, which tend to be some of the smallest players in the industry. For example, if E&P companies were required to replace atmospheric tanks with pressurized tanks, the costs for a single onshore facility would increase by $200,000, which translates into a ten percent capital cost increase for the tanks alone.

Even if EPA's estimate were accurate, a two percent cut in revenues is a meaningful decrease for small entities and, under current market conditions, could result in reduced operators, limit employee hours, and even lay-offs. These are the exact types of measures that will stretch small entities even thinner, and are, therefore, more likely to hinder, rather than help, efforts to improve environmental oversight. While EPA may view the impact of each of its regulatory programs in a vacuum, the reality for the entities that EPA regulates is that they have to find a way to comply with all of the rules that EPA creates. Two percent here, and two percent there may not sound like much in the abstract, but these compliance costs quickly add up and can quickly make it impossible for businesses to operate profitably.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: W. Michael Scott, Vice President and General Counsel
Commenter Affiliation: CrownQuest Operating, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6703
Comment Excerpt Number: 21

Comment: The costs associated with these Rules will be particularly devastating to these small businesses, because the costs primarily take the form of up-front capital costs that they must expend when they begin drilling a new well or refracturing an existing well, and before the well is generating any revenue for the company. The need for additional up-front capital can hurt a small entity's ability to borrow money on favorable terms, which can in turn impact whether or not a particular project is actually profitable. Small entities need to procure the capital for these projects from outside sources, and the need to borrow additional amounts, before knowing how profitable a particular well will be, will inhibit the ability of these small entities to borrow on

terms that make it economically feasible to pursue these projects. These added expenses will create serious barriers to entry for smaller players in the oil and gas industry. Because these smaller players are often the source of significant innovations, this will prevent the introduction and development of new engineering methods, operating techniques and technologies, including environmentally beneficial innovations.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: W. Michael Scott, Vice President and General Counsel
Commenter Affiliation: CrownQuest Operating, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6703
Comment Excerpt Number: 25

Comment: Recommendations: EPA should revise its regulatory impact statement to consider the financial impact on small businesses. EPA should consider:

1. Exempting small entities; or

2. Alternatively, EPA should consider exempting well sites with less than four affected wells;

3. Giving small entities 60 days from start-up or modification to perform an initial survey, and 30 days for repairs and follow up surveys;

4. Allowing small entities to use alternative, performance-based methods to demonstrate they are monitoring and repairing natural gas leaks in a timely manner; and

5. Allowing compliance with state leak detection and repair programs to create a presumption of compliance with the Methane NSPS; or

6. Alternatively, only requiring surveys to be performed annually unless two or more consecutive surveys reveal leaks in more than 50 of the fugitive emission components at a well site or compressor station, in which case surveys should be performed semi-annually.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Bradley C. Cross, President/Partner
Commenter Affiliation: Big Star Oil & Gas, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6757
Comment Excerpt Number: 16

Comment: The cost associated with these Rules would be particularly onerous for small E&P entities, and EPA has failed to fully consider these impacts.

EPA is required by the Regulatory Flexibility Act ("RFA") and subsequent amendments to determine— to the extent feasible—the Methane NSPS's economic impact on small entities, explore regulatory options for reducing any significant economic impact on a substantial number of such entities, and explain its ultimate choice of regulatory approach.

By EPA's own estimation, 98 percent of the firms in the industries affected by the Methane NSPS are considered small entities. While many members of the public envision giant international conglomerates when they call to mind the oil and gas industry, this figure demonstrates that in reality, the industry is made up of a mosaic of small players, many of whom cannot shoulder the kind of recordkeeping and compliance burden that these Rules would impose. Because the industry is overwhelmingly made up of small entities, the impact of these Rules will be primarily felt by those small businesses. EPA determined that it could not certify that this Rule does not have a significant economic impact on a substantial number of small entities. EPA then convened a Small Business Review Panel and published an Initial Regulatory Flexibility Analysis of the Methane NSPS. This analysis has a number of shortcomings and fails to meet the statutory requirements.

First, the RFA requires EPA to include "a description of the projected reporting, recordkeeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record." Each initial regulatory flexibility analysis must also contain:

a description of any significant alternatives to the proposed rule which accomplish the stated objectives of applicable statutes and which minimize any significant economic impact of the proposed rule on small entities. Consistent with the stated objectives of applicable statutes, the analysis shall discuss significant alternatives such as —

(1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities;

(2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities;

(3) the use of performance rather than design standards; and (4) an exemption from coverage of the rule, or any part thereof, for such small entities.

The analysis for the Methane NSPS is wholly inadequate in addressing these issues.

As discussed in the previous section, EPA's projections grossly understate the amount of time and resources that will have to be devoted to the reporting and recordkeeping aspects of this rule. The Methane NSPS is a highly complex and technical rule with a number of overlapping requirements and upstream oil and gas operations in particular are unlikely to be familiar with federal air regulations. This means that these small entities will have to expend far more resources either training their own personnel, or hiring personnel with expertise in federal air regulatory matters than EPA estimated. Big Star is a very small company, but representative of

the type of company that produces a substantial portion of the oil and gas needs of our country. The additional workload burden resulting from the complex record keeping and reporting requirements proposed are beyond the capabilities of our existing staff. Big Star would most likely be forced to contract expensive regulatory consultants just to meet the requirements of the Methane NSPS. This will result in a significant financial burden on the company to address the complex and continual monitoring, reporting, and recordkeeping requirements associated with the fugitive surveys. Like most other upstream companies, Big Star's well sites are dispersed over a large geographic area and will require substantial amounts of (billable) travel time in order to visit each site semi-annually or quarterly, and continual (billable) maintenance of records and periodic (billable) reporting for each of these small sites. EPA's analysis and Methane NSPS fail to take into account the resources available to a small entity like Big Star, or to provide a simplified or consolidated method of compliance reporting for small entities. As a result, the analysis does not comply with the RFA.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Bradley C. Cross, President/Partner
Commenter Affiliation: Big Star Oil & Gas, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6757
Comment Excerpt Number: 17

Comment: EPA also failed to consider the devastating financial impact that these Rules could have on small entities like Big Star. If small entities are required to replace their atmospheric tanks in order to comply with the Methane NSPS, then the cost of those storage vessel replacements could be more than many small businesses can bear, especially in the current economic environment. Even if EPA clarifies that the storage vessels will not need to be replaced, the cost of compliance with fugitive survey requirements will impose a serious burden on small businesses. As discussed above, oil and gas prices have fallen during the past year, and many industry experts expect crude oil prices to remain depressed—around $50/bbl or less. The "break-even" oil price for the average company that operates in the Midland Basin region of the Permian, as Big Star does, is over $50/bbl. Estimates suggest that the break-even points for other major shale plays are also above the current market prices for oil. For example, the break-even point has been estimated at $65/bbl for the Eagle Ford and at $68/bbl for the Bakken. Increased compliance costs will raise these break-even amounts further and make it difficult, if not impossible, for small entities like Big Star to stay competitive in current market conditions.

EPA estimates that the annual cost of compliance will be less than two percent of the revenue for the oil and gas industry per year, but did so based on outdated data that suggests far higher revenue for the oil and gas industry than current market rates. As a result, EPA has underestimated the degree to which these Rules will impact revenues. EPA's estimate also ignores the fact that this cost burden will be disproportionately applied to upstream oil and gas businesses, which tend to be some of the smallest players in the industry. For example, if E&P companies were required to replace atmospheric tanks with pressurized tanks, the costs for a

single onshore facility would increase by $200,000. This raises the cost of a new well by ten percent, simply due to the capital cost increase for the tanks alone.

Even if EPA's estimates were accurate, a two percent cut in revenues is a meaningful decrease for small entities and, under current market conditions, could result in reduced operators, limit employee hours, and even lay-offs. A two-percent reduction in revenue translates to a significantly higher decrease in an operator's profit. After paying for employee wages, electrical costs, maintenance of equipment, taxes, and other related operating expenses the remaining profits may only be 10-20% of revenue. Increasing costs by 2% of revenue therefore decreases profit by 10-20%, a very significant amount. These are the exact types of measures that will stretch small entities even thinner, and are, therefore, more likely to hinder, rather than help, efforts to improve environmental oversight. While EPA may view the impact of each of its regulatory programs in a vacuum, the reality for the entities that EPA regulates is that they have to find a way to comply with all of the rules that EPA creates. Two percent may not sound like much in the abstract, but these compliance costs quickly add up and can quickly make it impossible for businesses to operate profitably.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Bradley C. Cross, President/Partner
Commenter Affiliation: Big Star Oil & Gas, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6757
Comment Excerpt Number: 20

Comment: The costs associated with these Rules will be particularly devastating to these small businesses, because the costs primarily take the form of up-front capital costs that they must expend when they begin drilling a new well or refracturing an existing well, and before the well is generating any revenue for the company. The need for additional up-front capital can hurt a small entity's ability to borrow money on favorable terms, which can in turn impact whether or not a particular project is actually profitable. Small entities need to procure the capital for these projects from outside sources, and the need to borrow additional amounts, before knowing how profitable a particular well will be, will inhibit the ability of these small entities to borrow on terms that make it economically feasible to pursue these projects. These added expenses will create serious barriers to entry for smaller players in the oil and gas industry. Because these smaller players are often the source of significant innovations, this will prevent the introduction and development of new engineering methods, operating techniques and technologies, including environmentally beneficial innovations.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Bradley C. Cross, President/Partner
Commenter Affiliation: Big Star Oil & Gas, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6757
Comment Excerpt Number: 24

Comment: Recommendations: EPA should revise its regulatory impact statement to consider the financial impact on small businesses. EPA should consider:

1. Exempting small entities; or

2. Alternatively, EPA should consider exempting well sites with less than four affected wells;

3. Giving small entities 60 days from start-up or modification to perform an initial survey, and 30 days for repairs and follow up surveys;

4. Allowing small entities to use alternative, performance-based methods to demonstrate they are monitoring and repairing natural gas leaks in a timely manner; and

5. Allowing compliance with state leak detection and repair programs to create a presumption of compliance with the Methane NSPS; or

6. Alternatively, only requiring surveys to be performed annually unless two or more consecutive surveys reveal leaks in more than 50 of the fugitive emission components at a well site or compressor station, in which case surveys should be performed semi-annually.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Mike Cantrell, Chairman
Commenter Affiliation: National Stripper Well Association (NSWA)
Document Control Number: EPA-HQ-OAR-2010-0505-6758
Comment Excerpt Number: 7

Comment: EPA fails to consider the additional costs to small producers and the reduced rate of return for stripper and marginal wells. In developing a strategy for EPA's cost-effectiveness of the proposed regulations EPA has estimated the cost of natural gas at $4/Mcf. This estimate seems both wildly optimistic and fails to consider the lower price often given to small producers. In addition, EPA's cost estimates assume that ongoing production will pay for upfront capital investments, a requirement that many marginal and stripper producers simply can't accomplish.

Recent natural gas has been valued around $2.50/Mcf on the national market, significantly below the EPA assumed value. Although prices have been low for an extended period of time, there has not been a significant decline in production nor increase in price, and there is little reason to believe that the massive technological advances in fracking and gas production that has made natural gas abundant in the United States will suddenly stop. As a result, producers realistically

need to expect to receive a lower price for the foreseeable future. However, according to NSWA members in November 2015, the NYMEX price of $2.50/Mcf was optimistic for many small producers.

The E&P sector of the oil and gas industry is heavily capitalized and requires significant costs to explore, plan, permit and drill wells before income is generated from the property. For stripper well producers, some of those costs can be built into the original purchase of the property and extended into the operation, maintenance, and upkeep of existing production equipment. EPA's decision to change the regulatory structure of permitting operations by mandating significant new processing, production and compression equipment at a time of record low prices will effectively result in many producers deciding to shut-in their producing wells instead of installing the newly mandated equipment, especially if the timeframe for cost recapture of the new equipment is significantly extended because of the low price environment which EPA fails to recognize in the rulemaking. As a result, many small producers simply won't make it until some future time when natural gas prices rebound.

Response: With respect to the EPA's assumptions about natural gas prices in 2020 and 2025, see response to DCN EPA-HQ-OAR-2010-0505-6847, Excerpt.3. Regarding the comments about challenges faced by producers of low production wells, as explained in the Final Regulatory Flexibility Analysis for the final rule, which is included in the final RIA, changes to the rule from proposal that may benefit small entities due to comments received. These changes include allowing both OGI and Method 21 as acceptable monitoring technology, replacing a performance based monitoring schedule with a fixed frequency, lengthening the time of initial fugitive monitoring, and simplified the third party verification of technical infeasibility requirements. Though these are not monetized, we believe the flexibility and simplifications these changes have added to the rule result in a reduced burden on small entities.

Commenter Name: Glenn Prescott
Commenter Affiliation: RK Petroleum Corporation
Document Control Number: EPA-HQ-OAR-2010-0505-6788
Comment Excerpt Number: 17

Comment: The cost associated with these Rules would be particularly onerous for small E&P entities, and EPA has failed to fully consider these impacts.

EPA is required by the Regulatory Flexibility Act ("RFA") and subsequent amendments to determine—to the extent feasible—the Methane NSPS's economic impact on small entities, explore regulatory options for reducing any significant economic impact on a substantial number of such entities, and explain its ultimate choice of regulatory approach.

By EPA's own estimation, 98 percent of the firms in the industries affected by the Methane NSPS are considered small entities. While many members of the public envision giant international conglomerates when they call to mind the oil and gas industry, this figure demonstrates that in reality, the industry is made up of a mosaic of small players, many of whom

cannot shoulder the kind of recordkeeping and compliance burden that these Rules would impose. Because the industry is overwhelmingly made up of small entities, the impact of these Rules will be primarily felt by those small businesses. EPA determined that it could not certify that this Rule does not have a significant economic impact on a substantial number of small entities. EPA then convened a Small Business Review Panel and published an Initial Regulatory Flexibility Analysis of the Methane NSPS. This analysis has a number of shortcomings and fails to meet the statutory requirements.

First, the RFA requires EPA to include "a description of the projected reporting, recordkeeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record." Each initial regulatory flexibility analysis must also contain:

a description of any significant alternatives to the proposed rule which accomplish the stated objectives of applicable statutes and which minimize any significant economic impact of the proposed rule on small entities. Consistent with the stated objectives of applicable statutes, the analysis shall discuss significant alternatives such as —

(1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities;

(2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities;

(3) the use of performance rather than design standards; and

(4) an exemption from coverage of the rule, or any part thereof, for such small entities.

The analysis for the Methane NSPS is wholly inadequate in addressing these issues.

As discussed in the previous section, EPA's projections grossly understate the amount of time and resources that will have to be devoted to the reporting and recordkeeping aspects of this rule. The Methane NSPS is a highly complex and technical rule with a number of overlapping requirements and upstream oil and gas operations in particular are unlikely to be familiar with federal air regulations. This means that these small entities will have to expend far more resources either training their own personnel, or hiring personnel with expertise in federal air regulatory matters than EPA estimated.

RK's own experience with these proposed Rules is a good example of what many other small upstream entities are also encountering as they analyze the requirements imposed by the Rules. RK has 18 employees. Presently, RK has no employee dedicated full time to regulatory compliance issues, and employs several contract employees to assist with state regulatory compliance requirements. Some other employees spend a portion of their time on regulatory compliance issues, and RK estimates that the total man-hours spent on compliance each year is at least the equivalent of about 4 full-time employees. RK estimates that it will need to hire at least

one additional full-time employee dedicated to complying with the Methane Proposal. In other words, our small entity will have to double the man-hours that it devotes to compliance just to meet the requirements of the Methane NSPS. This sharp increase is due in part to the complexity of these Rules, as well as the continual nature of the monitoring, reporting, and recordkeeping requirements associated with the fugitive surveys. Like most other upstream companies, RK's well sites are dispersed over a large geographic area, and an employee will have to do substantial amounts of travel in order to visit each site semi-annually or quarterly, and will then have to keep up with the continual recordkeeping and reporting requirements for each of these small sites. EPA's analysis and Methane NSPS fail to take into account the resources available to a small entity like RK, or to provide a simplified or consolidated method of compliance reporting for small entities. As a result, the analysis does not comply with the RFA.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Glenn Prescott
Commenter Affiliation: RK Petroleum Corporation
Document Control Number: EPA-HQ-OAR-2010-0505-6788
Comment Excerpt Number: 18

Comment: EPA also failed to consider the devastating financial impact that these Rules could have on small entities. If small entities are required to replace their atmospheric tanks in order to comply with the Methane NSPS, then the cost of those storage vessel replacements could be more than many small businesses can bear, especially in the current economic environment. Even if EPA clarifies that the storage vessels will not need to be replaced, the cost of compliance with fugitive survey requirements will impose a serious burden on small businesses. As discussed above, oil and gas prices have fallen during the past year, and many industry experts expect crude oil prices to remain depressed—around $50/bbl or less. The "break-even" point for the average company that operates in the Midland Verticals portion of the Permian Basin, as RK does, is around $59/bbl. The break-even point ranges within the Permian Basin but is generally between $50-$152/bbl, depending on the percent of liquids in the particular area of drilling. Estimates suggest that the break-even points for other major shale plays are also above the current market prices for oil. For example, the break-even point has been estimated at $65/bbl for the Eagle Ford and at $68/bbl for the Bakken. Increased compliance costs will raise these break-even amounts further and make it difficult, if not impossible, for small entities like RK to stay competitive in current market conditions.

EPA estimates that the annual cost of compliance will be less than two percent of the revenue for the oil and gas industry per year, but did so based on outdated data that suggests far higher revenue for the oil and gas industry than current market rates. As a result, EPA has underestimated the degree to which these Rules will impact revenues. EPA's estimate also ignores the fact that these costs will be disproportionately felt by upstream oil and gas businesses, which tend to be some of the smallest players in the industry. For example, if E&P companies were required to replace atmospheric tanks with pressurized tanks, the costs for a

single onshore facility would increase by $200,000, which translates into a ten percent capital cost increase for the tanks alone.

Even if EPA's estimate were accurate, a two percent cut in revenues is a meaningful decrease for small entities and, under current market conditions, could result in reduced operators, limit employee hours, and even lay-offs. These are the exact types of measures that will stretch small entities even thinner, and are, therefore, more likely to hinder, rather than help, efforts to improve environmental oversight. While EPA may view the impact of each of its regulatory programs in a vacuum, the reality for the entities that EPA regulates is that they have to find a way to comply with all of the rules that EPA creates. Two percent here, and two percent there may not sound like much in the abstract, but these compliance costs quickly add up and can quickly make it impossible for businesses to operate profitably.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Glenn Prescott
Commenter Affiliation: RK Petroleum Corporation
Document Control Number: EPA-HQ-OAR-2010-0505-6788
Comment Excerpt Number: 21

Comment: The costs associated with these Rules will be particularly devastating to these small businesses, because the costs primarily take the form of up-front capital costs that they must expend when they begin drilling a new well or refracturing an existing well, and before the well is generating any revenue for the company. The need for additional up-front capital can hurt a small entity's ability to borrow money on favorable terms, which can in turn impact whether or not a particular project is actually profitable. Small entities need to procure the capital for these projects from outside sources, and the need to borrow additional amounts, before knowing how profitable a particular well will be, will inhibit the ability of these small entities to borrow on terms that make it economically feasible to pursue these projects. These added expenses will create serious barriers to entry for smaller players in the oil and gas industry. Because these smaller players are often the source of significant innovations, this will prevent the introduction and development of new engineering methods, operating techniques and technologies, including environmentally beneficial innovations.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Glenn Prescott
Commenter Affiliation: RK Petroleum Corporation
Document Control Number: EPA-HQ-OAR-2010-0505-6788
Comment Excerpt Number: 25

Comment: Recommendations: EPA should revise its regulatory impact statement to consider the financial impact on small businesses. EPA should consider:

1. Exempting small entities; or

2. Alternatively, EPA should consider exempting well sites with less than four affected wells;

3. Giving small entities 60 days from start-up or modification to perform an initial survey, and 30 days for repairs and follow up surveys;

4. Allowing small entities to use alternative, performance-based methods to demonstrate they are monitoring and repairing natural gas leaks in a timely manner; and

5. Allowing compliance with state leak detection and repair programs to create a presumption of compliance with the Methane NSPS; or

6. Alternatively, only requiring surveys to be performed annually unless two or more consecutive surveys reveal leaks in more than 50 of the fugitive emission components at a well site or compressor station, in which case surveys should be performed semi-annually.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: W. Jeffrey Sparks
Commenter Affiliation: Discovery Operating, Inc
Document Control Number: EPA-HQ-OAR-2010-0505-6790
Comment Excerpt Number: 17

Comment: EPA is required by the Regulatory Flexibility Act ("RFA") and subsequent amendments to determine—to the extent feasible—the Methane NSPS's economic impact on small entities, explore regulatory options for reducing any significant economic impact on a substantial number of such entities, and explain its ultimate choice of regulatory approach.

By EPA's own estimation, 98 percent of the firms in the industries affected by the Methane NSPS are considered small entities. While many members of the public envision giant international conglomerates when they call to mind the oil and gas industry, this figure demonstrates that in reality, the industry is made up of a mosaic of small players, many of whom cannot shoulder the kind of recordkeeping and compliance burden that these Rules would impose. Because the industry is overwhelmingly made up of small entities, the impact of these Rules will be primarily felt by those small businesses. EPA determined that it could not certify

that this Rule does not have a significant economic impact on a substantial number of small entities. EPA then convened a Small Business Review Panel and published an Initial Regulatory Flexibility Analysis of the Methane NSPS. This analysis has a number of shortcomings and fails to meet the statutory requirements.

First, the RFA requires EPA to include "a description of the projected reporting, recordkeeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record." Each initial regulatory flexibility analysis must also contain:

a description of any significant alternatives to the proposed rule which accomplish the stated objectives of applicable statutes and which minimize any significant economic impact of the proposed rule on small entities. Consistent with the stated objectives of applicable statutes, the analysis shall discuss significant alternatives such as —
(1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities;
(2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities;
(3) the use of performance rather than design standards; and
(4) an exemption from coverage of the rule, or any part thereof, for such small entities.

The analysis for the Methane NSPS is wholly inadequate in addressing these issues.

As discussed in the previous section, EPA's projections grossly understate the amount of time and resources that will have to be devoted to the reporting and recordkeeping aspects of this rule. The Methane NSPS is a highly complex and technical rule with a number of overlapping requirements and upstream oil and gas operations in particular are unlikely to be familiar with federal air regulations. This means that these small entities will have to expend far more resources either training their own personnel, or hiring personnel with expertise in federal air regulatory matters than EPA estimated.

Discovery's own experience with these proposed Rules is a good example of what many other small upstream entities are also encountering as they analyze the requirements imposed by the Rules. Discovery has 20 employees. Presently, Discovery has no employee dedicated full time to just regulatory compliance issues, but employs several contractors to assist with state regulatory compliance requirements as well as some employees spend a portion of their time on regulatory compliance issues. Discovery estimates that it will need to hire at least four additional full-time employees dedicated to complying with the Methane Proposal. In other words, our small entity may never be able to afford to hire the personnel that it needs just to comply with the requirements of the Methane NSPS. This sharp increase is due in part to the complexity of these Rules, as well as the continual nature of the monitoring, reporting, and recordkeeping requirements associated with the fugitive surveys. Like most other upstream companies, Discovery's well sites are dispersed over a large geographic area, and an employee will have to do substantial amounts of travel in order to visit each site semi-annually or quarterly, and will then have to keep up with the continual recordkeeping and reporting requirements for each of

these small sites. The extra cost for this bureaucracy would be a crushing blow for low producing wells (stripper wells) which is a high percentage of Discovery's current production and a significant part of our country's energy reserves. EPA's analysis and Methane NSPS fail to take into account the resources available to a small entity like Discovery, or to provide a simplified or consolidated method of compliance reporting for small entities. As a result, the analysis does not comply with the RFA.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: W. Jeffrey Sparks
Commenter Affiliation: Discovery Operating, Inc
Document Control Number: EPA-HQ-OAR-2010-0505-6790
Comment Excerpt Number: 18

Comment: EPA also failed to consider the devastating financial impact that these Rules could have on small entities. If small entities are required to replace their atmospheric tanks in order to comply with the Methane NSPS, then the cost of those storage vessel replacements could be more than many small businesses can bear, especially in the current economic environment. Even if EPA clarifies that the storage vessels will not need to be replaced, the cost of compliance with fugitive survey requirements will impose a serious burden on small businesses. As discussed above, oil and gas prices have fallen during the past year, and many industry experts expect crude oil prices to remain depressed—around $50/bbl or less. The "break-even" point for the average company that operates in the Midland Verticals portion of the Permian Basin, as Discovery does, is around $59/bbl. The break-even point ranges within the Permian Basin but is generally between $50-$152/bbl, depending on the percent of liquids in the particular area of drilling. Estimates suggest that the break-even points for other major shale plays are also above the current market prices for oil. For example, the break-even point has been estimated at $65/bbl for the Eagle Ford and at $68/bbl for the Bakken. Increased compliance costs will raise these break-even amounts further and make it difficult, if not impossible, for small entities like Discovery to stay competitive in current market conditions.

EPA estimates that the annual cost of compliance will be less than two percent of the revenue for the oil and gas industry per year, but did so based on outdated data that suggests far higher revenue for the oil and gas industry than current market rates. As a result, EPA has underestimated the degree to which these Rules will impact revenues. EPA's estimate also ignores the fact that these costs will be disproportionately felt by upstream oil and gas businesses, which tend to be some of the smallest players in the industry. For example, if E&P companies were required to replace atmospheric tanks with pressurized tanks, the costs for a single onshore facility would increase by $200,000, which translates into a ten percent capital cost increase for the tanks alone.

Even if EPA's estimate were accurate, a two percent cut in revenues is a meaningful decrease for small entities and, under current market conditions, could result in reduced operators, limit employee hours, and even lay-offs. These are the exact types of measures that will stretch small

entities even thinner, and are, therefore, more likely to hinder, rather than help, efforts to improve environmental oversight. While EPA may view the impact of each of its regulatory programs in a vacuum, the reality for the entities that EPA regulates is that they have to find a way to comply with all of the rules that EPA creates. Two percent here, and two percent there may not sound like much in the abstract, but these compliance costs quickly add up and can quickly make it impossible for businesses to operate profitably.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: W. Jeffrey Sparks
Commenter Affiliation: Discovery Operating, Inc
Document Control Number: EPA-HQ-OAR-2010-0505-6790
Comment Excerpt Number: 21

Comment: The costs associated with these Rules will be particularly devastating to these small businesses, because the costs primarily take the form of up-front capital costs that they must expend when they begin drilling a new well or refracturing an existing well, and before the well is generating any revenue for the company. The need for additional up-front capital can hurt a small entity's ability to borrow money on favorable terms, which can in turn impact whether or not a particular project is actually profitable. Small entities need to procure the capital for these projects from outside sources, and the need to borrow additional amounts, before knowing how profitable a particular well will be, will inhibit the ability of these small entities to borrow on terms that make it economically feasible to pursue these projects. These added expenses will create serious barriers to entry for smaller players in the oil and gas industry. Because these smaller players are often the source of significant innovations, this will prevent the introduction and development of new engineering methods, operating techniques and technologies, including environmentally beneficial innovations.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: W. Jeffrey Sparks
Commenter Affiliation: Discovery Operating, Inc
Document Control Number: EPA-HQ-OAR-2010-0505-6790
Comment Excerpt Number: 25

Comment: Recommendations: EPA should revise its regulatory impact statement to consider the financial impact on small businesses. EPA should consider:

1. Exempting small entities; or
2. Alternatively, EPA should consider exempting well sites with less than four affected wells;
3. Giving small entities 60 days from start-up or modification to perform an initial survey, and 30 days for repairs and follow up surveys;

4. Allowing small entities to use alternative, performance-based methods to demonstrate they are monitoring and repairing natural gas leaks in a timely manner; and

5. Allowing compliance with state leak detection and repair programs to create a presumption of compliance with the Methane NSPS; or
6. Alternatively, only requiring surveys to be performed annually unless two or more consecutive surveys reveal leaks in more than 50 of the fugitive emission components at a well site or compressor station, in which case surveys should be performed semiannually.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Josh W. Luig
Commenter Affiliation: Veritas Energy, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6797
Comment Excerpt Number: 18

Comment: EPA is required by the Regulatory Flexibility Act ("RFA") and subsequent amendments to determine—to the extent feasible—the Methane NSPS's economic impact on small entities, explore regulatory options for reducing any significant economic impact on a substantial number of such entities, and explain its ultimate choice of regulatory approach.

By EPA's own estimation, 98 percent of the firms in the industries affected by the Methane NSPS are considered small entities. While many members of the public envision giant international conglomerates when they call to mind the oil and gas industry, this figure demonstrates that in reality, the industry is made up of a mosaic of small players, many of whom cannot shoulder the kind of recordkeeping and compliance burden that these Rules would impose. Because the industry is overwhelmingly made up of small entities, the impact of these Rules will be primarily felt by those small businesses. EPA determined that it could not certify that this Rule does not have a significant economic impact on a substantial number of small entities. EPA then convened a Small Business Review Panel and published an Initial Regulatory Flexibility Analysis of the Methane NSPS.
This analysis has a number of shortcomings and fails to meet the statutory requirements.

First, the RFA requires EPA to include "a description of the projected reporting, recordkeeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record." Each initial regulatory flexibility analysis must also contain: a description of any significant alternatives to the proposed rule which accomplish the stated objectives of applicable statutes and which minimize any significant economic impact of the proposed rule on small entities. Consistent with the stated objectives of applicable statutes, the analysis shall discuss significant alternatives such as —
(1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities;
(2) the clarification, consolidation, or simplification of compliance and reporting requirements

under the rule for such small entities;
(3) the use of performance rather than design standards; and
(4) an exemption from coverage of the rule, or any part thereof, for such small entities.

The analysis for the Methane NSPS is wholly inadequate in addressing these issues.

As discussed in the previous section, EPA's projections grossly understate the amount of time and resources that will have to be devoted to the reporting and recordkeeping aspects of this rule. The Methane NSPS is a highly complex and technical rule with a number of overlapping requirements and upstream oil and gas operations in particular are unlikely to be familiar with federal air regulations. This means that these small entities will have to expend far more resources either training their own personnel, or hiring personnel with expertise in federal air regulatory matters than EPA estimated.

Veritas' own experience with these proposed Rules is a good example of what many other small upstream entities are also encountering as they analyze the requirements imposed by the Rules. Veritas has 20 employees. Presently, Veritas has only one employee dedicated part time to regulatory compliance issues, and employs contract employees to assist with state regulatory compliance requirements. Some other employees spend a portion of their time on regulatory compliance issues, and Veritas estimates that the total man-hours spent on compliance each year is at least the equivalent of about 1 full-time employee. Veritas estimates that it will need to hire at least one additional full-time employee dedicated to complying with the Methane Proposal. In other words, our small entity will have to double the man-hours that it devotes to compliance just to meet the requirements of the Methane NSPS. This sharp increase is due in part to the complexity of these Rules, as well as the continual nature of the monitoring, reporting, and recordkeeping requirements associated with the fugitive surveys. Like most other upstream companies, Veritas' well sites are dispersed over a large geographic area, and an employee will have to do substantial amounts of travel in order to visit each site semi-annually or quarterly, and will then have to keep up with the continual recordkeeping and reporting requirements for each of these small sites. EPA's analysis and Methane NSPS fail to take into account the resources available to a small entity like Veritas, or to provide a simplified or consolidated method of compliance reporting for small entities. As a result, the analysis does not comply with the RFA.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Josh W. Luig
Commenter Affiliation: Veritas Energy, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6797
Comment Excerpt Number: 19

Comment: EPA also failed to consider the devastating financial impact that these Rules could have on small entities. If small entities are required to replace their atmospheric tanks in order to comply with the Methane NSPS, then the cost of those storage vessel replacements could be more than many small businesses can bear, especially in the current economic environment.

Even if EPA clarifies that the storage vessels will not need to be replaced, the cost of compliance with fugitive survey requirements will impose a serious burden on small businesses. As discussed above, oil and gas prices have fallen during the past year, and many industry experts expect crude oil prices to remain depressed—around $50/bbl or less. The "break-even" point for the average company that operates in the Midland Verticals portion of the Permian Basin, as Veritas does, is around $59/bbl. The break-even point ranges within the Permian Basin but is generally between $50-$152/bbl, depending on the percent of liquids in the particular area of drilling. Estimates suggest that the break-even points for other major shale plays are also above the current market prices for oil. For example, the break-even point has been estimated at $65/bbl for the Eagle Ford and at $68/bbl for the Bakken. Increased compliance costs will raise these break-even amounts further and make it difficult, if not impossible, for small entities like Veritas to stay competitive in current market conditions.

EPA estimates that the annual cost of compliance will be less than two percent of the revenue for the oil and gas industry per year, but did so based on outdated data that suggests far higher revenue for the oil and gas industry than current market rates. As a result, EPA has underestimated the degree to which these Rules will impact revenues. EPA's estimate also ignores the fact that these costs will be disproportionately felt by upstream oil and gas businesses, which tend to be some of the smallest players in the industry. For example, if E&P companies were required to replace atmospheric tanks with pressurized tanks, the costs for a single onshore facility would increase by $200,000, which translates into a ten percent capital cost increase for the tanks alone.

Even if EPA's estimate were accurate, a two percent cut in revenues is a meaningful decrease for small entities and, under current market conditions, could result in reduced operators, limit employee hours, and even lay-offs. These are the exact types of measures that will stretch small entities even thinner, and are, therefore, more likely to hinder, rather than help, efforts to improve environmental oversight. While EPA may view the impact of each of its regulatory programs in a vacuum, the reality for the entities that EPA regulates is that they have to find a way to comply with all of the rules that EPA creates. Two percent here, and two percent there may not sound like much in the abstract, but these compliance costs quickly add up and can quickly make it impossible for businesses to operate profitably.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Josh W. Luig
Commenter Affiliation: Veritas Energy, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6797
Comment Excerpt Number: 22

Comment: The costs associated with these Rules will be particularly devastating to these small businesses, because the costs primarily take the form of up-front capital costs that they must expend when they begin drilling a new well or refracturing an existing well, and before the well is generating any revenue for the company. The need for additional up-front capital can hurt a

small entity's ability to borrow money on favorable terms, which can in turn impact whether or not a particular project is actually profitable. Small entities need to procure the capital for these projects from outside sources, and the need to borrow additional amounts, before knowing how profitable a particular well will be, will inhibit the ability of these small entities to borrow on terms that make it economically feasible to pursue these projects. These added expenses will create serious barriers to entry for smaller players in the oil and gas industry. Because these smaller players are often the source of significant innovations, this will prevent the introduction and development of new engineering methods, operating techniques and technologies, including environmentally beneficial innovations.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Josh W. Luig
Commenter Affiliation: Veritas Energy, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6797
Comment Excerpt Number: 26

Comment: Recommendations: EPA should revise its regulatory impact statement to consider the financial impact on small businesses. EPA should consider:
1. Exempting small entities; or
2. Alternatively, EPA should consider exempting well sites with less than four affected wells;
3. Giving small entities 60 days from start-up or modification to perform an initial survey, and 30 days for repairs and follow up surveys;
4. Allowing small entities to use alternative, performance-based methods to demonstrate they are monitoring and repairing natural gas leaks in a timely manner; and
5. Allowing compliance with state leak detection and repair programs to create a presumption of compliance with the Methane NSPS; or
6. Alternatively, only requiring surveys to be performed annually unless two or more consecutive surveys reveal leaks in more than 50 of the fugitive emission components at a well site or compressor station, in which case surveys should be performed semi-annually.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Rick D. Davis, Jr.
Commenter Affiliation: Midland Energy, Inc. and Petroplex Energy, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6801
Comment Excerpt Number: 17

Comment: The cost associated with these Rules would be particularly onerous for small E&P entities, and EPA has failed to fully consider these impacts.

EPA is required by the Regulatory Flexibility Act ("RFA") and subsequent amendments to determine-to the extent feasible-the Methane NSPS' s economic impact on small entities, explore regulatory options for reducing any significant economic impact on a substantial number of such entities, and explain its ultimate choice of regulatory approach.

By EPA's own estimation, 98 percent of the firms in the industries affected by the Methane NSPS are considered small entities. While many members of the public envision giant international conglomerates when they call to mind the oil and gas industry, this figure demonstrates that in reality, the industry is made up of a mosaic of small players, many of whom cannot shoulder the kind of recordkeeping and compliance burden that these Rules would impose. Because the industry is overwhelmingly made up of small entities, the impact of these Rules will be primarily felt by those small businesses. EPA determined that it could not certify that this Rule does not have a significant economic impact on a substantial number of small entities. EPA then convened a Small Business Review Panel and published an Initial Regulatory Flexibility Analysis of the Methane NSPS. This analysis has a number of shortcomings and fails to meet the statutory requirements.

First, the RFA requires EPA to include "a description of the projected reporting, recordkeeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record." Each initial regulatory flexibility analysis must also contain:

a description of any significant alternatives to the proposed rule which accomplish the stated objectives of applicable statutes and which minimize any significant economic impact of the proposed rule on small entities. Consistent with the stated objectives of applicable statutes, the analysis shall discuss significant alternatives such as- (1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities; (3) the use of performance rather than design standards; and (4) an exemption from coverage of the rule, or any part thereof, for such small entities.

The analysis for the Methane NSPS is wholly inadequate in addressing these issues.

As discussed in the previous section, EPA's projections grossly understate the amount of time and resources that will have to be devoted to the reporting and recordkeeping aspects of this rule. The Methane NSPS is a highly complex and technical rule with a number of overlapping requirements and upstream oil and gas operations in particular are unlikely to be familiar with federal air regulations. This means that these small entities will have to expend far more resources either training their own personnel, or hiring personnel with expertise in federal air regulatory matters than EPA estimated.

MEI's own experience with these proposed Rules is a good example of what many other small upstream entities are also encountering as they analyze the requirements imposed by the Rules. MEI has approximately 30 employees and only one of those is responsible for employee

dedicated full time to regulatory compliance issues. MEI estimates that it will need to hire at least two additional full-time employees dedicated to complying with the Methane Proposal. In other words, our small entity will have to double the man-hours that it devotes to compliance just to meet the requirements of the Methane NSPS. This sharp increase is due in part to the complexity of these Rules, as well as the continual nature of the monitoring, reporting, and recordkeeping requirements associated with the fugitive surveys. An employee will have to do substantial amounts of travel in order to visit each site semi-annually or quarterly, and will then have to keep up with the continual recordkeeping and reporting requirements for each of these small sites. EPA's analysis and Methane NSPS fail to take into account the resources available to a small entity like MEI, or to provide a simplified or consolidated method of compliance reporting for small entities. As a result, the analysis does not comply with the RFA.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Rick D. Davis, Jr.
Commenter Affiliation: Midland Energy, Inc. and Petroplex Energy, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6801
Comment Excerpt Number: 18

Comment: EPA also failed to consider the devastating financial impact that these Rules could have on small entities. If small entities are required to replace their atmospheric tanks in order to comply with the Methane NSPS, then the cost of those storage vessel replacements could be more than many small businesses can bear, especially in the current economic environment. Even if EPA clarifies that the storage vessels will not need to be replaced, the cost of compliance with fugitive survey requirements will impose a serious burden on small businesses. As discussed above, oil and gas prices have fallen during the past year, and many industry experts expect crude oil prices to remain depressed-around $50/bbl or less. The "break-even" point for the average company that operates in the Midland Verticals portion of the Permian Basin, as MEI does, is around $59/bbl. The break-even point ranges within the Permian Basin but is generally between $50-$152/bbl, depending on the percent of liquids in the particular area of drilling. Estimates suggest that the break-even points for other major shale plays are also above the current market prices for oil. For example, the break-even point has been estimated at $65/bbl for the Eagle Ford and at $68/bbl for the Bakken. Increased compliance costs will raise these break-even amounts further and make it difficult, if not impossible, for small entities like MEI to stay competitive in current market conditions.

EPA estimates that the annual cost of compliance will be less than two percent of the revenue for the oil and gas industry per year, but did so based on outdated data that suggests far higher revenue for the oil and gas industry than current market rates. As a result, EPA has underestimated the degree to which these Rules will impact revenues. EPA's estimate also ignores the fact that these costs will be disproportionately felt by upstream oil and gas businesses, which tend to be some of the smallest players in the industry. For example, if E&P companies were required to replace atmospheric tanks with pressurized tanks, the costs for a

single onshore facility would increase by $200,000, which translates into a ten percent capital cost increase for the tanks alone.

Even if EPA's estimate were accurate, a two percent cut in revenues is a meaningful decrease for small entities and, under current market conditions, could result in reduced operators, limit employee hours, and even lay-offs. These are the exact types of measures that will stretch small entities even thinner, and are, therefore, more .likely to hinder, rather than help, efforts to improve environmental oversight. While EPA may view the impact of each of its regulatory programs in a vacuum, the reality for the entities that EPA regulates is that they have to find a way to comply with all of the rules that EPA creates. Two percent here, and two percent there may not sound like much in the abstract, but these compliance costs quickly add up and can quickly make it impossible for businesses to operate profitably.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Rick D. Davis, Jr.
Commenter Affiliation: Midland Energy, Inc. and Petroplex Energy, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6801
Comment Excerpt Number: 21

Comment: The costs associated with these Rules will be particularly devastating to these small businesses, because the costs primarily take the form of up-front capital costs that they must expend when they begin drilling a new well or refracturing an existing well, and before the well is generating any revenue for the company. The need for additional up-front capital can hurt a small entity's ability to borrow money on favorable terms, which can in turn impact whether or not a particular project is actually profitable. Small entities need to procure the capital for these projects from outside sources, and the need to borrow additional amounts, before knowing how profitable a particular well will be, will inhibit the ability of these small entities to borrow on terms that make it economically feasible to pursue these projects. These added expenses will create serious barriers to entry for smaller players in the oil and gas industry. Because these smaller players are often the source of significant innovations, this will prevent the introduction and development of new engineering methods, operating techniques and technologies, including environmentally beneficial innovations.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Rick D. Davis, Jr.
Commenter Affiliation: Midland Energy, Inc. and Petroplex Energy, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6801
Comment Excerpt Number: 25

Comment: Recommendations: EPA should revise its regulatory impact statement to consider the financial impact on small businesses. EPA should consider:

1. Exempting small entities; or

2. Alternatively, EPA should consider exempting well sites with less than four affected wells;

3. Giving small entities 60 days from start-up or modification to perform an initial survey, and 30 days for repairs and follow up surveys;

4. Allowing small entities to use alternative, performance-based methods to demonstrate they are monitoring and repairing natural gas leaks in a timely manner; and

5. Allowing compliance with state leak detection and repair programs to create a presumption of compliance with the Methane NSPS; or

6. Alternatively, only requiring surveys to be performed annually unless two or more consecutive surveys reveal leaks in more than 50 of the fugitive emission components at a well site or compressor station, in which case surveys should be performed semiannually.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Ben Shepperd
Commenter Affiliation: Permian Basin Petroleum Association
Document Control Number: EPA-HQ-OAR-2010-0505-6849
Comment Excerpt Number: 16

Comment: EPA is required by the Regulatory Flexibility Act ("RFA") and subsequent amendments to determine—to the extent feasible—the Methane NSPS's economic impact on small entities, explore regulatory options for reducing any significant economic impact on a substantial number of such entities, and explain its ultimate choice of regulatory approach.

By EPA's own estimation, 98 percent of the firms in the industries affected by the Methane NSPS are considered small entities. While many members of the public envision giant international conglomerates when they call to mind the oil and gas industry, this figure demonstrates that in reality, the industry is made up of a mosaic of small players, many of whom cannot shoulder the kind of recordkeeping and compliance burden that these Rules would impose. Because the industry is overwhelmingly made up of small entities, the impact of these Rules will be primarily felt by those small businesses. EPA determined that it could not certify

that this Rule does not have a significant economic impact on a substantial number of small entities. EPA then convened a Small Business Review Panel and published an Initial Regulatory Flexibility Analysis of the Methane NSPS. This analysis has a number of shortcomings and fails to meet the statutory requirements.

First, the RFA requires EPA to include "a description of the projected reporting, recordkeeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record." Each initial regulatory flexibility analysis must also contain:

a description of any significant alternatives to the proposed rule which accomplish the stated objectives of applicable statutes and which minimize any significant economic impact of the proposed rule on small entities. Consistent with the stated objectives of applicable statutes, the analysis shall discuss significant alternatives such as —
(1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities;
(2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities;
(3) the use of performance rather than design standards; and
(4) an exemption from coverage of the rule, or any part thereof, for such small entities.

The analysis for the Methane NSPS is wholly inadequate in addressing these issues.

As discussed in the previous section, EPA's projections grossly understate the amount of time and resources that will have to be devoted to the reporting and recordkeeping aspects of this rule. The Methane NSPS is a highly complex and technical rule with a number of overlapping requirements and upstream oil and gas operations in particular are unlikely to be familiar with federal air regulations. This means that these small entities will have to expend far more resources either training their own personnel, or hiring personnel with expertise in federal air regulatory matters than EPA estimated.

Based on projections and estimates from our member companies, the smaller entities will have to double the man-hours that they previously devoted to compliance just to meet the requirements of the Methane NSPS. This sharp increase is due in part to the complexity of these Rules, as well as the continual nature of the monitoring, reporting, and recordkeeping requirements associated with the fugitive surveys. Most upstream companies' well sites are dispersed over a large geographic area, and an employee will have to do substantial amounts of travel in order to visit each site semi-annually or quarterly, and will then have to keep up with the continual recordkeeping and reporting requirements for each of these small sites. EPA's analysis and Methane NSPS fail to take into account the resources available to a small entities, being the majority or the PBPA's membership, or to provide a simplified or consolidated method of compliance reporting for small entities. As a result, the analysis does not comply with the RFA.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Ben Shepperd
Commenter Affiliation: Permian Basin Petroleum Association
Document Control Number: EPA-HQ-OAR-2010-0505-6849
Comment Excerpt Number: 17

Comment: EPA also failed to consider the devastating financial impact that these Rules could have on small entities. If small entities are required to replace their atmospheric tanks in order to comply with the Methane NSPS, then the cost of those storage vessel replacements could be more than many small businesses can bear, especially in the current economic environment. Even if EPA clarifies that the storage vessels will not need to be replaced, the cost of compliance with fugitive survey requirements will impose a serious burden on small businesses. As discussed above, oil and gas prices have fallen during the past year, and many industry experts expect crude oil prices to remain depressed—around $50/bbl or less. The "break-even" point ranges within the Permian Basin but is generally between $50-$152/bbl, depending on the percent of liquids in the particular area of drilling. Estimates suggest that the break-even points for other major shale plays are also above the current market prices for oil. For example, the break-even point has been estimated at $65/bbl for the Eagle Ford and at $68/bbl for the Bakken. Increased compliance costs will raise these break-even amounts further and make it difficult, if not impossible, for small entities to stay competitive in current market conditions.

EPA estimates that the annual cost of compliance will be less than two percent of the revenue for the oil and gas industry per year, but did so based on outdated data that suggests far higher revenue for the oil and gas industry than current market rates. As a result, EPA has underestimated the degree to which these Rules will impact revenues. EPA's estimate also ignores the fact that these costs will be disproportionately felt by upstream oil and gas businesses, which tend to be some of the smallest players in the industry. For example, if E&P companies were required to replace atmospheric tanks with pressurized tanks, the costs for a single onshore facility would increase by $200,000, which translates into a ten percent capital cost increase for the tanks alone.

Even if EPA's estimate were accurate, a two percent cut in revenues is a meaningful decrease for small entities and, under current market conditions, could result in reduced operators, limit employee hours, and even lay-offs. These are the exact types of measures that will stretch small entities even thinner, and are, therefore, more likely to hinder, rather than help, efforts to improve environmental oversight. While EPA may view the impact of each of its regulatory programs in a vacuum, the reality for the entities that EPA regulates is that they have to find a way to comply with all of the rules that EPA creates. Two percent here, and two percent there may not sound like much in the abstract, but these compliance costs quickly add up and can quickly make it impossible for businesses to operate profitably.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Ben Shepperd
Commenter Affiliation: Permian Basin Petroleum Association
Document Control Number: EPA-HQ-OAR-2010-0505-6849
Comment Excerpt Number: 20

Comment: The costs associated with these Rules will be particularly devastating to these small businesses, because the costs primarily take the form of up-front capital costs that they must expend when they begin drilling a new well or refracturing an existing well, and before the well is generating any revenue for the company. The need for additional up-front capital can hurt a small entity's ability to borrow money on favorable terms, which can in turn impact whether or not a particular project is actually profitable. Small entities need to procure the capital for these projects from outside sources, and the need to borrow additional amounts, before knowing how profitable a particular well will be, will inhibit the ability of these small entities to borrow on terms that make it economically feasible to pursue these projects. These added expenses will create serious barriers to entry for smaller players in the oil and gas industry. Because these smaller players are often the source of significant innovations, this will prevent the introduction and development of new engineering methods, operating techniques and technologies, including environmentally beneficial innovations.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Ben Shepperd
Commenter Affiliation: Permian Basin Petroleum Association
Document Control Number: EPA-HQ-OAR-2010-0505-6849
Comment Excerpt Number: 24

Comment: Recommendations: EPA should revise its regulatory impact statement to consider the financial impact on small businesses. EPA should consider:
1. Exempting small entities; or
2. Alternatively, EPA should consider exempting well sites with less than four affected wells;
3. Giving small entities 60 days from start-up or modification to perform an initial survey, and 30 days for repairs and follow up surveys;
4. Allowing small entities to use alternative, performance-based methods to demonstrate they are monitoring and repairing natural gas leaks in a timely manner; and
5. Allowing compliance with state leak detection and repair programs to create a presumption of compliance with the Methane NSPS; or
6. Alternatively, only requiring surveys to be performed annually unless two or more consecutive surveys reveal leaks in more than 50 of the fugitive emission components at a well site or compressor station, in which case surveys should be performed semi-annually.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Michael Hollis
Commenter Affiliation: Diamondback E&P LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6869
Comment Excerpt Number: 8

Comment: The cost associated with these Rules would be particularly onerous for small E&P entities, and EPA has failed to fully consider these impacts.

EPA is required by the Regulatory Flexibility Act ("RFA") and subsequent amendments to determine-to the extent feasible-the Methane NSPS' s economic impact on small entities, explore regulatory options for reducing any significant economic impact on a substantial number of such entities, and explain its ultimate choice of regulatory approach. By EPA's own estimation, 98 percent of the firms in the industries affected by the Methane NSPS are considered small entities. While many members of the public envision giant international conglomerates when they call to mind the oil and gas industry, this figure demonstrates that in reality, the industry is made up of a mosaic of small players, many of whom cannot shoulder the kind of recordkeeping and compliance burden that these Rules would impose. Because the industry is overwhelmingly made up of small entities, the impact of these Rules will be primarily felt by those small businesses. EPA determined that it could not certify that this Rule does not have a significant economic impact on a substantial number of small entities. EPA then convened a Small Business Review Panel and published an Initial Regulatory Flexibility Analysis of the Methane NSPS. This analysis has a number of shortcomings and fails to meet the statutory requirements. First, the RFA requires EPA to include "a description of the projected reporting, recordkeeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record. Each initial regulatory flexibility analysis must also contain:

a description of any significant alternatives to the proposed rule which accomplish the stated objectives of applicable statutes and which minimize any significant economic impact of the proposed rule on small entities. Consistent with the stated objectives of applicable statutes, the analysis shall discuss significant alternatives such as-

(1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities;
(2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities;
(3) the use of performance rather than design standards; and
(4) an exemption from coverage of the rule, or any part thereof, for such small entities.

The analysis for the Methane NSPS is wholly inadequate in addressing these issues. As discussed in the previous section, EPA's projections grossly understate the amount of time and resources that will have to be devoted to the reporting and recordkeeping aspects of this rule. The Methane NSPS is a highly complex and technical rule with a number of overlapping requirements and upstream oil and gas operations in particular are unlikely to be familiar with federal air regulations. This means that these small entities will have to expend far

more resources either training their own personnel, or hiring personnel with expertise in federal air regulatory matters than EPA estimated.

Diamondback's own experience with these proposed Rules is a good example of what many other small upstream entities are also encountering as they analyze the requirements imposed by the Rules. Diamondback has about 142 employees. It will be a significant burden on our small entity to have to increase the man-hours that it devotes to compliance just to meet the requirements of the Methane NSPS. This increase is due in part to the complexity of these Rules, as well as the continual nature of the monitoring, reporting, and recordkeeping requirements associated with the fugitive surveys. EPA's analysis and Methane NSPS fail to take into account the resources available to a small entity like Diamondback, or to provide a simplified or consolidated method of compliance reporting for small entities. As a result, the analysis does not comply with the RFA.

EPA also failed to consider the devastating financial impact that these Rules could have on small entities. If small entities are required to replace their atmospheric tanks in order to comply with the Methane NSPS, then the cost of those storage vessel replacements could be more than many small businesses can bear, especially in the current economic environment. Even if EPA clarifies that the storage vessels will not need to be replaced, the cost of compliance with fugitive survey requirements will impose a serious burden on small businesses. As discussed above, oil and gas prices have fallen during the past year, and many industry experts expect crude oil prices to remain depressed. The "break-even" point varies by company within the Permian Basin. Increased compliance costs will put pressure on these break-even points and make it difficult, if not impossible, for small entities like Diamondback to stay competitive in current market conditions.

EPA estimates that the annual cost of compliance will be less than two percent of the revenue for the oil and gas industry per year, but did so based on outdated data that suggests far higher revenue for the oil and gas industry than current market rates. As a result, EPA has underestimated the degree to which these Rules will impact revenues. EPA's estimate also ignores the fact that these costs will be disproportionately felt by upstream oil and gas businesses, which tend to be some of the smallest players in the industry. Even if EPA's estimate were accurate, a two percent cut in revenues is a meaningful decrease for small entities and, under current market conditions, could result in reduced operators, limit employee hours, and even lay-offs. These are the exact types of measures that will stretch small entities even thinner, and are, therefore, more likely to hinder, rather than help, efforts to improve environmental oversight. While EPA may view the impact of each of its regulatory programs in a vacuum, the reality for the entities that EPA regulates is that they have to find a way to comply with all of the rules that EPA creates. Two percent here, and two percent there may not sound like much in the abstract, but these compliance costs quickly add up and can quickly make it impossible for businesses to operate profitably.

By hindering the profitability of U.S. oil and gas companies, these Rules will not lead to the decrease in global greenhouse gas emissions that EPA hopes to achieve. EPA has noted that climate change is not a localized problem, and that greenhouse gases disperse globally. Likewise, the oil market is global. These Rules will create a market advantage for our

competitors abroad, who are not subject to the same level of environmental regulations, and who have not taken the same voluntary steps to limit emissions. EPA's rules may, therefore, exacerbate the very problem that they are trying to solve by encouraging a greater percentage of oil and gas activities to occur in foreign jurisdictions with no limits on methane emissions.

EPA's analysis also does not establish differing compliance or reporting requirements or timetables that take into account the resources available to small entities. EPA has attempted to take into account the fact that small E&P entities are more likely to drill smaller wells, which will produce fewer barrels per day than the wells drilled by bigger entities. While EPA provides an exemption for fugitive monitoring requirements for well sites that average below 15 barrels of oil equivalent per day ("boepd"), this exemption will not provide any actual relief to small entities. First, it would be difficult, if not impossible, for a well site averaging below 15 boepd to be profitable. As a result, few, if any, small entities will attempt to operate new well sites that average 15 boepd.

In addition, small entities are unlikely to know their actual average boepd until after they have already expended the resources to complete those wells. This after-the-fact exemption is little help for companies like Diamondback, because they must estimate their compliance costs at the outset of the project to determine whether it is economically feasible to drill, fracture, or refracture a well. Given the short timeframe that EPA gives these entities to perform fugitive monitoring after a start-up or modification, small entities must make decisions about whether to hire additional personnel, or invest in Optical Gas Imaging ("OGI") cameras, before drilling or modifying a well site. As a result, this exemption for low-producing wells does not provide relief for small entities, and demonstrates a misunderstanding of the upstream industry. Small entities will have to spend the capital to comply with these rules before they are in a position to determine whether compliance is even required. Instead, EPA should provide an exemption either for all small entities, or based on the total number of affected wells at a particular well site to provide greater clarity and certainty to small entities when they make a decision about whether or not to drill a new well, or fracture or refracture an existing well.

The costs associated with these Rules will be particularly devastating to these small businesses, because the costs primarily take the form of up-front capital costs that they must expend when they begin drilling a new well or refracturing an existing well, and before the well is generating any revenue for the company. The need for additional up-front capital can hurt a small entity's ability to borrow money on favorable terms, which can in turn impact whether or not a particular project is actually profitable. Small entities need to procure the capital for these projects from outside sources, and the need to borrow additional amounts, before knowing how profitable a particular well will be, will inhibit the ability of these small entities to borrow on terms that make it economically feasible to pursue these projects. These added expenses will create serious barriers to entry for smaller players in the oil and gas industry. Because these smaller players are often the source of significant innovations, this will prevent the introduction and development of new engineering methods, operating techniques and technologies, including environmentally beneficial innovations.

EPA has also failed to consider the impact that the short time periods included in the rule will have on small entities. As previously discussed, these entities have many small well

or compressor sites spread out over large geographic areas. The Methane NSPS creates an endless cycle of tight compliance deadlines that will strain the resources of small entities: first the operators must complete fugitive emissions surveys within 30 days of start-up or modification, then semiannual or even quarterly surveys, followed by repairs within 15 days of the survey, followed by a follow-up survey within 15 days of the repair. The affected small businesses will have to repeat these requirements at each of their dispersed sites, as well as the recordkeeping and reporting requirements. EPA should have considered the impact that these tight time lines place on small entities and offered extended timelines for those entities.

EPA also did not consider the use of performance, rather than design, standards for fugitive emissions monitoring. The Methane NSPS requires fugitive emissions surveys to be performed with OGI technology. However, as discussed more thoroughly below, OGI cameras are expensive and are only one of a multitude of ways that leaks can be detected. By selecting a single form of expensive technology for detection, the Methane NSPS would require these entities to either invest in purchasing their own cameras and training personnel to use them, or hiring trained contractors to travel to their remote sites. Instead, EPA should allow small entities to demonstrate that they have company-wide compliance plans in place that detect and address leaks through a variety of means best suited to their particular sites. For small entities in states that already require monitoring and leak repair, EPA should allow compliance with those state programs to create a presumption of compliance with the Methane NSPS to ease the burden on operators.

Finally, using a percentage of components, rather than a set number of components, to determine the frequency of surveys is also unfair to small entities. A small site will have fewer fugitive emission components than a larger site. As a result, each leaking component will represent a greater share of the total number of components. While a site with 5,000 components can afford to have 50 leaks without any impact on the frequency of its survey requirements, 50 leaks at a much smaller site with only 1,000 components would trigger more frequent survey requirements under the Rules. Smaller entities are much more likely to operate these smaller sites, and thus are more likely to face more frequent survey requirements under the percentage-based system. Smaller entities are, therefore, more likely to have additional survey requirements, despite the fact that there is no reason to believe that 50 leaking components at a small site have a more meaningful impact on emissions than 50 leaks at a larger site.

Recommendations: EPA should revise its regulatory impact statement to consider the financial impact on small businesses. EPA should consider:

1. Exempting small entities; or

2. Alternatively, EPA should consider exempting well sites with less than four affected wells;

3. Giving small entities 60 days from start-up or modification to perform an initial survey, and 30 days for repairs and follow up surveys;

4. Allowing small entities to use alternative, performance-based methods to demonstrate they are monitoring and repairing natural gas leaks in a timely manner; and

5. Allowing compliance with state leak detection and repair programs to create a presumption of compliance with the Methane NSPS; or

6. Alternatively, only requiring surveys to be performed annually unless two or more consecutive surveys reveal leaks in more than 50 of the fugitive emission components at a well site or compressor station, in which case surveys should be performed semi-annually.

Response: The EPA agrees with the commenter that small entities constitute a large fraction of the oil and natural gas industry and play a very important role in energy production in the U.S. In its Initial Regulatory Flexibility Analysis (IRFA), the EPA did include an assessment of projected reporting, recordkeeping, and other compliance requirements. With respect to the commenter's assertion that the EPA underestimated the amount of time and resources required for reporting recordkeeping, please see the response to DCN EPA-HQ-OAR-2010-0505-6857, Excerpt 60 in Chapter 11 of this document. The commenter suggests to either exempt small entities or well sites with fewer than four affected wells, to allow small entities 60 days from start-up or modification to perform an initial survey and 30 days for repairs and follow up surveys, and to allow small entities to use alternative, performance-based methods to demonstrate they are monitoring and repairing natural gas leaks. As presented in the Regulatory Flexibility Act (RFA) section of the preamble and the Final Regulatory Flexibility Analysis (FRFA) in the RIA, the EPA considered all comments related to small entity impacts. The agency is unable to incorporate all suggestions without compromising the effectiveness of the final regulation. However, changes to the rule from proposal that may benefit small entities due to comments received include allowing both OGI and Method 21 as acceptable monitoring technology, replacing a performance based monitoring schedule with a fixed frequency, lengthening the time of initial fugitive monitoring, and simplified the third party verification of technical infeasibility requirements. Though these are not monetized, we believe the flexibility and simplifications these changes have added to the rule result in a reduced burden on small entities. In addition, the EPA evaluated the impact of low oil prices on small entities in the FRFA, which is in section 6.3 of the RIA. Also, the EPA has updated the compliance schedule for all entities, which has added some flexibility that may benefit small producers. For more information, please see the response to DCN EPA-HQ-OAR-2010-0505-6852, Excerpt 4 in Chapter 11 of this document.

For more information on how the analysis complies with the RFA, specifically with respect to the commenter's assertion that the EPA did not take into account the resources available to small entities, please see the response to DCN EPA-HQ-OAR-2010-0505-6758, Excerpt 8.

With respect to the comment regarding the replacing of atmospheric storage tanks, please see the response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 4.

The EPA has received many comments indicating that the proposed low production exemption is not beneficial to small entities. For this and other reasons, we have removed the low production exemption for fugitive survey requirements. Please see the response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 22 in Chapter 4 of this document for more information.

The commenter discusses a few points with respect to fugitive survey requirements. With respect to the time period for initial fugitives survey monitoring in the final rule, please see the response to DCN EPA-HQ-OAR-2010-0505-5290, Excerpt 4 In Chapter 4 of this document. With respect to the determination of frequency of surveys, we have finalized the rule with fixed monitoring frequencies with no change due to leak rate performance. See sections VI.F.1.d and VI.F.2.c of the preamble to the final rule for more information. Also, see response to DCN EPA-HQ-OAR-2010-0505-6876, Excerpt 12 in Chapter 4 of this document, regarding fixed frequency monitoring. Also, see response to DCN EPA-HQ-OAR-2010-0505-6880, Excerpt 9 in Chapter 4 of this document, for a discussion on the determination of the monitoring frequency. With respect to the commenter's assertion that OGI technology is required for fugitive survey and resurvey, the final rule does allow the use of Method 21 as well. Please see the response to DCN EPA-HQ-OAR-2010-0505-6240, Excerpt 2 in Chapter 4 of this document for more information.

The commenter points out that the EPA estimates the impact of the NSPS is less that 2 percent of industries revenue. This is correct, but, as shown in Section 15.0 of the TSD for the final rule, the estimate of nationwide compliance costs in 2025 to be about 0.12 percent for the production related segments of the industry and about 0.012 percent and to 0.06 percent for the transmission and storage segment. The commenter is also concerned about small entity access to capital. The analysis in Section 15.0 of the TSD also shows the estimate of nationwide capital costs of the NSPS in 2025 to be about 0.24 percent of capital expenditures for the production related segments of the industry and about 0.02 percent of capital expenditures for the transmission and storage segment.

The EPA disagrees with the conclusion of that commenter that the costs of compliance are excessive. It is reasonable to assume that a small number of drilling projects might not be pursued as a result of increased regulatory costs. The EPA does not believe that the final rules are overly burdensome or will harm the U.S. economy or, specifically, oil and natural gas production. The final NSPS will reduce emissions from the oil and natural gas sector in sensible and cost effective ways. On these points, see response to DCN EPA-HQ-OAR-2010-0505-7336, Excerpt 98. With respect to the cumulative impacts of multiple actions, the EPA's proposed and final RIAs are consistent with Executive Order 12866 and appropriately evaluate the incremental regulatory impacts of the NSPS OOOOa regulatory action. Comments on regulatory impacts of other regulatory actions are out of scope for this response to comments document.

The EPA disagrees that the final NSPS will lead to a market advantage for international competitors and lead to an overall increase in emissions. As shown in Table 6-5, over the 2020 to 2025 period, net imports of crude oil are not estimated to change in response to the rule. Net imports of natural gas are estimated to increase by about 0.11 percent across the 2020 to 2025 period under the rule. However, trade in natural gas is relatively small compared to domestic production that is consumed domestically. In addition, in recent years, over 90 percent of U.S. imports of natural gas have been from Canada.[3] In addition, like the U.S., Canada is pursuing emissions reductions from its oil and natural gas sector.[4] The combination of these points leads

[3] http://www.eia.gov/dnav/ng/ng_move_impc_s1_a.htm
[4] https://www.whitehouse.gov/the-press-office/2016/03/10/us-canada-joint-statement-climate-energy-and-arctic-leadership

the EPA to conclude that the final NSPS will have minimal to no emissions leakage effects from the implementation of the final NSPS.

The EPA disagrees with the commenter that the final NSPS will stifle innovation in the industry, particularly environmental technology. For example, as the EPA noted in the preamble to the proposed rule, fugitive emissions monitoring is a field of emerging technology, and major advances are expected in the near future. 80 FR at 56639. The agency is seeing a rapidly growing push to develop and produce low-cost monitoring technologies to find fugitive and direct methane and VOC emissions sooner and at lower levels than current technology allows, thus enhancing the ability of operators to detect fugitive emissions. As noted in Section VI.F.1.i of the final preamble, in order to facilitate the application and review process for an emerging technology, the final rule includes information to be provided in the application that would be needed for us to expeditiously evaluate the emerging technology.

With respect to the commenter's suggestion to allow compliance with state fugitive emissions programs to create a presumption of compliance with the final NSPS, see response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 25 in Chapter 4 of this document.

Commenter Name: Matthew Hite
Commenter Affiliation: Gas Processors Association (GPA)
Document Control Number: EPA-HQ-OAR-2010-0505-6881
Comment Excerpt Number: 40

Comment: EPA's Cost Benefit Analysis is Arbitrary and Capricious

EPA's proposed rule is arbitrary and capricious because EPA both understates the likely costs of the proposed rule and also overestimates the potential benefits. As discussed in Section V.A. and described in Attachment A, EPA dramatically understates the costs associated with routing emission from pneumatic pumps to existing controls devices. Further, as discussed in Section IV, GPA incorporates by reference API's critique of EPA's cost estimates for the proposed rule. That comprehensive analysis highlights a series of ways in which EPA has systematically understated the likely costs of complying with the rule, leaving the mistaken impression that the costs of the rule can be justified by its benefits.

Furthermore, the costs of implementing the proposed regulations will be unduly expensive, particularly for the gathering sector where many of GPA's members operate. According to data prepared by the Small Business Advocacy Review ("SBAR") Panel, gas processing facilities, which include gathering and boosting operations, accounted for 34,000 MT of methane emissions. SBAR Panel Report on EPA's Emissions Standards for New and Modified Sources in the Oil and Natural Gas Sector, App'x A at 8. This accounts for only 7% of the methane emissions from the oil and natural gas sector. The significance of these emissions is further diminished when viewed in the broader context of the natural gas distribution system. According to EPA's GHG Inventory, gas processing facilities account for only 0.54% of the methane emissions from natural gas systems and 0.13% of the methane emissions from the U.S. as a

whole. EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013 at ES-6 (Apr. 15, 2015). Thus, gas processing facilities produce only the smallest fraction of methane emissions from natural gas systems and from the United States as a whole. Given the extremely small incremental effect that this rule's requirements will have in reducing U.S. methane emissions from gathering and boosting facilities, GPA does not believe that the costs of this rule can be justified by its purported benefits.

[Attachment 1 - "Cost Effectiveness of Pneumatic Pump Controls", which contains four tables. and the following description:

The EPA's estimate of cost savings from the rule is misleading. By adjusting the value in the equation closer to actual costs for Routing Equipment, the average cost/ton is much greater than the figure EPA used. See tables below. Original Figures, (Source: Docket EPA-HQ-OAR-2010-0505, Support Document: TSD Section 7 Pneumatic Pumps 073015)]

Response: With respect to the commenter's assertion that costs of routing emissions from a pneumatic pump to an existing control device is overestimated, please see the response to DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 72 in Chapter 5 of this document. For more information on the cost of pneumatic pump controls, please see the response to DCN EPA-HQ-OAR-2010-0505-6930, Excerpt 48 in Chapter 5 of this document. With respect to the allegation that the RIA is arbitrary and capricious, see response to DCN EPA-HQ-OAR-2010-0505-7058, Excerpt 24.

Commenter Name: Dan G. LeRoy
Commenter Affiliation: Legacy Reserves Operating LP
Document Control Number: EPA-HQ-OAR-2010-0505-6882
Comment Excerpt Number: 6

Comment: The cost associated with these Rules would be particularly onerous for small E&P entities, and EPA has failed to fully consider these impacts.

EPA is required by the Regulatory Flexibility Act ("RFA") and subsequent amendments to determine-to the extent feasible-the Methane NSPS's economic impact on small entities, explore regulatory options for reducing any significant economic impact on a substantial number of such entities, and explain its ultimate choice of regulatory approach.

By EPA's own estimation, 98 percent of the firms in the industries affected by the Methane NSPS are considered small entities While many members of the public envision giant international conglomerates when they call to mind the oil and gas industry, this figure demonstrates that in reality, the industry is made up of a mosaic of small players, many of whom cannot shoulder the kind of recordkeeping and compliance burden that these Rules would impose. Because the industry is overwhelmingly made up of small entities, the impact of these Rules will be primarily felt by those small businesses. EPA determined that it could not certify that this Rule does not have a significant economic impact on a substantial number of small

entities. EPA then convened a Small Business Review Panel and published an Initial Regulatory Flexibility Analysis of the Methane NSPS. This analysis has a number of shortcomings and fails to meet the statutory requirements.

First, the RFA requires EPA to include "a description of the projected reporting, recordkeeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record." Each initial regulatory flexibility analysis must also contain:

a description of any significant alternatives to the proposed rule which accomplish the stated objectives of applicable statutes and which minimize any significant economic impact of the proposed rule on small entities. Consistent with the stated objectives of applicable statutes, the analysis shall discuss significant alternatives such as-

(1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities;

(2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities;

(3) the use of performance rather than design standards; and

(4) an exemption from coverage of the rule, or any part thereof, for such small entities.

The analysis for the Methane NSPS is wholly inadequate in addressing these issues.

As discussed in the previous section, EPA's projections grossly understate the amount of time and resources that will have to be devoted to the reporting and recordkeeping aspects of this rule. The Methane NSPS is a highly complex and technical rule with a number of overlapping requirements and upstream oil and gas operations in particular are unlikely to be familiar with federal air regulations. This means that these small entities will have to expend far more resources either training their own personnel, or hiring personnel with expertise in federal air regulatory matters than EPA estimated.

Legacy's own experience with these proposed Rules is a good example of what many other small upstream entities are also encountering as they analyze the requirements imposed by the Rules. Legacy has about 390 employees. Presently, Legacy has only five employees dedicated full time to regulatory compliance issues, and employs several contract employees to assist with state regulatory compliance requirements. Some other employees spend a portion of their time on regulatory compliance issues. Legacy estimates that it will need to hire additional full-time employees and contractors dedicated to complying with the Methane Proposal. In other words, our small entity will have to substantially increase the man-hours that it devotes to compliance just to meet the requirements of the Methane NSPS. This projected increase is due in part to the complexity of these Rules, as well as the continual nature of the monitoring, reporting, and recordkeeping requirements associated with the fugitive surveys. Like most other upstream

companies, Legacy's well sites are dispersed over a large geographic area, and an employee will have to do substantial amounts of travel in order to visit each site semi-annually or quarterly, and will then have to keep up with the continual recordkeeping and reporting requirements for each of these small sites. EPA's analysis and Methane NSPS fail to take into account the resources available to a small entity like Legacy, or to provide a simplified or consolidated method of compliance reporting for small entities. As a result, the analysis does not comply with the RFA.

EPA also failed to consider the devastating financial impact that these Rules could have on small entities. If small entities are required to replace their atmospheric tanks in order to comply with the Methane NSPS, then the cost of those storage vessel replacements could be more than many small businesses can bear, especially in the current economic environment. Even if EPA clarifies that the storage vessels will not need to be replaced, the cost of compliance with fugitive survey requirements will impose a serious burden on small businesses. As discussed above, oil and gas prices have fallen during the past year, and many industry experts expect crude oil prices to remain depressed-around $50/bbl or less. The "break-even" point for the average company that operates in the Permian Basin, as Legacy does, is around $60/bbl, which is well above current market prices. Other areas, including those in which Legacy operates, have a higher "break-even" point. For example, the break -even point has been estimated at $65/bbl for the Eagle Ford and at $68/bbl for the Bakken. Increased compliance costs will raise these break-even amounts further and make it difficult, if not impossible, for small entities like Legacy to stay competitive in current market conditions.

EPA estimates that the annual cost of compliance will be less than two percent of the revenue for the oil and gas industry per year, but did so based on outdated data that suggests far higher revenue for the oil and gas industry than current market rates. As a result, EPA has underestimated the degree to which these Rules will impact revenues. EPA's estimate also ignores the fact that these costs will be disproportionately felt by upstream oil and gas businesses, which tend to be some of the smallest players in the industry. For example, if E&P companies were required to replace atmospheric tanks with pressurized tanks, the costs for a single onshore facility would increase by $200,000, which translates into a ten percent capital cost increase for the tanks alone.

Even if EPA's estimate were accurate, a two percent cut in revenues is a meaningful decrease for small entities and, under current market conditions, could result in reduced operators, limit employee hours, and even lay-offs. These are the exact types of measures that will stretch small entities even thinner, and are, therefore, more likely to hinder, rather than help, efforts to improve environmental oversight. While EPA may view the impact of each of its regulatory programs in a vacuum, the reality for the entities that EPA regulates is that they have to find a way to comply with all of the rules that EPA creates. Two percent here, and two percent there may not sound like much in the abstract, but these compliance costs quickly add up and can quickly make it impossible for businesses to operate profitably.

By hindering the profitability of U.S. oil and gas companies, these Rules will not lead to the decrease in global greenhouse gas emissions that EPA hopes to achieve. EPA has noted that climate change is not a localized problem, and that greenhouse gases disperse globally. Likewise, the oil market is global. These Rules will create a market advantage for our competitors abroad,

who are not subject to the same level of environmental regulations, and who have not taken the same voluntary steps to limit emissions. EPA's rules may, therefore, exacerbate the very problem that they are trying to solve by encouraging a greater percentage of oil and gas activities to occur in foreign jurisdictions with no limits on methane emissions.

EPA's analysis also does not establish differing compliance or reporting requirements or timetables that take into account the resources available to small entities. EPA has attempted to take into account the fact that small E&P entities are more likely to drill smaller wells, which will produce fewer barrels per day than the wells drilled by bigger entities. While EPA provides an exemption for fugitive monitoring requirements for well sites that average below 15 barrels of oil equivalent per day ("boepd"), this exemption will not provide any actual relief to small entities. First, it would be difficult, if not impossible, for a well site averaging below 15 boepd to be profitable. As a result, few, if any, small entities will attempt to operate new well sites that average 15 boepd.

In addition, small entities are unlikely to know their actual average boepd until after they have already expended the resources to complete those wells. This after-the-fact exemption is little help for companies like Legacy, because they must estimate their compliance costs at the outset of the project to determine whether it is economically feasible to drill, fracture, or refracture a well. Given the short timeframe that EPA gives these entities to perform fugitive monitoring after a start-up or modification, small entities must make decisions about whether to hire additional personnel, or invest in Optical Gas Imaging ("OGI") cameras, before drilling or modifying a well site. As a result, this exemption for low-producing wells does not provide relief for small entities, and demonstrates a misunderstanding of the upstream industry. Small entities will have to spend the capital to comply with these rules before they are in a position to determine whether compliance is even required. Instead, EPA should provide an exemption either for all small entities, or based on the total number of affected wells at a particular well site to provide greater clarity and certainty to small entities when they make a decision about whether or not to drill a new well, or fracture or refracture an existing well.

The costs associated with these Rules will be particularly devastating to these small businesses, because the costs primarily take the form of up-front capital costs that they must expend when they begin drilling a new well or refracturing an existing well, and before the well is generating any revenue for the company. The need for additional up-front capital can hurt a small entity's ability to borrow money on favorable terms, which can in turn impact whether or not a particular project is actually profitable. Small entities need to procure the capital for these projects from outside sources, and the need to borrow additional amounts, before knowing how profitable a particular well will be, will inhibit the ability of these small entities to borrow on terms that make it economically feasible to pursue these projects. These added expenses will create serious barriers to entry for smaller players in the oil and gas industry. Because these smaller players are often the source of significant innovations, this will prevent the introduction and development of new engineering methods, operating techniques and technologies, including environmentally beneficial innovations.

EPA has also failed to consider the impact that the short time periods included in the rule will have on small entities. As previously discussed, these entities have many small well or

compressor sites spread out over large geographic areas. The Methane NSPS creates an endless cycle of tight compliance deadlines that will strain the resources of small entities: first the operators must complete fugitive emissions surveys within 30 days of start-up or modification, then semi-annual or even quarterly surveys, followed by repairs within 15 days of the survey, followed by a follow-up survey within 15 days of the repair. The affected small businesses will have to repeat these requirements at each of their dispersed sites, as well as the recordkeeping and reporting requirements. EPA should have considered the impact that these tight timelines place on small entities and offered extended timelines for those entities.

EPA also did not consider the use of performance, rather than design, standards for fugitive emissions monitoring. The Methane NSPS requires fugitive emissions surveys to be performed with OGI technology. However, as discussed more thoroughly below, OGI cameras are expensive and are only one of a multitude of ways that leaks can be detected. By selecting a single form of expensive technology for detection, the Methane NSPS would require these entities to either invest in purchasing their own cameras and training personnel to use them, or hiring trained contractors to travel to their remote sites. Instead, EPA should allow small entities to demonstrate that they have company-wide compliance plans in place that detect and address leaks through a variety of means best suited to their particular sites. For small entities in states that already require monitoring and leak repair, EPA should allow compliance with those state programs to create a presumption of compliance with the Methane NSPS to ease the burden on operators.

Finally, using a percentage of components, rather than a set number of components, to determine the frequency of surveys is also unfair to small entities. A small site will have fewer fugitive emission components than a larger site. As a result, each leaking component will represent a greater share of the total number of components. While a site with 5,000 components can afford to have 50 leaks without any impact on the frequency of its survey requirements, 50 leaks at a much smaller site with only 1,000 components would trigger more frequent survey requirements under the Rules. Smaller entities are much more likely to operate these smaller sites, and thus are more likely to face more frequent survey requirements under the percentage based system. Smaller entities are, therefore, more likely to have additional survey requirements, despite the fact that there is no reason to believe that 50 leaking components at a small site have a more meaningful impact on emissions than 50 leaks at a larger site.

Recommendations: EPA should revise its regulatory impact statement to consider the financial impact on small businesses. EPA should consider:

1. Exempting small entities; or

2. Alternatively, EPA should consider exempting well sites with less than four affected wells;

3. Giving small entities 60 days from start-up or modification to perform an initial survey, and 30 days for repairs and follow up surveys;

4. Allowing small entities to use alternative, performance-based methods to demonstrate they are monitoring and repairing natural gas leaks in a timely manner; and

5. Allowing compliance with state leak detection and repair programs to create a presumption of compliance with the Methane NSPS; or

6. Alternatively, only requiring surveys to be performed annually unless two or more consecutive surveys reveal leaks in more than 50 of the fugitive emission components at a well site or compressor station, in which case surveys should be performed semiannually.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Denzil R. West, Vice President
Commenter Affiliation: Reliance Energy, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6915
Comment Excerpt Number: 8

Comment: The cost associated with these Rules would be particularly onerous for small E&P entities, and EPA has failed to fully consider these impacts.

EPA is required by the Regulatory Flexibility Act ("RFA") and subsequent amendments to determine-to the extent feasible-the Methane NSPS' s economic impact on small entities, explore regulatory options for reducing any significant economic impact on a substantial number of such entities, and explain its ultimate choice of regulatory approach. By EPA's own estimation, 98 percent of the firms in the industries affected by the Methane NSPS are considered small entities. While many members of the public envision giant international conglomerates when they call to mind the oil and gas industry, this figure demonstrates that in reality, the industry is made up of a mosaic of small players, many of whom cannot shoulder the kind of recordkeeping and compliance burden that these Rules would impose. Because the industry is overwhelmingly made up of small entities, the impact of these Rules will be primarily felt by those small businesses. EPA determined that it could not certify that this Rule does not have a significant economic impact on a substantial number of small entities. EPA then convened a Small Business Review Panel and published an Initial Regulatory Flexibility Analysis of the Methane NSPS. This analysis has a number of shortcomings and fails to meet the statutory requirements.

First, the RFA requires EPA to include "a description of the projected reporting, recordkeeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record." Each initial regulatory flexibility analysis must also contain:

a description of any significant alternatives to the proposed rule which accomplish the stated objectives of applicable statutes and which minimize any significant economic impact of the proposed rule on small entities. Consistent with the stated objectives of applicable statutes, the analysis shall discuss significant alternatives such as-

(1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities;
(2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities;
(3) the use of performance rather than design standards; and
(4) an exemption from coverage of the rule, or any part thereof, for such small entities.

The analysis for the Methane NSPS is wholly inadequate in addressing these issues.

As discussed in the previous section, EPA's projections grossly understate the amount of time and resources that will have to be devoted to the reporting and recordkeeping aspects of this rule. The Methane NSPS is a highly complex and technical rule with a number of overlapping requirements and upstream oil and gas operations in particular are unlikely to be familiar with federal air regulations. This means that these small entities will have to expend far more resources either training their own personnel, or hiring personnel with expertise in federal air regulatory matters than EPA estimated.

Reliance's own experience with these proposed Rules is a good example of what many other small upstream entities are also encountering as they analyze the requirements imposed by the Rules. Reliance has 90 employees. Presently, Reliance has only one employee dedicated full time to regulatory compliance issues, and employs several contract employees to assist with state regulatory compliance requirements. Some other employees spend a portion of their time on regulatory compliance issues, and Reliance estimates that the total man-hours spent on compliance each year is at least the equivalent of about 4 full-time employees. Reliance estimates that it will need to hire at least four additional full-time employees dedicated to complying with the Methane Proposal. In other words, our small entity will have to double the man-hours that it devotes to compliance just to meet the requirements of the Methane NSPS. This sharp increase is due in part to the complexity of these Rules, as well as the continual nature of the monitoring, reporting, and recordkeeping requirements associated with the fugitive surveys. Like most other upstream companies, Reliance's well sites are dispersed over a large geographic area, and an employee will have to do substantial amounts of travel in order to visit each site semi-annually or quarterly, and will then have to keep up with the continual recordkeeping and reporting requirements for each of these small sites. EPA's analysis and Methane NSPS fail to take into account the resources available to a small entity like Reliance, or to provide a simplified or consolidated method of compliance reporting for small entities. As a result, the analysis does not comply with the RFA.

EPA also failed to consider the devastating financial impact that these Rules could have on small entities. If small entities are required to replace their atmospheric tanks in order to comply with the Methane NSPS, then the cost of those storage vessel replacements could be more than many small businesses can bear, especially in the current economic environment. Even if EPA clarifies that the storage vessels will not need to be replaced, the cost of compliance with fugitive survey requirements will impose a serious burden on small businesses. As discussed above, oil and gas prices have fallen during the past year, and many industry experts expect crude oil prices to remain depressed—around $50/bbl or less. The "break-even" point for the average company that operates in the Midland Basin portion of the Permian Basin, as Reliance does, is around $50/bbl.

Estimates suggest that the break-even points for other major shale plays are also above the current market prices for oil. For example, the break-even point has been estimated at $65/bbl for the Eagle Ford and at $68/bbl for the Bakken. Increased compliance costs will raise these break-even amounts further and make it difficult, if not impossible, for small entities like Reliance to stay competitive in current market conditions.

EPA estimates that the annual cost of compliance will be less than two percent of the revenue for the oil and gas industry per year, but did so based on outdated data that suggests far higher revenue for the oil and gas industry than current market rates. As a result, EPA has underestimated the degree to which these Rules will impact revenues. EPA's estimate also ignores the fact that these costs will be disproportionately felt by upstream oil and gas businesses, which tend to be some of the smallest players in the industry. For example, if E&P companies were required to replace atmospheric tanks with pressurized tanks, estimates of the costs for a single onshore facility would increase by $200,000, which translates into a fifty to one hundred percent capital cost increase for the tanks alone.

Even if EPA's estimate were accurate, a two percent cut in revenues is a meaningful decrease for small entities and, under current market conditions, could result in reduced operators, limit employee hours, and even lay-offs. These are the exact types of measures that will stretch small entities even thinner, and are, therefore, more likely to hinder, rather than help, efforts to improve environmental oversight. While EPA may view the impact of each of its regulatory programs in a vacuum, the reality for the entities that EPA regulates is that they have to find a way to comply with all of the rules that EPA creates. Two percent here, and two percent there may not sound like much in the abstract, but these compliance costs quickly add up and can quickly make it impossible for businesses to operate profitably.

By hindering the profitability of U.S. oil and gas companies, these Rules will not lead to the decrease in global greenhouse gas emissions that EPA hopes to achieve. EPA has noted that climate change is not a localized problem, and that greenhouse gases disperse globally. Likewise, the oil market is global. These Rules will create a market advantage for our competitors abroad, who are not subject to the same level of environmental regulations, and who have not taken the same voluntary steps to limit emissions. EPA's rules may, therefore, exacerbate the very problem that they are trying to solve by encouraging a greater percentage of oil and gas activities to occur in foreign jurisdictions with no limits on methane emissions.

EPA's analysis also does not establish differing compliance or reporting requirements or timetables that take into account the resources available to small entities. EPA has attempted to take into account the fact that small E&P entities are more likely to drill smaller wells, which will produce fewer barrels per day than the wells drilled by bigger entities. While EPA provides an exemption for fugitive monitoring requirements for well sites that average below 15 barrels of oil equivalent per day ("boepd"), this exemption will not provide any actual relief to small entities. First, it would be difficult, if not impossible, for a well site averaging below 15 boepd to be profitable. As a result, few, if any, small entities will attempt to operate new well sites that average 15 boepd.

In addition, small entities are unlikely to know their actual average boepd until after they have already expended the resources to complete those wells. This after-the-fact exemption is little help for companies like Reliance, because they must estimate their compliance costs at the outset of the project to determine whether it is economically feasible to drill, fracture, or refracture a well. Given the short timeframe that EPA gives these entities to perform fugitive monitoring after a start-up or modification, small entities must make decisions about whether to hire additional personnel, or invest in Optical Gas Imaging ("OGI") cameras, before drilling or modifying a well site. As a result, this exemption for low-producing wells does not provide relief for small entities, and demonstrates a misunderstanding of the upstream industry. Small entities will have to spend the capital to comply with these rules before they are in a position to determine whether compliance is even required. Instead, EPA should provide an exemption either for all small entities, or based on the total number of affected wells at a particular well site to provide greater clarity and certainty to small entities when they make a decision about whether or not to drill a new well, or fracture or refracture an existing well.

The costs associated with these Rules will be particularly devastating to these small businesses, because the costs primarily take the form of up-front capital costs that they must expend when they begin drilling a new well or refracturing an existing well, and before the well is generating any revenue for the company. The need for additional up-front capital can hurt a small entity's ability to borrow money on favorable terms, which can in turn impact whether or not a particular project is actually profitable. Small entities need to procure the capital for these projects from outside sources, and the need to borrow additional amounts, before knowing how profitable a particular well will be, will inhibit the ability of these small entities to borrow on terms that make it economically feasible to pursue these projects. These added expenses will create serious barriers to entry for smaller players in the oil and gas industry. Because these smaller players are often the source of significant innovations, this will prevent the introduction and development of new engineering methods, operating techniques and technologies, including environmentally beneficial innovations.

EPA has also failed to consider the impact that the short time periods included in the rule will have on small entities. As previously discussed, these entities have many small well or compressor sites spread out over large geographic areas. The Methane NSPS creates an endless cycle of tight compliance deadlines that will strain the resources of small entities: first the operators must complete fugitive emissions surveys within 30 days of start-up or modification, then semiannual or even quarterly surveys, followed by repairs within 15 days of the survey, followed by a follow-up survey within 15 days of the repair. The affected small businesses will have to repeat these requirements at each of their dispersed sites, as well as the recordkeeping and reporting requirements. EPA should have considered the impact that these tight time lines place on small entities and offered extended timelines for those entities.

EPA also did not consider the use of performance, rather than design, standards for fugitive emissions monitoring. The Methane NSPS requires fugitive emissions surveys to be performed with OGI technology. However, as discussed more thoroughly below, OGI cameras are expensive and are only one of a multitude of ways that leaks can be detected. By selecting a single form of expensive technology for detection, the Methane NSPS would require these entities to either invest in purchasing their own cameras and training personnel to use them, or

hiring trained contractors to travel to their remote sites. Instead, EPA should allow small entities to demonstrate that they have company-wide compliance plans in place that detect and address leaks through a variety of means best suited to their particular sites. For small entities in states that already require monitoring and leak repair, EPA should allow compliance with those state programs to create a presumption of compliance with the Methane NSPS to ease the burden on operators.

Finally, using a percentage of components, rather than a set number of components, to determine the frequency of surveys is also unfair to small entities. A small site will have fewer fugitive emission components than a larger site. As a result, each leaking component will represent a greater share of the total number of components. While a site with 5,000 components can afford to have 50 leaks without any impact on the frequency of its survey requirements, 50 leaks at a much smaller site with only 1,000 components would trigger more frequent survey requirements under the Rules. Smaller entities are much more likely to operate these smaller sites, and thus are more likely to face more frequent survey requirements under the percentage-based system. Smaller entities are, therefore, more likely to have additional survey requirements, despite the fact that there is no reason to believe that 50 leaking components at a small site have a more meaningful impact on emissions than 50 leaks at a larger site.

Recommendations: EPA should revise its regulatory impact statement to consider the financial impact on small businesses. EPA should consider:

1. Exempting small entities; or

2. Alternatively, EPA should consider exempting well sites with less than four affected wells;

3. Giving small entities 60 days from start-up or modification to perform an initial survey, and 30 days for repairs and follow up surveys;

4. Allowing small entities to use alternative, performance-based methods to demonstrate they are monitoring and repairing natural gas leaks in a timely manner; and

5. Allowing compliance with state leak detection and repair programs to create a presumption of compliance with the Methane NSPS; or

6. Alternatively, only requiring surveys to be performed annually unless two or more consecutive surveys reveal leaks in more than 50 of the fugitive emission components at a well site or compressor station, in which case surveys should be performed semi-annually.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Brandon M. Black, Vice President
Commenter Affiliation: BC Operating, Inc.

Document Control Number: EPA-HQ-OAR-2010-0505-6968
Comment Excerpt Number: 8

Comment: The cost associated with these Rules would be particularly onerous for small E&P entities, and EPA has failed to fully consider these impacts.

EPA is required by the Regulatory Flexibility Act ("RFA") and subsequent amendments to determine-to the extent feasible-the Methane NSPS's economic impact on small entities, explore regulatory options for reducing any significant economic impact on a substantial number of such entities, and explain its ultimate choice of regulatory approach.

By EPA's own estimation, 98 percent of the firms in the industries affected by the Methane NSPS are considered small entities. While many members of the public envision giant international conglomerates when they call to mind the oil and gas industry, this figure demonstrates that in reality, the industry is made up of a mosaic of small players, many of whom cannot shoulder the kind of recordkeeping and compliance burden that these Rules would impose. Because the industry is overwhelmingly made up of small entities, the impact of these Rules will be primarily felt by those small businesses. EPA determined that it could not certify that this Rule does not have a significant economic impact on a substantial number of small entities. EPA then convened a Small Business Review Panel and published an Initial Regulatory Flexibility Analysis of the Methane NSPS. This analysis has a number of shortcomings and fails to meet the statutory requirements.

First, the RFA requires EPA to include "a description of the projected reporting, recordkeeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record." Each initial regulatory flexibility analysis must also contain:

a description of any significant alternatives to the proposed rule which accomplish the stated objectives of applicable statutes and which minimize any significant economic impact of the proposed rule on small entities. Consistent with the stated objectives of applicable statutes, the analysis shall discuss significant alternatives

such as-

(1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities;

(2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities;

(3) the use of performance rather than design standards; and

(4) an exemption from coverage of the rule, or any part thereof, for such small entities.

The analysis for the Methane NSPS is wholly inadequate in addressing these issues.

As discussed in the previous section, EPA's projections grossly understate the amount of time and resources that will have to be devoted to the reporting and recordkeeping aspects of this rule. The Methane NSPS is a highly complex and technical rule with a number of overlapping requirements and upstream oil and gas operations in particular are unlikely to be familiar with federal air regulations. This means that these small entities will have to expend far more resources either training their own personnel, or hiring personnel with expertise in federal air regulatory matters than EPA estimated.

BC own experience with these proposed Rules is a good example of what many other small upstream entities are also encountering as they analyze the requirements imposed by the Rules. BC has 50 employees. Presently, BC has only one employee dedicated full time to regulatory compliance issues, and employs several contract employees to assist with state regulatory compliance requirements. Some other employees spend a portion of their time on regulatory compliance issues, and BC estimates that the total man-hours spent on compliance each year is at least the equivalent of about 2 full-time employees. BC estimates that it will need to hire at least two additional full-time employees dedicated to complying with the Methane Proposal. In other words, our small entity will have to *double* the man-hours that it devotes to compliance just to meet the requirements of the Methane NSPS. This sharp increase is due in part to the complexity of these Rules, as well as the continual nature of the monitoring, reporting, and recordkeeping requirements associated with the fugitive surveys. Like most other upstream companies, BC well sites are dispersed over a large geographic area, and an employee will have to do substantial amounts of travel in order to visit each site semi-annually or quarterly, and will then have to keep up with the continual recordkeeping and reporting requirements for each of these small sites. EPA's analysis and Methane NSPS fail to take into account the resources available to a small entity like BC, or to provide a simplified or consolidated method of compliance reporting for small entities. As a result, the analysis does not comply with the RFA.

EPA also failed to consider the devastating financial impact that these Ru1es could have on small entities. If small entities are required to replace their atmospheric tanks in order to comply with the Methane NSPS, then the cost of those storage vessel replacements could be more than many small businesses can bear, especially in the current economic environment. Even if EPA clarifies that the storage vessels will not need to be replaced, the cost of compliance with fugitive survey requirements will impose a serious burden on small businesses. As discussed above, oil and gas prices have fallen during the past year, and many industry experts expect crude oil prices to remain depressed-around $50/bbl or less. The "break-even" point for the average company that operates in the Delaware Basin portion of the Permian Basin, as BC does, is around $62/bbl. The break-even point ranges within the Permian Basin but is generally between $55-$152/bbl, depending on the percent of liquids in the particular area of drilling. Estimates suggest that the break-even points for other major shale plays are also above the current market prices for oil. For example, the break-even point has been estimated at $65/bbl for the Eagle Ford and at $68/bbl for the Bakken. Increased compliance costs will raise these break-even amounts further and make it difficult, if not impossible, for small entities like BC to stay competitive in current market conditions.

EPA estimates that the annual cost of compliance will be less than two percent of the revenue for the oil and gas industry per year, but did so based on outdated data that suggests far higher revenue for the oil and gas industry than current market rates. As a result, EPA has underestimated the degree to which these Rules will impact revenues. EPA's estimate also ignores the fact that these costs will be disproportionately felt by upstream oil and gas businesses, which tend to be some of the smallest players in the industry. For example, if E&P companies were required to replace atmospheric tanks with pressurized tanks, the costs for a single onshore facility would increase by $200,000, which translates into a ten percent capital cost increase for the tanks alone.

Even if EPA's estimate were accurate, a two percent cut in revenues is a meaningful decrease for small entities and, under current market conditions, could result in reduced operators, limit employee hours, and even lay-offs. These are the exact types of measures that will stretch small entities even thinner, and are, therefore, more likely to hinder, rather than help, efforts to improve environmental oversight. While EPA may view the impact of each of its regulatory programs in a vacuum, the reality for the entities that EPA regulates is that they have to find a way to comply with *all* of the rules that EPA creates. Two percent here, and two percent there may not sound like much in the abstract, but these compliance costs quickly add up and can quickly make it impossible for businesses to operate profitably.

By hindering the profitability of U.S. oil and gas companies, these Rules will not lead to the decrease in global greenhouse gas emissions that EPA hopes to achieve. EPA has noted that climate change is not a localized problem, and that greenhouse gases disperse globally. Likewise, the oil market is global. These Rules will create a market advantage for our competitors abroad, who are not subject to the same level of environmental regulations, and who have not taken the same voluntary steps to limit emissions. EPA's rules may, therefore, exacerbate the very problem that they are trying to solve by encouraging a greater percentage of oil and gas activities to occur in foreign jurisdictions with no limits on methane emissions.

EPA's analysis also does not establish differing compliance or reporting requirements or timetables that take into account the resources available to small entities. EPA has attempted to take into account the fact that small E&P entities are more likely to drill smaller wells, which will produce fewer barrels per day than the wells drilled by bigger entities. While EPA provides an exemption for fugitive monitoring requirements for well sites that average below 15 barrels of oil equivalent per day ("boepd"), this exemption will not provide any actual relief to small entities. First, it would be difficult, if not impossible, for a well site averaging below 15 boepd to be profitable. As a result, few, if any, small entities will attempt to operate new well sites that average 15 boepd.

In addition, small entities are unlikely to know their actual average boepd until after they have already expended the resources to complete those wells. This after-the-fact exemption is little help for companies like BC, because they must estimate their compliance costs at the outset of the project to determine whether it is economically feasible to drill, fracture, or refracture a well. Given the short timeframe that EPA gives these entities to perform fugitive monitoring after a start-up or modification, small entities must make decisions about whether to hire additional personnel, or invest in Optical Gas Imaging ("OGI") cameras, before drilling or modifying a well

site. As a result, this exemption for low-producing wells does not provide relief for small entities, and demonstrates a misunderstanding of the upstream industry. Small entities will have to spend the capital to comply with these rules before they are in a position to determine whether compliance is even required. Instead, EPA should provide an exemption either for all small entities, or based on the total number of affected wells at a particular well site to provide greater clarity and certainty to small entities when they make a decision about whether or not to drill a new well, or fracture or refracture an existing well.

The costs associated with these Rules will be particularly devastating to these small businesses, because the costs primarily take the form of up-front capital costs that they must expend when they begin drilling a new well or refracturing an existing well, and before the well is generating any revenue for the company. The need for additional up-front capital can hurt a small entity's ability to borrow money on favorable terms, which can in turn impact whether or not a particular project is actually profitable. Small entities need to procure the capital for these projects from outside sources, and the need to borrow additional amounts, before knowing how profitable a particular well will be, will inhibit the ability of these small entities to borrow on terms that make it economically feasible to pursue these projects. These added expenses will create serious barriers to entry for smaller players in the oil and gas industry. Because these smaller players are often the source of significant innovations, this will prevent the introduction and development of new engineering methods, operating techniques and technologies, including environmentally beneficial innovations.

EPA has also failed to consider the impact that the short time periods included in the rule will have on small entities. As previously discussed, these entities have many small well or compressor sites spread out over large geographic areas. The Methane NSPS creates an endless cycle of tight compliance deadlines that will strain the resources of small entities: first the operators must complete fugitive emissions surveys within 30 days of start-up or modification, then semi-annual or even quarterly surveys, followed by repairs within 15 days of the survey, followed by a follow-up survey within 15 days of the repair. The affected small businesses will have to repeat these requirements at each of their dispersed sites, as well as the recordkeeping and reporting requirements. EPA should have considered the impact that these tight timelines place on small entities and offered extended timelines for those entities.

EPA also did not consider the use of performance, rather than design, standards for fugitive emissions monitoring. The Methane NSPS requires fugitive emissions surveys to be performed with OGI technology. However, as discussed more thoroughly below, OGI cameras are expensive and are only one of a multitude of ways that leaks can be detected. By selecting a single form of expensive technology for detection, the Methane NSPS would require these entities to either invest in purchasing their own cameras and training personnel to use them, or hiring trained contractors to travel to their remote sites. Instead, EPA should allow small entities to demonstrate that they have company-wide compliance plans in place that detect and address leaks through a variety of means best suited to their particular sites. For small entities in states that already require monitoring and leak repair, EPA should allow compliance with those state programs to create a presumption of compliance with the Methane NSPS to ease the burden on operators.

Finally, using a percentage of components, rather than a set number of components, to determine the frequency of surveys is also unfair to small entities. A small site will have fewer fugitive emission components than a larger site. As a result, each leaking component will represent a greater share of the total number of components. While a site with 5,000 components can afford to have 50 leaks without any impact on the frequency of its survey requirements, leaks at a much smaller site with only 1,000 components would trigger more frequent survey requirements under the Rules. Smaller entities are much more likely to operate these smaller sites, and thus are more likely to face more frequent survey requirements under the percentage based system. Smaller entities are, therefore, more likely to have additional survey requirements, despite the fact that there is no reason to believe that 50 leaking components at a small site have a more meaningful impact on emissions than 50 leaks at a larger site.

Recommendations: EPA should revise its regulatory impact statement to consider the financial impact on small businesses. EPA should consider:

1. Exempting small entities; or

2. Alternatively, EPA should consider exempting well sites with less than four affected wells;

3. Giving small entities 60 days from start-up or modification to perform an initial survey, and 30 days for repairs and follow up surveys;

4. Allowing small entities to use alternative, performance-based methods to demonstrate they are monitoring and repairing natural gas leaks in a timely manner; and

5. Allowing compliance with state leak detection and repair programs to create a presumption of compliance with the Methane NSPS; or

6. Alternatively, only requiring surveys to be performed annually unless two or more consecutive surveys reveal leaks in more than 50 of the fugitive emission components at a well site or compressor station, in which case surveys should be performed semiannually.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Joe Strickling, Operations Manager
Commenter Affiliation: Patriot Resources, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6978
Comment Excerpt Number: 8

Comment: The cost associated with these Rules would be particularly onerous for small E&P entities, and EPA has failed to fully consider these impacts.

EPA is required by the Regulatory Flexibility Act ("RFA") and subsequent amendments to determine-to the extent feasible-the Methane NSPS's economic impact on small entities, explore

regulatory options for reducing any significant economic impact on a substantial number of such entities, and explain its ultimate choice of regulatory approach.

By EPA's own estimation, 98 percent of the firms in the industries affected by the Methane NSPS are considered small entities.34 While many members of the public envision giant international conglomerates when they call to mind the oil and gas industry, this figure demonstrates that in reality, the industry is made up of a mosaic of small players, many of whom cannot shoulder the kind of recordkeeping and compliance burden that these Rules would impose. Because the industry is overwhelmingly made up of small entities, the impact of these Rules will be primarily felt by those small businesses. EPA determined that it could not certify that this Rule does not have a significant economic impact on a substantial number of small entities. EPA then convened a Small Business Review Panel and published an Initial Regulatory Flexibility Analysis of the Methane NSPS. This analysis has a number of shortcomings and fails to meet the statutory requirements.

First, the RF A requires EPA to include "a description of the projected reporting, recordkeeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record." Each initial regulatory flexibility analysis must also contain:

a description of any significant alternatives to the proposed rule which accomplish the stated objectives of applicable statutes and which minimize any significant economic impact of the proposed rule on small entities. Consistent with the stated objectives of applicable statutes, the analysis shall discuss significant alternatives

such as-

(1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities;

(2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities;

(3) the use of performance rather than design standards; and

(4) an exemption from coverage of the rule, or any part thereof, for such small entities.

The analysis for the Methane NSPS is wholly inadequate in addressing these issues.

As discussed in the previous section, EPA's projections grossly understate the amount of time and resources that will have to be devoted to the reporting and recordkeeping aspects of this rule. The Methane NSPS is a highly complex and technical rule with a number of overlapping requirements and upstream oil and gas operations in particular are unlikely to be familiar with federal air regulations. This means that these small entities will have to expend far more

resources either training their own personnel, or hiring personnel with expertise in federal air regulatory matters than EPA estimated.

Patriot Resources' own experience with these proposed Rules is a good example of what many other small upstream entities are also encountering as they analyze the requirements imposed by the Rules. Patriot Resources has 35 employees. Presently, Patriot Resources has only one employee dedicated full time to regulatory compliance issues, and employs several contract employees to assist with state regulatory compliance requirements. Some other employees spend a portion of their time on regulatory compliance issues, and Patriot Resources estimates that the total man-hours spent on compliance each year is at least the equivalent of about 2 full-time employees. Patriot Resources estimates that it will need to hire at least 2 additional full-time employees dedicated to complying with the Methane Proposal. In other words, our small entity will have to *double* the man-hours that it devotes to compliance just to meet the requirements of the Methane NSPS. This sharp increase is due in part to the complexity of these Rules, as well as the continual nature of the monitoring, reporting, and recordkeeping requirements associated with the fugitive surveys. Like most other upstream companies, Patriot Resources' well sites are dispersed over a large geographic area, and an employee will have to do substantial amounts of travel in order to visit each site semi-annually or quarterly, and will then have to keep up with the continual recordkeeping and reporting requirements for each of these small sites. EPA's analysis and Methane NSPS fail to take into account the resources available to a small entity like Patriot Resources, or to provide a simplified or consolidated method of compliance reporting for small entities. As a result, the analysis does not comply with the RFA.

EPA also failed to consider the devastating financial impact that these Rules could have on small entities. If small entities are required to replace their atmospheric tanks in order to comply with the Methane NSPS, then the cost of those storage vessel replacements could be more than many small businesses can bear, especially in the current economic environment.

Even if EPA clarifies that the storage vessels will not need to be replaced, the cost of compliance with fugitive survey requirements will impose a serious burden on small businesses. As discussed above, oil and gas prices have fallen during the past year, and many industry experts expect crude oil prices to remain depressed-around $50/bbl or less. The "break-even" point for the average company that operates in the horizontal play of the Delaware Basin, as Patriot Resources does is around $55/bbl. The break-even point ranges within the Permian Basin but is generally between $50-$152/bbl, depending on the percent of liquids in the particular area of drilling. Estimates suggest that the break-even points for other major shale plays are also above the current market prices for oil. For example, the break-even point has been estimated at $65/bbl for the Eagle Ford and at $68/bbl for the Bakken. 37 Increased compliance costs will raise these break-even amounts further and make it difficult, if not impossible, for small entities like Patriot Resources to stay competitive in current market conditions.

EPA estimates that the annual cost of compliance will be less than two percent of the revenue for the oil and gas industry per year, but did so based on outdated data that suggests far higher revenue for the oil and gas industry than current market rates. As a result, EPA has underestimated the degree to which these Rules will impact revenues. EPA's estimate also ignores the fact that these costs will be disproportionately felt by upstream oil and gas

businesses, which tend to be some of the smallest players in the industry. For example, if E&P companies were required to replace atmospheric tanks with pressurized tanks, the costs for a single onshore facility would increase by $200,000, which translates into a ten percent capital cost increase for the tanks alone.

Even if EPA's estimate were accurate, a two percent cut in revenues is a meaningful decrease for small entities and, under current market conditions, could result in reduced operators, limit employee hours, and even lay-offs. These are the exact types of measures that will stretch small entities even thinner, and are, therefore, more likely to hinder, rather than help, efforts to improve environmental oversight. While EPA may view the impact of each of its regulatory programs in a vacuum, the reality for the entities that EPA regulates is that they have to find a way to comply with *all* of the rules that EPA creates. Two percent here, and two percent there may not sound like much in the abstract, but these compliance costs quickly add up and can quickly make it impossible for businesses to operate profitably.

By hindering the profitability of U.S. oil and gas companies, these Rules will not lead to the decrease in global greenhouse gas emissions that EPA hopes to achieve. EPA has noted that climate change is not a localized problem, and that greenhouse gases disperse globally. Likewise, the oil market is global. These Rules will create a market advantage for our competitors abroad, who are not subject to the same level of environmental regulations, and who have not taken the same voluntary steps to limit emissions. EPA's rules may, therefore, exacerbate the very problem that they are trying to solve by encouraging a greater percentage of oil and gas activities to occur in foreign jurisdictions with no limits on methane emissions.

EPA's analysis also does not establish differing compliance or reporting requirements or timetables that take into account the resources available to small entities. EPA has attempted to take into account the fact that small E&P entities are more likely to drill smaller wells, which will produce fewer barrels per day than the wells drilled by bigger entities. While EPA provides an exemption for fugitive monitoring requirements for well sites that average below 15 barrels of oil equivalent per day ("boepd"), this exemption will not provide any actual relief to small entities. First, it would be difficult, if not impossible, for a well site averaging below 15 boepd to be profitable. As a result, few, if any, small entities will attempt to operate new well sites that average 15 boepd.

In addition, small entities are unlikely to know their actual average boepd until after they have already expended the resources to complete those wells. This after-the-fact exemption is little help for companies like Patriot Resources, because they must estimate their compliance costs at the outset of the project to determine whether it is economically feasible to drill, fracture, or refracture a well. Given the short timeframe that EPA gives these entities to perform fugitive monitoring after a start-up or modification, small entities must make decisions about whether to hire additional personnel, or invest in Optical Gas Imaging ("OGI") cameras, before drilling or modifying a well site. As a result, this exemption for low-producing wells does not provide relief for small entities, and demonstrates a misunderstanding of the upstream industry. Small entities will have to spend the capital to comply with these rules before they are in a position to determine whether compliance is even required. Instead, EPA should provide an exemption either for all small entities, or based on the total number of affected wells at a particular well site

to provide greater clarity and certainty to small entities when they make a decision about whether or not to drill a new well, or fracture or refracture an existing well.

The costs associated with these Rules will be particularly devastating to these small businesses, because the costs primarily take the form of up-front capital costs that they must expend when they begin drilling a new well or refracturing an existing well, and before the well is generating any revenue for the company. The need for additional up-front capital can hurt a small entity's ability to borrow money on favorable terms, which can in tum impact whether or not a particular project is actually profitable. Small entities need to procure the capital for these projects from outside sources, and the need to borrow additional amounts, before knowing how profitable a particular well will be, will inhibit the ability of these small entities to borrow on terms that make it economically feasible to pursue these projects. These added expenses will create serious barriers to entry for smaller players in the oil and gas industry. Because these smaller players are often the source of significant innovations, this will prevent the introduction and development of new engineering methods, operating techniques and technologies, including environmentally beneficial innovations.

EPA has also failed to consider the impact that the short time periods included in the rule will have on small entities. As previously discussed, these entities have many small well or compressor sites spread out over large geographic areas. The Methane NSPS creates an endless cycle of tight compliance deadlines that will strain the resources of small entities: first the operators must complete fugitive emissions surveys within 30 days of start-up or modification, then semi-annual or even quarterly surveys, followed by repairs within 15 days of the survey, followed by a follow-up survey within 15 days of the repair. The affected small businesses will have to repeat these requirements at each of their dispersed sites, as well as the recordkeeping and reporting requirements. EPA should have considered the impact that these tight timelines place on small entities and offered extended timelines for those entities.

EPA also did not consider the use of performance, rather than design, standards for fugitive emissions monitoring. The Methane NSPS requires fugitive emissions surveys to be performed with OGI technology. However, as discussed more thoroughly below, OGI cameras are expensive and are only one of a multitude of ways that leaks can be detected. By selecting a single form of expensive technology for detection, the Methane NSPS would require these entities to either invest in purchasing their own cameras and training personnel to use them, or hiring trained contractors to travel to their remote sites. Instead, EPA should allow small entities to demonstrate that they have company-wide compliance plans in place that detect and address leaks through a variety of means best suited to their particular sites. For small entities in states that already require monitoring and leak repair, EPA should allow compliance with those state programs to create a presumption of compliance with the Methane NSPS to ease the burden on operators.

Finally, using a percentage of components, rather than a set number of components, to determine the frequency of surveys is also unfair to small entities. A small site will have fewer fugitive emission components than a larger site. As a result, each leaking component will represent a greater share of the total number of components. While a site with 5,000 components can afford to have 50 leaks without any impact on the frequency of its survey requirements, 50 leaks at a

much smaller site with only 1,000 components would trigger more frequent survey requirements under the Rules. Smaller entities are much more likely to operate these smaller sites, and thus are more likely to face more frequent survey requirements under the percentage based system. Smaller entities are, therefore, more likely to have additional survey requirements, despite the fact that there is no reason to believe that 50 leaking components at a small site have a more meaningful impact on emissions than 50 leaks at a larger site.

Recommendations: EPA should revise its regulatory impact statement to consider the financial impact on small businesses. EPA should consider:

1. Exempting small entities; or

2. Alternatively, EPA should consider exempting well sites with less than four affected wells;

3. Giving small entities 60 days from start-up or modification to perform an initial survey, and 30 days for repairs and follow up surveys;

4. Allowing small entities to use alternative, performance-based methods to demonstrate they are monitoring and repairing natural gas leaks in a timely manner; and

5. Allowing compliance with state leak detection and repa1r programs to create a presumption of compliance with the Methane NSPS; or

6. Alternatively, only requiring surveys to be performed annually unless two or more consecutive surveys reveal leaks in more than 50 of the fugitive emission components at a well site or compressor station, in which case surveys should be performed semiannually.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Darin Schroeder, David McCabe, Lesley Fleishman and Conrad Schneider
Commenter Affiliation: Clean Air Task Force et al.
Document Control Number: EPA-HQ-OAR-2010-0505-7062
Comment Excerpt Number: 34

Comment: Lower-Producing Wells Are Owned by both Large and Small Producers. EPA assumes that exempted lower-producing wells are largely owned by small businesses. We examined data from the HPDI Database to evaluate this claim, analyzing wells above and below the 15 BOE/d threshold (as well as lower thresholds). We then examined ownership profiles of these wells, classifying wells owned by the top 100 oil and natural gas producers as well as other smaller producers. Importantly, this is a very conservative approximation of small-business ownership profile, as many of the producers that fall outside of the top 100 nonetheless have more than 500 employees, the threshold for small business status for oil and natural gas exploration / production. Moreover, even companies in the oil and gas sector with fewer than 500 employees can have significant revenues—sometimes in excess $1 billion annually.

Our analysis demonstrates that wells producing less than 15 BOE/d are owned by both large and small producers. In particular, major operators own approximately one third of such wells (35 percent of new gas wells and 29 percent of new oil wells). Thus, EPA's assumption that small businesses own lower-producing wells belies the significant number that are *not* owned by small business.

Response: In response to comments received, including comments indicating that low producing wells are not indicative of small producers, we removed the exemption from fugitive requirements for low producing wells in the final rule.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:10 AM - 8:00 PM; Public Hearing #1 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 40

Comment: More importantly, the EPA's proposed methane rules may actually stem the methane reductions by interfering with industry successes.

Instead of investing in new technologies, companies will have to divert their investments to compliance and reporting. In fact, financial analysts have already said that EPA's methane rule could wipe out small drillers, the same family-owned businesses that drill a significant number of wells here in Texas.

[Commenter remarked that smaller drillers would be forced out, and EPA inquired where this information could be found. In response, commenter stated the following:]

It was reported by Bloomberg, and it was an Oppenheimer study, but I'll get it for you.

Response: The EPA does not believe that the final rules are overly burdensome or will harm the U.S. economy or, specifically, oil and natural gas production. For the final rule, we carefully considered the comments received on all aspects of the proposed rules. While our approach and methodology for establishing the final standards remained the same, we made several changes to make the final rules more flexible and cost-effective, address concerns with equipment availability, streamline recordkeeping and reporting requirements, and improve clarity, while fully preserving or improving the public health and environmental protection required by the CAA. These changes are discussed in more detail in the preamble to the final rule and in the other sections of this document. The final NSPS establishes several performance standards that give regulated entities flexibility in determining how to best comply with the regulation. In an industry that is geographically and economically heterogeneous, this flexibility is an important factor in reducing regulatory burden.

We used the National Energy Modeling System (NEMS) to estimate the impacts of the final NSPS on the U.S. oil and natural gas drilling, production, prices, and trade. The NEMS is a publically available model of the U.S. energy economy developed and maintained by the Energy Information Administration of the U.S. DOE and is used to produce the Annual Energy Outlook, a reference publication that provides detailed forecasts of the United States energy economy. We disagree with the commenters' belief that the rules will "be an economic detriment" for the U.S. economy, as all impacts to oil and natural gas markets, as presented in Section 6 of the final RIA are relatively small.

Additionally, emission measures required by the final rules capture natural emissions that otherwise would be vented to the atmosphere. A large proportion of the averted methane emissions can be directed into natural gas production streams and sold. The revenues from additional natural gas are expected to partly offset the costs of implementing the final rules. The revenue from additional natural gas product recovery will also lead to increased revenues from taxes and royalties.

Regarding the comments about challenges faced by producers of low production wells, as explained in the Final Regulatory Flexibility Analysis for the final rule, which is included in the final RIA, changes to the rule from proposal that may benefit small entities due to comments received. These changes include allowing both OGI and Method 21 as acceptable monitoring technology, replacing a performance based monitoring schedule with a fixed frequency, lengthening the time of initial fugitive monitoring, and simplified the third party verification of technical infeasibility requirements. Though these are not monetized, we believe the flexibility and simplifications these changes have added to the rule result in a reduced burden on small entities.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:10 AM - 8:00 PM; Public Hearing #1 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 111

Comment: These regulations will impose substantial costs simply by virtue of the extensive systems that will be required to document and certify compliance. This concern is pronounced for smaller operators for whom the real-world economic resource burden of recordkeeping and compliance have the potential to -- have the potential to disproportionally outweigh predicted benefits. TXOGA believes that the additional costs will be substantial, particularly for smaller operators and remote operations.

We urge EPA to consider whether formalizing these requirements and regulations is truly necessary given the costs that compliance demonstration will impose on our members, and to the extent EPA finalizes these requirements, we urge EPA to reduce the monitoring of the compliance burdens that they will impose.

Response: See response to DCN EPA-HQ-OAR-2010-0505-7336, Excerpt 40.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:10 AM - 8:00 PM; Public Hearing #1 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 241

Comment: Since 2001, the Barnett Shale development has added more than $110 billion in value for the North Texas economy, has generated tax receipts of more than $10 billion for local and state governments, and supported more than 107,000 jobs, but EPA's proposed methane rule will this development harder, not easier. In fact, Oppenheimer recently stated that EPA's proposal could wipe out energy companies that are already suffering from a difficult commodities market. Many of these companies are the smaller producers rather than, quote, big oil corporations.

Response: See response to DCN EPA-HQ-OAR-2010-0505-7336, Excerpt 40.

Commenter Name: Matthew Hite
Commenter Affiliation: Gas Processors Association (GPA)
Document Control Number: EPA-HQ-OAR-2010-0505-6881
Comment Excerpt Number: 43

Comment: EPA Failed to Conduct a Meaningful Small Business Advocacy Review Panel

EPA failed to conduct a meaningful review of the impact of the proposed rule on small businesses because it completed the notice of proposed rulemaking and submitted it to OMB prior to completing the Small Business Advocacy Review Panel. By submitting the proposed rule to OMB before even receiving comments from small businesses, EPA sent a signal that it did not intend to take their concerns into account and instead was merely working to meet the procedural requirements of the Regulatory Flexibility Act ("RFA") and Small Business Regulatory Enforcement Fairness Act ("SBREFA"). Section 609(b) of the RFA requires EPA to convene a Small Business Advocacy Review ("SBAR") Panel before proposal of any rule which would have a significant impact on a substantial number of small entities. The purpose of this requirement is to allow dialogue between EPA and small business representatives to ensure that EPA is taking the interests of small businesses into account in its rulemakings.

EPA's own guidance clearly states that EPA must conduct SBAR panels early in the rulemaking process to ensure that it has time to review the reports from such panels and, when necessary, make changes to the proposal to address impacts on small businesses. See EPA, Final Guidance for EPA Rule writers: Regulatory Flexibility Act 53 (Nov. 2006) ("RFA Guidance") ("In light of

the Panel Report, the Agency is to modify, where appropriate, the proposed rule ….”). Thus, the RFA Guidance explains that “[e]arly involvement helps ensure that small entity comments and insights inform EPA’s thinking about fundamental issues of rule design and scope, as well as more specific issues posed by the particular regulatory program at issue.” Id. To achieve these goals, “EPA expects that the Panel process will normally be concluded well in advance of Final Agency Review … in order to be most useful in the development of the proposed rule.” Id. at 57. EPA sets a specific process for ensuring that the agency takes small business interests into account and dictates that the SBAR Panel Report must be completed and incorporated into the proposed rule before the rule can be submitted to OMB for review. Id. at 67 (“The Regulatory Management Division of EPA’s Office of Policy, Economics and Innovation, which is responsible for the review of regulations prior to OMB review and signature by the Administrator, will, in conjunction with OGC, ensure that your preamble language is sufficient.” (emphasis added)).

Here, EPA failed to comply with its own guidelines when it submitted the proposed rule to OMB on June 23, 2015, before the July 6, 2105, deadline for accepting comments from small businesses as part of the SBAR panel process. This is contrary to the RFA and suggests that the entire SBAR Panel was merely a formality and not taken seriously by the agency. EPA cannot assert that it took the interests of small businesses into account if it had already finalized its proposal before receiving their comments. Further, by failing to address their concerns at the outset of this rulemaking, EPA has prejudiced the interests of small businesses in the oil and gas sector, many of whom will be significantly impacted by the requirements of this rule. Those harms cannot be undone. However, to alleviate those concerns to the fullest degree possible, GPA urges EPA to convene another SBAR Panel well in advance of OMB’s review of the final rule so that EPA can make necessary changes to address the impacts of the rule on small businesses.

Response: The EPA takes its responsibilities under the RFA seriously and disagrees that we failed to conduct a meaningful Panel process. Please see the FRFA in the RIA and the Final SBAR report in the docket for this rule for further information detailing the actions the EPA took to accommodate small entities.

12.8 Cost Savings From Recovered Oil and Natural Gas

Commenter Name: Cyrus Reed, Conservation Director
Commenter Affiliation: Lone Star Chapter, Sierra Club
Document Control Number: EPA-HQ-OAR-2010-0505-5418
Comment Excerpt Number: 14

Comment: Finally, we suggest that the description of the rule and the cost-benefit analysis fully account for the added benefits of the captured and useful product. This is a cost savings to industry since the product can then be sold instead of lost. Although EPA includes the cost savings from conserved gas in the production and processing segments, it does not account for savings in the transmission and storage segment, even society benefits from those savings. In addition, EPA should emphasize in its cost-benefit analysis the co-benefits of reduced ground level ozone, particulate matter, and toxic air pollutants. Thus, as EPA and Texas assess how to reduce ozone and PM levels (as well as regional haze), this proposed rule will help achieve these ends, and the health benefits and reduced compliance costs through this rule should be calculated.

Response: Some commenters have argued that the EPA should include natural gas recovery as an offset to national compliance costs within the transmission and storage segment. The EPA has modified its estimate of national costs to include the value of product recovery for transmission and storage. The estimate of national costs represents an estimate of societal costs of emissions control, which may differ from the costs borne by affected sources. The EPA agrees that natural gas recovery benefits society regardless of ownership and contractual circumstances. Valued at $4/Mcf, estimated national gas recovery as a result of the NSPS in the transmission and storage segment would be about $2 million in 2020 and $4 million in 2025. However, most companies in the transmission and storage segment do not own the gas they are transmitting, and so their compliance costs are not necessarily affected by natural gas recovery in the short term. In the long term, it may be possible for transmission and storage companies to make more favorable contracts which account for more efficient operations. Section 2.6 of the RIA includes a discussion of firm characteristics in the oil and gas sector.

Additionally, the EPA agrees with the commenter that this rule would reduce ground-level ozone, particulate matter, and toxic air pollutants. These benefits are fully discussed in Chapter 4 of the RIA.

Commenter Name: Mike Gibbons, Vice President – Production
Commenter Affiliation: CountryMark Energy Resources, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6241
Comment Excerpt Number: 11

Comment: EPA states that much of the methane and VOCs that are captured as a result of this regulation will be sold into the natural gas market (Page 22 and Page 345). EPA is expecting owners and operators to use the gas sales to offset compliance costs.

Most of the gas that is not being sold today cost too much for owners and operators to collect, process, transport, and sell into the natural gas market. Management teams at energy companies have fiduciary responsibility to use owners' and investors' capital in the most efficient way possible. If projects to collect, process, and sell gas were economically attractive, companies would have already made the investment.

Many of the wells that we drill and produce in the Illinois Basin have a gas to oil ratio that is greater than the minimum threshold, but far below the quantity to justify a profitable project. The associated gas would need to be purified to make it pipeline quality, which is a significant investment for the small volume of produced gas. We estimate that the construction of a gas processing facility could cost $1 million to $2.5 million, depending on gas quantity and quality.

Most operators in the Illinois Basin do not have gas gathering pipelines installed to enable collection and processing of the gas. Gas gathering lines could exceed $500,000 per field to procure right of way and install the pipeline network. There are a few interstate pipelines crossing the Illinois Basin, but in addition to the cost of building the gathering lines, the required tie-in and associated measurement equipment on an interstate pipeline may cost an additional $250,000-$500,000.

We have evaluated several natural gas projects in the Illinois Basin. In every case, the projects were uneconomic because nitrogen is a very common contaminant, and it is very expensive to remove. These projects do not produce enough gas to justify cryogenic nitrogen removal which is the lowest cost option. The next best alternative is a pressure swing absorption system or equivalent filtering method. With the produced gas, this results in an additional processing cost of approximately $1.00/MCF. According to EIA, the Henry Hub spot market price for natural gas in mid-October 2015 is approximately $2.40/MCF. At the current gas price, any project that requires nitrogen removal will lose money for the investor.

We performed Monte Carlo simulations around our expected gas production, gas quality, compliance cost, operating cost, and product pricing. The outcome of our simulations shows that none of the projects are profitable (positive Net Present Value (NPV)) and any management team would reject the investment opportunity. Every well that we drill will only have additional compliance costs added to our operation, no economic benefit will be realized from the typical well fields that we produce.

Response: The EPA continues believe that much of the natural gas that is captured by environmental activities under the NSPS that would have otherwise been emitted can be sold and help offset compliance costs. The rule also provides flexibility to operators in meeting requirements. For oil well completion requirements, for example, see response to DCN EPA-HQ-OAR-2010-0505-6818, Excerpt 7.

Commenter Name: Mike Gibbons, Vice President – Production
Commenter Affiliation: CountryMark Energy Resources, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6241
Comment Excerpt Number: 21

Comment: The reported numbers are equivalent to 8 billion cubic feet in 2020 and 16-19 billion cubic feet in 2025. According the Reference Case in EIA's Annual Energy Outlook 2015 with projections to 2040 (Figure 2 below, Page 20 in report), the estimated natural gas production will be approximately 28 trillion cubic feet in 2020 and 30 trillion cubic feet in 2025. Implementation will result in an addition to the US gas supply of less than 0.03% in 2020 and approximately 0.05% increase in 2025. While this small amount of natural gas will not impact the price of natural gas, the savings are too small to contribute to any type of "significant" energy benefit for the United States citizens.

Figure 25. US total dry natural gas production in four cases, 2005-40 (trillion cubic feet)

Response: The EPA disagrees with the commenter. The purpose of the rule is environmental protection, not producing energy benefits. The final NSPS is needed to reduce emissions from the oil and natural gas sector, and the health, welfare, and environmental benefits of this action once implemented will be significant. While performing environmental practices to comply with the final NSPS, producers are likely to capture natural gas that would otherwise be emitted, producing additional revenues.

Commenter Name: W. Michael Scott, General Counsel
Commenter Affiliation: Trilogy Operating, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6603
Comment Excerpt Number: 13

Comment: EPA made a number of faulty assumptions in its calculations of the Methane NSPS's costs and benefits. First, EPA estimated the total costs to the oil and gas industry to implement the Methane NSPS. EPA then reduced those costs by the value of the natural gas that EPA estimates that operators will recover from repairing leaks and otherwise complying with the Methane NSPS. EPA asserted that operators would gain revenues of $4/thousand cubic feet (mcf) for this recovered gas. By using this recovered-gas-revenue figure, EPA was able to reduce its calculation of the total annual engineering costs of complying with the Methane NSPS by tens of millions of dollars, from a range of $180 to $200 million in 2020 and $370 to $500 million in 2025, down to $150 to $170 million in 2020 and $320 to $420 million in 2025.

EPA is incorrect in concluding that owners and operators will be able to recover any amount, let alone $4/mcf, for the captured fugitive gases because the amount of gas captured is within the industry margin of error for gas measurement and, therefore, will not be valued in any sale. EPA's cost estimate simply misunderstands the way that natural gas is measured and sold. Orifice meters are the most common and economic measuring equipment used in the industry today. Oil wells typically produce gas at variable rates that create uncertainty in the operating

ranges of orifice meters, which increases the margin of error above the perfect condition error of 0.55% inherent to best condition orifice measurement. These differences result in a variance that puts the small volumes per facility anticipated to be captured by compliance with this rule within the error measurement range of the custody transfer equipment. The result of this is that there will be no additional revenue from gas sales generated by compliance with this rule. The EPA's high estimates of 12,000,000 Mcf that might be recovered by compliance with this rule is only 0.04% of the 2014 U.S. gas production. EPA's estimates indicate that gas captured at most exploration and production ("E&P") facilities as a result of the Methane NSPS will fall beneath the meter's margin of error, and, therefore, will not result in any incremental revenue. Even if the industry could generate revenue from the recovered gas, EPA's $4/mcf estimate ignores the current market realities. According to the Henry Hub Natural Gas Futures Quotes, natural gas is currently valued around $2/mcf, and is predicted to stay below $4/mcf until then end of 2024.

By including these "cost savings," which the industry will never actually realize, EPA has skewed its cost analysis and prevented the public from understanding the actual costs associated with this rule.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6978, Excerpt 7.

Commenter Name: W. Michael Scott, Vice President and General Counsel
Commenter Affiliation: CrownQuest Operating, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6703
Comment Excerpt Number: 11

Comment: EPA's cost benefit analysis is fundamentally flawed to the point that neither the agency nor the public can actually assess the impacts of the Methane NSPS.

EPA made a number of faulty assumptions in its calculations of the Methane NSPS's costs and benefits. First, EPA estimated the total costs to the oil and gas industry to implement the Methane NSPS. EPA then reduced those costs by the value of the natural gas that EPA estimates that operators will recover from repairing leaks and otherwise complying with the Methane NSPS. EPA asserted that operators would gain revenues of $4/thousand cubic feet (mcf) for this recovered gas. By using this recovered-gas-revenue figure, EPA was able to reduce its calculation of the total annual engineering costs of complying with the Methane NSPS by tens of millions of dollars, from a range of $180 to $200 million in 2020 and $370 to $500 million in 2025, down to $150 to $170 million in 2020 and $320 to $420 million in 2025.

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0.55% inherent to best condition orifice measurement. These differences result in a variance that puts the small volumes per facility anticipated to be captured by compliance with this rule within the error measurement range of the custody transfer equipment. The result of this is that there will be no additional revenue from gas sales generated by compliance with this rule. The EPA's high estimates of 12,000,000 Mcf that might be recovered by compliance with this rule is only 0.04% of the 2014 U.S. gas production. EPA's estimates indicate that gas captured at most exploration and production ("E&P") facilities as a result of the Methane NSPS will fall beneath the meter's margin of error, and, therefore, will not result in any incremental revenue. Even if the industry could generate revenue from the recovered gas, EPA's $4/mcf estimate ignores the current market realities. According to the Henry Hub Natural Gas Futures Quotes, natural gas is currently valued around $2/mcf, and is predicted to stay below $4/mcf until then end of 2024.

By including these "cost savings," which the industry will never actually realize, EPA has skewed its cost analysis and prevented the public from understanding the actual costs associated with this rule.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6978, Excerpt 7.

Commenter Name: Richard A. Hyde, P.E., Executive Director
Commenter Affiliation: Texas Commission of Environmental Quality (TCEQ)
Document Control Number: EPA-HQ-OAR-2010-0505-6753
Comment Excerpt Number: 19

Comment: In addition, the EPA's economic evaluation is based on a gas price of $4.00 per thousand standard cubic feet, and in the current volatile energy market, there is a great deal of uncertainty associated with future gas prices. If the present gas well drilling and fracking rate continues, gas prices may average closer to less than $3.00 per thousand standard cubic feet, instead of $4.00 (data from U.S. Energy Information Administration).

Response: See response to DCN EPA-HQ-OAR-2010-0505-6847, Excerpt 3.

Commenter Name: Bradley C. Cross, President/Partner
Commenter Affiliation: Big Star Oil & Gas, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6757
Comment Excerpt Number: 11

Comment: EPA's cost benefit analysis does not correctly assess the impacts of the Methane NSPS.

EPA made a number of faulty assumptions in its calculations of the Methane NSPS's costs and benefits. First, EPA estimated the total costs to the oil and gas industry to implement the Methane NSPS. EPA then reduced those costs by the value of the natural gas that EPA estimates

that operators will recover from repairing leaks and otherwise complying with the Methane NSPS. EPA asserted that operators would gain revenues of $4/thousand cubic feet (mcf) for this recovered gas. By using this recovered-gas-revenue figure, EPA was able to reduce its calculation of the total annual engineering costs of complying with the Methane NSPS by tens of millions of dollars, from a range of $180 to $200 million in 2020 and $370 to $500 million in 2025, down to $150 to $170 million in 2020 and $320 to $420 million in 2025.

EPA is incorrect in concluding that owners and operators will be able to recover any amount, let alone $4/mcf, for the captured fugitive gases because the amount of gas captured is within the industry margin of error for gas measurement and, therefore, will not be recovered in any sale. EPA's cost estimate simply misunderstands the way that natural gas is measured and sold. Orifice meters are the most common and economic measuring equipment used in the industry today. Oil wells typically produce gas at variable rates that create uncertainty in the operating ranges of orifice meters, which increases the margin of error above the perfect condition error of 0.55% inherent to best condition orifice measurement. These differences result in a variance that puts the small volumes per facility anticipated to be captured by compliance with this rule within the error measurement range of the custody transfer equipment. The result of this is that there will be no additional revenue from gas sales generated by compliance with this rule. The EPA's high estimates of 12,000,000 Mcf that might be recovered by compliance with this rule is only 0.04% of the 2014 U.S. gas production. EPA's estimates indicate that gas captured at most exploration and production ("E&P") facilities as a result of the Methane NSPS will fall beneath the meter's margin of error, and, therefore, will not result in any incremental revenue. Even if the industry could generate revenue from the recovered gas, EPA's $4/mcf estimate ignores the current market realities. According to the Henry Hub Natural Gas Futures Quotes, natural gas is currently valued around $2/mcf, and is predicted to stay below $4/mcf until then end of 2024.

By including these fictional "cost savings," which the industry will never actually realize, EPA has skewed its cost analysis and prevented the public from understanding the actual costs associated with this rule.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6978, Excerpt 7.

Commenter Name: Glenn Prescott
Commenter Affiliation: RK Petroleum Corporation
Document Control Number: EPA-HQ-OAR-2010-0505-6788
Comment Excerpt Number: 11

Comment: EPA's cost benefit analysis is fundamentally flawed to the point that neither the agency nor the public can actually assess the impacts of the Methane NSPS.

EPA made a number of faulty assumptions in its calculations of the Methane NSPS's costs and benefits. First, EPA estimated the total costs to the oil and gas industry to implement the Methane NSPS. EPA then reduced those costs by the value of the natural gas that EPA estimates that operators will recover from repairing leaks and otherwise complying with the Methane

NSPS. EPA asserted that operators would gain revenues of $4/thousand cubic feet (mcf) for this recovered gas. By using this recovered-gas-revenue figure, EPA was able to reduce its calculation of the total annual engineering costs of complying with the Methane NSPS by tens of millions of dollars, from a range of $180 to $200 million in 2020 and $370 to $500 million in 2025, down to $150 to $170 million in 2020 and $320 to $420 million in 2025.

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By including these "cost savings," which the industry will never actually realize, EPA has skewed its cost analysis and prevented the public from understanding the actual costs associated with this rule

Response: See response to DCN EPA-HQ-OAR-2010-0505-6978, Excerpt 7.

Commenter Name: W. Jeffrey Sparks
Commenter Affiliation: Discovery Operating, Inc
Document Control Number: EPA-HQ-OAR-2010-0505-6790
Comment Excerpt Number: 11

Comment: EPA made a number of faulty assumptions in its calculations of the Methane NSPS's costs and benefits. First, EPA estimated the total costs to the oil and gas industry to implement the Methane NSPS. EPA then reduced those costs by the value of the natural gas that EPA estimates that operators will recover from repairing leaks and otherwise complying with the Methane NSPS. EPA asserted that operators would gain revenues of $4/thousand cubic feet (mcf) for this recovered gas. By using this recovered-gas-revenue figure, EPA was able to reduce its calculation of the total annual engineering costs of complying with the Methane NSPS by tens

of millions of dollars, from a range of $180 to $200 million in 2020 and $370 to $500 million in 2025, down to $150 to $170 million in 2020 and $320 to $420 million in 2025.

EPA is incorrect in concluding that owners and operators will be able to recover any amount, let alone $4/mcf, for the captured fugitive gases because the amount of gas captured is within the industry margin of error for gas measurement and, therefore, will not be valued in any sale. EPA's cost estimate simply misunderstands the way that natural gas is measured and sold. Orifice meters are the most common and economic measuring equipment used in the industry today. Oil wells typically produce gas at variable rates that create uncertainty in the operating ranges of orifice meters, which increases the margin of error above the perfect condition error of 0.55% inherent to best condition orifice measurement. These differences result in a variance that puts the small volumes per facility anticipated to be captured by compliance with this rule within the error measurement range of the custody transfer equipment. The result of this is that there will be no additional revenue from gas sales generated by compliance with this rule. The EPA's high estimates of 12,000,000 Mcf that might be recovered by compliance with this rule is only 0.04% of the 2014 U.S. gas production. EPA's estimates indicate that gas captured at most exploration and production ("E&P") facilities as a result of the Methane NSPS will fall beneath the meter's margin of error, and, therefore, will not result in any incremental revenue. Even if the industry could generate revenue from the recovered gas, EPA's $4/mcf estimate ignores the current market realities. According to the Henry Hub Natural Gas Futures Quotes, natural gas is currently valued around $2/mcf, and is predicted to stay below $4/mcf until then end of 2024.

By including these "cost savings," which the industry will never actually realize, EPA has skewed its cost analysis and prevented the public from understanding the actual costs associated with this rule.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6978, Excerpt 7.

Commenter Name: Josh W. Luig
Commenter Affiliation: Veritas Energy, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6797
Comment Excerpt Number: 12

Comment: EPA made a number of faulty assumptions in its calculations of the Methane NSPS's costs and benefits. First, EPA estimated the total costs to the oil and gas industry to implement the Methane NSPS. EPA then reduced those costs by the value of the natural gas that EPA estimates that operators will recover from repairing leaks and otherwise complying with the Methane NSPS. EPA asserted that operators would gain revenues of $4/thousand cubic feet (mcf) for this recovered gas. By using this recovered-gas-revenue figure, EPA was able to reduce its calculation of the total annual engineering costs of complying with the Methane NSPS by tens of millions of dollars, from a range of $180 to $200 million in 2020 and $370 to $500 million in 2025, down to $150 to $170 million in 2020 and $320 to $420 million in 2025.

EPA is incorrect in concluding that owners and operators will be able to recover any amount, let alone $4/mcf, for the captured fugitive gases because the amount of gas captured is within the industry margin of error for gas measurement and, therefore, will not be valued in any sale. EPA's cost estimate simply misunderstands the way that natural gas is measured and sold. Orifice meters are the most common and economic measuring equipment used in the industry today. Oil wells typically produce gas at variable rates that create uncertainty in the operating ranges of orifice meters, which increases the margin of error above the perfect condition error of 0.55% inherent to best condition orifice measurement. These differences result in a variance that puts the small volumes per facility anticipated to be captured by compliance with this rule within the error measurement range of the custody transfer equipment. The result of this is that there will be no additional revenue from gas sales generated by compliance with this rule. The EPA's high estimates of 12,000,000 Mcf that might be recovered by compliance with this rule is only 0.04% of the 2014 U.S. gas production. EPA's estimates indicate that gas captured at most exploration and production ("E&P") facilities as a result of the Methane NSPS will fall beneath the meter's margin of error, and, therefore, will not result in any incremental revenue. Even if the industry could generate revenue from the recovered gas, EPA's $4/mcf estimate ignores the current market realities. According to the Henry Hub Natural Gas Futures Quotes, natural gas is currently valued around $2/mcf, and is predicted to stay below $4/mcf until then end of 2024.

By including these "cost savings," which the industry will never actually realize, EPA has skewed its cost analysis and prevented the public from understanding the actual costs associated with this rule.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6978, Excerpt 7.

Commenter Name: Josh W. Luig
Commenter Affiliation: Veritas Energy, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6797
Comment Excerpt Number: 16

Comment: EPA is also relying on revenue estimates that no longer reflect the reality of the oil and gas market. For oil prices, EPA "estimated revenues using two alternative prices, $70/bbl and $50/bbl. In the results, EPA refers to the case using $70/bbl the 'primary scenario' and the case using the $50/bbl as the 'low oil price scenario.'" In contrast to EPA's estimates, the U.S. Energy Information Administration ("EIA") expects the price of Brent Crude Oil to average $53.96 for the year and the West Texas Intermediate spot average is expected to be $53.57 for the year. Prices have fallen below EPA's "low oil price scenario" of $50/bbl, and many industry experts predict that this trend will continue. For example, Brent crude prices remained below $50/bbl for 20 consecutive days in September 2015, and the West Texas Intermediate price fell to $44.74/bbl on October 1, 2015. Goldman Sachs has forecasted that crude prices will average around $45/bbl in 2016, and has even predicted that oil could fall as low as $20/bbl. EPA's cost analysis fails to consider the reality that many industry analysts have repeatedly voiced: lower oil and gas prices are likely to continue for the foreseeable future. EPA should therefore reevaluate

its cost estimates based on more realistic revenue figures of the oil and gas sector. As discussed above, natural gas prices are likewise lower than EPA's estimates.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 17.

Commenter Name: Rick D. Davis, Jr.
Commenter Affiliation: Midland Energy, Inc. and Petroplex Energy, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6801
Comment Excerpt Number: 11

Comment: EPA's cost benefit analysis is fundamentally flawed to the point that neither the agency nor the public can actually assess the impacts of the Methane NSPS.

EPA made a number of faulty assumptions in its calculations of the Methane NSPS's costs and benefits. First, EPA estimated the total costs to the oil and gas industry to implement the Methane NSPS. EPA then reduced those costs by the value of the natural gas that EPA estimates that operators will recover from repairing leaks and otherwise complying with the Methane NSPS. EPA asserted that operators would gain revenues of $4/thousand cubic feet (mcf) for this recovered gas. By using this recovered-gas-revenue figure, EPA was able to reduce its calculation of the total annual engineering costs of complying with the Methane NSPS by tens of millions of dollars, from a range of $180 to $200 million in 2020 and $370 to $500 million in 2025, down to $150 to $170 million in 2020 and $320 to $420 million in 2025.

EPA is incorrect in concluding that owners and operators will be able to recover any amount, let alone $4/mcf, for the captured fugitive gases because the amount of gas captured is within the industry margin of error for gas measurement and, therefore, will not be valued in any sale. EPA's cost estimate simply misunderstands the way that natural gas is measured and sold. Orifice meters are the most common and economic measuring equipment used in the industry today. Oil wells typically produce gas at variable rates that create uncertainty in the operating ranges of orifice meters, which increases the margin of error above the perfect condition error of 0.55% inherent to best condition orifice measurement. These differences result in a variance that puts the small volumes per facility anticipated to be captured by compliance with this rule within the error measurement range of the custody transfer equipment. The result of this is that there will be no additional revenue from gas sales generated by compliance with this rule. The EPA's high estimates of 12,000,000 Mcf that might be recovered by compliance with this rule is only 0.04% of the 2014 U.S. gas production. EPA's estimates indicate that gas captured at most exploration and production ("E&P") facilities as a result of the Methane NSPS will fall beneath the meter's margin of error, and, therefore, will not result in any incremental revenue. Even if the industry could generate revenue from the recovered gas, EPA's $4/mcf estimate ignores the current market realities. According to the Henry Hub Natural Gas Futures Quotes, natural gas is currently valued around $2/mcf, and is predicted to stay below $4/mcf until then end of 2024.

By including these "cost savings," which the industry will never actually realize, EPA has skewed its cost analysis and prevented the public from understanding the actual costs associated with this rule.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6978, Excerpt 7.

Commenter Name: Jim Welty
Commenter Affiliation: Marcellus Shale Coalition
Document Control Number: EPA-HQ-OAR-2010-0505-6803
Comment Excerpt Number: 15

Comment: U.S. EPA over-estimates the cost effectiveness of controls by using a monetary value of $4 per thousand standard cubic foot (Mcf). The NYMEX price of natural gas for December 2015 was $2.20/Mcf, and this price still does not account for factors such as regional price variability and gathering contracts that reduce revenue even further. For example, according to the MSC the average bid week price for the month of December at major Appalachian basin transmission points in Pennsylvania is approximately $1.36/Mcf. This overestimation of natural gas prices can force premature shut downs of marginal wells and, in some cases, prevent wells from ever being drilled. We encourage U.S. EPA to reevaluate the cost effectiveness of controls and regulatory impact based on more realistic numbers, and to particularly be mindful of the regional pricing disparity, especially in Pennsylvania, as that can have a disproportionately negative economic impact in the Commonwealth.

Response: Some commenters have argued that because gas prices can vary by region, it is inappropriate for the EPA to use a single gas price. The EPA disagrees. For the purpose of estimating national impacts, it is appropriate for EPA to use national average prices. For further discussion on the reasonableness of $4/Mcf to estimate revenue from natural gas recovery, see the response to DCN EPA-HQ-OAR-2010-0505-6847, Excerpt 3.

Commenter Name: Anthony J. Ferate
Commenter Affiliation: Oklahoma Independent Petroleum Association (OPIA)
Document Control Number: EPA-HQ-OAR-2010-0505-6810
Comment Excerpt Number: 9

Comment: EPA overestimated the cost savings from gas sales (estimated at 4.00 per Mcf) because much of the currently leaking gas (from the thief hatches) is routed to a flare and not sold. EPA should recalculate the cost benefit based on the 95% of the collected vapors going to a combustion unit and not to a sales line.

Response: The EPA analysis includes estimates of natural gas recovery for controls that result in gas recovery as opposed to combustion. The controls that result in natural gas recovery are: RECs at hydraulically fractured oil wells, fugitive emissions monitoring and repair, rod packing

replacement in reciprocating compressors, and the use of low-bleed pneumatic devices. The requirements for completions at exploration and delineation wells, pneumatic pumps, and centrifugal compressors do not result in natural gas recovery. See section 3.4.4 of the RIA for a discussion of product recovery.

Commenter Name: Patricia Karr Seabrook
Commenter Affiliation: Miller/Howard Investments, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6818
Comment Excerpt Number: 8

Comment: EPA also omitted from its cost-benefit analysis the monetary savings that would accrue from the sale of conserved gas in the transmission and storage segment. The agency's reason is the owners/operators of the infrastructure don't own the gas, and therefore are not personally enjoying the benefits of those savings. Yet the owner of the gas does realize the benefit of those savings. A cost-benefit analysis looks at societal costs and benefits – the cost-bearing entity need not be the one to enjoy the benefits for those benefits to factor into the analysis. There is therefore no reason to omit cost savings from preserved gas in the transmission and storage segment from the analysis.

Response: See response to DCN EPA-HQ-OAR-2010-0505-5418, Excerpt 14.

Commenter Name: Ben Shepperd
Commenter Affiliation: Permian Basin Petroleum Association
Document Control Number: EPA-HQ-OAR-2010-0505-6849
Comment Excerpt Number: 10

Comment: EPA made a number of faulty assumptions in its calculations of the Methane NSPS's costs and benefits. First, EPA estimated the total costs to the oil and gas industry to implement the Methane NSPS. EPA then reduced those costs by the value of the natural gas that EPA estimates that operators will recover from repairing leaks and otherwise complying with the Methane NSPS. EPA asserted that operators would gain revenues of $4/thousand cubic feet (mcf) for this recovered gas. By using this recovered-gas-revenue figure, EPA was able to reduce its calculation of the total annual engineering costs of complying with the Methane NSPS by tens of millions of dollars, from a range of $180 to $200 million in 2020 and $370 to $500 million in 2025, down to $150 to $170 million in 2020 and $320 to $420 million in 2025.

EPA is incorrect in concluding that owners and operators will be able to recover any amount, let alone $4/mcf, for the captured fugitive gases because the amount of gas captured is sale. EPA's cost estimate simply misunderstands the way that natural gas is measured and sold. Orifice meters are the most common and economic measuring equipment used in the industry today. Oil wells typically produce gas at variable rates that create uncertainty in the operating ranges of orifice meters, which increases the margin of error above the perfect condition error of 0.55%

inherent to best condition orifice measurement. These differences result in a variance that puts the small volumes per facility anticipated to be captured by compliance with this rule within the error measurement range of the custody transfer equipment. The result of this is that there will be no additional revenue from gas sales generated by compliance with this rule. The EPA's high estimates of 12,000,000 Mcf that might be recovered by compliance with this rule is only 0.04% of the 2014 U.S. gas production. EPA's estimates indicate that gas captured at most exploration and production ("E&P") facilities as a result of the Methane NSPS will fall beneath the meter's margin of error, and, therefore, will not result in any incremental revenue. Even if the industry could generate revenue from the recovered gas, EPA's $4/mcf estimate ignores the current market realities. According to the Henry Hub Natural Gas Futures Quotes, natural gas is currently valued around $2/mcf, and is predicted to stay below $4/mcf until the end of 2024.

By including these "cost savings," which the industry will never actually realize, EPA has skewed its cost analysis and prevented the public from understanding the actual costs associated with this rule.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6978, Excerpt 7.

Commenter Name: Steve Henke
Commenter Affiliation: New Mexico Oil and Gas Association (NMOGA)
Document Control Number: EPA-HQ-OAR-2010-0505-6850
Comment Excerpt Number: 3

Comment: NMOGA believes the basis of EPA's cost analysis is deeply flawed. Specifically, the cost analysis is based on $4 per mscf of natural gas. This simply does not reflect the market reality. Natural gas is a dynamic commodity, even more so than oil. Since 2009, natural gas has routinely been below $4 per mscf, and has not been above $4/mscf since mid-‑2014.

Lower prices result in longer cost recovery times and less cost effectiveness. NMOGA respectfully requests that EPA re-‑evaluate the cost of compliance and the cost effectiveness of compliance based on current market conditions for natural gas.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6847, Excerpt 3.

Commenter Name: Jimmy D. Carlile
Commenter Affiliation: Fasken Oil and Ranch, Ltd.
Document Control Number: EPA-HQ-OAR-2010-0505-6851
Comment Excerpt Number: 5

Comment: Fasken believes the basis of EPA's cost analysis of this proposed methane emission limit is deeply flawed. Specifically, the cost analysis is based on $4 per mscf of natural gas. This simply does not reflect the market reality. Natural gas is a dynamic commodity, even more so

than oil. Since 2009, natural gas has routinely been below $4 per mmscf, and has not been above $4/mmscf since mid-2014. Lower prices result in longer cost recovery times and less cost effectiveness. Fasken respectfully requests that EPA re-evaluate the cost of compliance and the cost effectiveness of compliance based on recent pricing of $2.00 to 2.25 per mmscf; a value Fasken believes to be representative of the cost of natural gas in 2016, when these rules may become finalized.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6847, Excerpt 3.

Commenter Name: John Robitaille
Commenter Affiliation: Petroleum Association of Wyoming (PAW)
Document Control Number: EPA-HQ-OAR-2010-0505-6854
Comment Excerpt Number: 33

Comment: Likewise, EPA's cost-benefit analysis demonstrates that the net benefit is negative for 2020 and 2025 for oil well sites. A negative net benefit means that the overall costs to industry for implementing the LDAR requirements for oil well sites is higher than the overall societal benefits from the emission reductions of methane. Thus, the proposed LDAR requirements for oil well sites are not justified from an economic standpoint and the burden to the industry is greater than the benefits gained.

Response: The EPA's standard-setting duties and authority are derived under section 111 of the CAA, and its decisions are made within the confines of that authority. Although the EPA must consider the costs of control, it may not base the setting of standards on a broad-ranging benefit-cost analysis. The RIA prepared by the EPA under Executive Order 12866 may inform the standard-setting process, but cannot provide the direct basis for the standards and does not "create any right or benefit, substantive or procedural, enforceable at law or equity by a party against the United States..." (Executive Order 12866, Section 10). In addition, the EPA recognizes that there will be substantial non-monetized health, welfare, and climate benefits from implementation of the final NSPS. For more details, see Section 4 of the final RIA.

Commenter Name: Gary Buchler
Commenter Affiliation: Kinder Morgan, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6857
Comment Excerpt Number: 7

Comment: EPA not only overestimates the cost-savings for the gathering and boosting sector, but EPA's estimated costs for implementation in the natural gas transmission and storage sector demonstrate that it would be unreasonable for EPA to regulate this sector under NSPS OOOOa. EPA's assumptions regarding the number of natural gas transmission and storage facilities that would be impacted by the proposed OOOOa are flawed. Furthermore, EPA's entire cost-benefit

analysis is premised on a faulty assumption – that the benefits from reducing one ton of methane are equivalent to reducing one ton of VOC.

EPA's anticipated number of affected compressor stations is low: EPA estimated that the average number of new transmission compressor stations and new storage stations subject to any final NSPS OOOOa to be six (6) and fifteen (15), respectively. *See* NSPS OOOOa Technical Support Document, at Table 5-12. Based on Kinder Morgan's experience, it appears that EPA's projected number of natural gas transmission and storage stations and associated compressor units that would become subject to the Proposed NSPS OOOOa Rule is significantly underestimated, which undermines EPA's cost analysis. First, given the increase in demand for natural gas and other factors there will be far more than six (6) new transmission compressor stations. Second EPA's assumption that there will be twice as many storage facilities as compressor stations is nonsensical. Third, in addition to construction of new transmission compressor stations, the addition of a new compressor unit at an existing compressor station (either transmission or storage) would make that existing facility subject to the Proposed NSPS OOOOa Rule (*see* Section V(I), below, for further discussion regarding proposed "modification" definition). Notwithstanding, EPA failed to provide an estimate for the number of existing facilities that would become subject to the Proposed NSPS OOOOa Rule due to a modification at existing stations.

Response: With respect to the comment on accounting for revenue from captured natural gas in gathering and boosting sector, see response to DCN EPA-HQ-OAR-2010-0505-6857, Excerpt 37.

The commenter alleges that the EPA underestimated the number of gas transmission and storage facilities that would be affected by the rule. The commenter misinterpreted the referenced table to say that there would be six new transmission compressor stations. This was the number of stations predicted to be newly affected by the final NSPS each year, not in total. Based upon comments, the EPA revised its estimates of newly affected transmission compressor stations and storage stations to four and five per year, respectively. By 2025, then, the EPA estimates that there will be 40 affected compressor stations and 50 affected storage facilities. The EPA acknowledges that these estimates do not include estimates of modified or reconstructed affected facilities, which would lead to higher estimates of total affected facilities. However, these counts represent EPA's best estimate. With respect to commenter's suggestion that the EPA assumes there are twice as many storage facilities as compressor stations, the EPA notes that, for the final RIA, this ratio is 4:5, which the EPA believes is a reasonable estimate for newly affected transmission compression stations and storage facilities.

Regarding the comments on the how the EPA accounted for the reductions of methane and VOC from emissions control measures under the NSPS in its cost analysis, see response to DCN EPA-HQ-OAR-2010-0505-6857, Excerpt 7.

Commenter Name: Gary Buchler
Commenter Affiliation: Kinder Morgan, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6857
Comment Excerpt Number: 24

Comment: In addition, natural gas pipeline companies often do not own the gas that they transport. In the transmission sector, the pipeline companies' ability to transport gas owned by the pipeline company may be limited by regulatory restrictions. Even without those restrictions, however, pipeline companies typically transport third-party gas for fixed transportation fees.

These fee arrangements and the ownership (or lack thereof) of the natural gas are important considerations in understanding the cost-effectiveness and economic impacts of the proposed controls and requirements under the Proposed NSPS OOOOa Rule. In particular, and as discussed in greater detail below, this fee arrangement undermines EPA's expectations that each company implementing the requirements under Proposed NSPS OOOOa Rule will be able to recoup those investments simply from the gas savings achieved from the rule implementation. In fact, with respect to the transmission sector, EPA acknowledges that "[b]ecause the operators of facilities in the natural gas transmission and storage segment typically do not own the gas they are handling, these costs do not account for gas savings in those segments. Although these reductions may not result in a direct financial benefit to the operator, we believe it is worthwhile to note that overall these standards save a non-renewable resource." This mere statement by EPA, however, does not appropriately account for the cost-effectiveness in reduction of these emissions in the various sectors (particularly without gas savings); and specifically, does not acknowledge similar impacts in the gathering and boosting sector. Kinder Morgan and other natural gas pipeline companies compete against one another in a highly competitive market and cannot, contrary to some misconceptions, automatically pass on regulatory costs to their customers. Even though Kinder Morgan operates numerous pipelines subject to regulatory oversight by FERC and other federal and state agencies that in many cases cover rate recovery, Kinder Morgan operates in markets in which other natural gas pipeline companies regularly compete for pipeline business. Rate proceedings to establish shipping rates for an interstate natural gas pipeline do not occur annually, and typically occur infrequently. Thus, new costs incurred between rate cases—such as increased regulatory costs caused by new regulation—cannot be automatically added to the shipping rate and are instead borne by the pipeline company.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6857, Excerpt 37.

Commenter Name: Gary Buchler
Commenter Affiliation: Kinder Morgan, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6857
Comment Excerpt Number: 36

Comment: EPA not only overestimates the cost-savings for the gathering and boosting sector, but also fails to conclude that the cost per ton of implementing the Proposed NSPS OOOOa Rule

in the natural gas transmission and storage sector is unreasonably high. Additionally, EPA's entire cost analysis is premised on a faulty assumption—that reducing one ton of methane is equivalent to reducing one ton of VOC. In order to support its proposed rule, EPA must correct these significant valuation concerns.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6857, Excerpt 7.

Commenter Name: Gary Buchler
Commenter Affiliation: Kinder Morgan, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6857
Comment Excerpt Number: 37

Comment: With respect to cost savings, EPA states that "[a] potential benefit of emissions reductions for the affected facilities under the NSPS [OOOOa] is the gas savings realized in the process of capturing gas that would have otherwise been vented or combusted." EPA goes on to state that "[t]his natural gas savings can result in monetary savings to the owner or operator which can offset costs incurred by control requirements." While cost-savings may be realized in certain circumstances, EPA over-estimates the cost savings attributed to the gathering and boosting sector. Specifically, EPA estimates that operators in the gathering and boosting sector would enjoy a $1.3 million in cost savings related to equipment leaks alone, which could offset control requirements. Kinder Morgan submits that this estimate is significantly inflated. As noted in Section IV above, in the gathering and boosting sector, natural gas pipeline companies do not always own the gas that they transport. Thus, more often than not, the owner and operator in the gathering and boosting sector cannot and will not reap the benefits of any potential cost savings.

In short, EPA's cost estimates regarding the gathering and boosting sector are inaccurate and grossly underestimated because of EPA's incorrect understanding of gas ownership issues. EPA cannot move forward with the regulations for the gathering and boosting sector until EPA can accurately account for the cost of the regulations and those costs should be subject to additional public comment.

Response: Commenter has argued that because some companies in the gathering and boosting segment do not own the gas that they are transporting, the revenues from natural gas recovery should not be included as an offset to compliance costs in this segment. The EPA agrees that affected sources may not own recovered product, but disagrees regarding the treatment of product recovery for estimating national costs. From a social perspective, the increased financial returns from natural gas recovery accrues to entities somewhere along the natural gas supply chain and should be accounted for in the national impacts analysis. An economic argument can be made that, in the long run, no single entity is going to bear the entire burden of the compliance costs or fully receive the financial gain of the additional revenues associated with natural gas recovery. The change in economic surplus resulting from natural gas recovery is going to be spread out amongst different agents via price mechanisms. Therefore, the most simple and transparent option for allocating these revenues would be to keep the compliance

costs and associated revenues together in a given source category and not add assumptions regarding the allocation of these revenues across agents.

Commenter Name: Dan G. LeRoy
Commenter Affiliation: Legacy Reserves Operating LP
Document Control Number: EPA-HQ-OAR-2010-0505-6882
Comment Excerpt Number: 3

Comment: EPA's cost benefit analysis is fundamentally flawed to the point that neither the agency nor the public can actually assess the impacts of the Methane NSPS.

EPA made a number of faulty assumptions in its calculations of the Methane NSPS's costs and benefits. First, EPA estimated the total costs to the oil and gas industry to implement the Methane NSPS. EPA then reduced those costs by the value of the natural gas that EPA estimates that operators will recover from repairing leaks and otherwise complying with the Methane NSPS. EPA asserted that operators would gain revenues of $4/thousand cubic feet (mcf) for this recovered gas. By using this recovered-gas-revenue figure, EPA was able to reduce its calculation of the total annual engineering costs of complying with the Methane NSPS by tens of millions of dollars, from a range of $180 to $200 million in 2020 and $370 to $500 million in 2025, down to $150 to $170 million in 2020 and $320 to $420 million in 2025.

EPA is incorrect in concluding that owners and operators will be able to recover any amount, let alone $4/mcf, for the captured fugitive gases because the amount of gas captured is within the industry margin of error for gas measurement and, therefore, will not be valued in any sale. EPA's cost estimate simply misunderstands the way that natural gas is measured and sold. Orifice meters are the most common and economic measuring equipment used in the industry today. Oil wells typically produce gas at variable rates that create uncertainty in the operating ranges of orifice meters, which increases the margin of error above the perfect condition error of 0.55% inherent to best condition orifice measurement. These differences result in a variance that puts the small volumes per facility anticipated to be captured by compliance with this rule within the error measurement range of the custody transfer equipment. The result of this is that there will be no additional revenue from gas sales generated by compliance with this rule. The EPA's high estimates of 12,000,000 Mcf that might be recovered by compliance with this rule is only 0.04% of the 2014 U.S. gas production. EPA's estimates indicate that gas captured at most exploration and production ("E&P") facilities as a result of the Methane NSPS will fall beneath the meter's margin of error, and, therefore, will not result in any incremental revenue. Even if the industry could generate revenue from the recovered gas, EPA's $4/mcf estimate ignores the current market realities. According to the Henry Hub Natural Gas Futures Quotes, natural gas is currently valued around $2/mcf, and is predicted to stay below $4/mcf until then end of2024.

By including these "cost savings," which the industry will never actually realize, EPA has skewed its cost analysis and prevented the public from understanding the actual costs associated with this rule. This problem is further exacerbated by the fact that EPA failed to consider the potentially costly equipment upgrades necessary to comply with this rule. As detailed in the

discussion of atmospheric tanks, if the Methane NSPS or CTG require operators to replace their atmospheric tanks with pressurized tanks in order to meet fugitive emissions survey requirements, then the industry will eventually bear a far heavier financial burden. EPA has not considered these costs in its analysis, and must either reevaluate its cost analysis or clarify that the ordinary breathing from atmospheric tanks are not "fugitive emissions" under the Rules.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6978, Excerpt 7.

Commenter Name: Colleen Cooley
Commenter Affiliation: Dine Citizens Against Ruining Our Environment
Document Control Number: EPA-HQ-OAR-2010-0505-6883
Comment Excerpt Number: 7

Comment: EPA also omitted from its cost-benefit analysis the monetary savings that would accrue from the sale of conserved gas in the transmission and storage segment. The agency's reason is the owners/operators of the infrastructure don't own the gas, and therefore are not personally enjoying the benefits of those savings. Yet they owner of the gas does realize the benefit of those savings. A cost-benefit analysis looks at societal costs and benefits – the cost-bearing entity need not be the one to enjoy the benefits for those benefits to factor into the analysis. There is therefore no reason to omit cost savings from preserved gas in the transmission and storage segment from the analysis.

Response: See response to DCN EPA-HQ-OAR-2010-0505-5418, Excerpt 14.

Commenter Name: Howard J Feldman
Commenter Affiliation: American Petroleum Institute
Document Control Number: EPA-HQ-OAR-2010-0505-6884
Comment Excerpt Number: 176

Comment: Where appropriate given the nature of the sector, EPA deducts revenue associated with natural gas recovered from avoided methane emissions from emission control costs. EPA valued estimated natural gas recovered at a price of $4.00/Mcf. Using a point estimate fails to recognize the inherent volatility of commodity markets, as demonstrated by the current landscape of and outlook for oil and gas commodity prices.

Response: Some commenters have argued that given regional and temporal variation in gas prices, the EPA should conduct a sensitivity analysis on various gas prices. The EPA has conducted a sensitivity of national costs on natural gas prices in section 3.5.2 of the RIA. That sensitivity analysis shows that for the promulgated option 2, a $1/Mcf change in the wellhead price causes a change in estimated engineering compliance costs of about $15 million in 2020 and $25 million in 2025.

Commenter Name: Camilla Feibelman
Commenter Affiliation: Rio Grande Chapter of the Sierra Club
Document Control Number: EPA-HQ-OAR-2010-0505-6895
Comment Excerpt Number: 17

Comment: Finally, we suggest that the description of the rule and the cost-benefit analysis fully account for the added benefits of the captured and useful product. This is a cost savings to industry since the product can then be sold instead of lost. Although EPA includes the cost savings from conserved gas in the production and processing segments, it does not account for savings in the transmission and storage segment, even society benefits from those savings. In addition, EPA should emphasize in its cost-benefit analysis the co-benefits of reduced ground-level ozone, particulate matter, and toxic air pollutants. Thus, as EPA and New Mexico assess how to reduce ozone and PM levels (as well as regional haze), this proposed rule will help achieve these ends, and the health benefits and reduced compliance costs through this rule should be calculated.

Response: See response to DCN EPA-HQ-OAR-2010-0505-5418, Excerpt 14.

Commenter Name: Denzil R. West, Vice President
Commenter Affiliation: Reliance Energy, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6915
Comment Excerpt Number: 7

Comment: EPA's cost benefit analysis is fundamentally flawed to the point that neither the agency nor the public can actually assess the impacts of the Methane NSPS.

EPA made a number of faulty assumptions in its calculations of the Methane NSPS's costs and benefits. First, EPA estimated the total costs to the oil and gas industry to implement the Methane NSPS. EPA then reduced those costs by the value of the natural gas that EPA estimates that operators will recover from repairing leaks and otherwise complying with the Methane NSPS. EPA asserted that operators would gain revenues of $4/thousand cubic feet (mcf) for this recovered gas. By using this recovered-gas-revenue figure, EPA was able to reduce its calculation of the total annual engineering costs of complying with the Methane NSPS by tens of millions of dollars, from a range of $180 to $200 million in 2020 and $370 to $500 million in 2025, down to $150 to $170 million in 2020 and $320 to $420 million in 2025.

EPA is incorrect in concluding that owners and operators will be able to recover any amount, let alone $4/mcf, for the captured fugitive gases because the amount of gas captured is within the industry margin of error for gas measurement and, therefore, will not be valued in any sale. EPA's cost estimate simply misunderstands the way that natural gas is measured and sold. Orifice meters are the most common and economic measuring equipment used in the industry today. Oil wells typically produce gas at variable rates that create uncertainty in the

operating ranges of orifice meters, which increases the margin of error above the perfect condition error of 0.55% inherent to best condition orifice measurement. These differences result in a variance that puts the small volumes per facility anticipated to be captured by compliance with this rule within the error measurement range of the custody transfer equipment. The result of this is that there will be no additional revenue from gas sales generated by compliance with this rule. The EPA's high estimates of 12,000,000 Mcf that might be recovered by compliance with this rule is only 0.04% of the 2014 U.S. gas production. EPA's estimates indicate that gas captured at most exploration and production ("E&P") facilities as a result of the Methane NSPS will fall beneath the meter's margin of error, and, therefore, will not result in any incremental revenue Even if the industry could generate revenue from the recovered gas, EPA's $4/mcf estimate ignores the current market realities. According to the Henry Hub Natural Gas Futures Quotes, natural gas is currently valued around $2/mcf, and is predicted to stay below $4/mcf until then end of 2024.

By including these "cost savings," which the industry will never actually realize, EPA has skewed its cost analysis and prevented the public from understanding the actual costs associated with this rule. This problem is further exacerbated by the fact that EPA failed to consider the potentially costly equipment upgrades necessary to comply with this rule. As detailed in the discussion of atmospheric tanks, if the Methane NSPS or CTG require operators to replace their atmospheric tanks with pressurized tanks in order to meet fugitive emissions survey requirements, then the industry will eventually bear a far heavier financial burden. EPA has not considered these costs in its analysis, and must either reevaluate its cost analysis or clarify that the ordinary breathing from atmospheric tanks are not "fugitive emissions" under the Rules.

EPA's estimates on the cost of labor for compliance are also wholly unreasonable. The Methane NSPS is a highly complex and technical rule with a number of overlapping requirements. Upstream oil and gas operations frequently fall beneath the air emissions thresholds for permitting requirements. As a result, this portion of the industry has not historically been subject to similar federal air regulations, and their staff is largely unfamiliar with the monitoring, reporting, and recordkeeping requirements that accompany such rules. This means that these entities will have to expend far more resources either training their own personnel, or hiring personnel with expertise in federal air regulatory matters. This is particularly true for operators in states that already have overlapping state air regulations, as the businesses will need to understand and convey to personnel the differences between the two sets of requirements. For example, the Texas Railroad Commission places limits on the venting or flaring of gas, and Colorado, Wyoming, Ohio, and Pennsylvania have state regulations regarding natural gas emissions and leaks. Differentiating between the requirements from state and federal regimes-particularly when those requirements conflict or overlap-will take additional time and resources.

For most upstream companies, well sites are spread out over a large geographic area. This dispersion of activities across a large geographic area is significantly different from the physical set up of larger facilities, such as natural gas processing plants or refineries, where EPA has imposed these kinds of monitoring requirements in the past. Unlike those larger sites, which have full-time personnel dedicated to one particular facility, most E&P companies assign one

employee to multiple small sites. Well sites simply do not have the concentration of activity (including activity that would give rise to air emissions) to justify dedicating a single air compliance employee to each well site. Instead, the air compliance employee will have to spend substantial amounts of time traveling in order to visit each site semi-annually or quarterly, and will then have to keep up with the continual recordkeeping and reporting requirements for each of these small sites. Reliance estimates that operators will need to hire one full-time employee or contractor dedicated to implementing the requirements of the Methane NSPS for every 25 affected well sites operated. Given that there are almost 200,000 producing wells in Texas alone, this means the industry will eventually need to hire thousands of new employees merely to track and fix small equipment leaks.

According to EPA's analysis, "[t]he annual public reporting and recordkeeping burden for this collection of information is estimated to average 3.9 hours per response. Respondents must monitor all specified criteria at each affected facility and maintain these records for 5 years." Reliance estimates that the actual annual burden imposed by these Rules will be closer to 40-60 hours per affected well site, which will result in an additional cost of $3,500-$5,000 in labor per well site per year. Given that there are hundreds of thousands, if not more than a million, well sites around the nation, these reporting and recordkeeping requirements will eventually balloon into tremendous industry-wide compliance costs.

EPA is also relying on revenue estimates that no longer reflect the reality of the oil and gas market. For oil prices, EPA "estimated revenues using two alternative prices, $70/bbl and $50/bbl. In the results, EPA refers to the case using $70/bbl the 'primary scenario' and the case using the $50/bbl as the 'low oil price scenario." In contrast to EPA's estimates, the U.S. Energy Information Administration ("EIA") expects the price of Brent Crude Oil to average $53.96 for the year and the West Texas Intermediate spot average is expected to be $53.57 for the year. Prices have fallen below EPA's "low oil price scenario" of $50/bbl, and many industry experts predict that this trend will continue. For example, Brent crude prices remained below $50/bbl for 20 consecutive days in September 2015, and the West Texas Intermediate price fell to $44.74/bbl on October 1, 2015. Goldman Sachs has forecasted that crude prices will average around $45/bbl in 2016, and has even predicted that oil could fall as low as $20/bbl. EPA's cost analysis fails to consider the reality that many industry analysts have repeatedly voiced: lower oil and gas prices are likely to continue for the foreseeable future. EPA should therefore reevaluate its cost estimates based on more realistic revenue figures of the oil and gas sector. As discussed above, natural gas prices are likewise lower than EPA's estimates.

In addition, the model that EPA used to estimate the economic benefits for the reductions in methane emissions associated with this rule is deeply flawed and has not been subject to public notice and comment. In the past, EPA has used a model known as the "social cost of carbon" or "SCC" to place a dollar value on the reduction of carbon dioxide emissions resulting from regulations. This SCC model has come under criticism by those arguing that flaws in the modeling technique and use of discount rates result in inaccurate and inflated estimates of the value of reducing emissions. The SCC model used by EPA has been the subject of Congressional oversight hearings, and is currently under review by the National Academies of Sciences, Engineering, and Medicine. Indeed, some-including Robert Pindyck of the Massachusetts Institute of Technology-have argued that these types of models are so flawed that they are "close

to useless as tools for policy analysis." Worse yet, the inclusion of these models "create a perception of knowledge and precision that is illusory, and can fool policy-makers into thinking that the forecasts the models generate have some kind of scientific legitimacy." These models "can be misleading-and are inappropriate-as guides for policy, and yet they have been used by the government to estimate the social cost of carbon (SCC) and evaluate tax and abatement policies." "Because the modeler has so much freedom in choosing functional forms, parameter values, and other inputs, the model can be used to obtain almost any result one desires, and thereby legitimize what is essentially a subjective opinion about climate policy." In fact, EPA acknowledges some of these shortcomings with the SCC model in the Methane NSPS preamble.

While the SCC model used by EPA has many of its own flaws, it has, at least, been used by EPA and other federal agencies for many years, and repeatedly re-evaluated by the Office of Management and Budget ("OMB"). By contrast, the "social cost of methane" model used by EPA to estimate the benefits of methane reductions for the Methane NSPS was developed by an outside organization, has not been vetted for accuracy by the OMB, and has not been subjected to public scrutiny through the notice and comment process. The public has not had the chance to review the accuracy of the inputs or the results of this highly complex climate model, and is therefore unable to meaningfully evaluate the resulting figures that EPA used in its analysis.

EPA also notes in the preamble of the Methane NSPS proposal that the social cost of methane model used to evaluate this rulemaking was the first set of published social cost of methane estimates in the peer-reviewed literature that are consistent with the modeling assumptions underlying the SCC model used by federal agencies. This statement indicates both that social cost of methane model is likely to share many of the same flaws as the SCC model used by EPA, and that methane modeling is still very new and untested. These are two good reasons why EPA should not rely on these models to estimate the benefits of the emission reductions from the Methane NSPS.

This is particularly true when the magnitude of the "benefits" resulting from the use of this model is considered. EPA used this social cost of methane model to calculate an estimated benefit range of $200 to $210 million in 2020 and $460 to $550 million in 2025. These numbers eclipse the total estimated cost ranges associated with the rule of $150 to $170 million in 2020 and $320 to $420 million, and creates the public impression that this costly rule actually has a net economic benefit of hundreds of millions of dollars.

In addition, EPA selected a three percent discount rate to apply to the modeling result associated with this social cost of methane model, while simultaneously applying a much higher (seven percent) discount rate to the costs that the industry will incur. Economists have noted that these models are very sensitive to the discount rate that is applied, which can have huge impacts on the resulting value placed on the reduction of a ton of emissions. As one economist explained, there is no scientific justification for using the monetary values that result from a three percent discount rate for these reductions. Indeed, the federal interagency working group tasked with selecting the SCC model used by the EPA.

did not try to determine the "correct" values for the discount rate. Instead, they used middle of the road assumptions .... But other well-known studies have deviated from using these middle of-

the-road assumptions and arrived at very different estimates of the SCC .... The problem here is that there is no consensus regarding the "correct" discount rate .... Because reasonable arguments can be made for a low discount rate or for a high rate, the modeler simply has too much flexibility.

While EPA includes the modeling results and cost estimates at additional discount rates, this information is tucked away in the text of the Methane NSPS and supporting technical documents, while the costs to industry at a seven percent discount rate, and benefits from the model at a three percent discount rate are used to reach the EPA's net-benefit estimate. As a result, the public is unable to fairly compare the costs and benefits associated with this rule.

Recommendations: EPA should re-conduct its cost assessment, and do so in a way which:

1. Takes into account the full costs of compliance that the industry will bear, and removes the cost savings which the industry will never recover;

2. Incorporates a more realistic estimate of the amount of time and labor the Methane NSPS will require;

3. Considers the reduced revenue from oil and natural gas under current market conditions; and

4. Removes the comparison to a social cost of methane model that has not yet been reviewed by the Science Advisory Board; National Academies of Sciences, Engineering, and Medicine, or OMB. ·

Response: See response to DCN EPA-HQ-OAR-2010-0505-6978, Excerpt 7.

Commenter Name: Shawn Bennett, Executive Vice President
Commenter Affiliation: Ohio Oil & Gas Association (OOGA)
Document Control Number: EPA-HQ-OAR-2010-0505-6921
Comment Excerpt Number: 6

Comment: EPA's cost analysis to support the proposed rules is fundamentally flawed because the analysis utilizes gas prices that are far in excess of current market prices. EPA used a "conservative" price of $4 per mcf. However, current market prices, and prices for gas over the past two years, are well below $4 per mcf. In fact, as of December 1, 2015, the NYMEX price in Ohio was $2.14 per mcf or less. Most importantly, EPA failed to consider that these low prices for gas will continue for the foreseeable future because of the remarkable success that the industry has had in unlocking the vast natural gas resources found in our country's shale formations. Because most of the proposed requirements are not cost-effective, the proposed rules are unreasonable and arbitrary.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6847, Excerpt 3.

Commenter Name: Alvyn A. Schopp, Chief Administration Officer and Regional Vice President and Treasurer
Commenter Affiliation: Antero Resources Corporation
Document Control Number: EPA-HQ-OAR-2010-0505-6935
Comment Excerpt Number: 6

Comment: Antero does not support USEPA's Cost Analysis because USEPA's assessment does not appropriately reflect market conditions for natural gas prices. Therefore, USEPA's cost analysis fails to consider the significant cost burden associated with compliance on the regulated community. Specifically, the price of natural gas used to justify the cost-effectiveness values in USEPA's control option evaluation ($4/Mcf) is nearly two times greater than the current Henry Hub futures price ($2.15/Mcf) (in addition the local indexes are currently closer to a $1 or $1.10). The lower price of natural gas also lessens the value of recovered natural gas which in turn impacts the savings that USEPA indicates would be realized through recovery and resale. For these reasons, Antero believes the cost analysis is flawed.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6847, Excerpt 3.

Commenter Name: Kevin J. Moody, General Counsel
Commenter Affiliation: Pennsylvania Independent Oil & Gas Association (PIOGA)
Document Control Number: EPA-HQ-OAR-2010-0505-6943
Comment Excerpt Number: 11

Comment: The cost-effectiveness evaluation in the Technical Support Document (TSD) should be redone.

The value of natural gas recovered ($4/Mcf) used to do the cost-effectiveness evaluation is nearly double the current NYMEX futures price of natural gas ($2.15/Mcf – NYMEX December 2015). In fact, there is currently no upward pressure on natural gas pricing, and none is anticipated in the near future. Significantly reduced exploration and production activity in most active basins and the slow pace of development of necessary infrastructure "take away" capacity is expected to continue. Accordingly, the costs used to justify the expansive reach of Subpart OOOOa are not accurate. They do not reflect the current or anticipated future market activity and pricing. Extended periods of low prices and consequent slowdown of drilling activity will impact the projections of future activity (and emissions) from the sector. Lower prices will also reduce the estimated value of recovered product thereby significantly impacting the "savings" that EPA believes is associated with gas recovery and resale. Based on the current and reasonably foreseeable circumstances, PIOGA urges EPA re-evaluate the cost-effectiveness calculations reused.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6847, Excerpt 3.

Commenter Name: Cory Pomeroy, General Counsel
Commenter Affiliation: Texas Oil & Gas Association
Document Control Number: EPA-HQ-OAR-2010-0505-7058
Comment Excerpt Number: 10

Comment: While EPA alludes to the significant differences between EIA's 2014 and 2015 Annual Energy Outlook, the Agency makes the unsupportable simplifying assumption that these changes will not affect the costs per facility. Long-term reductions in energy prices, however, will have a clear impact on costs by reducing the offsetting value of the recovered product. This will have a very direct and important impact in raising the overall cost of the rule for affected entities. In light of recent market developments, EPA's failure to conduct even a sensitivity analysis of the impact of a lower price environment on costs is unsupportable.

Response: For the final RIA, the EPA has updated its projections of oil and gas drilling activity to reflect the 2015 Annual Energy Outlook, the most recent long-term projection available at the time that the analysis was updated. Regarding the price used to estimate revenue from natural gas recovery, see response to DCN EPA-HQ-OAR-2010-0505-6847, Excerpt 3. The EPA has conducted a sensitivity of national costs on natural gas prices in section 3.5.2 of the RIA. That sensitivity analysis shows that for the promulgated option 2, a $1/Mcf change in the wellhead price causes a change in estimated engineering compliance costs of about $15 million in 2020 and $25 million in 2025.

Commenter Name: Darin Schroeder, David McCabe, Lesley Fleishman and Conrad Schneider
Commenter Affiliation: Clean Air Task Force et al.
Document Control Number: EPA-HQ-OAR-2010-0505-7062
Comment Excerpt Number: 25

Comment: Lastly, EPA's control cost analysis takes into consideration estimated savings operators can expect from selling natural gas that control measures capture. This approach clearly falls within EPA's discretion under section 111. While the D.C. Circuit has yet to address directly whether EPA may take revenue generated in conjunction with control options into account in evaluating BSER, the court has held that the agency retains broad authority to weigh all the statutory factors in a BSER determination, noting that questions of costs and benefits must be addressed taking a long-term perspective. *See Sierra Club*, 657 F.2d at 331.As EPA notes, it is a reasonable interpretation of section 111 that expected revenue from the sale of natural gas that is recovered as a result of a control option be considered in accurately assessing the costs of the standard, as it "would offset regulatory costs." 80 Fed. Reg. at 56,617. The practice also comports with EPA's approach to material savings achieved through emission standards in prior NSPS rulemakings. *See* Standards of Performance for Petroleum Refineries; Standards of Performance for Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After May 14, 2007, 77 Fed. Reg. 56422 (Sept. 12, 2012) (EPA evaluated fuel savings from improved flare standards and calculated a product recovery credit). Inclusion of the value of gas savings better approximates the true cost to operators.

Response: Comment is a supportive comment to which no response is required.

Commenter Name: Interfaith Center on Corporate Responsibility (ICCR)
Commenter Affiliation: Interfaith Center on Corporate Responsibility (ICCR)
Document Control Number: EPA-HQ-OAR-2010-0505-7068
Comment Excerpt Number: 11

Comment: EPA also omitted from its cost-benefit analysis the monetary savings that would accrue from the sale of conserved gas in the transmission and storage segment. The agency's reason is the owners/operators of the infrastructure don't own the gas, and therefore are not personally enjoying the benefits of those savings. Yet the owner of the gas does realize the benefit of those savings. A cost-benefit analysis looks at societal costs and benefits -the cost-bearing entity need not be the one to enjoy the benefits for those benefits to factor into the analysis. There is therefore no reason to omit cost savings from preserved gas in the transmission and storage segment from the analysis.

Response: See response to DCN EPA-HQ-OAR-2010-0505-5418, Excerpt 14.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:10 AM - 8:00 PM; Public Hearing #1 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 135

Comment: [S]o and finally, last point, we suggest in the rule and making description of rules, you look at cost and the cost benefit analysis of actually the gas that's been saved. That is a benefit, as well as the other benefits from reducing ozone and smog and haze, so we would like you to include that in the final description of the rule.

Response: See response to DCN EPA-HQ-OAR-2010-0505-7338, Excerpt 38.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:10 AM - 8:00 PM; Public Hearing #1 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 189

Comment: In addition to that, we'd love to also uplift the importance of looking at the economic question of having the ability to look at the benefits of the sale of the gas that would be saved in the transmission and storage segments as well. That wasn't included in the draft rules, and I think that would be a societal benefit or cost depending on which side you're looking at.

Response: See response to DCN EPA-HQ-OAR-2010-0505-5418, Excerpt 14.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:10 AM - 8:00 PM; Public Hearing #1 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 197

Comment: The rules come with modest cost to industry, much of which can be recouped by the capture and sale of these now wasted gases.

Response: The EPA agrees with the commenter. There are many cost-effective measures that will reduce emissions from the oil and natural gas sector, particularly measures that capture natural gas that would otherwise be emitted to the atmosphere. Section 3.4.4 of the RIA for the final NSPS presents estimates of the revenues from product recovery predicted to result from emissions reductions. Conserving gas for sale is treated as an offset to compliance costs in the analysis supporting the rulemaking.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:00 AM - 2:40 PM; Public Hearing #2 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 22

Comment: And then finally, the cost savings that was estimated -- that EPA estimated that the gas that would be saved would go back into the pipeline when most sites use combustors. So it just goes up in stack. So I think you need to maybe revise your calculations there. And then, I think that's about it.

Response: The EPA disagrees with the commenter. While some of the emissions reductions anticipated for the final NSPS will likely be combusted in meeting the performance standards, a substantial amount of natural gas that would otherwise be emitted to the atmosphere will be captured and sent to the sales line. The controls that result in natural gas recovery are: RECs at hydraulically fractured oil wells, fugitive emissions monitoring and repair, rod packing replacement in reciprocating compressors, and the use of low-bleed pneumatic devices. The

requirements for completions at exploration and delineation wells, pneumatic pumps, and centrifugal compressors do not result in natural gas recovery. Section 3.4.4 of the RIA for the final NSPS presents estimates of the revenues from product recovery predicted to result from emissions reductions. Conserving gas for sale is treated as an offset to compliance costs in the analysis supporting the rulemaking.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:00 AM - 2:40 PM; Public Hearing #2 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 38

Comment: The methane we lose can amount to as much as 30 percent in some parts of our state. And this is done to keep costs down for the industry. It's money in their pocket. Sadly, though, this is lost product that could be used to boost production, but which instead is released into the air to sicken those who live nearby and may have respiratory problems before it makes its way into the atmosphere.

Response: The EPA agrees with the commenter that vented gas can be captured. The final rule will reduce emissions from the oil and natural gas sector, increase natural gas product recovery, and once implemented will produce significant health, welfare, and climate benefits.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:00 AM - 2:40 PM; Public Hearing #2 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 82

Comment: There are serious leakages of methane throughout the entire oil and gas production and pipeline distribution in the structure. In many cases investing in the equipment and practices necessary to reduce leakage can actually be a cost savings.

The administration estimates that -- methane oils would save up to 180 billion feet of natural gas in 2025, and I'm thinking more than two million homes per year.

Response: The EPA agrees that there are many cost-effective measures that will reduce emissions from the oil and natural gas sector, particularly measures that capture natural gas that would otherwise be emitted to the atmosphere. Section 3.4.4 of the RIA for the final NSPS presents estimates of the revenues from product recovery predicted to result from emissions

reductions. Conserving gas for sale is treated as an offset to compliance costs in the analysis supporting the rulemaking.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:00 AM - 7:55 PM; Public Hearing #1 - Denver, Colorado
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7337
Comment Excerpt Number: 177

Comment: For my first point, our industry has voluntarily led the way in its pursuit of improved operations to safely maximize the recovery and capture of these valuable oil and gas resources. We are incentivized to do that, and many of these leading technologies that have been broadly used by industry were subsequently incorporated by EPA in its Natural Gas STAR Program.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 49.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:00 AM - 7:55 PM; Public Hearing #1 - Denver, Colorado
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7337
Comment Excerpt Number: 217

Comment: So we need fossil fuel, especially in the short term. And I think the challenge really is how do we do this. Well, and how do we do it sustainably. And I think the rules that are being put in place around methane, hazardous air pollutants, volatile organic hydrocarbons, go a long way to addressing the requirement for the oil and gas industry.

I represent a company, Questor Technology, that provides clean waste gas combustion technology. We're able to take methane, (inaudible), and volatile organic hydrocarbons; combust them at 99.99 percent combustion efficiency, which means we don't release any hydrocarbons off this process and all we're putting into the atmosphere is just water and CO2.

For example, when you look at the data in White Paper in 2011, if we took all the uncontrolled emissions and combusted it cleanly, we would reduce greenhouse gas emissions by 87 percent, at a cost of less than a dollar-fifty a ton. But in addition, after combusting it cleanly, we've got an opportunity to utilize that heat, whether that heat is used for process or heating a building at site, generating power for that site, or using it to treat water, all this technology is readily available.

Right now, we are providing this technology throughout the United States, especially in key oil- and gas-producing areas. So, for example, in Colorado, we're providing solutions on closed-loop

completions, so ensuring that we don't have any emissions. And companies are using it to create a social license for the community, address community concerns on air quality, but also get rid of one issue that is a big issue in the (inaudible).

And we're working similarly in West Virginia and Pennsylvania. We're working with industry to provide solutions to make sure that volatile organic hydrocarbons aren't produced in the atmosphere. In Texas we're doing the same thing with CO2 and H2S and (inaudible), for example.

What's important about all this is it's being done in a very cost-effective way. So complying with the rules aren't onerous. There's technology that's readily available that allows companies to be able to meet this.

Probably the key out of all this is really creating an opportunity to create the win-win community or social license to operate. And as I walked into this room today, I mean, I can see lots of people outside protesting. And I think, if we need the energy from fossil fuel short term, we really need a path to find a way to create the win-win, so between industry and community. In this low-price environment, we really need to find -- find ways that we can cost-effectively create what you're trying to do, which is reduce greenhouse gas emissions, improve air quality for communities.

And I really believe technology holds that key, so the ability not only to put in regulation that can force companies to pay fines, but also regulation that encourages the use of technology. I guess, looking at flaring and some of these as the low-hanging fruit, so the opportunity not only to deal with it cost effectively, but to use that energy wisely. So I thank you for the opportunity to speak to you.

Response: The EPA agrees with the commenter that the final NSPS will reduce emissions from the oil and natural gas sector in sensible and cost effective ways. In addition, the EPA agrees that health, environmental and climate benefits will be achieved through implementing this rule.

12.9 Consideration of Monetized Methane-Related Climate Benefits

Commenter Name: Domestic Energy Producers Alliance
Commenter Affiliation: Domestic Energy Producers Alliance
Document Control Number: EPA-HQ-OAR-2010-0505-5425
Comment Excerpt Number: 4

Comment: Industry was provided no meaningful opportunity to comment on the "social cost of methane", which was never discussed with the public until EPA published the methane rule. EPA has wildly exaggerated the "social cost of methane" as a backdoor attempt to fabricate benefits of a methane rule which is completely redundant given the VOC reductions already achieved by the E&P industry through its compliance with NSPS Subpart OOOO. This cost has been used to justify this rule without an open discussion of the methane volumes that are expected to be reduced or the reductions that have even yet been accomplished.

Response: The EPA disagrees with the comment that industry did not have a meaningful opportunity to comment on the social cost of methane. Consistent with its standard rulemaking practice and commitment to transparency, rigorous analysis, and public involvement, the EPA has sought public comment on the valuation of non-CO_2 GHG impacts and scientific review of the usage of the SC-CH_4 estimates from Marten et al (2014) through the process leading up to its inclusion in the main benefit-cost analyses of proposed rules, including the proposal for this rulemaking. EPA has sought public comment on the valuation of non-CO_2 GHG impacts in proposed rulemakings since 2011.[5] As discussed in RIA Section 4.3, the commenters on these rulemakings strongly encouraged the EPA to incorporate the monetized value of non-CO_2 GHG impacts into the benefit cost analysis. They noted the challenges associated with an alternative approach, known as the GWP-approach, and encouraged the use of directly-modeled estimates of the SC-CH4 to overcome those challenges. The EPA has also sought comment on the application of the Marten et al. 2014 SC-CH4 estimates in two other proposed rulemakings, which have not yet been finalized: (1) *Proposed Revisions to the Emission Guidelines and New Source Performance Standards in the Municipal Solid Waste Landfills Sector*[6] and (2) *Proposed Phase 2 Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles*[7].

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[5] For example, see: (1) U.S. Environmental Protection Agency (EPA). 2011. Regulatory Impact Analysis: Proposed New Source Performance Standards and Amendments to the National Emissions Standards for Hazardous Air Pollutants for the Oil and Natural Gas Industry. Office of Air Quality Planning and Standards. July. http://www3.epa.gov/ttn/ecas/regdata/RIAs/oilnaturalgasfinalria.pdf and (2) U.S. Environmental Protection Agency (EPA). 2011. Proposed Rule: 2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards. December. https://www.federalregister.gov/articles/2011/12/01/2011-30358/2017-and-later-model-year-light-duty-vehicle-greenhouse-gas-emissions-and-corporate-average-fuel.
[6] U.S. Environmental Protection Agency (EPA). 2015a. Regulatory Impact Analysis for the Proposed Revisions to the Emission Guidelines for Existing Sources and Supplemental Proposed New Source Performance Standards in the Municipal Solid Waste Landfills Sector. Office of Air Quality Planning and Standards, Health and Environmental Impacts Division. August. http://www3.epa.gov/ttn/atw/landfill/20150810_landfills_ria.pdf
[7] U.S. Environmental Protection Agency (EPA). 2015c. Draft Regulatory Impact Analysis: Proposed Rulemaking for Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles–

In addition, the EPA provided an opportunity for public comment on the peer review plan for the application of Marten et al. to RIAs. Specifically, the external peer review of the RIA application of Marten et al. (2014) was designated as influential scientific information (ISI), and was added to the EPA Peer Review Agenda for Fiscal Year 2015 in November 2014, as shown on the EPA Science Inventory website.[8] The public was invited to provide comment on the peer review plan, but the EPA did not receive any comments.

In the proposal for this rulemaking, the EPA presented detailed information about the Marten et al. social cost of methane estimates, requested comment, and provided a 77-day comment period (September 18, 2015 through December 4, 2015), including the extension.

The EPA also disagrees with the commenter's assertion that the Agency has exaggerated the social cost of methane. As discussed in detail in the RIA, both the development and application of the Marten et al. estimates have been subject to extensive review. The methodology and resulting estimates themselves underwent a standard double blind peer review process prior to journal publication. The EPA also sought additional external peer review before applying this work in the primary analysis of a proposed regulation. As discussed in the RIA, Section 4.3, the EPA determined that the Marten et al. estimates are scientifically defensible for valuing methane impacts in regulatory analyses and improve upon prior treatment of methane impacts in regulatory analysis. The EPA further notes that the commenter did not cite underlying data or rationale for its assertion that the EPA exaggerated the social cost of methane.

Regarding commenter's assertion that the rulemaking is redundant, see the EPA's response to comment DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 47, in the Miscellaneous chapter of this document.

Commenter Name: W. Michael Scott, General Counsel
Commenter Affiliation: Trilogy Operating, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6603
Comment Excerpt Number: 18

Comment: In addition, the model that EPA used to estimate the economic benefits for the reductions in methane emissions associated with this rule is deeply flawed and has not been subject to public notice and comment. In the past, EPA has used a model known as the "social cost of carbon" or "SCC" to place a dollar value on the reduction of carbon dioxide emissions resulting from regulations. This SCC model has come under criticism by those arguing that flaws in the modeling technique and use of discount rates result in inaccurate and inflated estimates of the value of reducing emissions. The SCC model used by EPA has been the subject of

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Phase 2. Office of Transportation and Air Quality, Assessment and Standards Division. June. http://www3.epa.gov/otaq/climate/documents/420d15900.pdf

[8] The Peer Review Agenda is available at: http://cfpub.epa.gov/si/si_public_pr_agenda.cfm This review is listed under "ISI" and "Office of Policy," "Valuing Non-CO2 GHG Emission Changes in BCA". Complete record at: http://cfpub.epa.gov/si/si_public_pra_view.cfm?dirEntryID=291976

Congressional oversight hearings, and is currently under review by the National Academies of Sciences, Engineering, and Medicine. Indeed, some—including Robert Pindyck of the Massachusetts Institute of Technology—have argued that these types of models are so flawed that they are "close to useless as tools for policy analysis." Worse yet, the inclusion of these models "create a perception of knowledge and precision that is illusory, and can fool policy-makers into thinking that the forecasts the models generate have some kind of scientific legitimacy." These models "can be misleading—and are inappropriate—as guides for policy, and yet they have been used by the government to estimate the social cost of carbon (SCC) and evaluate tax and abatement policies." "Because the modeler has so much freedom in choosing functional forms, parameter values, and other inputs, the model can be used to obtain almost any result one desires, and thereby legitimize what is essentially a subjective opinion about climate policy." In fact, EPA acknowledges some of these shortcomings with the SCC model in the Methane NSPS preamble.

While the SCC model used by EPA has many of its own flaws, it has, at least, been used by EPA and other federal agencies for many years, and repeatedly re-evaluated by the Office of Management and Budget ("OMB"). By contrast, the "social cost of methane" model used by EPA to estimate the benefits of methane reductions for the Methane NSPS was developed by an outside organization, has not been vetted for accuracy by the OMB, and has not been subjected to public scrutiny through the notice and comment process. The public has not had the chance to review the accuracy of the inputs or the results of this highly complex climate model, and is therefore unable to meaningfully evaluate the resulting figures that EPA used in its analysis.

EPA also notes in the preamble of the Methane NSPS proposal that the social cost of methane model used to evaluate this rulemaking was the first set of published social cost of methane estimates in the peer-reviewed literature that are consistent with the modeling assumptions underlying the SCC model used by federal agencies. This statement indicates both that social cost of methane model is likely to share many of the same flaws as the SCC model used by EPA, and that methane modeling is still very new and untested. These are two good reasons why EPA should not rely on these models to estimate the benefits of the emission reductions from the Methane NSPS.

This is particularly true when the magnitude of the "benefits" resulting from the use of this model is considered. EPA used this social cost of methane model to calculate an estimated benefit range of $200 to $210 million in 2020 and $460 to $550 million in 2025. These numbers eclipse the total estimated cost ranges associated with the rule of $150 to $170 million in 2020 and $320 to $420 million, and creates the public impression that this costly rule actually has a net economic benefit of hundreds of millions of dollars.

> In addition, EPA selected a three percent discount rate to apply to the modeling result associated with this social cost of methane model, while simultaneously applying a much higher (seven percent) discount rate to the costs that the industry will incur. Economists have noted that these models are very sensitive to the discount rate that is applied, which can have huge impacts on the resulting value placed on the reduction of a ton of emissions. As one economist explained, there is no scientific justification for using the monetary values that result from a three

> percent discount rate for these reductions. Indeed, the federal interagency working group tasked with selecting the SCC model used by the EPA did not try to determine the "correct" values for the discount rate. Instead, they used middle of the road assumptions. . . . But other well-known studies have deviated from using these middle of-the-road assumptions and arrived at very different estimates of the SCC. . . . The problem here is that there is no consensus regarding the "correct" discount rate. . . . Because reasonable arguments can be made for a low discount rate or for a high rate, the modeler simply has too much flexibility.

While EPA includes the modeling results and cost estimates at additional discount rates, this information is tucked away in the text of the Methane NSPS and supporting technical documents, while the costs to industry at a seven percent discount rate, and benefits from the model at a three percent discount rate are used to reach the EPA's net-benefit estimate. As a result, the public is unable to fairly compare the costs and benefits associated with this rule.

Recommendations: EPA should re-conduct its cost assessment, and do so in a way which:

1. Takes into account the full costs of compliance that the industry will bear, and removes the cost savings which the industry will never recover;
2. Incorporates a more realistic estimate of the amount of time and labor the Methane NSPS will require;
3. Considers the reduced revenue from oil and natural gas under current market conditions; and
4. Removes the comparison to a social cost of methane model that has not yet been reviewed by the Science Advisory Board; National Academies of Sciences, Engineering, and Medicine, or OMB.

Response: Overall, the EPA disagrees that the estimates of the economic benefits of methane reductions, based on the Marten et al. (2014) social cost of methane estimates, are "deeply flawed." As discussed in the RIA, Section 4.3, these estimates have been subject to extensive review. The EPA determined that the Marten et al. estimates are scientifically defensible for valuing methane impacts in regulatory analyses and improve upon prior treatment of methane impacts in regulatory analysis. The EPA also disagrees that its estimates of the economic benefits of methane reductions have not been subject to public notice and comments; see the EPA's response to DCN EPA-HQ-OAR-2010-0505-5425, Excerpt 4, for complete discussion on that point. Furthermore, the use of the estimates went through standard OMB review, per Executive Order 12866, prior to publication in the proposal rule. The review under Executive Order 12866 occurred for use of these estimates in the oil gas proposal as well as for the application in other Agency proposed rulemakings, i.e., for the landfill sector and the medium- and heavy-duty engine and vehicle proposed rulemakings.

The EPA disagrees with the commenter's conclusion that the SC-CH4 estimates should not be used and with the reasons given by the commenter: (1) that the estimates share the same limitations as the SC-CO2 estimates; and (2) that the commenter believes that the models used to develop the SC-CH4 are "new and untested." Regarding the commenter's first reason, the EPA notes that the fact that limitations exist does not itself suggest an approach should not be used;

every approach will have a limitation. Rather, the EPA has carefully examined those limitations and determined that the SC-CO2 estimates are the best available for monetizing carbon dioxide impacts in rulemaking analysis. The value of that information far outweighs the limitations of the estimates, which are clearly documented in the SC-CO2 Technical Support Documents and Regulatory Impact Analysis documents for rulemakings that use the SC-CO2. The EPA recognizes that the SC-CH4 estimates share some of the limitations of the SC-CO2 estimates, but after careful examination has determined that, again, the value of the information provided by the estimates far outweighs the limitations.

Regarding the commenter's second reason, the models that Marten et al. (2014) used to estimate the SC-CH4 are neither new nor are they untested. The models used to develop the SC-CH4 estimates—DICE, FUND, and PAGE—are by design the very same models used to estimate the SC-CO2 (see below for more discussion about these three models). Furthermore, Marten et al. (2014) were not the first to use these models to estimate the SC-CH4. Instead, Marten et al. (2014) used these models as part of their work to develop the first set of published estimates of the SC-CH4 that are fully consistent with the modeling assumptions underlying the USG SC-CO2 estimates. Specifically, the estimation approach of Marten et al. used the same set of three models, five socioeconomic and emissions scenarios, equilibrium climate sensitivity distribution, three constant discount rates, and aggregation approach used by the interagency working group to develop the SC-CO2 estimates. Prior to Marten et al., there were a number of studies in the scientific literature providing directly-modeled estimates of SC-CH4, but the EPA had found considerable variation among these estimates in terms of the models and input assumptions that made them outdated and inconsistent with the methodology underlying the USG SC-CO2 estimates. Some adjustments were made relative to SC-CO2, i.e., the methodology changes that capture methane chemistry, but these were reviewed in the peer-review paper. Moreover, as discussed in the RIA, three peer-reviewers scrutinized the SC-CH4 estimates and explicitly considered the consistency and appropriateness for application and estimating methane benefits.

After careful evaluation of the full range of comments and associated technical issues described in the Response to Comments, EPA has determined that it will continue to use the Marten et al. SC-CH_4 estimates in the final rulemaking analysis. In particular, the Marten et al. SC-CH_4 estimates represent the best scientific information on the impacts of climate change available in a form appropriate for incorporating the damages from incremental CH_4 emissions changes into regulatory analysis. Therefore, the EPA has presented the Marten et al. SC-CH_4 estimates in this rulemaking. The EPA will continue to consider these comments and will share the recommendations with the IWG as it moves forward with the Academies process.

Regarding comments about the limitations of the SCC, also referred to as the SC-CO2 estimates:

In addition, the assumptions and models employed in generating the SC-CO2 and SC-CH4 estimates are all drawn from the peer-reviewed academic literature. To further strengthen the robustness of the SC-CO2 estimates, the EPA and other members of the U.S. Interagency Working Group on the social cost of carbon are seeking independent expert advice on technical opportunities to update these estimates from the National Academies of Sciences, Engineering, and Medicine. A committee convened by the Academies is reviewing the state of the science on

estimating the SC-CO2, and will provide expert, independent advice on the merits of different technical approaches for modeling and highlight research priorities going forward. The Academies' review will focus on the SC-CO2 methodology, but recommendations on how to update many of the underlying modeling assumptions will also likely pertain to the SC-CH4 estimates. Going forward, the EPA will evaluate its approach to estimating the SC-CO2 and SC-CH4 based upon any feedback received from the Academies' panel.

To date, the Committee has released an interim report, which recommended against doing a near term update of the SC-CO2 estimates. For future revisions, the Committee recommended the IWG move efforts towards a broader update of the climate system module consistent with the most recent, best available science, and also offered recommendations for how to enhance the discussion and presentation of uncertainty in the SC-CO2 estimates. Specifically, the Committee recommended that "the IWG provide guidance in their technical support documents about how [SC-CO2] uncertainty should be represented and discussed in individual regulatory impact analyses that use the [SC-CO2]" and that the technical support document for each update of the estimates present a section discussing the uncertainty in the overall approach, in the models used, and uncertainty that may not be included in the estimates. At the time of this writing, the IWG is reviewing the interim report and considering the recommendations. The EPA looks forward to working with the IWG to respond to the recommendations and will continue to follow IWG guidance on SC-CO2.

Regarding the comments about the models: While the development of the DICE, FUND and PAGE models necessarily involved assumptions and judgments on the part of the modelers, the damage functions are not simply arbitrary representations of the modelers' opinions about climate damages. Rather they are based on a review by the modelers of the currently available literature on the effects of climate change on society. The conclusions that the modelers draw from the literature, and the bases for these conclusions are documented, and all three models are continually updated as new information becomes available. While the EPA recognizes that there are limitations with these models, including some of those discussed in Pindyck (2013), IAMs nonetheless provide valuable information for regulatory impact analysis. In a recent article in the peer-reviewed literature, Weyant (2014) addressed this issue as follows:

> *While Pindyck's observations about the empirical weaknesses of IAMs or calculations of the SCC are worthy of careful study, the conclusion that IAMs are therefore useless fundamentally misconceives the enterprise. IAMs and the [SC-CO2] are conceptual frameworks for dealing with highly complex, non-linear, dynamic, and uncertain systems. The human mind is incapable of solving all the equations simultaneously, and modeling allows making "If..., then..." analyses of the impacts of different factors. The models have provided important insights into many aspects of climate-change policy.*

The EPA thus believes that it was appropriate for the IWG to base the SC-CO2 estimates on the DICE, FUND and PAGE models. Moving forward, EPA will continue to follow and evaluate the latest peer reviewed literature applying IAMs. As previously noted, the EPA and all of the other IWG members are seeking external expert advice on the technical merits and challenges of using additional models (e.g., CRED, ENVISAGE) to estimate the SC-CO2 and/or removing existing models from the ensemble (DICE, FUND, and PAGE) used to estimate the SCC.

***Regarding comments about discount rates*:**

The EPA disagrees with the commenter's assertion that the discount rates applied to the SC-CH4, which are the same rates applied to the SC-CO2, do not allow the public to "fairly compare the costs and benefits associated with the rule." OMB guidance in Circular A-4 recommends that discount rates of 3 percent and 7 percent be used in regulatory impact analysis. The 7 percent rate is an estimate of the average before-tax real rate of return to private capital in the U.S. economy. It is a broad measure that reflects the returns to real estate and small business and corporate capital and is meant to approximate the opportunity cost of capital in the United States. The 3 percent rate is an estimate of the real rate at which consumers discount future consumption flows to their present value, often referred to as the social rate of time preference or the consumption rate of interest. As stated in the 2010 SC-CO2 Technical Support Document, in a market with no distortions, the return to savings would equal the private return on investment, and the market rate of interest would be the appropriate choice for the social discount rate. In the real world, however taxes and other market imperfections drive a wedge between the risk-free rate of return on capital and the consumption rate of interest.

While most regulatory impact analysis is conducted over a time frame in the range of 20 to 50 years, OMB guidance in Circular A-4 recognizes that special ethical considerations arise when comparing benefits and costs across generations. Although most people demonstrate time preference in their own consumption behavior, it may not be appropriate for society to demonstrate a similar preference when deciding between the well-being of current and future generations. Future citizens who are affected by such choices cannot take part in making them, and today's society must act with some consideration of their interest. Even in an intergenerational context, however, it would still be correct to discount future costs and benefits generally (though perhaps at a lower rate than for intergenerational analysis), due to the expectation that future generations will be wealthier and thus will value a marginal dollar of benefits or costs less than the current generation. Therefore, it is appropriate to discount future benefits and costs relative to current benefits and costs, even if the welfare of future generations is not being discounted. Estimates of the discount rate appropriate in this case, from the 1990s, ranged from 1 to 3 percent. After reviewing those considerations, Circular A-4 states that if a rule will have important intergenerational benefits or costs, agencies should consider a further sensitivity analysis using a lower but positive discount rate in addition to calculating net benefits using discount rates of 3 and 7 percent.

The EPA and the other members of the IWG examined the economics literature and concluded that the consumption rate of interest is the correct concept to use in evaluating the net social costs of a marginal change in CO2 emissions, as the impacts of climate change are measured in consumption-equivalent units in the three IAMs used to estimate the SCC. This is consistent with OMB's guidance in Circular A-4, which states that when a regulation is expected to primarily affect private consumption—for instance, via higher prices for goods and services--it is appropriate to use the consumption rate of interest to reflect how private individuals trade-off current and future consumption.

As explained in the 2010 SC-CO2 TSD, after a thorough review of the discounting literature, the interagency working group (IWG) chose to use three discount rates to span a plausible range of

constant discount rates: 2.5, 3, and 5 percent per year. The central value, 3 percent, is consistent with estimates provided in the economics literature and OMB's Circular A-4 guidance for the consumption rate of interest. The upper value of 5 percent represents the possibility that climate damages are positively correlated with market returns, which would suggest a rate higher than the risk-free rate of 3 percent. Additionally, this discount rate may be justified by the high interest rates that many consumers use to smooth consumption across periods. The low value, 2.5 percent, is included to incorporate the concern that interest rates are highly uncertain over time. It represents the average rate after adjusting for uncertainty using a mean-reverting and random walk approach as described in Newell and Pizer (2003), starting at a discount rate of 3 percent. Further, a rate below the riskless rate would be justified if climate investments are negatively correlated with the overall market rate of return. Use of this lower value also responds to the ethical concerns discussed above regarding intergenerational discounting.

The EPA recognizes that disagreement remains in the academic literature over the appropriate discount rate to use for regulatory analysis of actions with significant intergenerational impacts, such as CO2 emissions changes that affect the global climate on long time scales. The EPA and the members of the IWG will continue to follow and evaluate the latest science on intergenerational discounting and seek external expert advice on issues related to discounting in the context of climate change.

As the above discussion makes clear, estimating climate benefits using a 7 percent discount rate not appropriate. Regarding costs, the national cost estimates in for this rule are not highly sensitive to the use of a 3 percent or 7 percent discount rate in this RIA. As can be seen in section 3.5.1 of the final RIA, the estimated annualized costs are the same in 2020 using either a 3 percent or 7 percent discount rate. The estimated annualized costs for 2025 are about $10 million higher using a 3 percent discount rate. As a result, the net benefits of the rule are not highly sensitive to choice of discount rate for annualizing capital costs.

Regarding the recommendation to modify the compliance costs and remove cost savings to industry, see the EPA response to DCN EPA-HQ-OAR-2010-0505-6978, Excerpt 7. Regarding the recommendation to modify the estimates of time and labor required for compliance, see the EPA response to DCN EPA-HQ-OAR-2010-0505-6857, Excerpt 60 in Chapter 11 of this document. Regarding the recommendation to consider reduced revenue under current market conditions, see the EPA response to DCN EPA-HQ-OAR-2010-0505-6847, Excerpt 3 for a discussion on natural gas prices used in the RIA, and DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 17 for a discussion on oil prices used.

Commenter Name: W. Michael Scott, Vice President and General Counsel
Commenter Affiliation: CrownQuest Operating, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6703
Comment Excerpt Number: 16

Comment: In addition, the model that EPA used to estimate the economic benefits for the reductions in methane emissions associated with this rule is deeply flawed and has not been

subject to public notice and comment. In the past, EPA has used a model known as the "social cost of carbon" or "SCC" to place a dollar value on the reduction of carbon dioxide emissions resulting from regulations. This SCC model has come under criticism by those arguing that flaws in the modeling technique and use of discount rates result in inaccurate and inflated estimates of the value of reducing emissions. The SCC model used by EPA has been the subject of Congressional oversight hearings, and is currently under review by the National Academies of Sciences, Engineering, and Medicine. Indeed, some-including Robert Pindyck of the Massachusetts Institute of Technology-have argued that these types of models are so flawed that they are "close to useless as tools for policy analysis. Worse yet, the inclusion of these models "create a perception of knowledge and precision that is illusory, and can fool policy-makers into thinking that the forecasts the models generate have some kind of scientific legitimacy." These models "can be misleading-and are inappropriate-as guides for policy, and yet they have been used by the government to estimate the social cost of carbon (SCC) and evaluate tax and abatement policies." "Because the modeler has so much freedom in choosing functional forms, parameter values, and other inputs, the model can be used to obtain almost any result one desires, and thereby legitimize what is essentially a subjective opinion about climate policy." In fact, EPA acknowledges some of these shortcomings with the SCC model in the Methane NSPS preamble.

While the SCC model used by EPA has many of its own flaws, it has, at least, been used by EPA and other federal agencies for many years, and repeatedly re-evaluated by the Office of Management and Budget ("OMB"). By contrast, the "social cost of methane" model used by EPA to estimate the benefits of methane reductions for the Methane NSPS was developed by an outside organization, has not been vetted for accuracy by the OMB, and has not been subjected to public scrutiny through the notice and comment process. The public has not had the chance to review the accuracy of the inputs or the results of this highly complex climate model, and is therefore unable to meaningfully evaluate the resulting figures that EPA used in its analysis.

EPA also notes in the preamble of the Methane NSPS proposal that the social cost of methane model used to evaluate this rulemaking was the first set of published social cost of methane estimates in the peer-reviewed literature that are consistent with the modeling assumptions underlying the SCC model used by federal agencies. This statement indicates both that social cost of methane model is likely to share many of the same flaws as the SCC model used by EPA, and that methane modeling is still very new and untested. These are two good reasons why EPA should not rely on these models to estimate the benefits of the emission reductions from the Methane NSPS.

This is particularly true when the magnitude of the "benefits" resulting from the use of this model is considered. EPA used this social cost of methane model to calculate an estimated benefit range of $200 to $210 million in 2020 and $460 to $550 million in 2025. These numbers eclipse the total estimated cost ranges associated with the rule of $150 to $170 million in 2020 and $320 to $420 million, and creates the public impression that this costly rule actually has a net economic benefit of hundreds of millions of dollars.

In addition, EPA selected a three percent discount rate to apply to the modeling result associated with this social cost of methane model, while simultaneously applying a much higher (seven

percent) discount rate to the costs that the industry will incur. Economists have noted that these models are very sensitive to the discount rate that is applied, which can have huge impacts on the resulting value placed on the reduction of a ton of emissions. As one economist explained, there is no scientific justification for using the monetary values that result from a three percent discount rate for these reductions. Indeed, the federal interagency working group tasked with selecting the SCC model used by the EPA did not try to determine the "correct" values for the discount rate. Instead, they used middle of the road assumptions .... But other well-known studies have deviated from using these middle of-the-mad assumptions and arrived at very different estimates of the SCC .... The problem here is that there is no consensus regarding the "correct" discount rate .... Because reasonable arguments can be made for a low discount rate or for a high rate, the modeler simply has too much flexibility.

While EPA includes the modeling results and cost estimates at additional discount rates, this information is tucked away in the text of the Methane NSPS and supporting technical documents, while the costs to industry at a seven percent discount rate, and benefits from the model at a three percent discount rate are used to reach the EPA's net-benefit estimate. As a result, the public is unable to fairly compare the costs and benefits associated with this rule.

Recommendations: EPA should re-conduct its cost assessment, and do so in a way which:

1. Takes into account the full costs of compliance that the industry will bear, and removes the cost savings which the industry will never recover;

2. Incorporates a more realistic estimate of the amount of time and labor the Methane NSPS will require;

3. Considers the reduced revenue from oil and natural gas under current market conditions; and

4. Removes the comparison to a social cost of methane model that has not yet been reviewed by the Science Advisory Board; National Academies of Sciences, Engineering, and Medicine, or OMB.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18.

Commenter Name: Bradley C. Cross, President/Partner
Commenter Affiliation: Big Star Oil & Gas, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6757
Comment Excerpt Number: 15

Comment: In addition, the model that EPA used to estimate the economic benefits for the reductions in methane emissions associated with this rule is deeply flawed and has not been subject to public notice and comment. In the past, EPA has used a model known as the “social cost of carbon” or “SCC” to place a dollar value on the reduction of carbon dioxide emissions resulting from regulations. This SCC model has come under criticism by those arguing that flaws

in the modeling technique and use of discount rates result in inaccurate and inflated estimates of the value of reducing emissions. The SCC model used by EPA has been the subject of Congressional oversight hearings, and is currently under review by the National Academies of Sciences, Engineering, and Medicine. Indeed, some—including Robert Pindyck of the Massachusetts Institute of Technology—have argued that these types of models are so flawed that they are "close to useless as tools for policy analysis." Worse yet, the inclusion of these models "create a perception of knowledge and precision that is illusory, and can fool policy-makers into thinking that the forecasts the models generate have some kind of scientific legitimacy." These models "can be misleading—and are inappropriate—as guides for policy, and yet they have been used by the government to estimate the social cost of carbon (SCC) and evaluate tax and abatement policies." "Because the modeler has so much freedom in choosing functional forms, parameter values, and other inputs, the model can be used to obtain almost any result one desires, and thereby legitimize what is essentially a subjective opinion about climate policy." In fact, EPA acknowledges some of these shortcomings with the SCC model in the Methane NSPS preamble.

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Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18.

Commenter Name: Glenn Prescott
Commenter Affiliation: RK Petroleum Corporation
Document Control Number: EPA-HQ-OAR-2010-0505-6788
Comment Excerpt Number: 16

Comment: In addition, the model that EPA used to estimate the economic benefits for the reductions in methane emissions associated with this rule is deeply flawed and has not been subject to public notice and comment. In the past, EPA has used a model known as the "social cost of carbon" or "SCC" to place a dollar value on the reduction of carbon dioxide emissions resulting from regulations. This SCC model has come under criticism by those arguing that flaws in the modeling technique and use of discount rates result in inaccurate and inflated estimates of the value of reducing emissions. The SCC model used by EPA has been the subject of Congressional oversight hearings, and is currently under review by the National Academies of

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Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18.

Commenter Name: Kari Cutting
Commenter Affiliation: North Dakota Petroleum Council (NDPC)
Document Control Number: EPA-HQ-OAR-2010-0505-6789
Comment Excerpt Number: 9

Comment: EPA's cost-benefit analysis is also flawed because it balances global benefits and domestic costs, allowing it to inflate the benefits of the Proposed NSPS OOOOa in order to outweigh the costs of compliance. This is not only inconsistent with how the costs and benefits of proposed NSPSs should be weighed under the CAA-it goes beyond the scope of the authority granted to EPA by Congress.

EPA described its calculation of benefits as follows: "We calculated the global social benefits of methane emissions reductions expected from the proposed NSPS using estimates of the social cost of methane (SC-CH_4), a metric that estimates the monetary value of impacts associated with marginal changes in methane emissions in a given year. It includes a wide range of anticipated climate impacts, such as net changes in agricultural productivity and human health, property

damage from increased flood risk, and changes in energy system costs, such as reduced costs for heating and increased costs for air conditioning."

EPA, however, does not have any basis in the CAA that would allow it to compare global benefits of methane emissions reductions with domestic costs of compliance, thereby skewing the balance in favor of the benefits of the Proposed NSPS OOOOa. EPA has historically compared domestic benefits with domestic costs when proposing NSPS. The D.C. Circuit has noted that "[t]he language of section 111 ... gives EPA authority when determining the best technological system to weigh cost, energy, and environmental impacts in the broadest sense - at the national and regional levels and over time." It is arbitrary, unreasonable and contrary to the CAA for EPA to consider the global benefits rather than the local, regional, or national benefits of proposed standards to support a rulemaking.

Moreover, the purpose of the CAA is "to protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population. Nothing in the Act even hints that EPA may consider international environmental and health improvements as a basis for imposing costly domestic standards. By including international benefits in its cost-benefit analysis, EPA has skewed the balance in favor of the proposed rule's benefits and has exceeded the authority granted to it by Congress under the CAA.

Response: See response to DCN EPA-HQ-OAR-2010-0505-7058, Excerpt 18.

Commenter Name: W. Jeffrey Sparks
Commenter Affiliation: Discovery Operating, Inc
Document Control Number: EPA-HQ-OAR-2010-0505-6790
Comment Excerpt Number: 16

Comment: In addition, the model that EPA used to estimate the economic benefits for the reductions in methane emissions associated with this rule is deeply flawed and has not been subject to public notice and comment. In the past, EPA has used a model known as the "social cost of carbon" or "SCC" to place a dollar value on the reduction of carbon dioxide emissions resulting from regulations. This SCC model has come under criticism by those arguing that flaws in the modeling technique and use of discount rates result in inaccurate and inflated estimates of the value of reducing emissions. The SCC model used by EPA has been the subject of Congressional oversight hearings, and is currently under review by the National Academies of Sciences, Engineering, and Medicine. Indeed, some—including Robert Pindyck of the Massachusetts Institute of Technology—have argued that these types of models are so flawed that they are "close to useless as tools for policy analysis." Worse yet, the inclusion of these models "create a perception of knowledge and precision that is illusory, and can fool policy-makers into thinking that the forecasts the models generate have some kind of scientific legitimacy." These models "can be misleading—and are inappropriate—as guides for policy, and yet they have been used by the government to estimate the social cost of carbon (SCC) and evaluate tax and abatement policies." "Because the modeler has so much freedom in choosing functional forms, parameter values, and other inputs, the model can be used to obtain almost any

result one desires, and thereby legitimize what is essentially a subjective opinion about climate policy." In fact, EPA acknowledges some of these shortcomings with the SCC model in the Methane NSPS preamble.

While the SCC model used by EPA has many of its own flaws, it has, at least, been used by EPA and other federal agencies for many years, and repeatedly re-evaluated by the Office of Management and Budget ("OMB"). By contrast, the "social cost of methane" model used by EPA to estimate the benefits of methane reductions for the Methane NSPS was developed by an outside organization, has not been vetted for accuracy by the OMB, and has not been subjected to public scrutiny through the notice and comment process. The public has not had the chance to review the accuracy of the inputs or the results of this highly complex climate model, and is therefore unable to meaningfully evaluate the resulting figures that EPA used in its analysis.

EPA also notes in the preamble of the Methane NSPS proposal that the social cost of methane model used to evaluate this rulemaking was the first set of published social cost of methane estimates in the peer-reviewed literature that are consistent with the modeling assumptions underlying the SCC model used by federal agencies. This statement indicates both that social cost of methane model is likely to share many of the same flaws as the SCC model used by EPA, and that methane modeling is still very new and untested. These are two good reasons why EPA should not rely on these models to estimate the benefits of the emission reductions from the Methane NSPS.

This is particularly true when the magnitude of the "benefits" resulting from the use of this model is considered. EPA used this social cost of methane model to calculate an estimated benefit range of $200 to $210 million in 2020 and $460 to $550 million in 2025. These numbers eclipse the total estimated cost ranges associated with the rule of $150 to $170 million in 2020 and $320 to $420 million, and creates the public impression that this costly rule actually has a net economic benefit of hundreds of millions of dollars.

In addition, EPA selected a three percent discount rate to apply to the modeling result associated with this social cost of methane model, while simultaneously applying a much higher (seven percent) discount rate to the costs that the industry will incur. Economists have noted that these models are very sensitive to the discount rate that is applied, which can have huge impacts on the resulting value placed on the reduction of a ton of emissions. As one economist explained, there is no scientific justification for using the monetary values that result from a three percent discount rate for these reductions. Indeed, the federal interagency working group tasked with selecting the SCC model used by the EPA did not try to determine the "correct" values for the discount rate. Instead, they used middle of the road assumptions. . . . But other well-known studies have deviated from using these middle of-the-road assumptions and arrived at very different estimates of the SCC. . . . The problem here is that there is no consensus regarding the "correct" discount rate. . . . Because reasonable arguments can be made for a low discount rate or for a high rate, the modeler simply has too much flexibility.

While EPA includes the modeling results and cost estimates at additional discount rates, this information is tucked away in the text of the Methane NSPS and supporting technical documents, while the costs to industry at a seven percent discount rate, and benefits from the

model at a three percent discount rate are used to reach the EPA's net-benefit estimate. As a result, the public is unable to fairly compare the costs and benefits associated with this rule.

Recommendations: EPA should re-conduct its cost assessment, and do so in a way which:
1. Takes into account the full costs of compliance that the industry will bear, and removes the cost savings which the industry will never recover;
2. Incorporates a more realistic estimate of the amount of time and labor the Methane NSPS will require;
3. Considers the reduced revenue from oil and natural gas under current market conditions; and
4. Removes the comparison to a social cost of methane model that has not yet been reviewed by the Science Advisory Board; National Academies of Sciences, Engineering, and Medicine, or OMB.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18.

Commenter Name: J. Roger Kelley
Commenter Affiliation: Domestic Energy Producer's Alliance (DEPA)
Document Control Number: EPA-HQ-OAR-2010-0505-6793
Comment Excerpt Number: 8

Comment: EPA's cost-benefit analysis is also flawed because it balances global benefits and domestic costs, allowing it to inflate the benefits of the proposed rule in order to outweigh the costs of compliance. This is not only inconsistent with how costs and benefits of proposed NSPS should be weighed under the CAA; it goes beyond the scope of the authority granted to EPA by Congress.

EPA described its calculation of benefits as follows: "We calculated the global social benefits of methane emissions reductions expected from the proposed NSPS using estimates of the social cost of methane (SC-CH4), a metric that estimates the monetary value of impacts associated with marginal changes in methane emissions in a given year. It includes a wide range of anticipated climate impacts, such as net changes in agricultural productivity and human health, property damage from increased flood risk, and changes in energy system costs, such as reduced costs for heating and increased costs for air conditioning."

EPA does not have any basis in the CAA that would allow it to compare global benefits of methane emissions reductions with domestic costs of compliance, thereby skewing the balance in favor of the benefits of the proposed rule. EPA has historically compared domestic benefits with domestic costs when proposing NSPS. The D.C. Circuit has noted that "[t]he language of section 111 . . . gives EPA authority when determining the best technological system to weigh cost, energy, and environmental impacts in the broadest sense — at the **national** and **regional** levels and over time." It is arbitrary, unreasonable and contrary to the CAA for EPA to consider the global benefits rather than the national benefits of the proposed standards.

Moreover, the purpose of the CAA is "to protect and enhance the quality of the **Nation's** air resources so as to promote the public health and welfare and the productive capacity of its population." Nothing in the Act even hints that EPA may consider international environmental and health improvements as a basis for imposing costly domestic standards. By including international benefits in its cost-benefit analysis, EPA has skewed the balance in favor of the proposed rule's benefits and has exceeded the authority granted to it by Congress under the CAA.

Response: See response to DCN EPA-HQ-OAR-2010-0505-7058, Excerpt 18.

Commenter Name: Josh W. Luig
Commenter Affiliation: Veritas Energy, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6797
Comment Excerpt Number: 17

Comment: In addition, the model that EPA used to estimate the economic benefits for the reductions in methane emissions associated with this rule is deeply flawed and has not been subject to public notice and comment. In the past, EPA has used a model known as the "social cost of carbon" or "SCC" to place a dollar value on the reduction of carbon dioxide emissions resulting from regulations. This SCC model has come under criticism by those arguing that flaws in the modeling technique and use of discount rates result in inaccurate and inflated estimates of the value of reducing emissions. The SCC model used by EPA has been the subject of Congressional oversight hearings, and is currently under review by the National Academies of Sciences, Engineering, and Medicine. Indeed, some—including Robert Pindyck of the Massachusetts Institute of Technology—have argued that these types of models are so flawed that they are "close to useless as tools for policy analysis." Worse yet, the inclusion of these models "create a perception of knowledge and precision that is illusory, and can fool policy-makers into thinking that the forecasts the models generate have some kind of scientific legitimacy." These models "can be misleading—and are inappropriate—as guides for policy, and yet they have been used by the government to estimate the social cost of carbon (SCC) and evaluate tax and abatement policies." "Because the modeler has so much freedom in choosing functional forms, parameter values, and other inputs, the model can be used to obtain almost any result one desires, and thereby legitimize what is essentially a subjective opinion about climate policy." In fact, EPA acknowledges some of these shortcomings with the SCC model in the Methane NSPS preamble.

While the SCC model used by EPA has many of its own flaws, it has, at least, been used by EPA and other federal agencies for many years, and repeatedly re-evaluated by the Office of Management and Budget ("OMB"). By contrast, the "social cost of methane" model used by EPA to estimate the benefits of methane reductions for the Methane NSPS was developed by an outside organization, has not been vetted for accuracy by the OMB, and has not been subjected to public scrutiny through the notice and comment process. The public has not had the chance to review the accuracy of the inputs or the results of this highly complex climate model, and is therefore unable to meaningfully evaluate the resulting figures that EPA used in its analysis.

EPA also notes in the preamble of the Methane NSPS proposal that the social cost of methane model used to evaluate this rulemaking was the first set of published social cost of methane estimates in the peer-reviewed literature that are consistent with the modeling assumptions underlying the SCC model used by federal agencies. This statement indicates both that social cost of methane model is likely to share many of the same flaws as the SCC model used by EPA, and that methane modeling is still very new and untested. These are two good reasons why EPA should not rely on these models to estimate the benefits of the emission reductions from the Methane NSPS.

This is particularly true when the magnitude of the "benefits" resulting from the use of this model is considered. EPA used this social cost of methane model to calculate an estimated benefit range of $200 to $210 million in 2020 and $460 to $550 million in 2025. These numbers eclipse the total estimated cost ranges associated with the rule of $150 to $170 million in 2020 and $320 to $420 million, and creates the public impression that this costly rule actually has a net economic benefit of hundreds of millions of dollars.

> In addition, EPA selected a three percent discount rate to apply to the modeling result associated with this social cost of methane model, while simultaneously applying a much higher (seven percent) discount rate to the costs that the industry will incur. Economists have noted that these models are very sensitive to the discount rate that is applied, which can have huge impacts on the resulting value placed on the reduction of a ton of emissions. As one economist explained, there is no scientific justification for using the monetary values that result from a three percent discount rate for these reductions. Indeed, the federal interagency working group tasked with selecting the SCC model used by the EPA did not try to determine the "correct" values for the discount rate. Instead, they used middle of the road assumptions. . . . But other well-known studies have deviated from using these middle of-the-road assumptions and arrived at very different estimates of the SCC. . . . The problem here is that there is no consensus regarding the "correct" discount rate. . . . Because reasonable arguments can be made for a low discount rate or for a high rate, the modeler simply has too much flexibility.

While EPA includes the modeling results and cost estimates at additional discount rates, this information is tucked away in the text of the Methane NSPS and supporting technical documents, while the costs to industry at a seven percent discount rate, and benefits from the model at a three percent discount rate are used to reach the EPA's net-benefit estimate. As a result, the public is unable to fairly compare the costs and benefits associated with this rule.

Recommendations: EPA should re-conduct its cost assessment, and do so in a way which:
1. Takes into account the full costs of compliance that the industry will bear, and removes the cost savings which the industry will never recover;
2. Incorporates a more realistic estimate of the amount of time and labor the Methane NSPS will require;
3. Considers the reduced revenue from oil and natural gas under current market conditions; and
4. Removes the comparison to a social cost of methane model that has not yet been reviewed by

the Science Advisory Board; National Academies of Sciences, Engineering, and Medicine, or OMB.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18.

Commenter Name: Rick D. Davis, Jr.
Commenter Affiliation: Midland Energy, Inc. and Petroplex Energy, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6801
Comment Excerpt Number: 16

Comment: In addition, the model that EPA used to estimate the economic benefits for the reductions in methane emissions associated with this rule is deeply flawed and has not been subject to public notice and comment. In the past, EPA has used a model known as the "social cost of carbon" or "SCC" to place a dollar value on the reduction of carbon dioxide emissions resulting from regulations. This SCC model has come under criticism by those arguing that flaws in the modeling technique and use of discount rates result in inaccurate and inflated estimates of the value of reducing emissions. The SCC model used by EPA has been the subject of Congressional oversight hearings, and is currently under review by the National Academies of Sciences, Engineering, and Medicine. Indeed, some-including Robert Pindyck of the Massachusetts Institute of Technology-have argued that these types of models are so flawed that they are "close to useless as tools for policy analysis." Worse yet, the inclusion of these models "create a perception of knowledge and precision that is illusory, and can fool policy-makers into thinking that the forecasts the models generate have some kind of scientific legitimacy." These models "can be misleading-and are inappropriate-as guides for policy, and yet they have been used by the government to estimate the social cost of carbon (SCC) and evaluate tax and abatement policies." "Because the modeler has so much freedom in choosing functional forms, parameter values, and other inputs, the model can be used to obtain almost any result one desires, and thereby legitimize what is essentially a subjective opinion about climate policy." In fact, EPA acknowledges some of these shortcomings with the SCC model in the Methane NSPS preamble.

While the SCC model used by EPA has many of its own flaws, it has, at least, been used by EPA and other federal agencies for many years, and repeatedly re-evaluated by the Office of Management and Budget ("OMB"). By contrast, the "social cost of methane" model used by EPA to estimate the benefits of methane reductions for the Methane NSPS was developed by an outside organization, has not been vetted for accuracy by the OMB, and has not been subjected to public scrutiny through the notice and comment process. The public has not had the chance to review the accuracy of the inputs or the results of this highly complex climate model, and is therefore unable to meaningfully evaluate the resulting figures that EPA used in its analysis.

EPA also notes in the preamble of the Methane NSPS proposal that the social cost of methane model used to evaluate this rulemaking was the first set of published social cost of methane estimates in the peer-reviewed literature that are consistent with the modeling assumptions underlying the SCC model used by federal agencies. This statement indicates both that social

cost of methane model is likely to share many of the same flaws as the SCC model used by EPA, and that methane modeling is still very new and untested. These are two good reasons why EPA should not rely on these models to estimate the benefits of the emission reductions from the Methane NSPS.

This is particularly true when the magnitude of the "benefits" resulting from the use of this model is considered. EPA used this social cost of methane model to calculate an estimated benefit range of $200 to $210 million in 2020 and $460 to $550 million in 2025. These numbers eclipse the total estimated cost ranges associated with the rule of $150 to $170 million in 2020 and $320 to $420 million, and creates the public impression that this costly rule actually has a net economic benefit of hundreds of millions of dollars.

In addition, EPA selected a three percent discount rate to apply to the modeling result associated with this social cost of methane model, while simultaneously applying a much higher (seven percent) discount rate to the costs that the industry will incur. Economists have noted that these models are very sensitive to the discount rate that is applied, which can have huge impacts on the resulting value placed on the reduction of a ton of emissions. As one economist explained, there is no scientific justification for using the monetary values that result from a three percent discount rate for these reductions. Indeed, the federal interagency working group tasked with selecting the SCC model used by the EPA did not try to determine the "correct" values for the discount rate. Instead, they used middle of the road assumptions .... But other well-known studies have deviated from using these middle of-the-road assumptions and arrived at very different estimates of the SCC .... The problem here is that there is no consensus regarding the "correct" discount rate. . . . Because reasonable arguments can be made for a low discount rate or for a high rate, the modeler simply has too much flexibility.

While EPA includes the modeling results and cost estimates at additional discount rates, this information is tucked away in the text of the Methane NSPS and supporting technical documents, while the costs to industry at a seven percent discount rate, and benefits from the model at a three percent discount rate are used to reach the EPA's net-benefit estimate. As a result, the public is unable to fairly compare the costs and benefits associated with this rule.

Recommendations: EPA should re-conduct its cost assessment, and do so in a way which:

1. Takes into account the full costs of compliance that the industry will bear, and removes the cost savings which the industry will never recover;

2. Incorporates a more realistic estimate of the amount of time and labor the Methane NSPS will require;

3. Considers the reduced revenue from oil and natural gas under current market conditions; and

4. Removes the comparison to a social cost of methane model that has not yet been reviewed by the Science Advisory Board; National Academies of Sciences, Engineering, and Medicine, or OMB.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18.

Commenter Name: Ben Shepperd
Commenter Affiliation: Permian Basin Petroleum Association
Document Control Number: EPA-HQ-OAR-2010-0505-6849
Comment Excerpt Number: 15

Comment: In addition, the model that EPA used to estimate the economic benefits for the reductions in methane emissions associated with this rule is deeply flawed and has not been subject to public notice and comment. In the past, EPA has used a model known as the "social cost of carbon" or "SCC" to place a dollar value on the reduction of carbon dioxide emissions resulting from regulations. This SCC model has come under criticism by those arguing that flaws in the modeling technique and use of discount rates result in inaccurate and inflated estimates of the value of reducing emissions. The SCC model used by EPA has been the subject of Congressional oversight hearings, and is currently under review by the National Academies of Sciences, Engineering, and Medicine. Indeed, some—including Robert Pindyck of the Massachusetts Institute of Technology—have argued that these types of models are so flawed that they are "close to useless as tools for policy analysis." Worse yet, the inclusion of these models "create a perception of knowledge and precision that is illusory, and can fool policy-makers into thinking that the forecasts the models generate have some kind of scientific legitimacy." These models "can be misleading—and are inappropriate—as guides for policy, and yet they have been used by the government to estimate the social cost of carbon (SCC) and evaluate tax and abatement policies." "Because the modeler has so much freedom in choosing functional forms, parameter values, and other inputs, the model can be used to obtain almost any result one desires, and thereby legitimize what is essentially a subjective opinion about climate policy." In fact, EPA acknowledges some of these shortcomings with the SCC model in the Methane NSPS preamble.

While the SCC model used by EPA has many of its own flaws, it has, at least, been used by EPA and other federal agencies for many years, and repeatedly re-evaluated by the Office of Management and Budget ("OMB"). By contrast, the "social cost of methane" model used by EPA to estimate the benefits of methane reductions for the Methane NSPS was developed by an outside organization, has not been vetted for accuracy by the OMB, and has not been subjected to public scrutiny through the notice and comment process. The public has not had the chance to review the accuracy of the inputs or the results of this highly complex climate model, and is therefore unable to meaningfully evaluate the resulting figures that EPA used in its analysis.

EPA also notes in the preamble of the Methane NSPS proposal that the social cost of methane model used to evaluate this rulemaking was the first set of published social cost of methane estimates in the peer-reviewed literature that are consistent with the modeling assumptions underlying the SCC model used by federal agencies. This statement indicates both that social cost of methane model is likely to share many of the same flaws as the SCC model used by EPA, and that methane modeling is still very new and untested. These are two good reasons why EPA

should not rely on these models to estimate the benefits of the emission reductions from the Methane NSPS.

This is particularly true when the magnitude of the "benefits" resulting from the use of this model is considered. EPA used this social cost of methane model to calculate an estimated benefit range of $200 to $210 million in 2020 and $460 to $550 million in 2025. These numbers eclipse the total estimated cost ranges associated with the rule of $150 to $170 million in 2020 and $320 to $420 million, and creates the public impression that this costly rule actually has a net economic benefit of hundreds of millions of dollars.

> In addition, EPA selected a three percent discount rate to apply to the modeling result associated with this social cost of methane model, while simultaneously applying a much higher (seven percent) discount rate to the costs that the industry will incur. Economists have noted that these models are very sensitive to the discount rate that is applied, which can have huge impacts on the resulting value placed on the reduction of a ton of emissions. As one economist explained, there is no scientific justification for using the monetary values that result from a three percent discount rate for these reductions. Indeed, the federal interagency working group tasked with selecting the SCC model used by the EPA did not try to determine the "correct" values for the discount rate. Instead, they used middle of the road assumptions. . . . But other well-known studies have deviated from using these middle of-the-road assumptions and arrived at very different estimates of the SCC. . . . The problem here is that there is no consensus regarding the "correct" discount rate. . . . Because reasonable arguments can be made for a low discount rate or for a high rate, the modeler simply has too much flexibility.

While EPA includes the modeling results and cost estimates at additional discount rates, this information is tucked away in the text of the Methane NSPS and supporting technical documents, while the costs to industry at a seven percent discount rate, and benefits from the model at a three percent discount rate are used to reach the EPA's net-benefit estimate. As a result, the public is unable to fairly compare the costs and benefits associated with this rule.

Recommendations: EPA should re-conduct its cost assessment, and do so in a way which:
1. Takes into account the full costs of compliance that the industry will bear, and removes the cost savings which the industry will never recover;

2. Incorporates a more realistic estimate of the amount of time and labor the Methane NSPS will require;
3. Considers the reduced revenue from oil and natural gas under current market conditions; and
4. Removes the comparison to a social cost of methane model that has not yet been reviewed by the Science Advisory Board; National Academies of Sciences, Engineering, and Medicine, or OMB.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18.

Commenter Name: Theresa Pugh
Commenter Affiliation: Interstate Natural Gas Association of America (INGAA)
Document Control Number: EPA-HQ-OAR-2010-0505-6872
Comment Excerpt Number: 17

Comment: EPA should not include a social cost of methane in its cost-benefits analysis.

INGAA endorses the comments provided by NERA's economic consulting's analysis as to how EPA has estimated Social Cost of Methane. EPA has counted the global benefits to climate change mitigation through methane reduction while counting only the U.S. T&S sector costs. Further, EPA's estimates of net benefits lack appropriate peer review that is necessary for use in supporting regulatory policy. INGAA urges EPA to take these matters into consideration when setting the final NSPS rule regarding cost-effective reductions. As proposed, INGAA does not believe that EPA's NSPS is cost-effective, and it feels that the Proposed Rule exaggerates the benefits while significantly minimizing the costs to the T&S sector.

Response: The comments on SC-CH_4 provided by NERA's economic consulting analysis, which are referenced by this commenter (DCN EPA-HQ-OAR-2010-0505-6872, Excerpt 17) are coded as DCN EPA-HQ-OAR-2010-0505-6969, Excerpts 6 through 10, 13, 14, 15, and 17. See the EPA's response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpts 6 through 10, 13, 14, 15, and 17. In particular, the EPA's response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 7, discusses the basis for using global estimates of the SC-CH_4. EPA disagrees that the estimates of the benefits lacks appropriate review. See the EPA response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18, for discussion about the extensive reviews conducted before the SC-CH4 estimates were applied to the RIA and for discussion about the EPA's conclusions regarding the validity and rigor of the Marten et al (2014) SC-CH4 estimates as well as the interagency working group's SC-CO2 estimates. In addition, the EPA response to DCN EPA-HQ-OAR-2010-0505-5425, Excerpt 4, discusses the opportunities for public comment provided on the SC-CH_4.

Regarding the commenter's concerns about the cost analysis, the EPA disagrees with the commenter's assertion that the benefits are exaggerated and the costs are overestimated in the T&S sector. Because this equipment are widely used across this industry, they contribute a significant amount of emissions even if emissions from an individual piece of equipment may not be big. The EPA acknowledges uncertainty in the number of affected facilities and equipment in future years, but for the purposes of estimating national impacts has constructed its best estimate of those impacts. In addition, the EPA has modified its methodology for using historical inventory information to estimate new sources reflecting comments received, resulting in lower estimates of the number of new compressor stations, compressors, and pneumatic controllers constructed each year.

Commenter Name: Dan G. LeRoy
Commenter Affiliation: Legacy Reserves Operating LP

Document Control Number: EPA-HQ-OAR-2010-0505-6882
Comment Excerpt Number: 5

Comment: In addition, the model that EPA used to estimate the economic benefits for the reductions in methane emissions associated with this rule is deeply flawed and has not been subject to public notice and comment. In the past, EPA has used a model known as the "social cost of carbon" or "SCC" to place a dollar value on the reduction of carbon dioxide emissions resulting from regulations. This SCC model has come under criticism by those arguing that flaws in the modeling technique and use of discount rates result in inaccurate and inflated estimates of the value of reducing emissions. The SCC model used by EPA has been the subject of Congressional oversight hearings, and is currently under review by the National Academies of Sciences, Engineering, and Medicine. Indeed, some-including Robert Pindyck of the Massachusetts Institute of Technology-have argued that these types of models are so flawed that they are "close to useless as tools for policy analysis." Worse yet, the inclusion of these models "create a perception of knowledge and precision that is illusory, and can fool policy-makers into thinking that the forecasts the models generate have some kind of scientific legitimacy." These models "can be misleading-and are inappropriate-as guides for policy, and yet they have been used by the government to estimate the social cost of carbon (SCC) and evaluate tax and abatement policies." "Because the modeler has so much freedom in choosing functional forms, parameter values, and other inputs, the model can be used to obtain almost any result one desires, and thereby legitimize what is essentially a subjective opinion about climate policy." In fact, EPA acknowledges some of these shortcomings with the SCC model in the Methane NSPS preamble.

While the SCC model used by EPA has many of its own flaws, it has, at least, been used by EPA and other federal agencies for many years, and repeatedly re-evaluated by the Office of Management and Budget ("OMB"). By contrast, the "social cost of methane" model used by EPA to estimate the benefits of methane reductions for the Methane NSPS was developed by an outside organization, has not been vetted for accuracy by the OMB, and has not been subjected to public scrutiny through the notice and comment process. The public has not had the chance to review the accuracy of the inputs or the results of this highly complex climate model, and is therefore unable to meaningfully evaluate the resulting figures that EPA used in its analysis.

EPA also notes in the preamble of the Methane NSPS proposal that the social cost of methane model used to evaluate this rulemaking was the first set of published social cost of methane estimates in the peer-reviewed literature that are consistent with the modeling assumptions underlying the SCC model used by federal agencies. This statement indicates both that social cost of methane model is likely to share many of the same flaws as the SCC model used by EPA, and that methane modeling is still very new and untested. These are two good reasons why EPA should not rely on these models to estimate the benefits of the emission reductions from the Methane NSPS.

This is particularly true when the magnitude of the "benefits" resulting from the use of this model is considered. EPA used this social cost of methane model to calculate an estimated benefit range of $200 to $210 million in 2020 and $460 to $550 million in 2025. These numbers eclipse the total estimated cost ranges associated with the rule of $150 to $170 million in 2020

and $320 to $420 million, and creates the public impression that this costly rule actually has a net economic benefit of hundreds of millions of dollars.

In addition, EPA selected a three percent discount rate to apply to the modeling result associated with this social cost of methane model, while simultaneously applying a much higher (seven percent) discount rate to the costs that the industry will incur. Economists have noted that these models are very sensitive to the discount rate that is applied, which can have huge impacts on the resulting value placed on the reduction of a ton of emissions. As one economist explained, there is no scientific justification for using the monetary values that result from a three percent discount rate for these reductions. Indeed, the federal interagency working group tasked with selecting the SCC model used by the EPA did not try to determine the "correct" values for the discount rate. Instead, they used middle of the road assumptions .... But other well-known studies have deviated from using these middle of-the-road assumptions and arrived at very different estimates of the SCC .... The problem here is that there is no consensus regarding the "correct" discount rate. . . . Because reasonable arguments can be made for a low discount rate or for a high rate, the modeler simply has too much flexibility

While EPA includes the modeling results and cost estimates at additional discount rates, this information is tucked away in the text of the Methane NSPS and supporting technical documents, while the costs to industry at a seven percent discount rate, and benefits from the model at a three percent discount rate are used to reach the EPA's net-benefit estimate. As a result, the public is unable to fairly compare the costs and benefits associated with this rule.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18.

Commenter Name: Howard J Feldman
Commenter Affiliation: American Petroleum Institute
Document Control Number: EPA-HQ-OAR-2010-0505-6884
Comment Excerpt Number: 17

Comment: Social Cost of Methane

Issue – EPA has inappropriately applied a social cost of methane (SC-CH4) estimate that is highly speculative, not sufficiently peer-reviewed, and ultimately not suitable for policy applications. The SC-CH4 is based on the approach used for quantifying the social cost of carbon (SCC) and therefore carries with it all of the same challenges to accurately calculating the benefits of the rule, and seriously affect the scientific and economic reliability of the SC-CH4. The peer-reviewers selected by EPA did not reach a consensus and all found inconsistencies and other issues with the calculations used to generate the SC-CH4, as did an independent review by NERA. The issues associated with the estimation and use of the SC-CH4 include: differences in the way methane emissions was included in the three models; significant differences in the damage functions between the models; issues with the averaging approach used to synthesize the results; the inclusion of an unjustifiably low discount rate given the short atmospheric lifespan of CH4; the inclusion of global benefits rather than domestic benefits; and the *ad hoc* nature of

EPA's assumption of the indirect effects on radiative forcing. Independent review by NERA found that the benefits provided by the rule, after compensating for flaws in EPA's calculation, could be as much as 94% lower. When combined with the revised cost estimates and reduced emission benefits found by ERM, the rule could result in net costs of more than $1 billion in 2025.

Recommendation – There are significant uncertainties inherent in the newly-developed social cost of methane (SCM) calculation, and it may significantly overestimate methane's environmental impacts. Further, there has been a lack of adequate peer review for the SC-CH4 estimate. As such, EPA's use of the social cost of methane is inappropriate to justify this rulemaking.

EPA's Use Of A Social Cost Of Methane Value Should Undergo Notice And Comment.

The benefits of the proposed rule are estimated using a social cost of methane (SC-CH4), which has been derived from the approach the Interagency Working Group ("IWG") – a group of thirteen federal agencies developed for the Social Cost of Carbon (SCC). EPA's selected value for SC-CH4 in this proposed rulemaking is arbitrarily taken from one scientific report that attempts to find an equivalent SC-CH4 from the SCC, and for which EPA only requested a peer review, not formal public review and commenting. (80 Fed. Reg. at 56655) Moreover, even if the SC-CH4 estimate development process was transparent, rigorous, and adequately peer-reviewed, the modeling conducted in this effort does not offer a reasonably acceptable range of accuracy for use in policymaking. In addition, the EPA has failed to disclose and quantify key uncertainties to inform decision makers and the public about the effects and uncertainties of alternative regulatory actions as required by OMB. For these and the reasons elaborated in this section, the SC-CH4 should not be used to determine benefits as part of this rulemaking.

Response: The EPA disagrees with the commenter's assertions that the SC-CH_4 was inappropriately applied and disagrees that the SC-CH_4 is "highly speculative, not sufficiently peer-reviewed, and ultimately not suitable for policy applications." As discussed in the RIA these estimates have been subject to extensive review. The EPA determined that the Marten et al. estimates are scientifically defensible for valuing methane impacts in regulatory analyses and improve upon prior treatment of methane impacts in regulatory analysis. See the EPA response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18, for discussion about the extensive reviews conducted before the estimates were applied to the RIA and for discussion about EPA's conclusions regarding the validity and rigor of the Marten et al (2014) SC-CH4 estimates as well as the interagency working group's SC-CO2 estimates. The EPA also disagrees that its estimates of the economic benefits of methane reductions have not been subject to public notice and comments; see the EPA's response to DCN EPA-HQ-OAR-2010-0505-5425, Excerpt 4.

The EPA disagrees that the estimates were not sufficiently peer-reviewed and disagrees with the commenter's characterization of the peer-review of the application; see the EPA response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 15, for complete details. The EPA also disagrees that use of the estimates was arbitrary and disagrees that they lack transparency; see the EPA response to DCN EPA-HQ-OAR-2010-0505-6997, Excerpt 14. Regarding the comment that

uncertainty is not adequately represented and the RIA does not comply with OMB guidelines, please see DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 172.

Regarding the commenter's statements about the peer-reviewers selected by the EPA to review the application of the Marten et al. SC-CH_4 estimates, including the commenter's assertion that the peer-reviewers did not reach a consensus, see the EPA response to DCN EPA-HQ-OAR-2010-0505-6997, Excerpt 15.

The EPA has reviewed the NERA analysis of the SC-CH_4, which was referenced by this commenter, and has responded to those comments at DCN EPA-HQ-OAR-2010-0505-6969, Excerpts 6 through 10, 13, 14, 15, and 17. In particular, the EPA responded to the alternative SC-CH_4 estimates developed by NERA, see the EPA response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 17.

Additional topics of concern identified by this commenter are shown below along with the relevant reference to the EPA's response on that topic:

- Differences in the way methane emissions was included in the three models and differences in the damage functions among the models, see DCN EPA-HQ-OAR-2010-0505-6969, Excerpts 6, 13, 14.
- The averaging approach used to synthesize the results, see DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 20.
- Application of 2.5 percent discount rate to the SC-CH4, see the EPA's response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 8.
- Use of global benefits rather than domestic benefits, see the EPA's response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 7.
- Adjustment for indirect effects of radiative forcing, see the EPA's response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 9.

Commenter Name: Howard J Feldman
Commenter Affiliation: American Petroleum Institute
Document Control Number: EPA-HQ-OAR-2010-0505-6884
Comment Excerpt Number: 20

Comment: Precedence Issues Related To Prior Social Cost Of Carbon Publication.

The benefits of the proposed rule are estimated using the SC-CH4, which has been derived from the approach the USG uses for estimating the SCC. Therefore, the SC-CH4 inherits many of the same weaknesses as the SCC estimates.

The methodology used by EPA to estimate SC-CH4 is similar to the EPA's approach to estimating SCC in the following ways:

- Uses the same three Integrated Assessment Models (IAMs).

- Uses the same five same socio-economic and emissions scenarios.
- Uses the same discount rates.
- Uses the same approach for averaging social costs across scenarios and IAMs.

As discussed in Section 4.3.1 of the RIA, EPA asked three peer-reviewers to provide an assessment of the SC-CH4 approach and concluded that the reviewers generally agree that the SC-CH4 estimates are "consistent" with the SCC estimates. Moreover, because Office of Management and Budget (OMB) guidance supports the use of SCC estimates, the EPA has concluded that using the SC-CH4 estimates is an "analytical improvement" over their exclusion.

API believes that the use of the SC-CH4 estimates is not warranted. Two primary reasons are as follows:

- The three peer reviewers' endorsement of the "consistency" of the SC-CH4 estimates was in fact more modest than the EPA concludes. Further, the reviewers identified uncertainties with the approach being used. One reviewer commented that the fact that methane is not explicitly modeled in two out of the three IAMs used makes the approach inconsistent with SCC. A second reviewer commented that the emissions perturbation approach used for methane is inconsistent with the approach used for SCC and the impact of the difference is not understood. More importantly, the reviewer argued that neither the SCC approach nor the IAMs themselves have been peer-reviewed, which mean the SCC and SC-CH4 estimates are likely not reliable.
- All of the problems with estimating the SCC have been inherited by the SC-CH4 estimates. The issues associated with the SCC estimates include: differences in the climate outcomes of the three IAMs; significant differences in the damage functions between models; and issues with the averaging approach used to synthesize results. These challenges seriously affect the reliability and usefulness of the SCC and SCCH4 estimates in the foreseeable future.

The IAMs show significant differences in the climate outcome of the modeled results to the same increase in emissions. The three models project different temperature changes and sea level rise estimates resulting from the same increase in emissions and same underlying socioeconomic conditions. The temperature responses result from differences in the modeling of the carbon cycle, non-CO2 radiative forcing, and sensitivity. Even in the short-term, through 2040, the IAMs can yield temperature changes that vary by a factor of two.

The damage functions linked to these temperature changes and sea level rise estimates are also very different, corresponding to a wide range of economic impacts. For example, one IAM shows gains in GDP through 2100 for some scenarios with increased emissions, while the other two IAMs show losses. The three models also show wide variation in the impact on the GDP of different countries and different types of economic costs (i.e. agriculture, heating and cooling). The differences in the structure of the models, which lead to significant differences in the damages estimates, are not well understood or explained.

The USG approach averages the SCC models across different socioeconomic scenarios to form a single estimate of the SCC for a particular discount rate. Inconsistencies in the models, and the

fact that they may not be truly independent, may make such averaging inappropriate. Averaging assumes that each estimate is equally reliable and obscures the true uncertainty about the SCC that exists in the scientific literature. In addition, other key sources of uncertainty, such as economic variables, the damage functions, and temperature change can have significant impacts on social costs and are highly uncertain, Gillingham et. al. 2015. Modeling Uncertainty in Climate Change: A Multi-model Comparison. Cowles Foundation Working Paper. No. 2022. These issues need to be better understood before using SCC and SCM-CH4 in policy making.

One reviewers' assessment of the IAMs led him to conclude: "These models have crucial flaws that make them close to useless as tools for policy analysis: certain inputs (e.g., the discount rate) are arbitrary, but have huge effects on the SCC estimates the models produce; the models' descriptions of the impact of climate change are completely ad hoc, with no theoretical or empirical foundation; and the models can tell us nothing about the most important driver of the SCC, the possibility of a catastrophic climate outcome. IAM-based analyses of climate policy create a perception of knowledge and precision, but that perception is illusory and misleading."

Response: The EPA disagrees that use of the Marten et al (2014) SC-CH_4 estimates is not warranted. The EPA has fully acknowledged and discussed the limitations associated with the SC-CO2 estimates and noted that these limitations likewise apply to the SC-CH4 estimates. See the EPA response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18, for discussion about the extensive reviews conducted before the estimates were applied to the RIA and for discussion about EPA's conclusions regarding the validity and rigor of the Marten et al (2014) SC-CH4 estimates as well as the interagency working group's SC-CO2 estimates.

The EPA disagrees with the commenter's conclusion that the three peer reviewers' conclusions regarding the consistency of the SC-CO_2 estimates and the SC-CH_4 estimates is "more modest than the EPA concludes"; see EPA's response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 15. The EPA also notes that this commenter (EPA-HQ-OAR-2010-0505-6884, Excerpt 20) has provided vague references to the peer reviewers' responses to support its argument (e.g., the commenter paraphrases statements, then attributes the paraphrased statement to "one peer reviewer" rather than identifying which of the three peer reviewers it's paraphrasing). Given that there were three different peer reviewers and the commenter failed to identify the specific peer reviewer or provide either exact quotes, the EPA cannot definitively determine the basis for the commenter's conclusions. However, the EPA has reviewed the Peer Reviewers' responses in light of the commenter's summary, and the Agency disagrees with the commenter's interpretation and concludes that the commenter has not identified shortcomings in the application of the SC-CH4 estimates.

For example, the commenter states that "One reviewer commented that the fact that methane is not explicitly modeled in two out of the three IAMs used makes the approach inconsistent with SCC." None of the three peer-reviewers concluded that the Marten et al. approach was "inconsistent" for this purpose– see response to Questions 1 and 2 from Peer Reviewer 1, 2, and 3. The commenter appears to be referring to the response from Peer Reviewer 1, which is much more nuanced than the commenter's summary suggests and is copied here:

"[Question] 2. Do you agree that the Marten et al. SC-CH4 estimates are consistent with the USG SC-CO_2 estimates?

[Peer reviewer 1,Response:] *"Consistent" can have many interpretations. I will say that the Marten et al. SC-CH4 estimates are computed in a similar way as the SC-CO2 estimates, so in this regard, the two estimates are "consistent." However, CO2 is more explicitly modeled in the three models than CH4 so in this regard they are not "consistent." However, this inconsistency is due to limitations of the models and I feel that Marten et al. have taken appropriate steps to address these limitations the best way possible. However, gaps still remain and should be recognized.*" (page 16)[9]

The commenter's paraphrasing has omitted crucial context, including the Peer Reviewer 1's observation that the SC-CH4 and SC-CO2 estimates are computed in a similar way and consistent in that respect, and further concludes that Marten et al. took "appropriate steps to address [the] limitations of the models," i.e., lack of explicit treatment of methane, in "the best way possible" (16)[10]. Furthermore, Peer Reviewer 2 noted in response to the same question that "the method put forward by Marten et al. (2014) is theoretically and empirically consistent with the original Social Cost of Carbon estimates" (17) [11]. See the EPA response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 13, for discussion about the extensive review of the changes made to capture methane chemistry in DICE and PAGE.

The commenter also referred to another reviewer's comments, without identifying which of the three reviewers, on the emissions perturbation approach used for methane. It appears that the commenter is referring to the comments from the third peer reviewer ("Peer Reviewer 3"), who provided technical comments on the implementation of the emissions perturbations in the models. The commenter incorrectly attributes their own conclusion ("the SCC and SC-CH4 estimates are likely not reliable") to the reviewer. The commenter has failed to provide evidence, such as specific quotations, from the peer-reviewers' written statements that demonstrate this conclusion of unreliability can be attributed to the peer reviewers. None of the three reviewers characterized the SC-CO2 or SC-CH4 estimates as "unreliable." Reviewer 3 focused on long-term research to improve the SC-CO2 estimates and suggested that the SC-CH4 estimates lag the SC-CO2 process. The EPA supports continued improvement in the SC-CO2 estimates developed by the IWG and agrees that improvements in the SC-CO2 estimates should also be reflected in the SC-CH4 estimates. However, the fact that the reviewers agree that the SC-CH4 estimates are generally consistent with the SC-CO2 estimates that are recommended by OMB's guidance on valuing CO2 emissions reductions, leads the EPA to conclude that use of the SC-CH4 estimates

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[9] See Docket ID EPA-HQ-OAR-2010-0505-5016. Also available at https://cfpub.epa.gov/si/si_public_pra_view.cfm?dirEntryID=291976 (see "SCCH4 EPA PEER REVIEW FILES.PDF").
[10] See Docket ID EPA-HQ-OAR-2010-0505-5016. Also available at https://cfpub.epa.gov/si/si_public_pra_view.cfm?dirEntryID=291976 (see "SCCH4 EPA PEER REVIEW FILES.PDF").
[11] See Docket ID EPA-HQ-OAR-2010-0505-5016. Also available at https://cfpub.epa.gov/si/si_public_pra_view.cfm?dirEntryID=291976 (see "SCCH4 EPA PEER REVIEW FILES.PDF").

is an analytical improvement over excluding methane emissions from the monetized portion of the benefit cost analysis (see DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 15).

Regarding the comment about the approach the interagency working group used to develop the SC-CO2 estimates, specifically averaging across socioeconomic scenarios for a specific discount rate: This comment about averaging across socioeconomic scenarios for a specific discount rate (DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 20), mirrors those submitted to the Office of Management and Budget's separate comment solicitation on the SC-CO_2 (78 FR 70586; November 26, 2013). As a member of the interagency working group (IWG) on SC-CO_2, the EPA has carefully examined and evaluated comments submitted to OMB's separate solicitation. The EPA has also carefully examined and evaluated all comments received regarding SC-CO2 and SC-CH4 through this rulemaking process and determined that the IWG responses to the comments on the OMB solicitation address the comments on the SC-CO2 methodology, including the comments on consideration of uncertainty and comments about averaging. The comments submitted to OMB's separate solicitation focused on SC-CO2 but apply with equal force to the Marten et al. SC-CH4 comments, given that the same methodology has been used. The EPA concurs with the IWG's response to the comments and hereby incorporates them by reference.[12] In particular, the EPA refers the commenter to the following passage from the OMB Response to Comments document:

> "…the information presented in the TSDs is sufficiently disaggregated to reflect the variability of the SCC estimates across models, input assumptions, and discount rates. In addition, the IWG has provided the full set of Monte Carlo modeling results (10,000 model runs for each combination, for a total of 450,000 observations per emissions year) to outside researchers upon request and will continue to do so.
>
> As discussed in the 2010 TSD, using the full distribution of the SCC estimates from the 45 scenarios would be impractical in a regulatory impact analysis. To produce a range of plausible estimates that still reflects the uncertainty about the SCC estimates, the results from the various model and scenario combinations (150,000 observations per emissions year for each of the three discount rates) were pooled to produce three separate probability distributions for the SCC for emissions in a given year, one for each assumed discount rate (2.5, 3 and 5 percent). Three point estimates were then derived from these pooled distributions representing the mean at each discount rate. The IWG considers this approach for presenting expected SCC values across a range of discount rates to be appropriate for representing the central tendency of the SCC estimates across scenarios. The fourth value, the 95th percentile of the pooled distribution using a 3 percent discount rate, is included to represent higher-than-expected economic impacts from climate change further out in the tail of the SCC distribution - i.e., impacts that may have lower probability of occurring but relatively high damages. For purposes of representing the uncertainties involved, the TSDs emphasized the importance of considering and presenting the full range of these four estimates in regulatory impact analysis." (pg 25-26)

[12] Referred to as the "OMB Response to Comments on SC-CO2." In particular, see pgs 25-28 at https://www.whitehouse.gov/sites/default/files/omb/inforeg/scc-response-to-comments-final-july-2015.pdf.

The commenter discusses differences in the models and identifies several broad categories ("economic variables, damage functions, and temperature change") as sources of uncertainty that can have significant impacts on the estimates, and refers to Gillingham et al. 2015 to recommend further research on these sources before using the SC-CO2 or SC-CH4 estimates in regulatory impact analysis. First, the EPA disagrees with the commenter's statement that the differences in the structure of the models has not been well explained. To the contrary, these differences have been properly reviewed and documented, and notes that the sensitivity of the SC-CH4 results to key factors have been explored. See the EPA response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 13, for complete discussion.

Second, the EPA's response to DCN EPA-HQ-OAR-2010-0505-6997, Excerpt 7, also addresses the commenter's concerns about uncertainty, and explains that EPA has fully acknowledged the uncertainty in both the SC-CO2 and SC-CH4 estimates, that the EPA has used the best available scientific, technical and economic information to derive the best estimates of costs and benefits that they can, and then communicated to the public the limitations and uncertainties, and concludes that this uncertainty does not undermine the use of the estimates in regulatory impact analysis. The EPA's response to DCN EPA-HQ-OAR-2010-0505-6997, Excerpt 7, also notes that the EPA and other members of the IWG are seeking independent expert advice on technical opportunities to update these estimates from the National Academies of Sciences, Engineering, and Medicine. A committee convened by the Academies is reviewing the state of the science on estimating the SC-CO2, and will provide expert, independent advice on the merits of different technical approaches for modeling and highlight research priorities going forward. The Academies' review focuses on the SC-CO2 methodology, but recommendations on how to update many of the underlying modeling assumptions will also likely pertain to the SC-CH4 estimates. Going forward, the EPA will evaluate its approach to estimating the SC-CO2 and SC-CH4 based upon any feedback received from the Academies' panel.

Third, with respect to the commenter's concerns about differences in the climate outcome of the modeled results to the same increase in emissions, specifically that the three models project different temperature changes and sea level rise: the commenter has failed to provide a citation that documents this result or provide any details that would allow the EPA to understand the basis for the commenter's conclusion. For example, it is unclear whether the commenter is referring to the NERA study, which compared the Marten et al. SC-CH_4 estimates to other estimates published in the literature or if the commenter is comparing the results between the three integrated assessment models—DICE, FUND, and PAGE—that Marten et al. (2014) used. As discussed in the EPA response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 6, there is variability in published estimates of the SC-CH_4 due to key methodological differences. Moreover, one would not expect the three IAMs to provide the same results. The advantages of using more than one IAM are discussed in the 2010 SC-CO2 TSD, which details the basis for the methodology for SC-CO2 and was used by Marten et al to estimate the SC-CH4: "The parameters and assumptions embedded in the three models vary widely. A key objective of the interagency process was to enable a consistent exploration of the three models while respecting the different approaches to quantifying damages taken by the key modelers in the field" (2010 SC-CO2 TSD, pg 6). See the EPA response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpts 6 and 13 for complete discussion.

The EPA acknowledges the commenter's reference to the Gillingham et al 2015 working paper about uncertainty. See the EPA response to DCN EPA-HQ-OAR-2010-0505-6884, Excerpts 150 and 171.

Regarding the commenter's reference to Pindyck (2013), which discussed the application of IAMs to policy analysis, see the EPA's response to DCN EPA-HQ-OAR-2010-0505-6997, Excerpt 8.

Commenter Name: Howard J Feldman
Commenter Affiliation: American Petroleum Institute
Document Control Number: EPA-HQ-OAR-2010-0505-6884
Comment Excerpt Number: 21

Comment: Discount Rate Chosen Is Not Appropriate For This Rulemaking.

The selection of a 2.5% discount rate by EPA is not appropriate given the shorter atmospheric lifespan of methane. EPA justified the use of a 2.5% discount rate for the SCC by citing the long atmospheric lifespan of carbon dioxide which may remain in the atmosphere for several hundred years. However, methane dissipates significantly faster than carbon dioxide, typically lasting 80 to 100 years, eliminating the potential intergenerational equity impacts or uncertainty about future growth that the IWG used for justification in the SCC. As NERA detailed, changing the discount rate by just one half of a percent could lower the SC-CH4 by as much as 37% in 2020.

Response: The EPA disagrees that the 2.5 percent discount rate is not appropriate for SC-CH4; see the EPA response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 8. Regarding NERA's alternative estimates of the SC-CH4, see the EPA response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 17.

Commenter Name: Howard J Feldman
Commenter Affiliation: American Petroleum Institute
Document Control Number: EPA-HQ-OAR-2010-0505-6884
Comment Excerpt Number: 22

Comment: EPA should identify and apply only the domestic impacts.

For the SC-CH4, EPA does not report the net benefits to the United States; it only reports the global net benefits. Both estimates are relevant to the assessment of the value of the rule to U.S. taxpayers. However, using only the global benefits instead of domestic benefits is not consistent with past practice in benefit cost analyses, and is contrary to OMB Circular A-4. In EPA's prior analyses of the SCC, it estimates that between 17% and 23% of global SCC benefits actually accrue to the U.S. Using the PAGE and FUND models, NERA estimated that the using only the domestic damages would lower the SC-CH4 by 76% to 92% in 2020, respectively. Attachment E

shows that the 2025 annual net benefits to the U.S. will range between $-1.1 and -$0.6 billion. By considering only the global benefits rather than domestic benefits, the EPA is suggesting that the benefits the U.S. can expect from the proposed rule are significantly larger than what may actually accrue to the U.S.

A complete review of EPA's analysis of baseline emissions conducted, emission reduction and cost estimates is detailed in Attachment E. [Attachment E is excerpted by topic covering multiple sources].

Response: The EPA disagrees that the focus on a global estimate of the SC-CH4 is inconsistent with OMB guidance and disagrees that the focus on global estimates is inappropriate; see the EPA response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 7, for complete discussion, including the justification for using global values.

The EPA notes that the commenter has failed to provide a citation for its assertion that the EPA's "prior analyses of the SCC" have provided domestic estimates of the SC-CO2 "between 17 and 23 percent" of the global SC-CO2. The EPA notes that since the U.S. interagency working group (IWG) issued interim SC-CO2 values in 2009, the Agency has used only global estimates of the SC-CO2 in rulemaking analyses, consistent with the IWG's conclusions on use of global values. The EPA response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 7 also discusses the limitations of domestic estimates of the SC-CO2.

Regarding NERA's alternative estimates of the SC-CH4, see the EPA response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 17.

Regarding the "review of EPA's analysis of baseline emissions conducted, emission reduction and cost estimates," which was provided in commenter's Attachment E, see DCN EPA-HQ-OAR-2010-0505-6884, Excerpts 150, 152, 171, and 173.

Commenter Name: Howard J Feldman
Commenter Affiliation: American Petroleum Institute
Document Control Number: EPA-HQ-OAR-2010-0505-6884
Comment Excerpt Number: 150

Comment: ***OVERVIEW OF ISSUES ASSOCIATED WITH THE SOCIAL COST OF METHAN***E

There are numerous issues associated with the use of the SC-CH4 estimate to quantify potential benefits of methane emission controls. The SC-CH4 is derived using an approach that the EPA claims is "consistent with" the Interagency Working Group (IWG) approach for estimating the SCC. Therefore the SC-CH4 inherits all of the weaknesses of the SCC and it is far from clear that either the SCC or SC-CH4 provide the "scientifically and economically defensible" estimates that are required for conducting meaningful benefit–cost analysis. The EPA asked

three peer-reviewers to evaluate the SC-CH4 estimates and they identified serious concerns with estimates. (See Section 3.1)

The SC-CH4 was derived based on modeling results from three Integrated Assessment Models (IAMs) that are the basis for the SCC estimates as well. The three IAMs predict different climate impacts from the same change in emissions. It is not clear whether this reflects true scientific uncertainty or inconsistencies in the modeling (EPRI 2014). Even if the results do reflect scientific uncertainty, Gillingham et al. (2015) show relying on variation in model outcomes as a measure of uncertainty captures only a small fraction of the total variation in many important climate change outcomes. They also show that assumptions about the rate of technological change can have a profound effect on the estimates of SCC. Most importantly, the monetary damage functions that underlie these IAMs have no theoretical basis (Pindyck 2013).

The range of discount rates used by the EPA reflects the rates typically used in U.S. policy analysis. However, if EPA wants to illustrate the potential global benefits, the illustration should include the discount rates used by other nations Florio and Sirtori (2013) report that discount rates used by governments throughout the world range from 3 to 15 percent. As Pindyck (2013) states, the choice of discount rates in climate change IAMs is arbitrary, yet it has huge effects on the estimated social cost of emissions generated.

Response: The EPA has fully acknowledged and discussed the limitations associated with the SC-CO_2 estimates and noted that these limitations likewise apply to the SC-CH_4 estimates. See the EPA response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18, for discussion about the extensive reviews conducted before the estimates were applied to the RIA and for discussion about EPA's conclusions regarding the validity and rigor of the Marten et al (2014) SC-CH4 estimates as well as the interagency working group's SC-CO2 estimates.

The EPA disagrees with the commenter's characterization of the three peer reviewers' conclusions regarding the application of the SC-CH_4 estimates; see DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 20.

Regarding the comment that the three IAMs predict different climate impacts from the same change in emissions, see DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 20.

Regarding the commenter's reference to EPRI (2014), which discusses potential inconsistencies between scenarios and IAMs used to estimate the interagency working group's SC-CO2 estimates: see DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 171.

Regarding the commenter's reference to Gillingham et al. (2015), the EPA acknowledges and has reviewed this working paper with interest but has also determined that the Marten et al. (2014) estimates are scientifically defensible for valuing methane impacts in regulatory analyses and improve upon prior treatment of methane impacts in regulatory analysis (see also EPA response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18). The EPA also notes that beyond identifying an active area of research and emphasizing the importance of exploring, documenting, and assessing uncertainties, the commenter has not provided evidence that contradicts the EPA's determination that the Marten et al. improve upon prior treatment of

methane impacts in regulatory analysis. The EPA's response to DCN EPA-HQ-OAR-2010-0505-6997, Excerpt 7, addresses the commenter's concerns about uncertainty, and explains that the EPA has fully acknowledged the uncertainty in both the SC-CO2 and SC-CH4 estimates, that the EPA has used the best available scientific, technical and economic information to derive the best estimates of costs and benefits that they can, and then communicated to the public the limitations and uncertainties, and concludes that this uncertainty does not undermine the use of the estimates in regulatory impact analysis, and finally, discusses the National Academies process underway to provide the EPA and other members of the interagency working group expert, independent advice on the merits of different technical approaches for modeling and highlight research priorities going forward.

Regarding the commenter's reference to Pindyck (2013), which discussed the application of IAMs to policy analysis, see the EPA's response to DCN EPA-HQ-OAR-2010-0505-6997, Excerpt 8.

Regarding the commenter's recommendation to use the discount rates reported in Florio and Sirtori (2013)[13]: First, Florio and Sirtori (2013) is a working paper that has not been peer-reviewed and it relies on outdated sources. For example, Table 1 is meant to report social discount rates applied by selected countries and it cites a 2007 publication for the United States; it does not capture the 2010 guidance from the U.S. Interagency Working Group on discounting. The outdated reporting of discount rates for the U.S. in this table suggests that the discount rates reported for other countries may likewise not be those currently applied in practice. The most recent source in Table 1 was published in 2010; the remaining sources are dated 2003 through 2007.

Second, it is unclear which discounting approach or discount rate the commenter recommends specifically, as the range listed by the commenter appears to be from Table 1 of Florio and Sirtori, however, that table reports rates based on different methodologies (e.g., rate of returns on private investment and consumption discount rates) and for different purposes (e.g., intra- and inter-generational contexts). The high end of the range presented by the commenter (15 percent) is based on rates of return on private investments in the countries reviewed in the study. Citing additional economic literature, the authors of the study note that this "approach tends to be biased toward high estimates of the [social discount rate]. First of all, externalities, monopoly, rationing, incomplete information and other market failures distort private investment returns and may generate private investment returns higher than the social ones. Second, the observed private return on investments usually includes a risk premium." This comment regarding using private rates of return on capital for discounting mirrors ones submitted to the Office of Management and Budget's separate comment solicitation on the SC-CO_2 (78 FR 70586; November 26, 2013). As a member of the interagency working group (IWG) on SC-CO_2, the EPA has carefully examined and evaluated comments submitted to OMB's separate solicitation. The EPA has also carefully examined and evaluated all comments received regarding SC-CO2 and SC-CH4 through this rulemaking process and determined that the IWG responses to the comments on the OMB solicitation address the comments on the SC-CO2 methodology, including the comments on consideration of discount rates that represent rates of return on

[13] See http://www.csilmilano.com/docs/WP2013_03.pdf

private capital. The comments submitted to OMB's separate solicitation focused on SC-CO2 but apply with equal force to the Marten et al. SC-CH4 comments, given that the same methodology has been used. The EPA concurs with the IWG's response to the comments and hereby incorporates them by reference.[14] In particular, the EPA refers the commenter to the following passage from the OMB Response to Comments document: "The IWG examined the economics literature and concluded that the consumption rate of interest is the correct concept to use in evaluating the net social costs of a marginal change in CO2 emissions, as the impacts of climate change are measured in consumption-equivalent units in the three IAMs used to estimate the [SC-CO2]. This is consistent with OMB guidance in Circular A-4, which states that when a regulation is expected to primarily affect private consumption, for instance, via higher prices for goods and services--it is appropriate to use the consumption rate of interest to reflect how private individuals trade-off current and future consumption."

The EPA further notes that Florio and Sirtori developed an approach to estimate the consumption rate of interest based on Ramsey to estimate the social discount rate for some countries of the European Union. Florio and Sirtori report an average discount rate of 2.97 for 20 different EU countries in Table 2. Given that this average rate for the appropriate discount rate metric in this context, and nearly all of the country-specific rates in Table 2, fall within the range of discount rates (2.5, 3, 5 percent) applied to the U.S. interagency working group's SC-CO2 estimates and the Marten et al. (2014) SC-CH_4 estimates, it is unclear what change the commenter is recommending be made to the discount rates. The rationale for the discount rates (2.5, 3, and 5 percent) is presented in the RIA, Section 4.3, which also references the more detailed discussion in the 2010 SC-CO2 Technical Support Document. See pages 17-23 of the SC-CO2 TSD for discussion about why the IWG did not use a Ramsey approach and the rationale for selecting 2.5, 3, and 5 percent.[15]

See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18 for additional discussion about the selection of the discount rates applied to the SC-CO2, which were also applied to the SC-CH4. The EPA response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 8 discusses application of the 2.5 percent discount rate to estimate the SC-CH4. The EPA response to DCN EPA-HQ-OAR-2010-0505-6997, Excerpt 6 discusses the difficulty in selecting an appropriate discount rate for intergenerational analyses and references the extensive review and consideration given to this important issue by the EPA.

Commenter Name: Howard J Feldman
Commenter Affiliation: American Petroleum Institute
Document Control Number: EPA-HQ-OAR-2010-0505-6884
Comment Excerpt Number: 152

Comment: ***U.S. VS. GLOBAL IMPACT***S

[14] Referred to as the "OMB Response to Comments on SC-CO2." In particular, see pgs 25-28 at https://www.whitehouse.gov/sites/default/files/omb/inforeg/scc-response-to-comments-final-july-2015.pdf.
[15] See https://www.whitehouse.gov/sites/default/files/omb/inforeg/for-agencies/Social-Cost-of-Carbon-for-RIA.pdf

In the RIA analyses, EPA only reports the global benefits for SC-CH4, despite the fact they are required to show the U.S. benefits. While exact numbers for the U.S. are not provided by EPA, the EPA previously estimated that between 7 percent and 23 percent of global SCC total benefits actually accrue to the U.S. Using this range we computed the U.S. net benefits by subtracting between 7 and 23 percent of total benefits from 100 percent of the costs in the Monte Carlo model. This results in a range of net benefits from -$1.07 to -$0.56 billion in 2025.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 22. Also, the commenter has provided an incorrect citation. Commenter's footnote 6 was presented as "EPA 2015. Response to Comments: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866." There is no such document published by the EPA. The commenter has failed to provide any other identifying information, such as an Internet address, that would allow the EPA to determine what publication the commenter meant to cite. There is a Response To Comments document with a similar title but it was published by the Office of Management and Budget on behalf of the U.S. Interagency Working Group on Social Cost of Carbon, see https://www.whitehouse.gov/sites/default/files/omb/inforeg/scc-response-to-comments-final-july-2015.pdf . The OMB Response to Comments document does **not**, as the commenter has stated, refer to an EPA analysis that "*previously estimated that between 7 percent and 23 percent of global SCC total benefits actually accrue to the U.S.*" The complete citation and context for the range of 7-23 percent for a domestic SCC is discussed in DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 22.

Commenter Name: Howard J Feldman
Commenter Affiliation: American Petroleum Institute
Document Control Number: EPA-HQ-OAR-2010-0505-6884
Comment Excerpt Number: 171

Comment: ***SOCIAL COST OF METHANE***

The RIA used a paper by Marten et al. (2014) to determine the SC-CH4 estimates. The RIA claims that the Marten approach is "consistent with" methods used to develop the SCC. This is important to the EPA, as the SCC has been approved for use in RIAs by OMB; to the extent that there is consistency of the SC-CH4 with the SCC, then the imprimatur of the OMB may attach to the SC-CH4. Given that OMB approval does not necessarily verify that the SCC provides a scientifically and economically defensible basis for a benefit-cost analysis, in this section we examine consistency between the SC-CH4 and the SCC.

The methodology used by Marten et al. (2014) is similar to the IWG approach to estimating SCC in that it uses the same:

- Three IAMs;
- Five socio-economic and emissions scenarios;
- Discount rates; and
- Approach for averaging social costs across scenarios and IAMs.

One of the three IAMs, FUND, handles CH4 explicitly. The other two IAMs, PAGE and DICE, were modified by Marten et al. using a simple CH4 gas model to make it consistent across IAMs. The EPA asked three peer-reviewers to provide an assessment of the SC-CH4 and concluded that the reviewers generally agree that the SC-CH4 estimates are consistent with the SCC estimates. Moreover, because OMB guidance supports the use of SCC estimates, the EPA decided that a finding concluding that the SC-CH4 was consistent with SCC estimates justified the use of the SC-CH4 estimates, and further stated that the SC-CH4 estimates were an "analytical improvement" over their exclusion.

After reviewing the available data and studies, as well as the reviewers' comments, ERM believes that the use of the SC-CH4 estimates is not warranted at this time, for the following reasons:

- The three peer reviewers' endorsement of the "consistency" of the SC-CH4 estimates was far more modest than the EPA asserts. Further, the reviewers identified key uncertainties with the approach being used.
- All of the challenges with estimating the SCC apply to estimating the SC-CH4. These challenges seriously affect the scientific and economic reliability and usefulness of both the SCC and SC-CH4 in the foreseeable future.
- The SC-CH4 (and SCC) estimates are highly uncertain and the causes of the uncertainty are not well understood.

*3.1 MODEST PEER REVIEW ENDORSEMENT OF THE "CONSISTENCY" OF THE SC-CH*4 *ESTIMATE*S

The EPA notes that benefit-cost analysis must provide estimates that are produced in a "scientifically and economically defensible manner". Interestingly, the seven charge questions from EPA to the peer reviewers did not directly ask whether the SC-CH4 estimates are scientifically and economically defensible. Instead, the charge questions are concerned with: the consistency of the SC-CH4 estimates with the SCC estimates; whether the latest direct SC-CH4 estimates are better than SC-CH4 estimates based on global warming potential (GWP); and whether better SC-CH4 estimates currently exist. That the reviewers are never asked whether the SC-CH4 estimates used in the RIA are reliable and appropriate for use in policy analysis is an important omission.

The EPA asserts that the reviewers generally agree that the SC-CH4 estimation methods are consistent with SCC. This clearly is an overstatement. One reviewer agrees that the SC-CH4 estimates are consistent with the SCC. However, a second reviewer offers this assessment:

The term "Consistent" can have many interpretations. I will say that the Marten et al. SC-CH4 estimates are computed in a similar way as the SC-CO2 estimates, so in this regard, the two estimates are "consistent." However, CO2 is more explicitly modeled in the three models than CH4 so in this regard they are not "consistent."

The reviewer goes on to point out that inconsistencies reflect the limitations of models and that there are gaps that need to be understood, despite the Marten et al. attempts to address them.

The third reviewer also expressed concerns about specific consistency issues. Although all of the damages for SCC and SC-CH4 are reported on a per ton basis, the magnitude and duration of the perturbations that are used to estimate the damages vary across all of the IAMs for SCC and are different than what is used for SC-CH4. For example, for SCC, DICE uses a one Giga-ton carbon shock over a decade, while Marten et al. use a 1 million ton shock in a single year. Similarly, the SC-CH4 models that compute CH4 concentrations and radiative forcing differ from PAGE's approach for non-CO2 emissions. The implications of these differences are not well understood. More importantly, the reviewer believes that any consistency that does exist is a "serious problem", because it means the SC-CH4 inherits all of the problems of the SCC estimates. This reviewer also points out that while the Marten et al. paper has been peer-reviewed, the underlying IAM models and the multi-model averaging approach have not.

Thus, in our view, reliance upon the SC-CH4 estimates based on their purported consistency with the SCC cannot be justified.

*3.2 ALL OF THE CHALLENGES WITH ESTIMATING THE SCC APPLY TO ESTIMATING THE SCCH*4

The challenges with using the SCC estimates are well documented. We summarize the key issues here.

EPRI (2014) provides an in-depth technical assessment of the SCC estimates. Their goal is to understand the key drivers of the damage estimates, the reliability of the results, and whether estimates can be improved. They focus on three areas: climate; emissions; and damages.

They find significant differences across the three IAMs in the predicted temperature change and sea level rise change from the same increase in emissions and same underlying socioeconomic conditions. The temperature responses result from differences in the modeling of the carbon cycle, non-CO2 radiative forcing, and climate sensitivity. Even in the short-term, through 2040, the IAMs can yield temperature changes that vary across models by a factor of two for the same emissions scenario.

The economic damage functions linked to these temperature changes and sea level rise estimates are also very different. For example, one IAM shows gains in GDP through 2100 for some scenarios with increased emissions, while the other two IAMs show losses for the same scenarios and emissions. The three models also show wide variation in the impact on the GDP of different countries and for different types of economic costs (i.e., agriculture, heating and cooling). The damage functions themselves are arbitrary and not based on significant empirical data or economic theory (NERA 2014). For example, one can easily plot two damage functions that are both consistent with the few current data that are available, but which produce widely different damages in the distant future.

EPRI concludes that the significant differences in the structure of the models, which lead to significant differences in the damages estimates, are not well understood or explained. As a result, EPRI concludes that it is difficult to assess whether the differences reflect true scientific uncertainty (and therefore they should be retained) or the differences are topics that should be resolved and standardized.

The EPRI results also call into question the USG approach of averaging the SCC models across different socioeconomic scenarios to form a single estimate of the SCC for a particular discount rate. EPRI concludes that the inconsistencies in the models, the lack of robustness of the models, and the fact that they may not be truly independent may make such averaging inappropriate. In our view, such averaging may also be inappropriate because it assumes that each estimate is equally reliable and obscures the true uncertainty about the SCC that exists in the scientific literature. Gillingham et al. (2015) conclude that the concept of relying on an ensemble of models to capture total uncertainty is not theoretically sound and furthermore, based on their empirical data, is a "deficient" approach, because it fails to capture the full range of uncertainty that affects the models. Moreover, they believe their results highlight the importance of additional research on the role economic variables and damage functions to improve climate-change policy making.

EPRI provides six specific recommendations for improving public and scientific confidence in SCC estimates: conducting more detailed analyses of the differences among the IAMs to better understand and determine which differences and uncertainties to retain; additional peer review of the IAMs; integration (i.e., weighting of the results); better documentation of the approach; more complete justification on the methods; and guidance on their use.

Other reviewers have been even less enthusiastic. Pindyck's (2013) review of the IAMs led him to conclude:

These models have crucial flaws that make them close to useless as tools for policy analysis: certain inputs (e.g., the discount rate) are arbitrary, but have huge effects on the SCC estimates the models produce; the models' descriptions of the impact of climate change are completely ad hoc, with no theoretical or empirical foundation; and the models can tell us nothing about the most important driver of the SCC, the possibility of a catastrophic climate outcome. IAM-based analyses of climate policy create a perception of knowledge and precision, but that perception is illusory and misleading.

The SCC estimates' sensitivity to model parameters can also be found in the SC-CH4 estimates. ERM obtained the DICE model, data and computer code from Dr. Marten. In our evaluation, we found that changing the parameter on temperature squared in the assumed damage function of the DICE model for SC-CH4 by 0.000020405 (25%) changes the estimated SC-CH4 for 2025 by $200. Similarly, changing the global total factor productivity for the assumed process that generates output by 0.0075805 (25%) changes the SC-CH4 by $350. Our evaluation demonstrates that small changes in arbitrary functions have significant effects on SC-CH4 estimates.

3.3 THE SC-CH4 ESTIMATES ARE NOT WELL UNDERSTOOD AND HAVE NOT BEEN FULLY VETTED

As discussed above, the SCC estimates suffer from significant uncertainties about their sensitivity to the myriad assumptions embedded in the models, the impacts of which are poorly understood. These same uncertainties also plague the SC-CH4 estimates and are understated in the RIA. The uncertainties undermine the usefulness of resulting values in benefit-cost analysis at this time.

First, the degree of uncertainty in the estimates is unrepresented in the RIA. For any discount rate and emission year, the RIA reports the SC-CH4 as a single number. However, looking across the IAM models reveals a significant range of potential values. For example, for a 3 percent discount rate and incremental emissions occurring in 2020, the SC-CH4 is reported as $1,200 in Marten et al. However, Appendix B of the Marten et al. paper indicates that across the 3 IAMs and 5 socioeconomic policy scenarios (including the scenario average), the average SC-CH4 is $1,200 with a standard deviation of $251 (or approximately 20 percent of the average value). However, even this range underreports uncertainty. Each of those 15 estimates (i.e., 3 IAMs and 5 scenarios) is the average of 10,000 Monte Carlo simulations. Looking across the entirety of the SC-CH4 estimates from these simulations yields a standard deviation of $1,720, 138 percent of the average SC-CH4, nearly 6 times as high.

It is critical that the causes of variability of the SC-CH4 estimates be fully understood before they are used in policy analysis. As the authors of the FUND model note, many of the assumptions about the appropriate distributions that should be used to characterize the uncertainty are expert "guesses" (Anthoff, et al. 2014). Furthermore, in another paper Anthoff reports that parameters on cooling energy demand, migration, climate sensitivity, and agriculture are uncertain and have a significant impact on model results, but the first two have not been largely researched (Anthoff, et al. 2013).

EPA benefit cost-guidance also recommends providing undiscounted values, which would provide more insights into the issues surrounding uncertainty and the appropriate discount rate. (EPA 2010, pp. 6-18). However, that data was not discussed in the RIA.

ERM estimated the undiscounted benefits for the four socioeconomic scenarios using the DICE model. Modifying Dr. Marten's computer code, we produce the undiscounted social costs by year for 1 ton emission of CH4 that occurs in 2025 and 2045, and calculate the percentage of total social costs occurring before and after year 2100. Table 3.1 [Table 3-1. Percent of Undiscounted Social Costs of Methane Occurring Before and After 2100 (2007$) shows results under Image, Merge and Message Socio-economic modes for Emissions in 2025 and 2045] shows the results of our evaluation. The results show that the vast majority ($4 out of every $5 dollars) of social costs associated with methane emissions after the year 2100, which is the time period for which the temperature rise, baseline emission, and socio-economic projections are speculations at best. Higher discount rates effectively shorten the time period that are included in the benefits estimates.

The potential role of discount rates is also important because of the supposed global nature of the benefits. While lower discount rates may be the norm for the U.S. and developed countries, the discount rates for other countries (who will enjoy most of the benefits) may be significantly higher. For example, Lopez (2008) reports that a social discount rate for nine Latin American countries could range from 3 to 7 percent, depending on future growth rates. Florio and Sirtori (2013) report that discount rates being used throughout the world range from 3 to 15 percent. Therefore, if the EPA prefers to illustrate their estimated global benefits, they should base them on global discount rates. Moreover, a 7 percent discount rate is still the preferred rate regulatory impact analysis by the OMB and should be included in the RIA for the required analysis of domestic benefits (OMB, 2003).

To better understand the impact of using a higher discount rate, we estimated SC-CH4 using the DICE model. The results show that moving to the 7 percent discount rate reduces the SC-CH4 estimates by over two-thirds (Table 3-2) [Table 3.2. Impact of Discount Rates on SC-CH4 in the DICE Model (2007$). Table shows a difference of (-$641 or -68% for 2025 and ($1,059 or -64% for 2045)]. Technically, this result only applies to the DICE model. However, if the same percentage decline is applied to the 2020 SC-CH4 EPA used in the RIA, the value would drop from $1,300 to $403.

Response: The EPA disagrees that use of the Marten et al. (2014) SC-CH_4 estimates is not warranted. The EPA has fully acknowledged and discussed the limitations associated with the SC-CO2 estimates and noted that these limitations likewise apply to the SC-CH4 estimates. See the EPA response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18, for discussion about the extensive reviews conducted before the estimates were applied to the RIA and for discussion about EPA's conclusions regarding the validity and rigor of the Marten et al (2014) SC-CH4 estimates as well as the interagency working group's SC-CO2 estimates.

The EPA disagrees with the commenter's conclusion that the three peer reviewers' conclusions regarding the consistency of the SC-CO_2 estimates and the SC-CH_4 estimates is "more modest than the EPA concludes"; see the EPA's response to DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 20, for complete response to this point.

The EPA disagrees that "the reviewers are never asked whether the SC-CH4 estimates used in the RIA are reliable and appropriate for use in policy analysis." All seven of the questions posed to the reviewers addressed this issue. Several questions (#1, #4, #5) directly asked the reviewers about the appropriateness[16] (emphasis added here):

> "1. Has EPA correctly interpreted the SC-CH4 estimates provided in Marten et al. (2014) as designed to measure the monetized value of the climate impacts from marginal changes in CH4 emissions **in a way that is appropriate for use in benefit-cost analysis** of regulatory actions projected to change CH4 emissions?

[16] For a copy of the seven questions posed to the peer reviewers and their responses, see Docket ID EPA-HQ-OAR-2010-0505-5016. Also available at https://cfpub.epa.gov/si/si_public_pra_view.cfm?dirEntryID=291976 (see "SCCH4 EPA PEER REVIEW FILES.PDF")

4. Do you agree with EPA's assessment that direct estimates of the SC-CH4, as developed by Marten et al., **are more appropriate for monetizing changes** in CH4 emissions than using the GWP to scale the USG SC-CO2?

5. **Are there other existing approaches** for monetizing the benefits (or dis-benefits) to society from reductions (increases) in CH4 emissions **that should be considered** in regulatory analysis?"

RIA Section 4.3 provides a detailed explanation of the extensive reviews conducted related to the valuation of methane impacts and the Marten et al. estimates. In particular, the RIA clearly notes that the *application* of Marten et al.'s estimates to benefit-cost analysis of a regulatory action is analogous to the use of the SC-CO2 estimates; the peer-review discussed by the commenter in this excerpt was designed to obtain input on whether that application was consistent with the application of the interagency working group's (IWG) SC-CO2 estimates and therefore appropriate. The charge questions highlighted above demonstrate that the EPA asked reviewers to consider the appropriateness of the application and whether **other** methods would be more appropriate than the Marten et al. SC-CH4 estimates.

As discussed in the EPA response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18, the EPA evaluated the peer-review of the application as well as other and inputs—including the peer review conducted on the Marten et al. methodology prior to publication in a reputable journal and a long history of public comments supporting application of directly modeled estimates of the SC-CH4 to value methane impacts in regulatory impact analysis—before making its determination that the Marten et al. (2014) SC-CH4 estimates are scientifically and economically defensible and appropriate for use in regulatory impact analysis. The link between the SC-CH4 methodology and the SC-CO2 methodology is important, given the extensive review conducted for the IWG SC-CO2 estimates. The EPA has determined that the IWG's SC-CO2 estimates represent the best scientific information on the impacts of climate change available in a form appropriate for incorporating the damages from incremental CO2 emissions changes into regulatory analyses.[17]

See also response to DCN EPA-HQ-OAR-2010-0505-6997, Excerpt 2, which states that without estimates of the SC-CO_2 and SC-CH_4, the effect of a change in CO_2 and CH_4 emission changes, respectively, would be considered qualitatively, but could not be quantified in the bottom-line benefit cost estimates. In 2007 the Ninth Circuit Court remanded a fuel economy rule to DOT for

[17] See also Coalition for Responsible Regulation v. EPA, No. 09-1322 (D.C. Cir. June 26, 2012) slip op. p. 27 ("State and Industry Petitioners assert that EPA 'delegated' its judgment to the IPCC, USGCRP, and NRC by relying on these assessments of clime-change science. This argument is little more than a semantic trick….EPA simply did here what it and other decision-makers often must do to make a science-based judgment: it sought out and reviewed existing scientific evidence to determine whether a particular finding was warranted. It makes no difference that much of the scientific evidence in large part consisted of 'syntheses' of individual studies and research. Even individual studies and research papers often synthesize past work in an area and then build upon it. This is how science works. EPA is not required to re-prove the existence of the atom every time it approaches a scientific question.")

failing to monetize the benefits of the CO2 emissions reductions in its regulatory impact analysis, noting that "the value of carbon emissions reduction is certainly not zero."[18]

Regarding the commenter's summary of EPRI (2014), which focuses on the IWG SC-CO2 estimates, the EPA notes that the agency has already reviewed the EPRI (2014) report and responded to the EPRI findings in the U.S. EPA Response to Comments document for the Clean Power Plan[19]. The EPA has also carefully examined and evaluated EPRI (2014) findings regarding SC-CO2 through this rulemaking process and determined that EPA's responses to the comments in the Clean Power Plan address the comments raised in this comment excerpt about the SC-CO2. The EPA hereby incorporates its response to those comments in the Clean Power Plan by reference.[20,21] In particular, the EPA refers the commenter to:

- Clean Power Plan Response to Comments, Section 8.7.2, Comment 1, for response to the EPRI (2014) report findings on the IAMs (including: potential inconsistencies between scenarios and IAMs; potential inconsistencies beyond the year 2100; damage functions) and all of the EPRI recommendations, except for the recommendation on guidance for use of the SC-CO_2 estimates, that were referenced by this commenter.
- Clean Power Plan Response to Comments, Section 8.7.2, Comment 4, for response to the EPRI (2014) report findings on uncertainty, including the comments on treatment of uncertainties standardized across models, the treatment of model structure uncertainty, and analysis of model-specific parametric uncertainty.
- Clean Power Plan Response to Comments, Section 8.7.2, Comment 8, for response to the EPRI (2014) comment on aggregation of the SC-CO_2 estimates across socioeconomic scenario for a discount rate and recommendation for guidance on the use (i.e., application) of the SC-CO_2.

Regarding differences across the three IAMs, including predicted temperature change and sea level rise for same increase emissions and underlying socioeconomic scenarios, and the differences in damage functions as it relates to the SC-CH_4 estimates: see DCN EPA-HQ-OAR-2010-0505-6969, Excerpts 6, 13, 14. See also DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 20, for response to comments about differences in the climate outcome of modeled results to the same increase in emissions.

Regarding Gillingham et al. (2015): the EPA recognizes uncertainty as an important area of consideration and notes that the findings from the Gillingham et al. working paper relate to treatment of uncertainty. Gillingham et al. found greater parametric uncertainty than structural uncertainty and concluded that this suggests a "need for a re-orientation of research towards

[18] http://cdn.ca9.uscourts.gov/datastore/opinions/2007/11/14/0671891.pdf
[19] Section 8.7.2 in EPA's Responses to Public Comments on the EPA's *Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units*, August 2015, Docket ID EPA-HQ-OAR-2013-0602-37106.
[20] See Section 8.7.2, pgs 27-85.
[21] While the commenter did not explicitly link (a) the 2014 EPRI report's analysis of scenarios and the IAMs that the interagency working group used to estimates the SC-CO_2 to (b) the Marten et al. SC-CH_4 estimates, EPA notes that the Agency's response here is also applicable to the Marten et al. SC-CH_4 estimates, as the methodology, including scenarios and IAMs, is linked to the SC-CO_2 methodology.

examining parametric uncertainty across models" (pg 42). See the EPA response to DCN EPA-HQ-OAR-2010-0505-6884–A1, Excerpt 150, for discussion about EPA's determination that the IWG SC-CO2 and Marten et al. (2014) SC-CH4 estimates are valid and ongoing efforts to improve characterization of uncertainty in the estimates.

Regarding the commenter's reference to Pindyck (2013), which discussed the application of IAMs to policy analysis, see the EPA's response to DCN EPA-HQ-OAR-2010-0505-6997, Excerpt 8.

Regarding the commenter's concerns about uncertainty, including the causes of uncertainty, for both the SC-CO2 and SC-CH4 estimates, see the EPA's response to DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 20. The EPA also notes that the commenter incorrectly states the RIA reports a single SC-CH4 for any discount rate and emission year. The RIA reports two estimates of the SC-CH4—the average SC-CH4 and the 95th percentile SC-CH4—at the 3 percent discount rate for each emission year. Moreover, the EPA has responded to the commenter's concern about averaging across socioeconomic scenarios for a specific discount rate for both SC-CO2 and SC-CH4; see response to DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 20.

Regarding the comment about uncertain parameters and the estimation of the SC-CH4, and the references to Anthoff et al. 2013 and 2014, EPA notes that it continues to monitor the literature. See the EPA response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18, which notes that the Marten et al. SC-CH_4 estimates represent the best scientific information on the impacts of climate change available in a form appropriate for incorporating the damages from incremental CH_4 emissions changes into regulatory analysis, that the EPA will continue to consider these comments and will share the recommendations with the IWG as it moves forward with the National Academies process.

Regarding the comment that the SC-CH4 estimates are sensitive to model parameters, see EPA response to DCN EPA-HQ-OAR-2010-0505-6997, Excerpt 2. The EPA notes that the results of any model will change when the input assumptions and model parameters are changed. However, demonstrating this fact based on an arbitrary adjustment of the parameters of one model does provide any information as to the defensibility of the SC-CH4 estimates. The commenter does not even claim that the parameters they used in this experiment are defensible estimates of the underlying parameters or should be used in place of the ones estimated by the model developers based on the underlying scientific literature. The EPA notes that the RIA provides a detailed discussion about the methodology, including the basis for the input parameters, the limitations and uncertainty about the estimates, as well as references to the detailed supporting documentation, such as Marten et al. (2014) and the 2010 SC-CO2 Technical Support Document.

Regarding the comment that the presentation of benefits are inconsistent with the EPA Economic Guidelines (2010): The EPA notes first that page 6-18 states that the recommendations are "intended as practical and plausible default assumptions rather than comprehensive and precise estimates of social discount rates that must be applied without adjustment in all situations" (EPA 2010). Given that the benefits of controlling a longer-lived stock pollutant, such as methane, are expected to occur over very long time horizons, EPA determined that presenting the present

value of the stream of benefits is the appropriate approach for this rulemaking. Moreover, the estimates of total benefits presented in the RIA are consistent with the specific recommendation highlighted by the commenter, i.e., to present the benefits "as they are projected to occur." The RIA, section 4.3, presents tables showing the estimated climate-related benefits associated with methane emission reductions that occur in the years 2020 and 2025. The marginal values, i.e., the SC-CH_4 estimates, used to estimate the climate-related benefits, are consistent with standard economic theory and practice in that they represent the present value of the stream of damages associated with forgone emissions in a given year. For example, the Marten et al. SC-CH_4 estimate for the year 2020 is an estimate of the present value of additional damages expected to be borne by society from the year 2020 through the year 2300 as a result of an incremental ton being emitted in 2020. The application of the SC-CH_4 appropriately considers the timing of climate impacts from methane emissions and appropriately discounts these monetized values.

Regarding the ERM estimates of SC-CH_4, based on DICE, and the commenter's statement that the majority of undiscounted benefits associated with methane emissions occurs after the year 2100: The commenter has not provided sufficient information for the EPA to respond to their finding about the distribution of methane impacts. The commenter states that ERM "modified" the computer code but does not provide any information about what modifications were made. Furthermore, the EPA disagrees that the time horizon should be shortened because of uncertainty. While EPA cannot verify ERM's reported results on the temporal distribution of methane impacts, the commenter's statement suggests that using too short a time horizon could miss a significant fraction of damages. The EPA has already responded to comments about the uncertainty and noted the uncertainty does not undermine the use of the estimates in the regulatory impact analysis (see the EPA's response to DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 20). For additional discussion about the appropriate time frame to consider for methane emissions, see the EPA response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 8.

Regarding the commenter's assertion that the role of discount rates is important because of the global nature of the SC-CH4, see the EPA response to DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 150.

The EPA disagrees that the discounting rate approach and focus on global estimates violates OMB guidance. See the EPA response to DCN EPA-HQ-OAR-2010-0505-6997, Excerpts 10 through 12.

Commenter Name: Howard J Feldman
Commenter Affiliation: American Petroleum Institute
Document Control Number: EPA-HQ-OAR-2010-0505-6884
Comment Excerpt Number: 173

Comment: ***METHANE EMISSION BENEFIT***S

EPA used the SC-CH4 estimate from Marten et al. 2014 based on the 3 percent discount rate to report monetary benefits of methane emission reductions. While EPA "emphasiz[ed] the

importance and value of considering the benefits calculated using all [four] SC-CH4 estimates", the RIA did not report a comparison of benefits and costs using the wide-range of SC-CH4 estimates derived by Marten for alternative policy scenarios, IAMs and discount rates (RIA, Table 1-4, Note 1).

Using Monte Carlo methods, Marten generated 10,000 estimates of SC-CH4 for each of four future economic policy scenarios (excluding the overall policy-average) simulated using each of the three IAMs and three discount rates (i.e. 36 combinations) For each combination, the SC-CH4 is future social costs for an additional 1 ton of methane emitted in a particular year discounted back to 2012 at each of the three alternative discount rates. The 10,000 estimates for each combination are based on uncertainty parameters embedded in each IAM. In using the Marten et al. results, the RIA calculated the overall average SC-CH4 from the IAM and policy distributions separately for each of the three discount rates. The EPA focused on the overall average SC-CH4 for the 3 percent discount rate to value benefits of methane emission controls for the RIA.

ERM obtained Dr. Marten's Monte Carlo simulations for this evaluation. The data reveal the significant uncertainty in the SC-CH4, and underscore the inappropriate nature of using only average values of SC-CH4. Table 4-2 summarizes Marten's distributions of the 2020 SC-CH4 within each IAM, varying by policy scenario and using the 2.5 and 5.0 percent discount rates. Each of the distributions is skewed towards higher estimates of SC-CH4. The mean estimate exceeds the median estimate by 33 to 140 percent. The FUND and PAGE models are characterized by an enormous degree of variability. Overall, the estimated SC-CH4 typically varies by more than 230 percent of the mean, ranging from 75 to 310 percent across IAMs. FUND generates extreme lower and upper bounds (social benefit or costs of methane), ranging from over -$0.5 to $0.25 million per ton.

[Table 4-2. Empirical Distributions of SC-CH4 in 2020 Developed by Marten et al. 2014 (2007$ per ton)]

ERM used Marten's empirical distributions to model uncertainty in methane emissions benefits, but we used a different approach than the RIA. Using all 240,000 SC-CH4 estimates, we found the single probability distribution function that best described the data. The probability distribution we used is a log-normal distribution with a mean of $1,236 and a standard deviation of $1,439 per ton (2012$). This provides a single function that characterizes uncertainty across IAMs, policy scenarios, and discount rates. ERM estimated the 2025 SC-CH4 by multiplying each draw of the 2020 SC-CH4 by 1.162. This approach more fully captures the degree of uncertainty than the RIA approach, but does not capture the full range that might exist as described by Gillingham et al. (2015).

EPA estimated the monetary benefits of methane emissions associated with the NSPS OOOOa by multiplying the SC-CH4 by tons of controlled methane emissions. Total controlled methane emissions are derived by multiplying controlled emissions per regulated unit by the number of regulated units.

Table 4-3 [Table 4-3. Distribution of Annual Controlled CH4 Emissions Used in ERM's Monte Carlo Model] reports the range of uncertainty about per unit methane emission reductions that ERM used in the Monte Carlo model. As described in Section 2, EPA overestimated per unit methane emission reductions for several emission sources/points. Unless otherwise noted, ERM used EPA's estimate as the upper bound, ERM's corrected estimate as the most likely value, and 70 percent of ERM's estimate as the lower bound of a Beta-PERT probability distribution.

Response: The alternative estimates of the SC-CH4 presented by the commenter are not consistent with the SC-CO2 estimates developed by the U.S. interagency working group and are therefore inappropriate for application to the regulatory impact analysis. Marten et al.'s selection of the four SC-CH4 estimates (average SC-CH4 at three discount rates plus the 95th percentile at a 3 percent discount rate) was done to provide estimates analogous to the interagency working group's estimates of the SC-CO2. The EPA has explained the basis for averaging across socioeconomic scenarios for a specific discount rate in its response to DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 20. The EPA has also responded to comments about the variability of the estimates in DCN EPA-HQ-OAR-2010-0505-6997, Excerpt 7.

Regarding the commenter's concerns about uncertainty, including the causes of uncertainty, for both the SC-CO2 and SC-CH4 estimates, see the EPA's response to DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 20. Regarding the commenter's suggested approach to describing the uncertainty in estimates of emission reduction benefits, they provide no evidence to support the claim that a log-normal distribution is the "single probability function that best describes the data." Furthermore, fitting a probability distribution to the frequency distribution of results and using it to characterize uncertainty about the estimates is not consistent with advice from the National Academies of Sciences, Engineering, and Medicine. A committee convened by the Academies is reviewing the state of the science on estimating the SC-CO_2 and concluded in an interim report that the modeling "does not yield a probability distribution that fully characterizes uncertainty about the SCC."[22]

The comment regarding concerns that the EPA overestimated per unit methane emission reductions for several emission sources/points is very general. Please see the other sections of the response to comments document and the final TSD for more information on how we estimate per unit methane emissions, as well as how we estimate the per unit emission reductions, for the final NSPS.

Commenter Name: United States Chamber of Commerce, et al.
Commenter Affiliation: United States Chamber of Commerce, et al.
Document Control Number: EPA-HQ-OAR-2010-0505-6919
Comment Excerpt Number: 2

[22] National Academies of Sciences, Engineering, and Medicine. (2016). *Assessment of Approaches to Updating the Social Cost of Carbon: Phase 1 Report on a Near-Term Update.* Committee on Assessing Approaches to Updating the Social Cost of Carbon, Board on Environmental Change and Society. Washington, DC: The National Academies Press. doi: 10.17226/21898. See page 59 for quoted text.

Comment: In numerous rulemakings over the last couple of years, the Associations have challenged the use of the Social Cost of Carbon ("SCC") as a means of justifying rules and standards proposed by various federal agencies, including the EPA and the Department of Energy. The Associations consistently have called for a more thorough and transparent regulatory review process for the SCC, including meaningful opportunity for notice and comment by the public and appropriate legal recourse to challenge the SCC as final agency action. Those calls have been largely unanswered or dismissed out of hand by the Administration.

Once again, the EPA is relying upon the SCC in its cost-benefit analysis for the Proposed Rule at issue here. The Agency takes this reliance a step further by also using the Social Cost of Methane ("SCM") – a calculation that the Agency bases in part on the SCC methodology in estimating the benefits of the Proposed Rule. While the EPA requests comments on certain aspects of the SCM methodology as part of this rulemaking, the SCM is a new calculation that the public has not had an opportunity to review and/or comment on previously. In other words, the process inadequacies of the SCC are being compounded with the SCM and the EPA's reliance upon it in showing that the benefits of the Proposed Rule outweigh the costs.

As described more fully below, the Associations also have concerns with the SCM methodology chosen by the EPA, the global aspects of the SCM, and the potential impacts of the pending review of the SCC by the National Academy of Sciences. In light of these concerns and the procedural flaws associated with the SCM, the Associations believe the SCM should be withdrawn as a basis for the Proposed Rule

I. THE SCC SHOULD UNDERGO A NOTICE AND COMMENT PROCESS BEFORE IT IS USED IN OR RELIED UPON IN THE PROPOSED RULE, IN CALCULATING THE SCM OR ANY OTHER RULEMAKINGS

The Interagency Working Group ("IWG") – a group of 13 federal agencies that developed the SCC – has defined the SCC as "an estimate of the monetized damages associated with an incremental increase in carbon emissions in a given year." In the Proposed Rule, the EPA uses SCM benefits, which were calculated, in part, based upon the SCC, to justify proposed emission standards for new and modified sources from the oil and natural gas sector. The SCC, however, has not passed through an adequate notice and review period before being used in this Proposed Rule or any other rulemaking. As described in the attached Petition for Correction pursuant to the Information Quality Act, the Associations believe that the 2010 and 2013 Technical Support Documents and SCC estimates should be withdrawn and not used in any rulemaking and policymaking, including the Proposed Rule, for the following reasons:

1. The SCC estimates fail in terms of process and transparency. The SCC estimates fail to comply with OMB guidance for developing influential policy-relevant information under the Information Quality Act. The SCC estimates are the product of an opaque process and any pretensions to their supposed accuracy (and therefore usefulness in policymaking) are unsupportable.

2. The models with inputs (hereafter referred to as "the modeling systems") used for the SCC estimates and the subsequent analyses were not subject to peer review as appropriate.

3. Moreover, even if the SCC estimate development process was transparent, rigorous, and peer-reviewed, the modeling conducted in this effort does not offer a reasonably acceptable range of accuracy for use in policymaking.

4. The IWG has failed to disclose and quantify key uncertainties to inform decision makers and the public about the effects and uncertainties of alternative regulatory actions as required by OMB.

5. By presenting only global SCC estimates and downplaying domestic SCC estimates in 2013, the IWG has severely limited the utility of the SCC for use in benefit-cost analysis and policymaking.

Given all of the concerns summarized above and detailed in the attached petition, none of the IWG estimates of SCC (2010, 2013 or 2015) should be used or relied upon in the Proposed Rule, as well as any other rulemaking and policymaking until the SCC undergoes a more rigorous notice, review and comment process subject to the APA.

Response: The EPA first notes that the status of commenter's prior submissions made to the Office of Management and Budget (OMB) are outside the scope of this rulemaking action. Notwithstanding, as a member of the interagency working group (IWG) on SC-CO2, the EPA carefully examined and evaluated comments submitted to OMB's separate solicitation. The EPA has also carefully examined and evaluated all comments received regarding SC-CO2 through this rulemaking process and determined that the IWG responses to the comments on the OMB solicitation address the comments noted here about aspects of the process used to develop the SC-CO2 estimates and use them in RIAs. Specifically, the EPA concurs with the IWG's response to these comments and hereby incorporates them by reference and has determined that they are also applicable to the use of the SC-CH4 as the methodology is linked to the SC-CO2 methodology and CH4 is also a global pollutant. The EPA hereby incorporates by reference (1) the responses to the public comments: OMB Response to Comments document[23] and (2) OMB's 1/24/14 response to the petition, "*Request for Correction on the Technical Support Document "Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12866" (February 2010) and Technical Support Document "Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12866" (May 2013)*".[24]

The OMB Response to Comments Section 10 responds to commenter's concerns about aspects of the interagency process used to develop the SC-CO_2 estimates, including legal/statutory authority for issuing the estimates, consistency with applicable OMB guidance documents, transparency, opportunity for public comment, and appropriate use of the estimates. Section 10 also discusses the Administration's response to Petition for Correction submitted under the

[23] Referred to as the "OMB Response to Comments on SC-CO_2."Available at https://www.whitehouse.gov/sites/default/files/omb/inforeg/scc-response-to-comments-final-july-2015.pdf.
[24] See at https://www.whitehouse.gov/sites/default/files/omb/inforeg/ssc-rfc-under-iqa-response.pdf

Information Quality Act to the OMB. The EPA further notes that OMB's written response to the Petition for Correction, specifically the five reasons itemized in this comment excerpt by the commenter, is available at https://www.whitehouse.gov/sites/default/files/omb/inforeg/ssc-rfc-under-iqa-response.pdf.

The EPA disagrees that opportunities for public input and comment have not been provided on the SC-CH4. See EPA response to DCN EPA-HQ-OAR-2010-0505-5425, Excerpt 4.

The EPA also disagrees that either the SC-CO2 or SC-CH4 estimates themselves constitute a rulemaking. See the OMB Response to Comments, page 34. The SC-CH4 estimates are not designed to implement, interpret, or prescribe law or policy. Rather they are intended to provide guidance to agencies on a science-based methodology for estimating the benefits of CH_4 reductions in regulatory impact analysis.

The EPA disagrees with the commenter's recommendation to withdraw the Marten et al. SC-CH_4 estimates. As discussed in the RIA, Section 4.3, the Marten et al. (2014) estimates have been subject to extensive review. The EPA determined that the Marten et al. estimates are scientifically defensible for valuing methane impacts in regulatory analyses and improve upon prior treatment of methane impacts in regulatory analysis. See the EPA response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18, for discussion about the extensive reviews conducted before the estimates were applied to the RIA and for discussion about the EPA's conclusions regarding the validity and rigor of the Marten et al (2014) SC-CH4 estimates as well as the interagency working group's SC-CO2 estimates.

The EPA also disagrees that the Marten et al SC-CH4 estimates should be withdrawn because of the ongoing National Academies process. (See DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18, for summary of the National Academies review and the implications for the Marten et al. SC-CH4 estimates). The EPA further notes that when the National Academies process was announced, the interagency working group (IWG) acknowledged that the process would

> "take some time, during which Federal agencies will have a continued need for estimates of the SCC to use in benefit-cost analysis. After careful evaluation of the full range of comments and associated technical issues detailed below, the IWG continues to recommend the use of the current SCC estimates in regulatory impact analysis until revisions based on the many thoughtful public comments we have received and the independent advice of the NRC can be incorporated into the estimates. We believe the current estimates continue to represent the best scientific information on the impacts of climate change available in a form appropriate for incorporating the damages from incremental CO2 emissions changes into regulatory analyses."[25]

Since then, the Committee convened by the Academies on SCC has released an interim report, which recommended against doing a near term update of the SC-CO2 estimates, and continues to

[25] See page 5 of the "OMB Response to Comments on SC-CO2."Available at https://www.whitehouse.gov/sites/default/files/omb/inforeg/scc-response-to-comments-final-july-2015.pdf.

work on a final report that will provide long-term recommendations. Given that the Marten et al. SC-CH4 estimates are analogous to the SC-CO2 estimates and given the extensive reviews of the Marten et al. SC-CH4 estimates, discussed in DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18, EPA continues to determine that it is appropriate to apply the Marten et al. SC-CH4 estimates to this regulatory impact analysis.

The EPA's explanation concerning its use of the SC-CH_4 and why it is appropriate to use for this rulemaking action are contained within Chapter 4 of the RIA (see section 4.3 specifically) and IX.E of the preamble to the final rule. Moreover, the Agency continues to agree with the IWG's recommendation that use of the SC-CO_2 estimates in regulatory impact analysis is appropriate. The commenter has provided no explanation to contradict the IWG's assertion that current estimates continue to represent the best scientific information.

Regarding the commenter's disagreement with the use of a global value of SC-CH_4, see EPA response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 7.

Commenter Name: United States Chamber of Commerce, et al.
Commenter Affiliation: United States Chamber of Commerce, et al.
Document Control Number: EPA-HQ-OAR-2010-0505-6919
Comment Excerpt Number: 3

Comment: In the Proposed Rule, the EPA defines the social cost of methane as "a metric that estimates the monetary value of impacts associated with marginal changes in methane emissions in a given year." According to the EPA, the SCM estimates used in this proposal were developed by Marten, et al. (2014). The EPA projects that the Proposed Rule will reduce approximately 340,000 to 400,000 U.S. short tons (or 308,000 to 363,000 metric tons) of methane emissions annually in 2025 when the rule is fully in effect. The EPA estimates that the annual benefit in 2025 of removing that amount of methane emissions will be $460 million to $550 million based upon reductions in climate change economic damages over the following 300 years. The EPA bases its benefits calculation on a SCM value of $1,500 per metric ton ($1,361 per short ton) estimated by Marten, et al. (2014). The Marten, et al. (2014) estimate for methane in 2025 is 32.6 times greater than the OMB/IWG estimate of $46 per ton estimate for SCC (applicable to 2025 emissions reductions).

Response: The EPA acknowledges this comment and clarifies that in addition to estimating the benefits based on the average SC-CH_4 at a 3 percent discount rate in the year 2025 ($1500 per metric ton methane), the Agency also estimated the benefits using three other estimates of the SC-CH_4: the average SC-CH4 at 5 percent, the average SC-CH_4 at 2.5 percent, and the 95th percentile SC-CH_4 at 3 percent. The EPA estimated emission reductions occurring in the year 2020 with these four SC-CH4 estimates. The EPA also notes that the commenter incorrectly cited the SC-CO_2 estimate for the year 2025. The average SC-CO_2 at a 3 percent discount rate in the year 2025 is $49.7, or about $50 per metric ton (2012$), not $46.

Commenter Name: United States Chamber of Commerce, et al.
Commenter Affiliation: United States Chamber of Commerce, et al.
Document Control Number: EPA-HQ-OAR-2010-0505-6919
Comment Excerpt Number: 4

Comment: The Overall Procedural Flaws of the Social Cost of Methane

For many of the same reasons cited in Section I above and in the comments and petition incorporated herein, the social cost of methane itself, including the data it is based upon and the methodology used to determine it, should be subject to a notice, review and comment process. In addition to lacking the hallmarks of the regulatory process and the Administrative Procedure Act – transparency, public notice, stakeholder input and meaningful review – the SCM fails to meet the guidelines and requirements of the OMB, including those imposed by the Information Quality Act. Before the EPA or any other federal agency bases a regulation or policy upon the SCM or uses the SCM to justify a regulation or policy, the SCM should be subject to a valid rulemaking process based on public input, sound science, quality data, and transparency. Simply asking for input into the methodology of the SCM after already relying upon it in a proposed regulation's cost-benefit analysis is insufficient and contrary to the laws and requirements governing agency rulemaking. Consequently, the SCM should not be used or relied upon in the Proposed Rule, as well as any other rulemaking or policymaking until the SCM undergoes a notice, review and comment process.

Response: The EPA disagrees that the review of the Marten et al. SC-CH_4 estimates lack transparency, public notice, stakeholder input and meaningful review. The EPA also disagrees with the commenter's recommendation to withdraw the Marten et al. SC-CH_4 estimates. As discussed in the RIA, Section 4.3, the Marten et al. (2014) estimates have been subject to extensive review. The EPA determined that the Marten et al. estimates are scientifically defensible for valuing methane impacts in regulatory analyses and improve upon prior treatment of methane impacts in regulatory analysis. See DCN EPA-HQ-OAR-2010-0505-6919, Excerpt 2 for complete discussion about the meaningful review conducted as it relates to the points highlighted by this commenter (transparency, public notice, stakeholder input and meaningful review).

Furthermore, the EPA has sought public comment on the valuation of non-CO_2 GHG impacts and scientific review of the usage of the SC-CH4 estimates from Marten et al (2014) through the process leading up to its inclusion in the main benefit-cost analyses of proposed rules, including the proposal for this rulemaking (see DCN EPA-HQ-OAR-2010-0505-5425, Excerpt 4). The EPA has sought public comment on the valuation of non-CO2 GHG impacts in proposed rulemakings since 2011. The EPA notes, however, that the commenter has not cited any legal authority that would require the Agency to seek public comment on an approach to value impacts before utilizing the approach in a proposal for rulemaking. The purpose of presenting the SC-CH_4 in the analysis at proposal is to obtain and consider public comments prior to finalizing the rulemaking. The final rulemaking reflects the EPA's consideration of the all of the comments submitted on the SC-CH4. The procedures that the EPA utilized throughout this rulemaking process comports will all aspects of the Administrative Procedures Act (APA). The EPA further notes that the commenter has failed to provide any evidence that there was insufficient time to

comment on how the Agency utilized the SC-CH_4 for purposes of this rulemaking action. The commenter has also failed to demonstrate the merits of issuing a proposal for a proposal. See DCN EPA-HQ-OAR-2010-0505-6919, Excerpt 2, for discussion that the SC-CO_2 and SC-CH_4 estimates themselves do not constitute rulemakings.

Commenter Name: United States Chamber of Commerce, et al.
Commenter Affiliation: United States Chamber of Commerce, et al.
Document Control Number: EPA-HQ-OAR-2010-0505-6919
Comment Excerpt Number: 5

Comment: According to the United Nations' Inter-governmental Panel on Climate Change ("IPCC"), methane, like carbon dioxide (CO2), is a greenhouse gas that has the potential to increase global temperature averages if its concentration in the atmosphere increases. The IPCC also maintains that, in general, the impact of methane as a climate-affecting gas is said to be about twenty-five times greater than that of CO2, at least in the near-term (100 years or less). This twenty-five times global warming potential ("GWP") factor is the commonly-used factor for conversion between methane and CO2, as endorsed by the IPCC. Authors before Marten, et al. (2014) have proposed alternative calculations to address various concerns with the GWP method, but none has gained widespread acceptance in the scientific community. Without more extensive peer review and scientific scrutiny, it is too early to assume that the recently published Marten, et al. (2014) paper will become widely accepted as a substitute for the GWP approach.

Despite general consensus around the twenty-five times GWP factor for valuing methane, the EPA is proposing to value methane reductions as worth *thirty-two* times more than CO2 reductions based on a single, recently-published report. Under the Marten, et al. (2014) approach, the estimated benefits of the Proposed Rule increase significantly (from the GWP approach). The table below shows revised benefit calculations based on the GWP approach, which is explained in detail below.

[Commenter presented a table titled: "Reproduction of EPA Table 6-2, Summary of Monetized Benefits, Costs and Net Benefits with benefits based on the GWP of methane value reported by IPCC]

Under the twenty-five times GWP approach, the SCM value is $1,050 per metric ton in 2025, and $953 per short ton. In terms of the U.S. short ton, the SCM value based on the widely used GWP factor is $953, and the benefit of eliminating 340,000 to 400,000 tons of methane in 2025 is $324 million to $381 million, compared to costs estimated by EPA of $320 million to $420 million. Using the GWP factor, the net impact of the Proposed Rule would be at best only a $4 million net benefit (under the optimistic low cost scenario) and possibly a negative net impact of minus $39 million under the higher cost scenario.

Applying the consensus GWP approach, the costs and the benefits of the Proposed Rule present a very different picture, namely that there is a scenario in which the costs outweigh the benefits. This is significant information that the EPA should be using in its cost-benefits analysis. At the

very least, the EPA should have reported in its regulatory analysis the net benefit results based upon both the Marten, et. al (2014) approach and the GWP approach.

Response: The commenter has misunderstood the discussion of the Global Warming Potential (GWP) in the RIA. The Global Warming Potential (or GWP) is a simple, transparent, and well-established metric for assessing the relative impacts of non-CO2 emissions compared to CO2 on a purely physical basis, based on the relative impact different GHGs have on cumulative radiative forcing over a particular time period. This is not the same problem as estimating the monetized benefits of Methane reductions compared to CO2 reductions. The application of the GWP to monetize impacts, has notable and well-established limitations, which are discussed in detail in the RIA, Section 4.3. The Marten et al. (2014) estimates were designed to overcome the limitations associated with using the GWP to monetize impacts; the Marten et al. estimates were not designed to replace the GWP as a way to compare, on a physical, non-monetary basis the radiative forcing impacts of non-CO2 GHGs to CO2. EPA emphasizes that the Marten et al. (2014) SC-CH4 estimates are **not** being used to replace the GWP as a metric to compare the physical impacts of non-CO2 GHGs to CO2 physical impacts.

Moreover, the commenter's misunderstanding about the intended purpose of the GWP led the commenter to incorrectly state that there is a general consensus to use a GWP of 25 to value methane impacts. The commenter has conflated the intended use of the GWP (i.e., to compare GWP as a metric to compare the physical impacts of non-CO2 GHGs to CO2 physical impacts) with the application, also referred to as the "GWP-approach," used in sensitivity analysis in past rulemakings, in the absence of directly modeled estimates of the SC-CH4, to approximate the dollar value of non-CO2 GHG impacts. The EPA notes that while there is widespread agreement about the use of GWP to compare the physical impacts of non-CO_2 GHGs to CO_2 impacts (as reported in the IPCC scientific assessments), there is not a consensus that the "GWP-approach" is a better way to estimate the monetary value of non-CO_2 GHG impacts than directly modeled estimates. Indeed, public comments submitted on past rulemakings recommended use of directly modeled estimates of the SC-CH4 and recommended using the GWP-approach only in the absence of directly modeled estimates.[26] The EPA notes that the commenter has not provided any citations or references supporting its statement that there is a consensus to use GWP values to monetize non-CO_2 GHG impacts. One additional note: the most recent IPCC estimates of the GWP of methane range from 28 to 36, as discussed in the preamble.

The EPA disagrees that it should present the results from the GWP-approach along with the results based on the Marten et al. estimates of the SC-CH_4 because of the well-documented limitations of the GWP-approach for valuation. As discussed in RIA Section 4.3:

"*In particular, several recent studies found that GWP-weighted benefit estimates for methane are likely to be lower than the estimates derived using directly modeled social cost estimates for these gases (Marten and Newbold, 2012; Marten et al. 2014; and Waldhoff et al. 2014). Gas comparison metrics, such as the GWP, are designed to measure the impact of non-CO2 GHG*

[26] For example, see the 2012 document, *Oil and Natural Gas Sector: NSPS and National Emission Standards for Hazardous Air Pollutants Review, Response to Public Comments on Proposed Rule August 23, 2011 (76 FR 52738)*, page 397 (PDF page 410), Docket ID EPA-HQ-OAR-2010-0505-4546.

emissions relative to CO2 at a specific point along the pathway from emissions to monetized damages, and this point may differ across measures.

The GWP is not ideally suited for use in benefit-cost analyses to approximate the social cost of non-CO2 GHGs because it ignores important nonlinear relationships beyond radiative forcing in the chain between emissions and damages. These can become relevant because gases have different lifetimes and the SC-CO2 takes into account the fact that marginal damages from an increase in temperature are a function of existing temperature levels. Another limitation of gas comparison metrics for this purpose is that some environmental and socioeconomic impacts are not linked to all of the gases under consideration, or radiative forcing for that matter, and will therefore be incorrectly allocated. For example, the economic impacts associated with increased agricultural productivity due to higher atmospheric CO2 concentrations included in the SC-CO2 would be incorrectly allocated to methane emissions with the GWP-based valuation approach.

Also of concern is the fact that the assumptions made in estimating the GWP are not consistent with the assumptions underlying SC-CO2 estimates in general, and the SC-CO2 estimates developed by the IWG more specifically. For example, the 100-year time horizon usually used in estimating the GWP is less than the approximately 300-year horizon the IWG used in developing the SC-CO2 estimates. The GWP approach also treats all impacts within the time horizon equally, independent of the time at which they occur. This is inconsistent with the role of discounting in economic analysis, which accounts for a basic preference for earlier over later gains in utility and expectations regarding future levels of economic growth. In the case of methane, which has a relatively short lifetime compared to CO2, the temporal independence of the GWP could lead the GWP approach to underestimate the SC-CH4 with a larger downward bias under higher discount rates (Marten and Newbold, 2012)."

Past EPA rulemakings that have used the GWP in sensitivity analysis have acknowledged the limitations of the GWP-approach to monetize non-CO_2 GHG impacts, including methane, and stated that the Agency used this alternative approach in the absence of directly modeled estimates that are analogous to the IWG SC-CO_2 estimates (e.g., see 77 FR 62929; October 15, 2012). The EPA also notes that aside from the incorrect statement that the GWP-approach for valuation is based on consensus, the commenter has not provided a justification for using the GWP-approach to value the methane benefits nor has the commenter demonstrated that the GWP-approach offers a more appropriate estimate of the methane benefits than the Marten et al SC-CH4 estimates.

Commenter Name: United States Chamber of Commerce, et al.
Commenter Affiliation: United States Chamber of Commerce, et al.
Document Control Number: EPA-HQ-OAR-2010-0505-6919
Comment Excerpt Number: 6

Comment: Global Aspects of the Social Cost of Methane

Another flaw in the EPA's treatment of the SCM is the Agency's failure to address the global aspects of the estimated SCM values and benefits. Specifically, the costs of the Proposed Rule are borne only domestically by U.S. businesses and consumers; however, the EPA justifies the Proposed Rule using benefits spread globally to other countries. Similar to the SCC, it is reasonable to assume that only 10 – 23% of global benefits actually accrue domestically. This domestic benefit proportion applies whether the SCM benefits are calculated using the Marten, et al. (2014) approach or the GWP approach. At a minimum, the EPA should make available the Proposed Rule's costs and benefits for which a global benefits reduction rate is applied so that stakeholders and the public have a true representation of the costs and the benefits that the United States alone will bear with the promulgation of the rule.

Response: The EPA disagrees that the focus on global estimates of SC-CH4 is inappropriate. See EPA response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 7. The commenter has not explained the source or the basis for its conclusion that it is "reasonable to assume that only 10-23% of global benefits" accrue domestically. See the EPA response to DCN EPA-HQ-OAR-2010-0505-6884, Excerpts 22 and 152, for EPA's response to a recommendation to use 7-23 percent as an approximation of domestic impacts. Regarding the GWP approach, see the EPA response to DCN EPA-HQ-OAR-2010-0505-6919. Excerpt 5.

Commenter Name: United States Chamber of Commerce, et al.
Commenter Affiliation: United States Chamber of Commerce, et al.
Document Control Number: EPA-HQ-OAR-2010-0505-6919
Comment Excerpt Number: 7

Comment: National Academy of Sciences' Review of SCC

A special working group of the National Academy of Sciences, Engineering, and Medicine (NAS) is currently conducting a comprehensive analysis of the existing methods used by the government to estimate the SCC. The working group is scheduled to release its findings and recommendations in late 2016. These findings and recommendations will have direct applicability to the related estimation of the social cost of methane. The EPA should delay any rulemaking that applies a SCM concept – or eliminate the reliance upon a SCM concept – until the NAS working group's analysis and report are complete, including be subject to peer review.

Response: The EPA disagrees that the Marten et al SC-CH_4 estimates should be withdrawn because of the ongoing National Academies process. See the EPA response to DCN EPA-HQ-OAR-2010-0505-6919, Excerpt 2.

Commenter Name: Rachel Cleetus, Ph.D. Senior Climate Economist
Commenter Affiliation: Union of Concerned Scientists, et al. on behalf of Environmental Defense Fund (EDF), Institute for Policy Integrity at New York University School of Law, Natural Resources Defense Council, and Union of Concerned Scientists
Document Control Number: EPA-HQ-OAR-2010-0505-6945
Comment Excerpt Number: 2

Comment: Introduction: The SCC is an important policy tool.

The SCC estimates the economic cost of climate impacts—specifically the additional economic harm caused by one additional metric ton of carbon dioxide (CO2) emissions. SCC calculations are important for evaluating the costs of activities that produce greenhouse gas emissions and contribute to climate change, such as burning fossil fuels to produce energy. The SCC is also important for evaluating the benefits of policies that would reduce the amount of those emissions going into the atmosphere. For example, in order to properly evaluate standards that reduce the use of carbon-intensive energy, improve energy efficiency, or lead to the capture and beneficial use of greenhouse gases—like the proposed rule—it is important to understand the benefits they will provide, including the benefit of reducing carbon pollution and the harm it causes.

As with all economic impact analyses, the exercise can only provide a partial accounting of the costs of climate change (those most easily monetized) and inevitably involves incorporating elements of uncertainty. However, accounting for the economic harms caused by climate change is a critical component of sound benefit-cost analyses of regulations that directly or indirectly limit greenhouse gases. This endeavor is important because benefit-cost analysis is a central tool of regulatory policy in the United States, first institutionalized in a 1981 executive order by President Ronald Reagan.

The executive order currently in effect provides that agencies:

- "[P]ropose or adopt a regulation only upon a reasoned determination that its benefits justify its costs (recognizing that some benefits and costs are difficult to quantify); . . .
- "[S]elect, in choosing among alternative regulatory approaches, those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity); . .
- "In applying these principles, each agency is directed to use the best available techniques to quantify anticipated present and future benefits and costs as accurately as possible. Where appropriate and permitted by law, each agency may consider (and discuss qualitatively) values that are difficult or impossible to quantify, including equity, human dignity, fairness, and distributive impacts."

Benefit-cost analysis has long been a staple of agency rulemakings, usually conducted as part of the regulatory impact analysis associated with proposed rules. Even though the analysis is generally not able to encompass all of the effects of a policy, and it is challenging to translate impacts on health, mortality, and welfare into dollar values, benefit-cost analysis is an important economic tool to help inform decision-makers about the societal benefits of different policy

choices. Of course, benefit-cost analysis cannot be the sole criterion for making regulatory decisions, especially in cases where there are overriding public health, equity, or safety imperatives. And in a few instances, legal protections prohibit the consideration of benefit-cost analysis.

Without an SCC estimate, regulators would by default be using a value of zero for the benefits of reducing carbon pollution, implying that carbon pollution has no costs. That, sadly, is not the case, as evidenced by the large body of research outlining the sobering health, environmental, and economic impacts of rising temperatures, extreme weather, intensifying smog, and other climate impacts. If anything, most evidence points to the fact that current numbers significantly underestimate the SCC. It would be arbitrary for a federal agency to weigh the societal benefits and costs of a rule with significant carbon pollution effects but to assign no value at all to the considerable benefits of reducing carbon pollution.

Response: EPA acknowledges this comment and notes that it has used the Marten et al. (2014) social cost of methane (SC-CH_4) estimates to monetize the climate-related impacts of this rulemaking. Regarding the comment that the SCC underestimates benefits, the EPA recognizes that none of the three integrated assessment models (IAMs) fully incorporates all climate change impacts, either positive or negative; see response to DCN EPA-HQ-OAR-2010-0505-6945, Excerpt 9.

Commenter Name: Rachel Cleetus, Ph.D. Senior Climate Economist
Commenter Affiliation: Union of Concerned Scientists, et al. on behalf of Environmental Defense Fund (EDF), Institute for Policy Integrity at New York University School of Law, Natural Resources Defense Council, and Union of Concerned Scientists
Document Control Number: EPA-HQ-OAR-2010-0505-6945
Comment Excerpt Number: 3

Comment: The IWG's analytic process was science-based, open, and transparent.

To facilitate accounting for the costs of climate impacts and the benefits of reducing carbon pollution in regulatory proceedings undertaken by different agencies, the United States government assembled an Interagency Working Group (IWG) to develop an estimate of a social cost of carbon that can be utilized in rulemakings and other pertinent settings across the federal government. The IWG's estimates—first released in 2010 and updated in 2013 and 2015—have been used in numerous benefit-cost analyses related to federal rulemakings. The IWG recently released an updated set of SCC estimates, centered at approximately $40 per metric ton of CO2 for emissions in the year 2015, in 2015 dollars at a 3% discount rate. The 2015 SCC estimates are higher than those from 2010, reflecting the growing understanding of the costs that climate impacts will impose on society.

The increase in the SCC estimate is important because it reflects the growing scientific and economic research on the risks and costs of climate change, but is still very likely an underestimate of the economic cost of carbon emissions. The increase also reflects the costs of

climate change that we are already experiencing, such as those associated with sea level rise and rising temperatures. Climate change is making coastal flooding, drought, and impacts from extreme weather worse. A rapidly increasing body of evidence has linked ever more recent events directly to climate change.

The analytic work of the IWG has been transparent. The 2010 Technical Support Document (TSD) set out in detail the IWG's decision-making process with respect to how it assessed and employed the models. Furthermore, the Government Accountability Office (GAO) found that "the working group's processes and methods reflected the following three principles: *Used consensus-based decision making, Relied on existing academic literature and models, and Took steps to disclose limitations and incorporate new information.*"

Because the 2013 IWG made no changes to the input assumptions and procedures for deriving its SCC estimates, the 2013 TSD discussed only how the three Integrated Assessment Models (IAMs) used in the analysis were updated in the academic literature over the three-year interim period by the independent researchers who have developed these models. The 2013 TSD also established that the increase in the SCC estimate from 2010 to 2013 resulted solely from updates to the three underlying IAMs.

The 2015 TSD update provided detailed responses to public comments collected through an opportunity for public participation initiated by the Office of Management and Budget (OMB). Additionally, the comment period on these proposed standards are yet another opportunity for continued dialogue about areas requiring further study. Such repeated comment processes and updates demonstrate that the IWG's SCC estimates were developed—and are being used—transparently. Given the strong grounding in the best science available, nothing should prevent the current, continued use of this well-established estimate. As economic and scientific research continues to develop, future revisions will be able to further refine existing estimates based on the latest peer-reviewed literature and the latest updates to the quality of the overall modeling exercise.

Response: The EPA acknowledges this comment and agrees that the process was science-based, open, and transparent.

Commenter Name: Rachel Cleetus, Ph.D. Senior Climate Economist
Commenter Affiliation: Union of Concerned Scientists, et al. on behalf of Environmental Defense Fund (EDF), Institute for Policy Integrity at New York University School of Law, Natural Resources Defense Council, and Union of Concerned Scientists
Document Control Number: EPA-HQ-OAR-2010-0505-6945
Comment Excerpt Number: 4

Comment: The SCC is an important and accepted tool for regulatory policy-making based on well-established law and fundamental economics.

The legal and analytic basis for using the SCC is clear and well established. ***As a matter of law and economics, uncertainty in benefits estimates does not mean they should be excluded from regulatory impact analyses***. No benefit or cost estimates are certain. Further, the courts have explicitly rejected the argument that uncertainty in assessing the costs of climate impacts provided a basis for ignoring them in assessing the benefits and costs of regulations, and executive orders dating back as far as the Reagan administration have all issued guidelines specifying explicit consideration of benefits even if the precise size of the benefit is uncertain.

In 2008, the U.S. Court of Appeals for the Ninth Circuit determined that agencies could not assign a zero dollar value to the social costs of the impacts of climate change. It determined that *failing* to count SCC benefits would be illegal. In this case, the National Highway Traffic Safety Administration (NHTSA) had decided not to count any avoided climate damages in issuing fuel economy standards. The court concluded: "NHTSA's reasoning is arbitrary and capricious for several reasons. First while the record shows that there is a ***range of values***, the value of carbon emission reductions is certainly ***not zero*** (emphasis added)."

Like the Court of Appeals, executive orders dating back to 1981 have also required agencies to assess benefits and costs even when significant uncertainty exists. Every president since (and including) Ronald Reagan has issued directives requiring that agencies conduct cost-benefit analyses of proposed regulations where permitted by statute. Specifically, agencies are directed to "take into account benefits and costs, both quantitative and qualitative . . . and use the ***best available techniques*** to quantify anticipated present and future benefits and costs as accurately as possible." The IWG's use of Integrated Assessment Models (IAMs) reflects the best available, peer- reviewed science to tally the benefits and costs of specific regulations with impacts on carbon dioxide emissions. While we address ways for improvement in the next section, current IAMs include benefits and costs that have been quantified to date.

The bottom line is that the IWG has properly and lawfully used the best available techniques to quantify the benefits of carbon emission reductions, basing its analysis on the peer-reviewed literature. When agencies use the IWG's estimates of the SCC to calculate the benefits of a rulemaking, they have taken, and will continue to take, comment on the SCC and the process used to derive that value. That is what the law—and good policy—requires.

Response: The EPA agrees with this comment.

Commenter Name: Rachel Cleetus, Ph.D. Senior Climate Economist
Commenter Affiliation: Union of Concerned Scientists, et al. on behalf of Environmental Defense Fund (EDF), Institute for Policy Integrity at New York University School of Law, Natural Resources Defense Council, and Union of Concerned Scientists
Document Control Number: EPA-HQ-OAR-2010-0505-6945
Comment Excerpt Number: 5

Comment: The IWG Correctly Used a Global SCC Value.

To design the economically efficient policies necessary to forestall severe and potentially catastrophic climate change, all countries must use a global SCC value. Given that the United States and many other significant players in the international climate negotiations have already applied a global SCC framework in evaluating their own climate policies, the continued use of the global value in U.S. regulatory decisions may be strategically important as the United States seeks to set an example for other countries, harmonize regulatory systems, and take the lead in ongoing international negotiations. Binding legal obligations, basic ethical responsibilities, and practical considerations further counsel in favor of the United States using a global SCC value.

To avoid a global "tragedy of the commons" and an economically inefficient degradation of the world's climate resources, all countries should set policy according to a global SCC value. The climate and clean air are global common resources, meaning they are free and available to all countries, but any one country's use—i.e., pollution—imposes harms on the polluting country as well as the rest of the world. Because greenhouse gases do not stay within geographic borders but rather mix in the atmosphere and affect climate worldwide, each ton of carbon pollution emitted by the United States not only creates domestic harms, but also imposes additional and large externalities on the rest of the world, including disproportionate harms to some of the least-developed nations. Conversely, each ton of carbon pollution abated in another country will benefit the United States along with the rest of the world.

If all countries set their greenhouse gas emission levels based on only their domestic costs and benefits, ignoring the large global externalities, the collective result would be substantially sub-optimal climate protections and significantly increased risks of severe harms to all nations, including to the United States. "[E]ach pursuing [only its] own best interest . . . in a commons brings ruin to all." By contrast, a global SCC value would require each country to account for the full damages of its greenhouse gas pollution and so to collectively select the efficient level of worldwide emissions reductions needed to secure the planet's common climate resources.

Thus, well-established economic principles demonstrate that the United States stands to benefit greatly if all countries apply a global SCC value in their regulatory decisions. A rational tactical option in the effort to secure that economically efficient outcome is for the United States to continue using a global SCC value itself. The United States is engaged in a repeated strategic game of international negotiations and regulatory coordination, in which several significant players— including the United States—have already adopted a global SCC framework. For the United States to now depart from this implicit collaborative dynamic by reverting to a domestic-only SCC estimate could undermine the country's long-term interests in future climate negotiations and could jeopardize emissions reductions underway in other countries, which are already benefiting the United States. A domestic-only SCC value could be construed as a signal that the United States does not recognize or care about the effects of its policy choices on other countries, and signal that it would be acceptable for other countries to ignore the harms they cause the United States. Further, a sudden about-face could undermine the United States' credibility in negotiations. The United States has recently reasserted its desire to take a lead in both bilateral and international climate negotiations. To set an example for the rest of the world, to advance its own long-term climate interests, and to secure greater cooperation toward reducing global emissions, strategic factors support the continued use a global SCC value in U.S. regulatory decisions.

Though the Constitution balances the delegation of foreign affairs power between the executive and legislative branches, "[t]he key to presidential leadership is the negotiation function. Everyone agrees that the President has the exclusive power of official communication with foreign governments." The development and analysis of U.S. climate regulations are essential parts of the dialogue between the United States and foreign countries about climate change. Using a global SCC value communicates a strong signal that the United States wishes to engage in reciprocal actions to mitigate the global threat of climate change. The President is responsible for developing and executing the negotiation strategy to achieve the United States' long-term climate interests. Currently, the President has instructed federal agencies to use a global SCC value as one important step that encourages other countries to take reciprocal actions that also account for global externalities. The President's constitutional powers to negotiate international agreements would be seriously impaired if federal agencies were forced to stop relying on a global SCC value.

In fact, the United States has already begun to harmonize with other countries its policies on climate change and on the valuation of regulatory benefits. The recent U.S.-China agreement is but the latest example. For instance, the United States has entered into a joint Regulatory Cooperation Council with Canada, which has adopted a work plan that commits the two countries to synchronizing "aggressive" greenhouse gas reductions, especially in the transportation sector. A separate Regulatory Cooperation Council with Mexico calls generally for improving and harmonizing policy "by strengthening the analytic basis of regulations," and its work plan acknowledges the transboundary nature of environmental risks. Mexico and Canada have both adopted greenhouse gas standards for vehicles that harmonize with the U.S. standards and that calculate benefits according to a global SCC value. Canada has also used the IWG's global SCC value in developing carbon dioxide standards for its coal-fired power plants, estimating $5.6 billion (Canadian dollars) worth of global climate benefits. The direct U.S. share of the net benefits from that Canadian regulation will likely total in the hundreds of millions of dollars.

Further efforts at regulatory harmonization are currently underway. For example, the United States is now negotiating a Transatlantic Trade and Investment Partnership with the European Union, and a key element is regulatory coordination. The European Union has already adopted an Emissions Trading Scheme (ETS) to cap its greenhouse gas emissions, and its Aviation Directive is just one of the climate policies that could be shaped by these negotiations. The European Commission has indicated its willingness to further reduce its ETS cap if other major emitters make proportional commitments—a result that will only occur if countries consider more than their own domestic costs and benefits from reducing greenhouse gas emissions. Moreover, several individual European nations—including the United Kingdom, France, Germany, and Norway—have adopted a global SCC value for use in their regulatory analyses. Some other European countries, such as Sweden, have adopted carbon taxes that implicitly operate as a high SCC that accounts for global externalities.

As further evidence of how the United States' use of a global SCC value is already influencing other international actors to follow suit, the International Monetary Fund (IMF) applies in its policy reviews an SCC estimate based on the IWG number. Given the potential influence of the IMF on the environmental policies of developing countries, the pull that the IWG's global

estimate has at the IMF could be very advantageous to the United States, by motivating industrializing countries to use similar numbers in the future.

In addition to this compelling strategic argument—namely, that it is rational for the United States and other countries to continue their reciprocal use of a global SCC value to achieve the economically efficient outcome on climate change (and avoid catastrophic climate impacts)—legal obligations further prescribe using a global SCC value. A basic ethical responsibility to prevent transboundary environmental harms has been enshrined in customary international law. For the United States to knowingly set pollution levels in light of only domestic harms, willfully ignoring that its pollution directly imposes environmental risks—including catastrophic risks—on other countries, would violate norms of comity among countries. The United States would be knowingly causing foreseeable harm to other countries, without compensation or just cause. Given that the nations most at risk from climate change are often the poorest countries in the world, such a policy would also violate basic and widely shared ethical beliefs about fairness and distributive justice. Indeed, taking a global approach to measuring climate benefits is consistent with the ideals of transboundary responsibility and justice that the United States commits to in other foreign affairs.

Binding international agreements also require consideration and mitigation of transboundary environmental harms. Notably, the United Nations Framework Convention on Climate Change—to which the United States is a party—declares that countries' "policies and measures to deal with climate change should be cost-effective so as to ensure *global benefits* at the lowest possible cost." The Convention further commits parties to evaluating global climate effects in their policy decisions, by "employ[ing] appropriate methods, for example *impact assessments* . . . with a view to minimizing adverse effects on the economy, on public health and on the quality of the environment, of projects or measures undertaken by them to mitigate or adapt to climate change." The unmistakable implication of the Convention is that parties—including the United States—must account for global economic, public health, and environmental effects in their impact assessments.

Similar obligations exist in domestic U.S. law as well. For example, the U.S. National Environmental Policy Act recognizes "the worldwide and long-range character of environmental problems" and requires federal agencies to include reasonably foreseeable transboundary effects in their environmental impact statements. While some individual statutes under which federal agencies will craft climate policies may be silent on the issue of considering extraterritorial benefits, arguably the most important statute for U.S. climate policy—the Clean Air Act—requires the control of air emissions that affect other countries and so encourages a global assessment of greenhouse gas effects. Specifically, Section 115 of the Clean Air Act directs EPA and the states to mitigate U.S. emissions that endanger foreign health and welfare. The global perspective on climate costs and benefits required by that provision should inform all regulatory actions developed under the Clean Air Act, and may provide useful guidance under other statutes as well.

Presidential orders on regulatory analysis also support use of a global SCC value. In 2012, President Obama issued Executive Order 13,609 on promoting international regulatory cooperation. The Order built on his previous Executive Order 13,563, which in turn had affirmed

its 1993 predecessor, Executive Order 12,866, in requiring benefit-cost analysis of significant federal regulations. Though White House guidance published in 2003 on regulatory impact analysis under E.O. 12,866 assumed that most analyses would focus on domestic costs and benefits, it ultimately deferred to the discretion of regulatory agencies on whether to evaluate "effects beyond the borders of the United States." More importantly, since the publication of that guidance, President Obama has issued his own supplemental orders on regulatory analysis, including E.O. 13,609, which clarified the importance of international cooperation to achieve U.S. regulatory goals. This 2012 order explicitly recognizes that significant regulations can have "significant international impacts," and it calls on federal agencies to work toward "best practices for international regulatory cooperation with respect to regulatory development." By employing a global SCC value in U.S. regulatory development, and by encouraging other countries to follow that best practice and account for the significant international impacts of their own climate policies, federal agencies will advance the mission of this presidential order on regulatory harmonization.

Finally, two practical considerations counsel in favor of a global SCC value. First, unlike some other significant international environmental impacts, no methodological limitations block the quantitative estimation of a global SCC value. In recent regulatory impact analyses for major environmental rules, EPA has qualitatively considered important transnational impacts that could not be quantified. For example, in the Mercury and Air Toxics Standards, EPA concluded that a reduction of mercury emissions from U.S. power plants would generate health benefits for foreign consumers of fish, both from U.S. exports and from fish sourced in foreign countries. EPA did not quantify these foreign health benefits, however, due to complexities in the scientific modeling. Similarly, in the analysis of the Cross-State Air Pollution Rule, EPA noted—though could not quantify—the "substantial health and environmental benefits that are likely to occur for Canadians" as U.S. states reduce their emissions of particulate matter and ozone—pollutants that can drift long distances across geographic borders. Yet where foreign costs or benefits are important and quantifiable, other federal agencies frequently include those calculations. Given that sophisticated models already exist to quantify the global SCC, the global estimate is appropriate to use.

Second, a global SCC value is in the national interest because harms experienced by other countries could significantly impact the United States. Climate damages in one country could generate large spillover effects to which the United States is especially vulnerable. The mesh of the global economy is woven tightly, and disruptions in one place can have consequences around the world. As seen historically, economic disruptions in one country can cause financial crises that reverberate globally at a breakneck pace. In a similar vein, national security analysts in government and academia increasingly emphasize that the geopolitical instability associated with climatic disruptions abroad poses a serious threat to the United States. Due to its unique place among countries—both as the largest global economy with trade- and investment-dependent links throughout the world, and as a military superpower—the United States is particularly vulnerable to international spillover effects.

The 2010 TSD included a rigorous examination of global versus domestic SCC estimates. Consistent with the above discussion, the 2010 IWG reached the conclusion to estimate a global SCC value, citing both the global impacts of climate change and the global action needed to

mitigate climate change. The IWG restated these arguments in the 2013 TSD, and refers back explicitly to its discussion in the 2010 TSD. EPA should continue using a global SCC estimate in its regulatory impact analyses.

Response: EPA agrees that a focus on global SC-CO_2 and global SC-CH_4 estimates in RIAs is appropriate and has applied global SC-CH_4 estimate to the analysis of the benefits in the final rulemaking (SC-CO_2 was not used in this rulemaking analysis). In particular, EPA agrees with the commenter's discussion of the global nature of GHG emissions—that each ton of GHGs emitted by the United States creates damages within the country and abroad—and with the commenter's conclusion that "each ton of carbon pollution abated in another country will benefit the United States along with the rest of the world." As noted by the commenter, the global economy is tightly interconnected and the United States is especially vulnerable to international spillover effects. The impacts of climate change that occur beyond the borders of the United States will affect the interests of U.S. citizens and U.S. national security interests. EPA agrees with the commenter's interpretation, as described in this excerpt, of recent reports on geopolitical instability associated with climatic disruptions abroad and the threat such disruptions may pose to the United States. For example, the National Research Council Climate and Social Stress assessment concluded that it is prudent to expect that some climate events "will produce consequences that exceed the capacity of the affected societies or global systems to manage and that have global security implications serious enough to compel international response."[27] As discussed in section IV.B of the preamble, the NRC National Security Implications assessment recommends that, due to climate change, the United States should be preparing for increased needs for humanitarian aid; responding to the effects of climate change in geopolitical hotspots, including possible mass migrations; and addressing changing security needs in the Arctic as sea ice retreats. Section IV.B of the preamble discusses other scientific assessments about the impacts of climate change and presents additional examples of climate change impacts within the United States.

Commenter Name: Rachel Cleetus, Ph.D. Senior Climate Economist
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Document Control Number: EPA-HQ-OAR-2010-0505-6945
Comment Excerpt Number: 7

Comment: The IWG appropriately used consumption discount rates rather than returns on capital.

[27] National Research Council. (2013). Climate and Social Stress: Implications for Security Analysis. Committee on Assessing the Impacts of Climate Change on Social and Political Stresses, J.D. Steinbruner, P.C. Stern, and J.L. Husbands, Eds. Board on Environmental Change and Society, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press. See page 20. Available at http://www.nap.edu/download.php?record_id=14682#

With respect to the **discount rate**, the IWG conducted sensitivity analysis of the results to three constant consumption discount rates: 2.5%, 3%, and 5%; for each of the discount rates, the TSDs reported the various moments and percentiles of the SCC estimates.

The discount rate is one of the most important inputs in models of climate damages, with plausible assumptions easily leading to differences of an order of magnitude in the SCC. The climate impacts of present emissions will unfold over hundreds of years. When used over very long periods of time, discounting penalizes future generations heavily due to compounding effects. For example, at a rate of 1%, $1 million 300 years hence equals over $50,000 today; at 5% it equals less than 50 cents. The discount rate changed by a factor of five, whereas the discounted value changed by more than five orders of magnitude. Depending on the link between climate risk and economic growth risk, even a rate of 1% may be too high. Uncertainty around the correct discount rate pushes the rate lower still.

The IWG correctly excluded a 7% discount rate, a typical private sector rate of return on capital, for several reasons. First, typical financial decisions, such as how much to save in a bank account or invest in stocks, focus on private decisions and utilize private rates of return. Private market participants typically have short time horizons. However, here we are concerned with social discount rates because emissions mitigation is a public good, where individual emissions choices affect public well-being broadly. Rather than evaluating an optimal outcome from the narrow perspective of investors alone, economic theory would require that we make the optimal choices based on societal preferences (and social discount rates). Second, climate change is expected to affect primarily consumption, not traditional capital investments. OMB guidelines note that in this circumstance, consumption discount rates are appropriate. Third, 7% is considered much too high for reasons of discount rate uncertainty and intergenerational concerns (further discussed below).

The IWG correctly adopted as one of its discount rates a value reflecting long-term interest rate uncertainty, and—as a primary extension to current results—should go further by directly implementing a declining discount rate.

The IWG was correct in choosing as one of its discount rates an estimate based upon declining discount rates (2.5%). Since the IWG undertook its initial analysis, a consensus has emerged among leading climate economists that a declining discount rate should be used for climate damages to reflect long-term uncertainty in interest rates. Arrow *et al* (2013) presents several arguments that strongly support the use of declining discount rates for long-term benefit-cost analysis.

Perhaps the best reason is the simple fact that there is considerable uncertainty around which interest rate to use: uncertainty in the rate points directly to the need to use a declining rate, as the impact of the uncertainty grows exponentially over time. The uncertainty about future discount rates could stem from a number of reasons particularly salient to climate damages, including uncertainties in future economic growth, consumption, and the interest rate reaped by investments.

A possible declining interest rate schedule for consideration by the IWG is the one proposed by Weitzman (2001). It is derived from a broad survey of top economists and the profession at large in a climate change context and explicitly incorporates arguments around interest rate uncertainty. Arrow *et al* (2013, 2014), Cropper *et al* (2014), and Gollier and Weitzman (2010), among others, similarly argue for a declining interest rate schedule and lay out the fundamental logic.

Moreover, the United States would not be alone in using a declining discount rate. It is standard practice for the United Kingdom and French governments, among others. The U.K. schedule explicitly subtracts out an estimated time preference. France's schedule is roughly similar to the United Kingdom's. Importantly, all of these discount rate schedules yield lower present values than the constant 2.5% Newell-Pizer rate, suggesting that even the lowest discount rate evaluated by the IWG is too high. The consensus of leading economists is that a declining discount rate schedule should be used, consistent with the approach of other countries like the United Kingdom. Adopting such a schedule would increase the SCC substantially from the administration's central estimate, suggesting that even the high end of the range presented by the administration is likely too low.

Response: The EPA acknowledges this comment and notes that the discount rates have not changed in the final analysis.

Regarding the commenters' recommendation that the interagency working group (IWG) use a declining discount rate for the social cost of carbon (SC-CO_2): EPA agrees that this is an important area of emerging research and will share these recommendations with the IWG. However, no widely-accepted declining discount rate schedule has yet been developed. Some key technical issues warrant careful consideration before adopting a declining discount rate schedule, such as determining how to update the discount rate schedule as uncertainty is resolved over time and ensuring that the use of declining discount rates does not lead to the possibility of time-inconsistent choices. A workshop sponsored by the federal government resulted in a paper in Science authored by thirteen prominent economists who concluded that a declining discount rate would be appropriate to analyze impacts that occur far into the future (Arrow et al., 2014). However, additional research and analysis is still needed to develop a methodology for implementing a declining discount rate and to understand the implications of applying these theoretical lessons in practice. The EPA will continue to follow and evaluate the latest science on the use of declining discount rates in intergenerational discounting.

In addition, EPA and other members of the U.S. Interagency Working Group on the social cost of carbon are seeking independent expert advice on technical opportunities to update the SC-CO_2 estimates from the National Academies of Sciences, Engineering, and Medicine. A committee convened by the Academies is reviewing the state of the science on estimating the SC-CO_2, and will provide expert, independent advice on the merits of different technical approaches for modeling and highlight research priorities going forward. The Academies' review will focus on the SC-CO_2 methodology, but recommendations on how to update many of the underlying modeling assumptions will also likely pertain to the SC-CH_4 estimates. Going forward, the EPA will evaluate its approach to estimating the SC-CO2 and SC-CH4 based upon any feedback received from the Academies' panel.

Commenter Name: Rachel Cleetus, Ph.D. Senior Climate Economist
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Document Control Number: EPA-HQ-OAR-2010-0505-6945
Comment Excerpt Number: 8

Comment: The IWG's choice of three IAMs was fully justified but should still be revisited in its next iteration.

In its calculations of the SCC, the IWG relied on the three Integrated Assessment Models (IAMs) available at the time, all with a long record of peer-reviewed publications that link physical and economic effects: the Dynamic Integrated Model of Climate and the Economy (DICE),72 the Climate Framework for Uncertainty, Negotiation, and Distribution (FUND), and Policy Analysis of the Greenhouse Effect (PAGE). The government's first SCC estimates, published in 2010, used the then-current versions of the models; the recent update employed revised, peer-reviewed versions of the models but maintained the underlying assumptions of the 2010 IWG analysis. As stated by the 2010 IWG, "the main objective of [the 2010 IWG modeling] process was to develop a range of SCC values using a defensible set of input assumptions grounded in the existing scientific and economic literatures."

DICE, FUND, and PAGE are well-established, peer-reviewed models. They represent the state-of- the-art IAMs. Each of these models has been developed over decades of research, and has been subject to rigorous peer review, documented in the published literature. However, updates to the SCC should also consider other models that are similarly peer reviewed and based on the state of the art of climate-economic modeling. One such model is Climate and Regional Economics of Development (CRED); another is the World Bank's Environmental Impact and Sustainability Applied General Equilibrium (ENVISAGE) model.

CRED borrows its fundamental structure from William Nordhaus's DICE and RICE models but also offers significant changes. For one, it uses updated damage functions and Marginal Abatement Cost Curves (MACC). Moreover, it uses different global equity weights, and uses additional state-of-the- art methodologies.

ENVISAGE represents a broader modeling effort by the World Bank, where perhaps the largest contribution is a more detailed sectoral breakdown, using 57 different sectors. This level of analysis allows for a more detailed view of agriculture as well as food and energy sectors that are particularly important to any climate-economy modeling.

Moreover, the broader policy and research community at large ought to consider creating the right incentive structure within the economic and scientific community to engage many more researchers on working with the core IAMs. Doing so could speed up the process of capturing the latest research on climate damages.

No model fully captures the costs of climate impacts to society. In fact, virtually all uncertainties and current omissions point to a higher SCC value. That makes it essential to use the established

IWG process, which provides for updating the SCC estimates every two to three years in order to capture the advances in physical and social sciences that have been incorporated into the models during the intervening period, in order to revisit both the choice of models and the key inputs used.

Response: The EPA acknowledges the commenters' recommendations for potential opportunities to improve the social cost of carbon (SC-CO_2) estimates and has considered each one in the context of this rulemaking, which uses the Marten et al. SC-CH_4 estimates. EPA recognizes the importance of the estimates to be as complete as possible and continues to engage in research on modeling and valuation of climate impacts. In addition, EPA and other members of the U.S. Interagency Working Group on the SC-CO_2 are seeking independent expert advice on technical opportunities to update the SC-CO_2 estimates from the National Academies of Sciences, Engineering, and Medicine. A committee convened by the Academies is reviewing the state of the science on estimating the SC-CO_2, and will provide expert, independent advice on the merits of different technical approaches for modeling and highlight research priorities going forward. The Academies' review will focus on the SC-CO_2 methodology, but recommendations on how to update many of the underlying modeling assumptions will also likely pertain to the SC-CH_4 estimates. Going forward, the EPA will evaluate its approach to estimating the SC-CO2 and SC-CH4 based upon any feedback received from the Academies' panel.

After careful evaluation of the full range of comments and associated technical issues described in this RTC, EPA has determined that it will continue to use the Marten et al. SC-CH_4 estimates in the final rulemaking analysis. In particular, the Marten et al. SC-CH_4 estimates represent the best scientific information on the impacts of climate change available in a form appropriate for incorporating the damages from incremental emissions changes into regulatory analysis. Therefore, EPA has presented the Marten et al. SC-CH_4 estimates in this rulemaking. EPA will continue to consider these comments and will share the recommendations with the IWG as it moves forward with the Academies process.

In addition, regarding model selection: EPA agrees that the selection of the three IAMs—DICE, FUND, and PAGE—was the most appropriate for the purpose of estimating the SC-CO_2. EPA and all of the other IWG members made this determination when they began developing the SC-CO_2 estimates in 2009-2010. DICE, FUND, and PAGE are the most widely used and widely cited models in the economic literature that link physical impacts to economic damages for the purposes of estimating the SC-CO_2. Moving forward, EPA will continue to follow and evaluate the latest peer reviewed literature applying IAMs. As previously noted, EPA and all of the other IWG members are seeking external expert advice on the technical merits and challenges of using additional models (e.g., CRED, ENVISAGE) to estimate the SC-CO_2 and/or removing existing models from the ensemble (DICE, FUND, and PAGE) used to estimate the SC-CO_2.

Finally, EPA agrees that it is important to update the SC-CO_2 periodically to incorporate improvements in the understanding of greenhouse gas emissions impacts. EPA will also share with the IWG the commenters' recommendation that the "broader policy and research community at large…consider creating the right incentive structure within the economic and scientific community to engage many more researchers on working with the core IAMs."

Commenter Name: Rachel Cleetus, Ph.D. Senior Climate Economist
Commenter Affiliation: Union of Concerned Scientists, et al. on behalf of Environmental Defense Fund (EDF), Institute for Policy Integrity at New York University School of Law, Natural Resources Defense Council, and Union of Concerned Scientists
Document Control Number: EPA-HQ-OAR-2010-0505-6945
Comment Excerpt Number: 9

Comment: The IWG should update its socio-economic assumptions to reflect the latest Shared Socio- economic Pathways (SSPs).

One key input is the use of socio-economic scenarios reflected in the choice of economic growth rates and emissions trajectories. Current IWG socio-economic and emissions scenarios were chosen from the Stanford Energy Modeling Forum exercise, EMF-22, and consist of projections for income/consumption, population, and emissions (CO2 and non-CO2). The IWG selected five sets of trajectories, four of which represent business as usual (BAU) trajectories (MiniCAM, MESSAGE, IMAGE, and MERGE models) and a fifth that represents a CO2 emissions pathway with CO2 concentrations stabilizing at 550 ppm. Given the possibility of increases in emissions above those expressed by Business As Usual Scenarios, a high-CO2 emissions pathway should also be considered. The assumptions used in calculating the SCC should be updated regularly to reflect the latest thinking around possible scenarios, reflecting the latest Shared Socio-economic Pathways (SSPs). These SSPs represent the latest, consistent pathways, feeding, for example, into the latest IPCC report.

The current inclusion of CO2 fertilization benefits likely overstates its effects.

The models do not reflect recent research on agricultural changes, which suggest the CO2 fertilization is overestimated, particularly in the FUND model, and that much, if not all, of the fertilization benefits may be cancelled out by negative impacts on agriculture (e.g., extreme heat, pests, and weeds). If the agency is not able to adequately model all agricultural impacts it should, at a minimum, remove CO2 fertilization benefits.

The specific functional form assumptions in IAMs ought to be re-evaluated.

Climate damages in IAMs are assumed to affect levels of economic output rather than economic growth rates. Similarly, standard modeling assumptions assume multiplicative damage functions—i.e. substitutability across economic sectors—rather than additive functions—i.e. limited substitutability across sectors. IAMs ought to probe the impacts of both assumptions. Recent literature supports the conclusion that climate change will effect economic growth rates.

Similarly, models ought to better capture the impacts of wildly heterogeneous climate damages. Each of the models used to calculate the SCC assume one representative household, going as far as to consider damages by relatively large regions. Such averaging ignores the enormously diverse effects of damages. It similarly contributes to not fully capturing the effects of extreme outcomes and tail risks. Instead, models ought to attempt to capture a much broader array of damages and climate impacts.

The IWG used solid economic tools to address uncertainty and ought to go further in capturing the full extent of its implications.

The IWG was rigorous in addressing **uncertainty**. First, it conducted Monte Carlo simulations over the IAMs specifying different possible outcomes for climate sensitivity (represented by a Roe and Baker Distribution). It also used five different emissions growth scenarios and three discount rates. Second, the IWG reported the various moments and percentiles of the resulting SCC estimates. Third, the IWG put in place an updating process, e.g., the 2013 revision, which updates the models as new information becomes available. As such, the IWG used the various tools that economists have developed over time to address the uncertainty inherent in estimating the economic cost of pollution: reporting various measures of uncertainty, using Monte Carlo simulations, and updating estimates as evolving research advances our knowledge of climate change.

The Monte Carlo framework took a step toward addressing what is the most concerning aspect of climate change, the potential for **catastrophic damages**, i.e., low probability/high damage events. These damages come from: uncertainty in the underlying parameters in IAMs, including the climate sensitivity parameter; climate tipping points—thresholds that, when crossed, cause rapid, often irreversible changes in ecosystem characteristics; and "black swan" events—which refer to unknown unknowns.

The analysis used a right-skewed distribution of temperature (as captured in the Roe Baker climate sensitivity parameter) and an increasing, strictly convex damage function; this correctly results in right-skewed distributions of damage and SCC estimates. By using the mean values of these estimates instead of the median, IWG estimates partially captured the effects of small probability, higher damages from high-level warming events. To reflect uncertainty in estimates resulting from the right-skewed distribution of SCC estimates, the IWG reported the SCC value for the 95th percentile from the central 3% discount rate distribution. This is done to reflect the estimation uncertainty in terms of the possibility of higher-than-expected economic impacts from climate change.

While the IAMs take different approaches to explicitly modeling tipping points, which to a great extent is lacking in current versions of FUND and DICE, the IWG improved (but in no way fixed) the representation of uncertain catastrophic damages with the Monte Carlo analysis. Still, black swan events go completely unaddressed in the IWG modeling framework, and therefore the SCC estimates do not reflect the value of preventing the occurrence of catastrophic events.

In addition to choosing an appropriate discount rate and sensitivity analyses around different SSPs, another important parameter to which the SCC estimates are sensitive is Equilibrium Climate Sensitivity (ECS)—how the climate system responds to a constant radiative forcing, which is typically expressed as the temperature response to a doubling of CO2 concentration in the atmosphere. In its current iteration, the IWG conducted extensive sensitivity analyses over a range of equilibrium climate sensitivity estimates. The assumptions are clearly stated in the TSD. In addition to its sensitivity analysis, the IWG conducted a Monte Carlo simulation over the climate sensitivity parameter and the other random variables specified within the three IAMs.

The range for the Equilibrium Climate Sensitivity (ECS) is derived from a combination of methods that constrain the values from measurements in addition to models. These include measured ranges from paleoclimate records, observed comparisons with current climate, as well as responses to recent climate forcings. The currently agreed "likely" range for the ECS (from both the IPCC TAR and AR5) is 1.5-4.5 degrees Celsius. Physical constraints make it "extremely unlikely" that the ECS is less than 1 degree Celsius and "very unlikely" greater than 6 degrees Celsius.

A host of analyses points to the costs of such uncertainty—both for values that go outside the "likely" range and for uncertainty within it: in short, the optimal SCC tends to increase with increased uncertainty, sometimes dramatically so. While the current treatment of uncertainty around climate sensitivity by the IWG highlights a range of possible uncertainties, a reconsideration of the assumptions feeding into the SCC ought to take the latest advances highlighting the potentially higher costs of deep-seated uncertainty into account. Additionally, the IWG should consider whether it relies too heavily on its 95th percentile estimates as a catchall to cover for limitations in its treatment of uncertainty and catastrophic damages.

Response: The EPA acknowledges the commenters' recommendations for potential opportunities for the IWG to update the scenarios for the SC-CO_2 and has considered it in the context of this rulemaking, which uses the Marten et al. SC-CH_4 estimates. EPA has acknowledged that the projection of the scenarios beyond 2100 has greater uncertainty than shorter-term projections and will continue to monitor the literature, including the development of extended RCP/SSP scenarios, for ways to improve the estimated trajectories and improve internal consistency. EPA and other members of the IWG on the SC-CO_2 are seeking independent expert advice on technical opportunities to update the SC-CO_2 estimates from the National Academies of Sciences, Engineering, and Medicine. A committee convened by the Academies is reviewing the state of the science on estimating the SC-CO_2, and will provide expert, independent advice on the merits of different technical approaches for modeling and highlight research priorities going forward. The Academies' review will focus on the SC-CO_2 methodology, but recommendations on how to update many of the underlying modeling assumptions will also likely pertain to the SC-CH_4 estimates. Going forward, the EPA will evaluate its approach to estimating the SC-CO2 and SC-CH4 based upon any feedback received from the Academies' panel.

Regarding the remaining comments (i.e., treatment of CO_2 fertilization benefits, the recommendation to re-evaluate the functional form assumptions in the IAMs, treatment of uncertainty): As noted in the OMB Response to Comments on SC-CO_2, to date, the interagency working group (IWG) has accepted the models as currently constituted, and omitted any damages or beneficial effects that the model developers themselves do not include.[28] The IWG recognizes that none of the three IAMs fully incorporates all climate change impacts, either positive or negative. Some of the effects referenced by commenters (e.g., "catastrophic" effects, disease, and CO_2 fertilization) are explicitly modeled in the damage functions of one or more of the current models (although the treatment may not be complete), and the model developers

[28] OMB's Response to Comments on SC-CO_2 is available at https://www.whitehouse.gov/sites/default/files/omb/inforeg/scc-response-to-comments-final-july-2015.pdf

continue to update their models as new research becomes available. In fact, the IWG undertook the 2013 SC-CO_2 revision because of updates to the models, which include new or enhanced representation of certain impacts, such as sea level rise damages. In addition, some of the categories mentioned by commenters are currently speculative or cannot be incorporated into the damage function for lack of appropriate data. Using an ensemble of three different models was intended to, at least partially, address the fact that no single model includes all of the impacts. EPA recognizes that there may be effects that none of the three selected models addresses (e.g., impacts from ocean acidification) or that are likely not fully captured (e.g. catastrophic effects).

EPA also recognizes that the impacts of climate change on agriculture is an area of active research and that methodological and data challenges persist. As a result there is uncertainty as to the magnitude of these impacts and the role of interactions between changes in the climate and other factors, such as CO_2 fertilization, temperature, precipitation, ozone, pests, etc. Additionally, these effects are likely to vary widely across regions and crops. However, with high confidence the IPCC (2013) stated in its Fifth Assessment Report (AR5) that "[b]ased on many studies covering a wide range of regions and crops, negative impacts of climate change on crop yields have been more common than positive impacts." As noted above, the IWG's approach to date has been to rely on the damage functions included in the three IAMs by their developers.

EPA recognizes that it is important to update the SC-CO_2 periodically to incorporate improvements in the understanding of greenhouse gas emissions impacts and will continue to follow and evaluate the latest science on impact categories that are omitted or not fully addressed in the IAMs. EPA and other members of the U.S. Interagency Working Group on the social cost of carbon are seeking independent expert advice on technical opportunities to update the SC-CO_2 estimates from the National Academies of Sciences, Engineering, and Medicine. A committee convened by the Academies is reviewing the state of the science on estimating the SC-CO_2, and will provide expert, independent advice on the merits of different technical approaches for modeling and highlight research priorities going forward. The Academies' review will focus on the SC-CO_2 methodology, but recommendations on how to update many of the underlying modeling assumptions will also likely pertain to the SC-CH_4 estimates. Going forward, the EPA will evaluate its approach to estimating the SC-CO2 and SC-CH4 based upon any feedback received from the Academies' panel.

In addition, EPA notes that in two of the IAMs (DICE and FUND), climate damages do affect the realized rate of economic growth in the models. However, EPA recognizes that the magnitude and pathway by which climate change may affect economic growth rates is an active area research.

After careful evaluation of the full range of comments and associated technical issues described in this Response to Comments, EPA has determined that it will continue to use the Marten et al. SC-CH_4 estimates in the final rulemaking analysis. In particular, the Marten et al. SC-CH_4 estimates represent the best scientific information on the impacts of climate change available in a form appropriate for incorporating the damages from incremental emissions changes into regulatory analysis. Therefore, EPA has presented the Marten et al. SC-CH_4 estimates in this rulemaking. EPA will continue to consider these comments, including the commenters' question

about use of the 95th percentile estimate, and will share the recommendations with the IWG as it moves forward with the Academies process.

Commenter Name: Rachel Cleetus, Ph.D. Senior Climate Economist
Commenter Affiliation: Union of Concerned Scientists, et al. on behalf of Environmental Defense Fund (EDF), Institute for Policy Integrity at New York University School of Law, Natural Resources Defense Council, and Union of Concerned Scientists
Document Control Number: EPA-HQ-OAR-2010-0505-6945
Comment Excerpt Number: 11

Comment: The Interagency Working Group on the Social Cost of Carbon has, to date, focused exclusively on carbon dioxide. The SCC can be roughly adjusted to approximate the costs of other greenhouse gases by multiplying by the relative global warming potential of those gases. Scientists, however, have long argued that the full social costs of specific, non-carbon dioxide gases like methane should be assessed through separate models and methodologies, which would more accurately account for varying atmospheric life spans, among other differences. At least a dozen published studies, dating back to 1993, have estimated the social cost of non-carbon dioxide greenhouse gases, including methane.

EPA proposes to use Social Cost of Methane estimates based on one of the most recent peer-reviewed articles: Marten et al. Marten et al. takes a reasonable (although conservative) approach to estimating the Social Cost of Methane and currently constitutes "the best available science" to inform agency regulation. Specifically, Marten et al. builds on the methodology used by the interagency Working Group to develop the SCC. The study maintains the same three integrated assessment models, five socioeconomic-emissions scenarios, equilibrium climate sensitivity distribution, three constant discount rates, and aggregation approach that were agreed upon by the Interagency Working Group. Consequently, many of the key assumptions underlying the Social Cost of Methane estimates have already gone through a transparent, consensus-driven, publically reviewed, regularly updated process, since they were borrowed from the Interagency Working Group's thoroughly vetted methodology.

Yet while sharing that carefully built framework with the SCC estimates, Marten et al.'s Social Cost of Methane estimates directly account for the quicker time horizon of methane's effects compared to carbon dioxide, include the indirect effects of methane on radiative forcing, and reflect the complex, nonlinear linkages along the pathway from methane emissions to monetized damages. Marten et al. was not only published in a peer reviewed economics journal, but EPA undertook additional internal and peer review of the approach. Marten et al.'s estimates thus are reasonable and appropriate measurements of the Social Cost of Methane.

In fact, Marten et al.'s estimates are conservative and very likely underestimate the true Social Cost of Methane. To start, as the authors note, because their methodology followed the Interagency Working Group's approach, all limitations that apply to inputs and modelling assumptions for the SCC also apply to the Social Cost of Methane. As discussed above, omitted

damages, socio-economic assumptions, the treatment of uncertainty and catastrophic damages, and so forth all suggest the Social Cost of Methane is underestimated, just as the SCC is.

Additionally, the integrated assessment models shared by both the Social Cost of Methane and the SCC include some features better suited to assessing carbon dioxide effects than methane effects, and so likely underestimate the costs of methane. For example, a countervailing benefit of carbon dioxide emissions—enhanced fertilization in the agricultural sector—is included in the underlying models used to develop both the SCC and Social Cost of Methane, yet does not apply to methane emissions. Similarly, the damage functions used by the integrated assessment models assume some level of adaptation to climate change over time, but because methane is a much faster-acting climate pollutant than carbon dioxide, there is less opportunity for technological advancement or political progress to adapt to the climate damages imposed by methane emissions. Methane also has indirect but significant effects, via its contribution to surface ozone levels, on global health and agriculture, and such effects need to be included either in the Social Cost of Methane or elsewhere in the cost-benefit analysis, but currently are not.

Overall, the Marten et al. methodology provides reasonable, direct estimates that reflect updated evidence and provide consistency with the Government's accepted methodology for estimating the SCC. At the same time, EPA should work toward the future refinement of these Social Cost of Methane estimates. For example, the Social Cost of Methane methodology does not yet fully reflect the effects of methane oxidizing in the atmosphere over time and becoming carbon dioxide. Because the Social Cost of Methane and the SCC share many assumptions and methods, it may make sense for the Interagency Working Group to review and update both metrics. In any case, any future improvements made to the SCC methodology should also be incorporated into and adjusted for the Social Cost of Methane estimates.

In particular, global Social Cost of Methane values are appropriate to use in EPA's regulatory impact analyses. The many strategic, economic, and legal grounds that justify use of a global SCC apply with equal force to the Social Cost of Methane. For example, other countries already use a global social cost of methane value. The United States, together with several other countries, has been trying to prioritize global action on methane reductions, because as "a powerful, short-lived greenhouse gas," methane has a greater potential to affect "warming in the near to medium term." And the United States has highlighted its planned actions on methane—including these standards for landfills—in its joint statements on climate with China. To demonstrate the U.S. commitment to reducing methane emissions specifically, and to encourage other countries to follow suit in prioritizing efforts on this powerful and fast-acting pollutant, it is strategically important for the United States to continue valuing the global effects of its methane regulations. Under the Clean Air Act, EPA has clear authority to do so. In its final emission standards for the oil and gas sector, and in its final regulatory impact analysis, EPA should bolster the rationales for the use of a global Social Cost of Methane value, as articulated in the underlying Interagency Working Group Technical Support Documents.

Response: EPA agrees that the Marten et al. methodology provides reasonable, direct estimates that reflect updated evidence and provide consistency with the interagency working group's (IWG) SC-CO_2 estimates. EPA notes that it has applied the Marten et al. SC-CH_4 estimate to the final rulemaking analysis. Regarding the recommendation that EPA bolster its rationale for use

of a global SC-CH_4 value, the Agency has reviewed the discussion in the preamble and RIA and clarified that the rationale for using a global SC-CO_2 value applies equally to using a global SC-CH_4 estimate. EPA recognizes the importance of the SC-CH4 and SC-CO2 estimates to be as complete as possible and continues to engage in research on modeling and valuation of climate impacts, which would support improvements to SC-CH4 and SC-CO2 estimates. EPA will share with the interagency working group (IWG) the commenters' recommendation to consider reviewing and updating both SC-CO2 and the SC-CH4. EPA will continue to follow and evaluate the latest science on impact categories that are omitted or not fully addressed in the IAMs. As previously noted, EPA and the other IWG members are seeking external expert advice on the technical merits and challenges of potential approaches to update the damage functions in future revisions to the SC-CO_2 estimates, which would likely inform updates to the SC-CH_4 estimates. See response to DCN EPA-HQ-OAR-2010-0505-6945, Excerpt 9, for complete discussion.

Commenter Name: Rachel Cleetus, Ph.D. Senior Climate Economist
Commenter Affiliation: Union of Concerned Scientists, et al. on behalf of Environmental Defense Fund (EDF), Institute for Policy Integrity at New York University School of Law, Natural Resources Defense Council, and Union of Concerned Scientists
Document Control Number: EPA-HQ-OAR-2010-0505-6945
Comment Excerpt Number: 12

Comment: If EPA for some reason declines to follow the Marten *et al.* approach, it could still use the global warming potential adjustment as a less accurate, lower-bound estimate. However, instead of the outdated multiplier of 25 for methane, EPA should utilize the latest global warming potential estimates for methane issued by the IPCC: 85 to 87 times greater than carbon dioxide after 20 years and 30 to 36 times greater than carbon dioxide after 100 years (after making the recommended adjustment for fossil methane). Given the short life of methane, EPA should at least conduct sensitivity analysis over the entire global warming potential range, instead of merely utilizing the lower 100-year timescale range. Again, though, the Social Cost of Methane approach is the more reasonable and preferred way to value this rule's important methane reductions.

Response: The EPA acknowledges this comment and notes that it is no longer relevant because the Agency has applied the Marten et al. approach to the final rulemaking analysis.

Commenter Name: Rachel Cleetus, Ph.D. Senior Climate Economist
Commenter Affiliation: Union of Concerned Scientists, et al. on behalf of Environmental Defense Fund (EDF), Institute for Policy Integrity at New York University School of Law, Natural Resources Defense Council, and Union of Concerned Scientists
Document Control Number: EPA-HQ-OAR-2010-0505-6945
Comment Excerpt Number: 13

Comment: Conclusion: Recommendations on the use of the SCC and Social Cost of Methane in regulatory impact analyses.

EPA should continue to use the latest IWG estimates of the SCC, and should start using the Social Cost of Methane estimates. The current estimates are biased downwards: more can and should be done to improve the estimates and to ensure, through regular updates, that they reflect the latest science and economics. However, the necessary process of improving the ability of the SCC and Social Cost of Methane to fully reflect the costs of climate impacts to society cannot hold up agency rulemaking efforts. The values provide an important, if conservative, estimate of the costs of climate change and the benefits of reducing carbon pollution. To ignore these costs would be detrimental to human health and well-being and contrary to law and Presidential directives to agencies to evaluate the cost of pollution to society when considering standards to abate that pollution. In the context of agency rulemakings, the SCC and Social Cost of Methane provide the best available means to factor those costs into benefit-cost analyses.

SCC plus SC of Methane

In using the estimates in its regulatory impact analyses, however, EPA should also include a qualitative assessment of all significant climate effects that are not currently quantified in the monetized estimate. The IWG acknowledged its incomplete treatment of both catastrophic and non- catastrophic damages, and instructed agencies that "These caveats . . . are necessary to consider when interpreting and applying the SCC estimates." Those instructions are consistent with Executive Orders on regulatory analysis, which tell agencies to "assess . . . qualitative measures of costs and benefits that are difficult to quantify, but nevertheless essential to consider." Before the IWG published its first estimates in 2010, some agencies included a detailed chart of unquantified climate effects in their regulatory impact analyses. However, most recent rulemakings only reference unquantified benefits from non-CO2 gases and from co-pollutants, and list none of the significant, unquantified climate effects from carbon dioxide. In the final emissions standards, and in the final regulatory impact analysis, EPA should detail all significant, unquantified climate effects, as consistent with administration-wide policy, the IWG's instructions, past agency practices, and best economic practices.

We also suggest that EPA encourage the IWG to regularly update the SCC and Social Cost of Methane, as new economic and scientific consensus emerges. Such updates are in line with the stated intentions of the IWG, which committed to "updating these estimates as the science and economic understanding of climate change . . . improves."

Response: The EPA acknowledges this comments and agrees with the recommendation to use the Marten et al. approach in the final rulemaking analysis. Regarding the recommendations to improve the estimates, see response to DCN EPA-HQ-OAR-2010-0505-6945, Excerpt 9.

Regarding the recommendations to include a qualitative assessment of impacts omitted from the SC-CO_2 and SC-CH_4 estimates: EPA notes, however, that it is not possible at this time to provide a precise list of each model's treatment (i.e., included, excluded) of climate impacts. EPA further

notes that the table referenced by the commenter,[29] which was published in a May 2009 draft regulatory impact analysis that was issued prior to the interagency working group's development of the 2010 SC-CO_2 estimates, itemizes some of the impacts omitted from only one model. Subsequent to the publication of this draft RIA, the interagency working group (IWG) developed SC-CO_2 estimates based on an ensemble of three models. The IWG's 2010 SC-CO_2 Technical Support Document presents a robust discussion of this key analytical issue, e.g., how each model estimates climate impacts, the known parameters and assumptions underlying those models, and the implications of incomplete treatment of impacts (catastrophic and non-catastrophic) for the SC-CO_2 and SC-CH_4 estimates. Moreover, the discussion in the SC-CO_2 TSD underscores the difficulty in accurately distilling the treatment of impacts in table-form for all three models. Most notably, the use of aggregate damage functions—which consolidate information about impacts from multiple studies—in two of the models, which were not addressed in the table referenced by the commenter, poses a challenge in listing included impacts. For example, within the broad agricultural impacts category, some of the sub-grouped impacts are not explicitly modeled but are highly correlated to other subcategories that are explicitly modeled. Therefore, EPA continues to determine that it is more appropriate to rely on the qualitative discussion in the TSDs about uncertainty. EPA has also updated the RIA Section 4.3 discussion to reference several publications that identify and discuss some of the important, unquantified climate effects.

EPA agrees that it is important to update the SC-CO_2 and SC-CH_4 periodically to incorporate improvements in the understanding of greenhouse gas emissions impacts and will continue to follow and evaluate the latest science on impact categories that are omitted or not fully addressed in the IAMs. As previously noted, EPA and the other IWG members are seeking external expert advice on the technical merits and challenges of potential approaches to update the damage functions in future revisions to the SC-CO_2 estimates, which would likely inform updates to the SC-CH_4 estimates. Finally, the RIA also continues to discuss climate change impacts, specifically an overview of the 2009 Endangerment Finding and climate science assessments released since then (see RIA, Chapter 4).

Regarding the recommendation for regular updates, see response to DCN EPA-HQ-OAR-2010-0505-6945, Excerpt 11.

Commenter Name: Margo Thorning, Senior Economic Advisor and Pinar Cebi Wilber, Senior Economist
Commenter Affiliation: American Council for Capital Formation (ACCF)
Document Control Number: EPA-HQ-OAR-2010-0505-6969
Comment Excerpt Number: 6

Comment: EPA Adopted the SC-CH4 Estimates from a Single Study and the SC-CH4 Estimates are Inconsistent with and Much Greater than Those from Other Studies

[29] EPA, 420-D-09-001, DRAFT REGULATORY IMPACT ANALYSIS:CHANGES TO RENEWABLE FUEL STANDARD PROGRAM 690 tbl. 5.3-4 (2009).

As described in Section II, EPA adopted the estimates of SC-CH4 from a single study (Marten et al. 2014). EPA researchers and others (Waldhoff et al. 2011, 2014) acknowledge that there are only a limited number of published estimates of the social cost of non-CO2 GHGs that have been estimated using IAMs, compared to a vast number of estimates of the SCC. The primary reason for the lack of non-CO2 social costs is that the research and knowledge base is very limited. Moreover, there are significant uncertainties associated with how to simulate CH4 and a lack of understanding of temperature and damage impacts. There appear to have been only 12 studies over the span of the past two decades (1993 to 2014) that quantified the impacts and costs of CH4 emissions reduction. They are listed in Figure 5.

[Figure 5 - table of studies that quantified impacts and costs of CH4. The first 11 studies are referenced in Marten et al., 2014]

Within this limited literature, the initial papers published in the 1990s were largely focused on assessing the trade-offs in controlling different types of GHGs. These early papers also attempted to quantify the potency of non-CO2 GHGs relative to CO2 using a "global damage potential" metric. They did not use IAMs to directly simulate the damage per ton of each type of emission. From 1999 forward, IAMs became the tool of choice, offering estimates of social costs of non-CO2 GHGs using different models and baseline assumptions for different years. These studies produced estimates of social costs of methane that varied widely, as shown in the last column of Figure 5. Notably, Marten et al.'s estimates (which are the ones EPA has adopted for the Proposed Rule's RIA) are much higher than all of the other available studies. One of the reasons that Marten et al. (2014) provided for its SC-CH4 estimates to be so much higher than prior studies' was their use of more recent versions of the IAMs. However, since the publication of Marten et al. (2014), there has been an additional study that has estimated SC-CH4 (Waldhoff et al. 2014). Waldhoff et al. employed the latest version of the FUND model (version 3.9) and again produced estimates of SC-CH4 that were much lower than Marten et al. (2014). Their 2014 estimate is $469 per metric ton of CH4 (in 2012$); which is 64% lower than the estimate adopted by EPA of $1,309 per metric ton.

Such variability in the literature, combined with the fact that EPA's values are much higher than any of the other six estimates is a clear sign that the RIA may be overstating the Proposed Rule's global benefits. It is also a reason why SC-CH4 methodology should be subjected to close scrutiny and reviewed by the original IAM developers, and that the assumptions that are found to cause its much higher estimates should be vetted by relevant scientists in a manner that is more thorough than the internally-controlled review that EPA conducted, or that a journal conducts prior to accepting a paper for publication. (The next section discusses peer review needs in more detail.)

Response: The EPA disagrees with the commenter's characterization of the level of review underlying the Marten et al. SC-CH4 estimates. First, broadly speaking, the SC-CH4 is a metric that has been thoroughly vetted in the peer-reviewed literature. While there are fewer studies examining the SC-CH4 relative to those analyzing the SC-CO2, there are a sufficient number of SC-CH4 studies demonstrating its validity; see RIA Chapter 4 for discussion about published estimates. Second, as discussed in the RIA, three peer-reviewers scrutinized the SC-CH4 estimates and explicitly considered the appropriateness of using the Marten et al. SC-CH4

estimates in regulatory impact analysis. The EPA has also sought comment on methods to monetize methane emissions in past rulemakings since 2011 and on the application of Marten et al SC-CH4 estimates to this oil and gas NSPS rulemaking and other recent proposed rulemakings. See DCN EPA-HQ-OAR-2010-0505-5425, Excerpt 4, for more detailed discussion about the opportunities provided for public comment and notice.

In addition, the EPA disagrees with the commenter's assertion that variability in published estimates in the literature suggest the Marten et al (2014) estimates are overstated. In short, the commenter has ignored the key methodological differences that influence the variation among published estimates. As explained in the RIA, a direct comparison of the Marten et al's estimates with all of the other published estimates is difficult, given the differences in the models and socioeconomic and emissions scenarios. For example, the Waldhoff et al. papers referenced by the commenter used only one model (FUND) whereas Marten et al estimates are based on three models. The advantages of using more than one model are discussed in the 2010 SC-CO_2 Technical Support Document (TSD), which details the basis for the methodology for SC-CO_2 and was used by Marten et al to estimate the SC-CH_4: "The parameters and assumptions embedded in the three models vary widely. A key objective of the interagency process was to enable a consistent exploration of the three models while respecting the different approaches to quantifying damages taken by the key modelers in the field" (2010 SC-CO_2 TSD, pg 6). [30]

Also, the RIA notes that results from three relatively recent studies using different models would offer a better basis for comparison than a single study using one model (see Hope (2006), Marten and Newbold (2012), Waldhoff et al. (2014)). Marten et al. found that, in general, the SC-CH_4 estimates from their 2014 paper are higher than previous estimates. The higher SC-CH_4 estimates are partially driven by the higher effective radiative forcing due to the inclusion of indirect effects from methane emissions in their modeling. Marten et al., similar to other recent studies, also find that their directly modeled SC-CH_4 estimates are higher than the GWP-weighted estimates.

Differences between recent estimates from similar model versions, for example the FUND model results of Marten et al. (2014) and Waldhoff et al. (2014), are driven in large part due to differences in the discount rate, parameterization of the equilibrium climate sensitivity, and socioeconomic and emissions scenarios (along with the inclusion of indirect effects noted above). For these modeling inputs, Marten et al. (2014) used the same settings as used by the IWG in the SC-CO2 estimates. EPA and the other members of the IWG examined the economics and climate science literature when selecting values for these inputs that would represent the best available scientific information. The rationale for the EPA and the IWG's conclusions on inputs values is comprehensively documented in the 2010 SC-CO_2 TSD. After careful review the EPA has concluded that these same conclusions also apply to estimating the SC-CH_4 due to the similar nature of the modeling exercise. Furthermore, EPA notes that the commenter has incorrectly compared SC-CH_4 estimates associated with different emission years. The SC-CH_4 estimates from Waldhoff et al (2014) are for emission changes in the year 2010 whereas the Marten et al. estimate reported by the commenter is for the year 2020. All else equal, the estimates of SC-CH4 for the year 2020 would be larger than those for 2010 because the SC-CH_4

[30] See https://www.whitehouse.gov/sites/default/files/omb/inforeg/for-agencies/Social-Cost-of-Carbon-for-RIA.pdf

estimates increase over time. The increase occurs because future emissions are expected to produce larger incremental changes as economies grow and physical and economic systems become more stressed in response to greater climate change.

EPA also notes that The difference between the FUND estimates in Marten et al. and Waldhoff et al. stem from the higher discount rate, fixed climate sensitivity, and alternative scenarios in the latter study. As far as I can tell there is not fundamental difference between the model versions that would lead to a notable divergence. And looking through the various sensitivities in Waldhoff et al. and the SI of Marten et al. the role of the aforementioned differences can be approximated and it can be seen that they make up for the difference.

Furthermore, the EPA disagrees with the commenter's statement that there is "a lack of understanding of temperature and damage impacts" associated with methane. First, the temperature and damage impacts resulting from emissions of a greenhouse gas are a function of the radiative forcing resulting from those emissions. The process of transforming radiative forcing due to elevated methane concentrations into temperature and damage estimates is effectively identical to the process of transforming radiative forcing due to elevated carbon dioxide concentrations into temperature and damage estimates. And the process of calculating the radiative forcing resulting from elevated methane concentrations is well understand. There is a large and robust peer-reviewed literature performing these kinds of calculations. The RIA, section 4.3, discusses methane impacts and includes citations to the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5, 2013).

Moreover, the uncertainties that the commenter referenced in modeling methane are not unique to this analysis or application. All regulatory impact analysis involves uncertainty. The EPA acknowledges uncertainty in the SC-CH4 estimates but disagrees that the uncertainty is so great as to undermine use of these estimates in regulatory impact analysis.

The uncertainty in the SC-CH4 estimates is fully acknowledged and comprehensively discussed in the RIA and in the supporting academic literature. While uncertainty must be acknowledged and addressed in regulatory impact analyses, even an uncertain analysis provides useful information to decision makers and the public. For example, if an analysis shows that benefits of a policy option consistently do (or do not) justify costs even over a broad range of estimates, this may increase confidence in the robustness of this conclusion. Conversely, if choices among parameter estimates within a plausible range significantly affect the conclusions of the analysis, this is an important consideration in deciding how to weigh the analytical results in the decision making process. The presence of uncertainty is thus not a reason to exclude the best available estimates of quantified/monetized benefits, as long as it is appropriately characterized.

In conclusion, the differences among published estimates are not surprising and result from key methodological differences. Such differences do not invalidate the approach used to develop the Marten et al estimates of the SC-CH4. The RIA provides a robust discussion about the basis for the Marten et al estimates, the extensive review of these estimates, and references to additional documents detailing the methodology.

Commenter Name: Margo Thorning, Senior Economic Advisor and Pinar Cebi Wilber, Senior Economist
Commenter Affiliation: American Council for Capital Formation (ACCF)
Document Control Number: EPA-HQ-OAR-2010-0505-6969
Comment Excerpt Number: 7

Comment: EPA Should Not Provide Benefits Estimates That Reflect Only a Global Geographic Scope Without Even Providing Separate Estimates for a U.S. Geographic Scope

In the IWG's SCC development, only global benefits values were presented. EPA has repeated the IWG's global focus in its SC-CH4 estimates. Use of only global benefits instead of domestic (U.S.) benefits to compute climate benefits is inconsistent with almost all past practice in benefit cost analyses. In justifying their use of global benefits for the SCC, the IWG argued:

...accounting for global benefits can encourage reciprocal action by other nations, leading ultimately to international cooperation that increases both global and U.S. net benefits relative to what could be achieved if each nation considered only its own domestic costs and benefits when determining its climate policies…the U.S. government can signal its leadership in this effort.

This practice by the IWG (and adopted by EPA for the Proposed Rule) is contrary to the OMB's Circular A-4 (OMB, 2003):

Your analysis should focus on benefits and costs that accrue to citizens and residents of the United States. Where you choose to evaluate a regulation that is likely to have effects beyond the borders of the United States, these effects should be reported separately.

By considering global benefits (and only global benefits), EPA is fostering a misunderstanding among RIA readers that implicitly overstates the benefits that the U.S. may expect from the Proposed Rule.

Gayer and Viscusi (2015) discuss the precedents for using non-U.S. benefits in evaluating U.S. regulations. They conclude that this practice is not only contrary to the requirements of Circular A-4, but that it is also inconsistent with past U.S. practice. They emphasize the role of legal standing in the determination of which benefits are appropriate to count, and note that legal standing of non-U.S. entities depends on reciprocity of effort in controlling emissions. Until there is more extensive global reciprocity in reducing GHGs to levels consistent with the estimated SC-CH4 in cost per ton, there is no precedent for considering only global benefits for U.S. regulatory policy evaluations.

Gayer and Viscusi provide a number of examples of how use of non-domestic benefits in the absence of reciprocity can cause a benefit-cost analysis to guide policy makers towards policy choices that are detrimental to domestic well-being. Without repeating the examples, we note that benefit-cost analysis is an analytic method designed to guide policy makers towards options that will improve the net welfare of their community. If conducted inconsistently with its original principles, the benefit-cost method loses its ability to inform policy makers whether their decisions will enhance the welfare of their constituents. One of those original principles is to

account for the costs, preferences, and benefits of the residents of the political jurisdiction contemplating a policy (i.e., the U.S. in the case of the Proposed Rule). The reason that estimates of benefits should be limited to those within the domestic jurisdiction is that a policy that passes a benefit-cost test is presumed to be welfare-enhancing only because of a principle known as the potential compensation principle. For example, the distributional impacts of a policy may be so imbalanced that the policy would be detrimental to societal welfare; however, if the policy's aggregate benefits across the domestic community do exceed its aggregate costs, the deciding policymaker has an ability to establish other (redistributive) policies to spread the benefits or costs more fairly, and create a net welfare improvement. On the other hand, if the domestic benefits of a policy do not exceed its domestic costs, the potential for the deciding policymaker to effectuate the necessary redistribution does not exist. Thus, a policy that passes a benefit-cost test based on global benefits cannot be presumed to indicate a welfare-enhancing change unless it is also passes the benefit-cost test based solely on domestic benefits. This is the theoretical underpinning for the Circular A-4 requirement that policies report any estimates of non-domestic benefits separately from domestic benefits.

In conclusion, it is inappropriate for the RIA to use SC-CH4 values that reflect only global damages until there is global reciprocity in the control of GHG emissions. Although nondomestic benefits may merit some altruistic weight, such altruistic motives should be considered independently of the domestic balance of benefits and costs. We now turn to the question of what a domestic SC-CH4 estimate is, otherwise following the same assumptions and methodology as Marten et al. (2014).

In its 2010 report on the SCC, the IWG stated that it was not able to calculate domestic SCC estimates because it lacked details on the regional specifications in the model and because there is a dearth of country-specific social costs estimates in the literature (IWG, 2010). The IWG determined that it was only possible to include an "approximate, provisional, and highly speculative" range of 7% to 23% for the share of domestic benefits. However, we find that both the FUND and PAGE models directly compute and report U.S.-specific values for SCC and SC-CH4. EPA should have at least reported these domestic values for SC-CH4 in the RIA for the Proposed Rule.

We were able to generate the SC-CH4 global estimates from the PAGE and the FUND models running the exact same models as those used to compute EPA's SC-CH4 estimates. Since the PAGE and the FUND model also contain U.S. and other regions, we were able to obtain the U.S.-specific SC-CH4 estimates directly from the same runs that produced the global estimates upon which EPA relied. These are shown in Figure 6 for a 3% discount rate (results for the 5% discount rate are in Figure 18 in Appendix A). The domestic SC-CH4 estimates are between 76% and 95% lower than the corresponding global estimates, depending on the socioeconomic scenario.

Using the PAGE model in 2020 (and using the 3% discount rate), the U.S.-specific SC-CH4 is on average about 78% less than the global SC-CH4; the FUND model U.S.-specific SC-CH4 on average is 94% less than the global SC-CH4. Therefore, the average SC-CH4 could be as small as $78 to $342 per tonne of CH4 compared to EPA's $1309 per tonne of CH4 in 2020 using a 3% discount rate. These significantly lower domestic SC-CH4 estimates would result in

significantly smaller climate benefits resulting in net costs for the Proposed Rule. These estimates, completely omitted from the RIA by EPA, demonstrate that EPA's SC-CH4 estimates significantly overstate the potential domestic benefits from the Proposed Rule.

Figure 6. Summary of SC-CH4 Assuming Global versus Domestic Damages (Perturbation year=2020, discount rate=3%, (2012$ per tonne of CH4)

IAM	Socioeconomic Scenario	RIA (Global)	Domestic (U.S.)	% Change Relative to RIA
PAGE	IMAGE	$1,818	$353	-81%
PAGE	MERGE	$1,383	$308	-78%
PAGE	MESSAGE	$1,712	$411	-76%
PAGE	MINICAM	$1,582	$380	-76%
PAGE	5THSCN	$1,225	$257	-79%
	Average	$1,544	$342	-78%
FUND	IMAGE	$1,507	$70	-95%
FUND	MERGE	$1,475	$89	-94%
FUND	MESSAGE	$1,374	$73	-95%
FUND	MINICAM	$1,458	$92	-94%
FUND	5THSCN	$1,059	$66	-94%
	Average	$1,375	$78	-94%

Response: This comment regarding the use of a global SC-CH4 estimate mirrors those submitted to the Office of Management and Budget's separate comment solicitation on the SC-CO2 (78 FR 70586; November 26, 2013). The EPA had determined that the basis for using global estimates of the SC-CO2 also applies to use of the SC-CH4 estimates, given that methane is also a global pollutant and that the SC-CH4 methodology is linked to the SC-CO2 methodology.

As a member of the interagency working group (IWG) on SC-CO2, the EPA has carefully examined and evaluated comments submitted to OMB's separate solicitation. EPA has also carefully examined and evaluated all comments received regarding SC-CH4 and SC-CO2 through this rulemaking process and determined that the IWG responses to the comments on the OMB solicitation address the comments on the scope of the SC-CH4 and SC-CO2 estimates and use of the estimates in this RIA. Specifically, the EPA concurs with the IWG's response to these comments and hereby incorporates them by reference and has determined that they are also applicable to the use of global estimates of the SC-CH4 as the methodology is linked to the SC-CO2 methodology and methane is also a well-mixed global pollutant.[31]

[31] Referred to as the "OMB Response to Comments on SC-CO_2." In particular, see pgs 30-32 at https://www.whitehouse.gov/sites/default/files/omb/inforeg/scc-response-to-comments-final-july-2015.pdf.

In addition, the EPA and other members of the U.S. Interagency Working Group on the social cost of carbon are seeking independent expert advice on technical opportunities to update the SC-CO2 estimates from the National Academies of Sciences, Engineering, and Medicine. A committee convened by the Academies is reviewing the state of the science on estimating the SC-CO2, and will provide expert, independent advice on the merits of different technical approaches for modeling and highlight research priorities going forward. The Academies' review will focus on the SC-CO2 methodology, but recommendations on how to update many of the underlying modeling assumptions will also likely pertain to the SC-CH4 estimates. Going forward, the EPA will evaluate its approach to estimating the SC-CO2 and SC-CH4 based upon any feedback received from the Academies' panel.

After careful evaluation of the full range of comments and associated technical issues described in the comments that EPA received on this action, the EPA has determined that it will continue to use the Marten et al. SC-CH4 estimates in the final rulemaking analysis. In particular, the Marten et al. SC-CH4 estimates represent the best scientific information on the impacts of climate change available in a form appropriate for incorporating the damages from incremental emissions changes into regulatory analysis. Therefore, the EPA has presented the Marten et al. SC-CH4 estimates in this rulemaking. The EPA will continue to consider these comments and will share the recommendations with the IWG as it moves forward with the Academies' process.

The remainder of this section provides more detailed responses to the comment.

The EPA disagrees with the commenters stating that a focus on global SC-CO_2 and SC-CH_4 estimates in RIAs is inappropriate. As discussed in the 2010 SC-CO2 Technical Support Document (TSD), the IWG determined that a global measure of SC-CO2 is appropriate in this context because emissions of most greenhouse gases contribute to damages around the world and the world's economies are now highly interconnected.[32] To reflect the global nature of the problem, the SC-CO2 incorporates the full damages caused by CO2 emissions and other governments are expected to consider the global consequences of their greenhouse gas emissions when setting their own domestic policies.

The same rationale applies to SC-CH_4 because, analogous to CO_2, methane is a global pollutant with global consequences. Methane, in addition to CO_2 and other GHG emissions, contributes to warming of the atmosphere, which over time leads to increased air and ocean temperatures, changes in precipitation patterns, melting and thawing of global glaciers and ice, increasingly severe weather events, such as hurricanes of greater intensity, and sea level rise, among other impacts. Pursuant to Clean Air Act section 202(a), the EPA Administrator found that GHGs in the atmosphere threaten the public health and welfare of current and future generations. In particular, the Administrator found that the mix of six greenhouse gases (CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6) is "global in nature because the greenhouse gas emissions emitted from the United States (or from any other region of the world) become globally well mixed, such that it would not be meaningful to define the air pollution as the greenhouse gas concentrations over the United as somehow being distinct from the greenhouse gas concentrations over other regions of

[32] 2010 SC-CO2 TSD available in the docket and at https://www.whitehouse.gov/sites/default/files/omb/inforeg/for-agencies/Social-Cost-of-Carbon-for-RIA.pdf

the world" (74 FR 66517; December 15, 2009). Any pollutant with an atmospheric lifetime of greater than one or two years becomes well-mixed globally. One attribute of a well-mixed substance is that the location of emission has little impact on the consequences of those emissions, such that a ton of methane emitted in the US will have just as much an impact on global temperatures as a ton of methane emitted in Australia.

As stated in the OMB Response to Comments on SC-CO2, if all countries acted independently to set policies based only on the domestic costs and benefits of carbon emissions, it would lead to an economically inefficient level of emissions reductions which could be harmful to all countries, including the United States, because each country would be underestimating the full value of its own reductions. The same applies to methane emissions because methane is, as discussed in the previous paragraph, a well-mixed global pollutant with global consequences. This is a classic public goods problem because each country's reductions benefit everyone else and no country can be excluded from enjoying the benefits of other countries' reductions, even if it provides no reductions itself. In this situation, the only way to achieve an economically efficient level of emissions reductions is for countries to cooperate in providing mutually beneficial reductions beyond the level that would be justified only by their own domestic benefits. By adopting a global estimate of the SC-CO2 or the SC-CH4, the U.S. government can signal its leadership in this effort. In reference to the public good nature of mitigation and its role in foreign relations, thirteen prominent academics noted that these "are compelling reasons to focus on a global [SC-CO2]" in a recent article on the SC-CO2 (Pizer et al., 2014). In addition, there is no bright line between domestic and global damages from greenhouse gas emissions, such as methane and CO2. Adverse impacts on other countries can have spillover effects on the United States, particularly in the areas of national security, international trade, public health and humanitarian concerns. See response to DCN EPA-HQ-OAR-2010-0505-6945, Excerpt 5, for additional discussion of spillover effects and how they impact the United States.

GHG emissions in the United States will have impacts abroad, some of which may, in turn, affect the United States. For this reason, a purely domestic measure is likely to understate actual impacts to the United States. Also, as stated above, the EPA and the other members of IWG believes that accounting for global benefits can encourage reciprocal action by other nations, leading ultimately to international cooperation that increases both global and U.S. net benefits relative to what could be achieved if each nation considered only its own domestic costs and benefits when determining its climate policies. As a party to the United Nations Framework Convention on Climate Change, the United States is actively engaging with the international community to find solutions and promote global cooperation on climate change. As of May 2016, over 170 nations have signed the Paris Agreement on climate change, signifying worldwide commitment to reduce GHG emissions.

Further, as explained in the 2010 TSD, from a technical perspective, the development of a domestic SC-CO2 was greatly complicated by the relatively few region- or country-specific estimates of the SC-CO2 in the literature, and impacts beyond our borders have spillover effects on the United States, particularly in the areas of national security, international trade, and public health. As a result, it was only possible to include an "approximate, provisional, and highly speculative" range of 7 to 23 percent for the share of domestic benefits in the 2010 TSD. This range was based on two strands of evidence: direct domestic estimates resulting from the FUND

model, and an alternative approach under which the fraction of GDP lost due to climate change is assumed to be similar across countries.

The EPA also disagrees that the SC-CO2 and SC-CH4 estimates are inconsistent with OMB guidance, e.g., OMB Circular A-4. To ensure that the SC-CO2 methodology is transparent, the TSDs are comprehensive and technically rigorous in explaining the sources of data, the assumptions employed, the analytic methods applied, and the statistical assumptions employed. To ensure that the results are reproducible, the EPA and other IWG members have provided technical assistance and modeling results to external stakeholders upon request.

Circular A-4 is a living document, which may be updated as appropriate to reflect new developments and unforeseen issues. OMB was fully involved in the development of the SC-CO2 estimates as a working group co-chair and supports the recommendations regarding the discount rate and the focus on global damages. The emphasis on global rather than domestic damages is also explained in detail in the TSDs. Beyond the fact that good methodologies for estimating domestic damages do not currently exist, basing decisions on only the domestic damages from carbon emissions, including methane, will lead to an inefficient allocation of resources to reducing them, especially if all countries adopt a similarly short-sighted approach. An efficient outcome can only be achieved if all countries consider the full costs and benefits of their actions; the United States continues to be a leader in working to establish such a regime internationally.

Commenter Name: Margo Thorning, Senior Economic Advisor and Pinar Cebi Wilber, Senior Economist
Commenter Affiliation: American Council for Capital Formation (ACCF)
Document Control Number: EPA-HQ-OAR-2010-0505-6969
Comment Excerpt Number: 8

Comment: EPA's Use of SC-CH4 Estimates Based on a 2.5% Discount Rate is Inconsistent With the Short Atmospheric Lifespan of Methane

EPA's SC-CH4 estimates are based on the same set of discount rates used in the IWG SCC analysis (2.5%, 3.0%, and 5.0%), even though CH4 has a much shorter lifespan than CO2. In its SCC work, IWG argued that a discount rate of 2.5% is based on the intergenerational impacts of CO2 due to its long lifespan in the atmosphere. Indeed, the IWG selected a 300-year time horizon because CO2 is presumed to have long-lived effect on climate. This very long atmospheric life does not apply to CH4. EPA's rationale for adopting the SC-CH4 based on the same discount rates was that they wanted to rely on SC-CH4 estimates that were consistent with the SCC approach even though the gases have much different global warming potentials over time. Given that CH4's atmospheric half-life of about 12 years is a small fraction of CO2's half-life of over 100 years, climate impacts from CH4 do not have the same intergenerational equity and/or uncertainty about future growth that the IWG used to justify a 2.5% discount rate in its SCC deliberations.

Figure 7 shows the sensitivity of the SC-CH4 to the assumed discount rate for each of the three IAMs in 2020. Relative to the 3.0% discount rate, the SC-CH4 values using a 2.5% discount rate are about 27% to 37% higher depending upon the IAMs; while the SC-CH4 values using a 5% discount rate are on average lower by 55% ($587 compared to $1,309 per tonne of CH4).

[Figure 7 provides a summary of 2020 SC-CH4 by Socioeconomic Scenarios and IAMs (Perturbation year=2020, 2012$ per tonne of CH4)]

By including the 2.5% discount rate, the range of benefits from EPA's SC-CH4 estimates extend much higher as shown in Figure 7. While discount rates of 3.0% to 5.0% are reflective of consumption rates of interest, there is little evidence for using 2.5% for the SC-CH4. We demonstrate the timing difference between CO2 and CH4 damage in our alternate approach later in these comments.

Response: The EPA agrees with the commenters that the atmospheric lifetime of CH_4 is notably shorter than that of CO_2, but disagrees that this is a sufficient reason for excluding use of the 2.5% discount rate in the estimating the social cost of CH_4 emissions changes. The IPCC Fifth Assessment Report (AR5) estimates a central tendency for the e-folding time of CH_4 in the atmosphere to be 12.4 years. This means that it is expected to take over 40 years for a unit of CH_4 emitted today to decay to less than one percent of its initial size. In other words, the CH_4 emissions changes estimated in the rulemaking for 2025 will have impacts on atmospheric concentrations of CH_4 beyond 2065. Such time frames will effect multiple generations to come, and therefore, the arguments put forth by the IWG in the 2010 SC-CO_2 TSD for using a 2.5% discount rate continue to hold in the case of CH_4.

Furthermore, when considering the social cost of changes in CH_4 emissions, one must look beyond the time frame in which those changes have an impact on the atmospheric concentration of CH_4. The benefits associated with reductions in CH_4 emissions depend on the present value of the cumulative impacts that those reductions have on radiative forcing, climate change, and ultimately economic impacts. While the direct impact of changes in atmospheric CH_4 concentrations on radiative forcing will have a lifetime similar to CH_4 concentrations, the oxidization of CH_4 in the atmosphere results in increased CO_2 concentrations. As noted by both the IWG, in the 2010 SC-CO_2 TSD, and the commenters changes in atmospheric CO_2 concentrations have impacts that last for hundreds of years and therefore, clearly have an intergenerational effect. Additional impacts of CH_4 on radiative forcing through carbon cycle feedbacks and inertia in temperature responses and sea level rise provide additional avenues by which contemporaneous changes in CH_4 emissions will continue to have an effect on climate change over a long time horizon.

Finally, monetized climate change impacts in a given year are the result of not just the effects of climate change in that year, but the impact of climate change in previous years. This is because climate change impacts in a given year can affect the rate at which the economy grows, leading to sustained losses in future years. Two of the IAMs used to estimate the social cost of CH_4 (DICE and FUND), at least partially, take these growth rate effects into account. As a result, the impacts of a change in CH_4 emissions can have impacts for over a 100 years.

In summary, while the e-folding time of CH_4 in the atmosphere may be relatively short compared to CO_2, the impacts of changes in contemporary CH_4 emissions are expected to occur over long time horizons that cover multiple generations. Therefore, the rationale put forth by the IWG to consider the intergenerational nature of CO_2 impacts through the use of a 2.5% discount rate (in addition to 3% and 5%) continues to hold for the case of CH_4. As such, in this rulemaking the EPA has applied the full range of four SC-CO_2 and SC-CH_4 estimates, including the values estimated with a 2.5% discount rate.

Commenter Name: Margo Thorning, Senior Economic Advisor and Pinar Cebi Wilber, Senior Economist
Commenter Affiliation: American Council for Capital Formation (ACCF)
Document Control Number: EPA-HQ-OAR-2010-0505-6969
Comment Excerpt Number: 9

Comment: EPA's Use of SC-CH4 Estimates Based on an Assumption to Increase Radiative Forcing Due to Indirect Effects by 40% Is Not Clearly Supported by the Scientific Literature.

Radiative forcing from CH4 released to the atmosphere can occur both directly and indirectly. The direct effects of CH4 on radiative forcing are characterized by a complex relationship that is a function of pre-industrial atmospheric concentrations of nitrous oxide and overlapping adsorption bands of CH4 and nitrous oxide (Marten et al. 2014). Potential indirect effects of CH4 are due to changes in tropospheric ozone which can enhance stratospheric water vapor levels. The indirect effect is accounted for in the three IAMs by assuming that it is equivalent to a fraction of the radiative forcing due to the direct effect. This assumption is uncertain and varies among analyses.

EPA's SC-CH4 estimates are computed based on an assumption that their estimate of direct radiative forcing of CH4 will be increased by 40% in the DICE and the FUND models to get the total radiative forcing. One of the reviewers engaged by EPA noted that this particular assumption is "ad hoc."

It is unclear from the model documentation how the indirect forcing effect of methane is applied in the PAGE model with respect to the calculation of SC-CH4 estimates. Since Marten et al. (2014) exogenously increased methane radiative forcing in PAGE (using their DICE model's radiative forcing outputs), possibly all the indirect effects assumed in DICE are already subsumed in the exogenous radiative forcing inputs to PAGE. However, because of the lack of clarity, we do not perform any sensitivity analysis for the PAGE SC-CH4 estimates.

To estimate the potential impact of this ad hoc assumption we re-ran the DICE and FUND models without the 40% multiplier, with resulting sensitivity estimates shown in Figure 8. We find that the impact of the indirect effects assumption is significant. As expected, lower radiative forcing results in smaller damages and hence lower SC-CH4 values. However, the magnitude of the effect depends upon the strength of the relationship between radiative forcing and temperature changes in each model. In 2020, for a 3% discount rate the average SC-CH4 from

the DICE model is $1,009 per tonne of CH4. This value declines to $731 per tonne CH4 if the ad hoc assumption of 40% indirect effects on radiative forcing is removed. Across all socioeconomic scenarios in the DICE model, SC-CH4 values are reduced by 29% if indirect effects are removed. In the FUND model, the percentage reduction is even larger. However, since the FUND model has higher SC-CH4 estimates than the DICE model, the resulting 2020 average SC-CH4 from FUND is $789 per tonne of CH4.

[Figure 8 provides a summary of 2020 SC-CH4 Assuming No Indirect Effects on Global Radiative Forcing (Perturbation year=2020, discount rate=3%, 2012$ per tonne of CH4)]

Response: The EPA disagrees with the commenter's assertion that increasing the radiative forcing by 40 percent to capture indirect effects is "not clearly supported by the scientific literature." The 40 percent adjustment made by Marten et al was obtained from the IPCC's assessment of the peer-reviewed scientific literature. As stated in the RIA Section 4.3, the atmospheric lifetime and radiative efficacy of methane used by Marten *et al* is based on the estimates reported by the IPCC in their Fourth Assessment Report (AR4, 2007), which includes an adjustment in the radiative efficacy of methane to account for its role as a precursor for tropospheric ozone and stratospheric water. The 40 percent factor is the sum of the adjustments reported in AR4: 25 percent for tropospheric ozone and 15 percent for stratospheric water (Climate Change 2007: Working Group I: The Physical Science Basis, Section 2.10.3). The IPCC also used this adjustment to calculate GWPs in AR4. The RIA continues to note that Marten et al used AR4 because it was the latest assessment report by the IPCC at the time they developed the SC-CH4 estimates. Since then, the IPCC has updated the GWP as part of the Fifth Assessment Report (AR5); the 100-year GWPs for methane presented in AR5 (28-36) increased relative to the 100-year GWP for methane reported in AR4 (25), reflecting changes in various factors, including the indirect effects of methane on tropospheric ozone and stratospheric water vapor. The new best estimate from AR5 for the appropriate factor to use to correct methane forcing to account for tropospheric ozone and stratospheric water vapor effects is 65%. Therefore, the use of a 40% adjustment factor in the estimation of the SC-CH4 is a conservative approach.

Regarding the peer reviewer's description of the 40 percent adjustment as "ad hoc," the EPA notes that the commenter has selectively quoted the peer reviewer and misrepresented his point. The peer reviewer noted that while Marten et al.'s explicit representation of methane was "a simplification of complex atmospheric chemistry," it has "been used in earlier publications and likely approximates a more complex representation." In this context, the reviewer noted that the 40 percent adjustment factor was another simplification but one that has been justified by the IPCC's indirect estimates. The peer reviewer did not disagree with the Marten et al. approach but rather identified the simplification made along with the scientific support for the simplification.

The commenter's estimation of the SC-CH4 (using DICE and FUND) without accounting for methane's indirect effects ignores the scientific findings of the IPCC. The estimates are lower than Marten et al.'s estimates because they are incomplete and fail to capture the damages associated with indirect effects. According to the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5, 2013), changes in methane concentrations since 1750 contributed 0.48 W/m2 of forcing, which is about 17 percent of all global forcing due to

increases in anthropogenic GHG concentrations, and which makes methane the second leading long-lived climate forcer after CO2. However, after accounting for changes in other greenhouse substances such as ozone and stratospheric water vapor due to chemical reactions of methane in the atmosphere, historical methane emissions were estimated to have contributed to 0.97 W/m2 of forcing today, which is about 30 percent of the contemporaneous forcing due to historical greenhouse gas emissions.

Finally, regarding the commenter's statement that they were unable to conduct a sensitivity analysis: EPA notes that the Agency often works with researchers and stakeholders to make sure they can replicate the estimates.

Commenter Name: Margo Thorning, Senior Economic Advisor and Pinar Cebi Wilber, Senior Economist
Commenter Affiliation: American Council for Capital Formation (ACCF)
Document Control Number: EPA-HQ-OAR-2010-0505-6969
Comment Excerpt Number: 10

Comment: EPA's Use of BaU Emissions Scenarios that Reflect No Incremental Future Mitigation Policy Creates an Inappropriate Overstatement of SC-CH4

Following the IWG's approach for its SCC estimates, EPA relied on SC-CH4 estimates that were calculated using a simple average of four BaU scenarios (IMAGE, MERGE, MESSAGE, and MiniCAM) that have growing GHG emissions and one scenario (5th Scenario) that reflects emissions from a substantial global GHG emissions reduction policy. All five socioeconomic scenarios treat emissions as exogenously specified, but the 5th Scenario is the only one of the five scenarios that reflects a consistent policy to price GHG emissions, not just in the near term, but through the entire model horizon. The choice of socioeconomic scenario is important for the social cost computation because the scenario's assumptions regarding far-future emissions levels determine the amount of damage that the IAMs will attribute to a one-ton perturbation now. Damage curves are convex, meaning that at low levels of concentration, emissions pose little or no harm to the society, but as concentration increases, damage from emissions increases at an increasing rate. Thus, the higher the assumed future emissions, the higher the damage that ends up being assigned to a ton of emission today. The appropriate socioeconomic scenario to assume about future emissions levels is therefore an important issue, particularly in a case such as this where the analysis treats the emissions from those scenarios as exogenously fixed.

The only appropriate assumption for assigning a price on GHG emissions in the near term is that such pricing will continue to be in place (and gradually increased) into the future. It is illogical, and indeed socially irrational, to choose to price emissions (i.e., to justify reducing them) in the current period based on an assumption that after the current period they will never again be priced (or reduced). However, that is exactly what is being done when exogenously-fixed BaU emissions projections are used to assess the benefit of one ton less of emissions in a year such as 2020 or 2025. The effect of this illogical assumption is to increase the SC-CH4 estimate compared to a more consistent assumption that the current period's reductions are the first step

on the path of a long-term global GHG emissions reduction policy. That is, it inappropriately increases the SC-CH4, resulting in an overstatement compared to more reasonable assumptions.

The use of five socioeconomic scenarios, four of which assume BaU emissions trajectories and only one of which assumes any reductions in future GHG emissions, effectively is then estimating the SC-CH4 with an 80% probability of no future emissions reductions and a 20% probably of emissions reductions to achieve 550 ppm. The 5th Scenario is the only scenario among the socioeconomic scenarios used to compute EPA's SC-CH4 estimates that fits with the IWG's belief that other countries will take reciprocal actions to reduce GHG emissions. The 5th Scenario is not necessarily the best or only appropriate emissions projection to use, but it is certainly closer than any of the four BaU scenarios upon which EPA relied. As one can see from Figure 9, the 5th Scenario produces a much lower SC-CH4 (roughly 20% lower across models and years) than the four BaU cases (as one would expect).

We conclude that, as long as one's scenario options are limited to those already developed and adopted by the IWG (for the SCC work) and EPA (for the SC-CH4 work), only the 5th Scenario should be used to derive SC-CH4 estimates for use in Federal policy evaluations. In a more ideal situation, multiple different projections of emissions under reciprocal, globally-shared GHG reduction policies could be used to assess a range in the SC-CH4 values. However, we can be sure (given the convexity of IAM damage functions) that even the highest value within such a range would be lower than those produced giving 80% weight to the other four of the IWG scenarios.

Response: The EPA disagrees with the commenter's conclusion that only the 5th scenario (i.e., the stabilization scenario) should be used to derive the SC-CH_4 estimates and the SC-CO_2 estimates. First, OMB guidance in Circular A-4 specifies that the correct baseline for regulatory impact analysis is an agency's best assessment of the state of the world without the regulation. As discussed in the 2010 SC-CO2 Technical Support Document (2010 SC-CO_2 TSD), the interagency working group (IWG) sought to "select scenarios that span most of the plausible ranges of outcomes" for GDP, population, and emissions trajectories (2010 SC-CO_2 TSD, page 16).[33] The IWG relied on a Stanford Energy Modeling Forum exercise, EMF-22. In addition to the fact that the EMF-22 scenarios were recent, peer-reviewed, and publicly available, they had the key advantage that GDP, population, and emissions trajectories are internally consistent for each model and scenario evaluated. As noted in the 2010 SC-CO_2 TSD, the scenarios used "span a wide range, from the more optimistic (e.g. abundant low-cost, low-carbon energy) to more pessimistic (e.g. constraints on the availability of nuclear and renewables)." Given the level of uncertainty in these trajectories, the IWG felt that it was appropriate to consider a trajectory with significant global mitigation, assuming that this is a distinct possibility even in the absence of U.S. actions.

In addition, this comment mirrors those submitted to the Office of Management and Budget's separate comment solicitation on the SC-CO_2 (78 FR 70586; November 26, 2013). As a member of the interagency working group (IWG) on SC-CO_2, the EPA has carefully examined and evaluated comments submitted to OMB's separate solicitation. The EPA has also carefully

[33] See https://www.whitehouse.gov/sites/default/files/omb/inforeg/for-agencies/Social-Cost-of-Carbon-for-RIA.pdf

examined and evaluated all comments received regarding SC-CO_2 and SC-CH_4 through this rulemaking process and determined that the IWG responses to the comments on the OMB solicitation address the comments on the SC-CO_2 methodology, including the comments on consideration of the socioeconomic and emission scenarios used to develop the estimates. The comments submitted to OMB's separate solicitation focused on SC-CO_2 but apply with equal force to the Marten et al. SC-CH_4 comments, given that the same methodology has been used. The EPA concurs with the IWG's response to the comments and hereby incorporates them by reference.[34]

The EPA will continue to follow and evaluate the latest science on socioeconomic and emissions scenarios and along with all the members of the IWG, is seeking external expert advice from the National Academies of Sciences, Engineering, and Medicine on the technical merits and challenges of potential approaches to update these scenarios in future revisions to the SC-CO_2 estimates. A committee convened by the Academies is reviewing the state of the science on estimating the SC-CO_2, and will provide expert, independent advice on the merits of different technical approaches for modeling and highlight research priorities going forward. To date, the Committee has released an interim report, which recommended against doing a near term update of the SC-CO2 estimates. The final report is expected in early 2017. The Academies' review will focus on the SC-CO_2 methodology, but recommendations on how to update many of the underlying modeling assumptions will also likely pertain to the SC-CH_4 estimates. Going forward, the EPA will evaluate its approach to estimating the SC-CO2 and SC-CH4 based upon any feedback received from the Academies' panel.

Commenter Name: Margo Thorning, Senior Economic Advisor and Pinar Cebi Wilber, Senior Economist
Commenter Affiliation: American Council for Capital Formation (ACCF)
Document Control Number: EPA-HQ-OAR-2010-0505-6969
Comment Excerpt Number: 13

Comment: EPA's SC-CH4 Estimates are Based on Significant Modifications of the IAMs and Render Moot any Previous Peer Reviews of Those Models

The IAMs used have frequently been cited in the peer-reviewed literature for estimating a global SCC (but not for a SC-CH4) and were used in the most recent Intergovernmental Panel on Climate Change (IPCC) assessment. A 2010 report of the National Academies of Science (NAS) identified these models as "the most widely used impact assessment models" (IWG 2015). The original authors have put in decades of research to incorporate the best available science through the course of these professional exchanges. However, EPA's SC-CH4 estimates are based on an approach that has simplified and modified the IAMs, disregarding the original model developers' scientific efforts; in the process, the models used to derive EPA's SC-CH4 are no longer the

[34] Referred to as the "OMB Response to Comments on SC-CO2." In particular, see pgs 17-20 at https://www.whitehouse.gov/sites/default/files/omb/inforeg/scc-response-to-comments-final-july-2015.pdf

well-documented and peer-reviewed models, even though EPA is attempting to represent them as such.

The FUND model is an IAM with a simplified representation of economic growth, the energy use carbon cycle, and climate (Waldhoff et al. 2014). Based on EPA's SC-CH4 documentation (Marten et al. 2014), the core structure of the FUND model was not modified because it could compute the social cost of the non-CO2 GHG gases directly by perturbing the emissions in any future year. The same, however, cannot be said for the other two models that were used to compute EPA's SC-CH4 estimates.

The original DICE model was modified by incorporating the structural equations, but not the developer's structural framework. As one of the most widely-used IAMs, DICE (using its full structural framework) is a policy optimization model that computes an ideal best-response from an economically-efficiently viewpoint. The modification of the DICE model (even for the SCC estimation) resulted in a static or a descriptive model that lacks optimization and behavioral response, which is better described as "DICE-based." There is no documentation as to why the DICE model was simplified from an optimization model to a simulation model or how this change might affect the structural integrity of the original DICE model and the resulting social cost estimates. In addition, the DICE model was also modified to include a representation of the atmospheric concentration of CH4 based on assumed emissions paths (Marten et al. 2014). Given the fundamental change in the model framework and inclusion of a simplified gas cycle model, the "DICE-based" model used to compute the EPA's SC-CH4 estimates significantly deviates from the peer-reviewed original DICE model that Professor Nordhaus created and uses. Thus, results from this model should not be accorded the same status of reliability as those that come from the original DICE model.

The PAGE model was also modified by Marten et al. (2014) for the SC-CH4 estimation by replacing its pre-existing built-in CH4 mechanisms with a simpler set of exogenously-specified changes in radiative forcing. Similar to the FUND model, the original PAGE model contains a complex structure with uncertainties in many variables, including the radiative forcing from non-CO2 emissions. Marten et al. (2014) replaced the PAGE model's endogenous methane-cycle logic with the exogenously-determined radiative forcing changes that they computed using their modified version of the DICE model. By doing this, the changes in the radiative forcing due to an emission impulse in a given year were harmonized for the DICE and the PAGE models. Beyond desiring consistency with the DICE model, there is neither justification in the model documentation as to why the PAGE model was changed nor any explanation of how this modification affected the original model's SC-CH4 estimates. Further, because the PAGE model's excess forcing over time is tied to the DICE model's radiative forcing, any errors that may exist in the DICE modifications would extend into their PAGE modeling, and may also be compounded by any inconsistencies with the rest of PAGE's pre-existing logic. Thus, as with the DICE model, the version of the PAGE model upon which EPA has relied for its SC-CH4 estimates can no longer be characterized as a peer-reviewed model.

To further demonstrate that the changes made to the IAMs for the EPA's SC-CH4 estimates make any previous peer reviews moot, we note that such changes were made without a complete understanding of how the IAMs function. Our review of comments made directly by the

developers of the EPA's SC-CH4 estimates demonstrates limited exploration of the model responses. For example, the PAGE model has varying time intervals. In the near term, it makes its computations on a decadal basis, while in the long term it makes its computations on a century basis. With reference to the implication of changing the model time steps in the PAGE model, the authors of the EPA's SC-CH4 estimates noted, "It is not clear if the result would hold if the size of the time steps in the model were reduced."

Another point that demonstrates limited exploration of the nuances of model responses when computing EPA's SC-CH4 estimates is the observed inconsistent patterns of the underlying temperature changes. The pattern of projected temperature impacts in the DICE and PAGE models is distinctly different from that of the FUND model. Neither Marten et al. (2014) nor the RIA provide any discussion or justification for this difference.

In the DICE and PAGE models, temperatures rise quickly and then fall rapidly within this century as a result of a near-term increment in CH4 emissions. For example, in the year of the impulse, the temperature change projected in the DICE and PAGE models is about 80% to 90% of the maximum temperature change. Figure 10 shows that the maximum temperature change occurs within a decade in the DICE model (blue markers) and the PAGE model (orange markers), and then declines to about 10% of the maximum temperature change by 2130. For the FUND model (green markers), the temperature change rises slowly reaching a maximum point by 2050. Decreases in the temperature change in the FUND model are much slower and sustained over a significantly longer time period. Even by the end of the model horizon (year 2300), temperature change in the FUND model maintains 15% of the maximum temperature change, while for the other two models it is only about 2% of the respective model's maximum temperature change by 2300.

To evaluate this inconsistency further, we ran the same models used to compute EPA's SC-CH4 estimates and compared the temperature changes associated with a pulse of CH4 and CO2 emissions. Figure 11 shows the temperature changes associated with a pulse of CH4 and CO2 emissions in 2020 for the DICE and FUND models (the blue and green lines, respectively).

[Figures 10 and 11 provides graphs of the normalized temperature change for CH4 and CH4 and CO2]

For these two scenarios, the temperature change for a CO2 impulse stays higher than the CH4 impulse temperature change response, as one would expect given the longer lifespan of CO2 compared to CH4. The FUND model pattern is inconsistent with the short lifespan of CH4 and overestimates temperature change compared to the DICE and PAGE models. This suggests that the EPA has not investigated the models properly to sufficiently understand the projected responses. These differences could not have been flagged by any of EPA's selected peer reviewers, or by any journal article reviewers, because this information was never presented to those reviewers. NERA identified these patterns in its own independent replication exercises, and although we cannot explain them, they highlight again the need for a much more thorough peer review process of the modified IAMs before they can be considered mature enough for use in evaluation of major Federal regulations.

Response: The EPA disagrees with the commenter's assertion that the models used to estimate the SC-CH4—DICE, FUND, and PAGE—have not been properly reviewed or documented and that the changes made to capture methane chemistry in DICE and PAGE render prior peer reviews moot. Marten et al used the same versions of DICE, FUND, and PAGE that the interagency working group (IWG) used to estimate the SC-CO2. Marten et al. (2014) used these versions of the models to develop the first set of published estimates of the SC-CH4 that are fully consistent with the modeling assumptions underlying the SC-CO2 estimates developed by the IWG. The adjustments made to the DICE and PAGE models to capture methane chemistry were reviewed and comprehensively documented in the Marten et al (2014) paper. Moreover, the commenter has failed to demonstrate that the peer review of the minor changes to capture methane chemistry in DICE and PAGE (via the Marten et al (2014) paper) render all previous peer reviews of these models moot.

The DICE model was developed with an internal default representation of GHG mitigation potentials and costs, and this could allow the model to be used to estimate the optimal emissions level based solely on a benefit cost criteria conditional on the model's specification. However, as clearly laid out in the RIA, the 2010 SC-CO2 TSD, and Marten et al. (2014), for estimating the benefits of regulations that result in incremental reductions in the appropriate measure to use in monetizing those benefits is the SC-CO2 for CO2 emissions and the SC-CH4 for CH4 emissions. The goal of the analysis in the RIA is to estimate the monetized impacts of the change in emissions expected as a result of the rulemaking and not the optimal level of overall emissions conditional on the marginal abatement cost curve contained within the DICE model. Therefore, the policy optimization portion of the model is not relevant in this context.[35] Furthermore, Marten et al. (2014) explain how computing the SC-CH4 by shocking the exogenous non-CO2 radiative forcing input by an amount equal to a one ton increase in CH4 is consistent with the default theory of the DICE model and the way in which it was designed to capture the effect of marginal change in CO2 emissions. After careful review, the EPA has concluded that the Marten et al. (2014) use of the DICE model is consistent with and does not deviate from the original conceptual or numerical DICE model in a way that would invalidate the results.

The commenters conclusions regarding Marten et al.'s use of the PAGE model are based on the argument that the researchers replaced PAGE's "pre-existing built-in CH4 mechanisms with a simpler set of exogenously-specified changes in radiative forcing" and that this removed a previously "complex structure with uncertainties in many variables, including the radiative forcing from nonCO2 emissions." However, these statements about the difference between the default PAGE model and the version used by Marten et al. (2014) are incorrect. First, the default PAGE model does not include any uncertain parameters with respect to the dynamics of atmospheric CH4 concentrations or the translation to changes in radiative forcing, as suggested by the commenter. Second, the structures used to estimate the impact of CH4 emissions on radiative forcing in the default PAGE model and Marten et al. (2014) are nearly identical and are consistent with the structure used by other modelers and by the IPCC when computing GWPs in TAR and AR4. The primary difference between these aspects in the default PAGE model and the

[35] EPA also notes that Dr. Nordhaus, the developer of the DICE, has run the model without the optimization portion of the model. See for example, results provided in Nordhaus, W. 2008. A Question of Balance: Weighing the Options on Global Warming Policies. New Haven, CT: Yale University Press.

version used by Marten et al. (2014) is the inclusion of indirect effects of CH4 concentrations on radiative forcing by the latter. Therefore, the EPA concludes that the Marten et al. (2014) modeling of changes in CH4 concentrations and their impact on radiative forcing with PAGE does not represent a significant deviation from the default model and does not invalidate the conclusion of any previous peer-review of the PAGE model in determining its fitness for the purpose of estimating the marginal damages of GHG emissions.

The EPA also disagrees with the commenter that the sensitivity of the results to key factors have not been adequately explored. Marten et al. (2014) consider sensitivity analysis over many of the key assumptions that might impact the results including: discount rates, complexity of modeling for CH4 emissions impacts on the climate, and extrapolations of the CH4 emissions scenarios.

The EPA also disagrees with the commenter that differences across the models invalidates the results of one or all of the models. The advantages of using more than one model are discussed in the 2010 SC-CO2 TSD, which details the basis for the methodology for SC-CO2 and was used by Marten et al to estimate the SC-CH4: "The parameters and assumptions embedded in the three models vary widely. A key objective of the interagency process was to enable a consistent exploration of the three models while respecting the different approaches to quantifying damages taken by the key modelers in the field" (2010 SC-CO2 TSD, pg 6). While the commenter points out an interesting difference in some of the modeling results and states that they "cannot explain them," the difference in the results is as expected given the difference in the modeling frameworks and does not invalidate the SC-CH4 estimates. The differences between the FUND and DICE models in terms of the forecast change in the temperature anomaly from a perturbation of CH4 is driven in large part by two modeling differences. First, the FUND model include an explicit carbon cycle feedback intended to represent the positive feedback effect that climate change has on the biosphere and in turn on CO2 concentration. Therefore, a perturbation of CH4 in FUND has a longer lasting impact on the climate through its indirect carbon cycle feedback. A second major reason for the difference is the rate of inertia in the climate system captured in the FUND model. This aspect of FUND has previously been explored in the scientific literature. There is uncertainty as to the strength of carbon cycle feedback and the inertia on the climate system, and as with other aspects of the modeling the IWG choose to use multiple models to help incorporate a range of the scientific literature on these topics. Therefore, the EPA has concluded that this differences in the modeling frameworks, which capture a range of opinions in the scientific literature, does not invalidate the results of one or all of the models, but instead strengthens the rationale for including multiple models in the analysis.

See the EPA's response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18, for discussion about the rigor of the review of the models and estimates.

Commenter Name: Margo Thorning, Senior Economic Advisor and Pinar Cebi Wilber, Senior Economist
Commenter Affiliation: American Council for Capital Formation (ACCF)
Document Control Number: EPA-HQ-OAR-2010-0505-6969
Comment Excerpt Number: 14

Comment: EPA's SC-CH4 Estimates are Based on Harmonization of Inputs Across the IAMs that Is Not Reflective of Best Available Science

The objective of a model comparison exercise is to understand the different responses based on different model constructs. In any model comparison exercise, caution should be used to avoid harmonization of inputs between the models that would force fundamental features of a model to be eliminated. When efforts to standardize assumptions between models become excessive, they could produce results that are more similar than what they should be, overshadowing the insights about modeling uncertainty that can be derived from the original heterogeneity in individual models, reflecting the independent views and alternative approaches of their developers.

A well-established model comparison platform is the Energy Modeling Forum (EMF) that was established in 1976 at Stanford University. The EMF's goal is to improve the use and usefulness of energy models by testing and understanding the differences between model estimates, while allowing models to operate independently. Models are and will be different, where an input in one model may be an output of other models (Sweeney and Weyant, 1979). Contrary to the approach adopted in computing EPA's SC-CH4 estimates, EMF has always provided for model independence and cautions against over harmonization of input assumptions. This is reflected in the following quote from the Study Design guidelines for EMF-14, which was a forum specifically focused on climate change IAMs:

As in all EMF studies, the standardization of input assumptions is accomplished so that important inputs take on common values for each EMF scenario. This process facilitates the interpretation of the model comparison, allowing one to separate the dependence of key model results on model structure and on specific numerical inputs. However, in instances where a particular model includes an endogenous computation of an input selected for standardization, the modeler is urged to pursue the internal calculation in lieu of the EMF 14 input assumption. By design this situation arises infrequently, but it is important for the modelers to maintain this flexibility.

The statements from EMF suggest that while input harmonization allows for a better understanding of how results are related to a model's structure, it does not require changing the structural integrity of the model. The approach adopted to estimate EPA's SC-CH4 estimates ignored this best practice in light of their changes to the DICE and PAGE model structures described above. Clearly, such model modifications cannot be justified as a standard procedure in model inter-comparison exercises, as it is inconsistent with the guidelines of the premier model inter-comparison forum, EMF. Further, in estimating a Federal SCC or a SC-CH4, the purpose of using three different IAMs was not to conduct an academic exercise in model inter-comparison—it was to reflect current scientific uncertainties by letting three generally independent models produce their own results. Standardization was not necessary—and probably

detrimental—to that goal of characterizing modeling uncertainty. Nevertheless, the fact that EPA made several significant changes to IAMs before using them implies a need for an in-depth review that has not yet been conducted.

Response: The commenter has described best practices for inter-comparison modeling exercises while also acknowledging that neither the Interagency Working Group (IWG) on SC-CO2 nor Marten et al (2014) authors were attempting to conduct an inter-comparison modeling exercise. Given that the commenter recognizes that the development of the SC-CO2 and SC-CH4 estimates were not an inter-comparison modeling exercises, the relevance of the comment about inter-comparison modeling best practices is unclear. As clearly explained in the RIA, Marten et al. sought to develop the first set of published estimates of the SC-CH4 that are fully consistent with the modeling assumptions underlying the USG SC-CO2 estimates. The purpose was to develop comparable estimates of the social cost of methane and carbon dioxide, not to develop versions of the models themselves that would be comparable, as the commenter has suggested. Marten et al. did not seek to "standardize" the models but rather retain consistency with the assumptions used to develop the SC-CO2 estimates. The only adjustments made were to enter the CH4 perturbation via exogenous radiative forcing input in DICE and PAGE in order to maintain consistency of the input across models. The adjustments were explicitly reviewed and published in the Marten et al. paper.

Commenter Name: Margo Thorning, Senior Economic Advisor and Pinar Cebi Wilber, Senior Economist
Commenter Affiliation: American Council for Capital Formation (ACCF)
Document Control Number: EPA-HQ-OAR-2010-0505-6969
Comment Excerpt Number: 15

Comment: EPA's Peer Review Process of the SC-CH4 Estimates was Insufficient

EPA relied upon estimates of SC-CH4 from a single research paper, Marten et al. (2014), which was written by EPA staff. Although there have been some reviews of the paper that are summarized below, we conclude that the significant modifications (and the absence of scientific justifications for some of the modifications) associated with that paper, combined with the fact that it reports SC-CH4 estimates so much higher than the rest of the literature, demands that a more thorough and independent scientific peer review process should be conducted before its results should be used as the sole determinants of an RIA's benefits estimates.

We note that Marten et al. (2014) has been published in a peer-reviewed journal, but we also note that such reviews do not address issues of concern for use in policy deliberations. The focus of peer reviews for journal publication is primarily to determine whether the paper makes a contribution to a particular body of knowledge. Publication peer reviews are not to evaluate or opine on the relevance of the contents of a paper for use in setting public policy. Further, publication of an article in a journal does not necessarily mean that the methodology or the approach laid out in the paper is the best or only approach. It is therefore incorrect to assume that the publication of the paper in an academic journal is an endorsement of the approach used to

compute EPA's SC-CH4 estimates, which reflects only one of several published estimates based on a science that is still uncertain and developing. The fact that its estimate is an outlier within the limited available literature suggests even greater concern with such an inference, albeit not a reason to block publication in a journal.

Appearing to recognize that publication review is not sufficient for the use EPA has put this to in its RIA, EPA conducted its own internally-managed review (US EPA 2014). In this review, three EPA-selected experts responded in writing to a set of EPA-specified charge questions. Two charge questions (Question-1 and Question-7) were directly related to the application of the SC-CH4 which was the main concern of the internal review. EPA states that in light of the "favorable peer review," EPA proposed to use the Marten et al. (2014) SC-CH4 estimates to value CH4 reductions in the Proposed Rule. However, we have read the reviewers comments and we find that they did not provide a consensus view as stated in the Proposed Rule's RIA, as we discuss below:

• Reviewer-1 points out that an application of the direct approach is theoretically better than the Global Warming Potential (GWP) approach and points to the differences between these two approaches when applied to computing CH4 benefits. However, this reviewer cautions in her response, "There, of course, is a host of issues that arises applying any social cost measure to regulatory analyses." In response to Charge Question-7, Reviewer-1 does not offer any definite affirmative or a negative response, but makes a point that EPA should be forthcoming about the shortcomings of the social cost estimates.

• Reviewer-2, in response to charge Question-1, also does not say that it is appropriate for use in benefit-cost analysis of regulatory actions. He only affirms EPA's view that the Marten et al. (2014) approach is designed to measure the monetized value of an incremental change in CH4 emission. This reviewer cautions that the estimate of the effect of an addition of CH4 is a simplification of complex atmospheric chemistry. The reviewer referred to the increase in the radiative forcing due to the indirect effects of tropospheric ozone effects and stratospheric water vapor effects as an "ad hoc assumption." With regard to Charge Question-7, this reviewer also does not provide an explicit response that endorses such use of the SC-CH4 estimates. The reviewer only acknowledges that Marten et al. (2014) consistently applied the IWG's SCC concept to estimating SC-CH4. However, he does not validate the implementation of the models with modifications.

• Reviewer-3 also agrees with the other reviewers that the direct approach used by Marten et al. (2014) (as contrasted to the GWP approach) can be used to monetize the value of an incremental change in CH4. However, his review is the most critical and expresses concerns about moving forward with the direct non-CO2 GHG social cost estimates based on the IWG's SCC methodology before having a peer-reviewed SCC methodology. This reviewer echoes the sentiments of many others (Pizer et al. 2015 and others cited in Marten et al. 2014) that have commented on the need for the greater scientific community to formally review the SCC and SC-CH4 approaches. Reviewer-3 is concerned that there are computational issues with calculating the SC-CH4 estimates and implementation issues using the SC-CH4 estimates for regulatory analysis.

The above comments hardly amount to endorsement for use of the EPA SC-CH4 estimates in regulatory impact analyses. Additionally, we note that EPA's review did not address an even more fundamental question of, "What is the scientific basis for using the SC-CH4 estimates?" Ultimately, EPA's justification to use its own SC-CH4 estimates from a single research paper is based on two factors: 1) To improve the current treatment of CH4 in regulatory analysis so that "… they [SC-CH4 estimates] need not be implicitly assigned a value of zero in USG policy assessment," and that 2) The published estimates are consistent with the SCC approach.

Regarding the first factor, EPA's justification is that any estimate is better than no estimate. Prior to the Proposed Rule, reductions of CH4 emissions were not monetized and in the Proposed Rule EPA felt compelled to come up with a non-zero value (or it could not justify the Proposed Rule on benefit-cost grounds). The need to come up with a non-zero value for SC-CH4 overlooks the reality that even though the state of research is limited, there are several other (and much lower) estimates in the published literature.

The second reason cited is that the published estimates are inconsistent with the SCC approach and the Marten et al. (2014) paper is the first and only set of direct estimates of the SC-CH4 that are consistent with the IWG's SCC estimates. The second factor also is not an appropriate justification. Being consistent with the SCC work may be desirable from the EPA's viewpoint, but it is not a sufficient condition to use such premature estimates as part of the regulatory process since it is contrary to using the best-available science. Both of these reasons are not based on science, but rather on subjective judgment and conform to an arbitrary procedural need. As our comments in the prior section reveal, there remain many technical concerns with the IWG approach as well.

The Federal government has recognized that there is a need for more scientific review of the entire process for estimating a social cost of GHGs, and the IWG has stated it plans to seek technical guidance from independent experts such the National Academies of Sciences, Engineering, and Medicine to examine the technical merits of the SCC (IWG 2015). We find that a comprehensive scientific review is even more important for the SC-CH4, given the limited research to date that we have documented above. Nevertheless, there is evidence of a general impatience on the part of the Administration towards the review process, with the IWG deciding to press ahead in using its SCC estimates because "Academies' review will take some time, during which Federal agencies will have continued need for estimates of the SCC to use in benefit-cost analysis." Deferring the scientific review of the SCC and the SC-CH4 to the future, even after recognizing the need for it, sets a dangerous precedent that undercuts the expectation that Federal regulations be based on best available science.

Response: The EPA disagrees that the peer review process of the estimates of the economic benefits of methane reductions, based on the Marten et al. (2014) social cost of methane estimates, is insufficient. As discussed in the RIA Section 4.3 and in a peer-reviewed whitepaper referenced by the commenter, the methodology used to develop the estimates and their application to the RIA have been subject to extensive review. The EPA has determined that the Marten et al. estimates are scientifically defensible for valuing methane impacts in regulatory analyses and improve upon prior treatment of methane impacts in regulatory analysis.

See the EPA's response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18, for discussion about the rigor of the review of the models and estimates.

The EPA also disagrees with the commenter's conclusion that peer-review of the application of the Marten et al. (2014) estimates was not favorable. As stated in the RIA: "The reviewers agreed with the EPA's interpretation of Marten et al.'s estimates, generally found the estimates to be consistent with the SC-CO2 estimates, and concurred with the limitations of the GWP approach, finding directly modeled estimates to be more appropriate. While outside of the scope of the review, the reviewers briefly considered the limitations in the SC-CO2 methodology (e.g., those discussed earlier in this section) and noted that because the SC-CO2 and SC-CH4 methodologies are similar, the limitations also apply to the resulting SC-CH4 estimates. Two of the reviewers concluded that use of the SC-CH4 estimates developed by Marten et al. and published in the peer-reviewed literature is appropriate in RIAs, provided that the Agency discuss the limitations, similar to the discussion provided for SC-CO2 and other economic analyses." The commenter has not provided evidence that contradicts this statement.

Regarding the specific points the commenter quoted from the peer-reviewers:

- Reviewer 1: the EPA notes that the passage quoted by the commenter does not reveal any shortcomings in the EPA's application of the SC-CH4. Furthermore, the commenter has omitted the following statement from Reviewer 1, which explicitly supports application of the Marten et al estimates to benefit cost analysis in an RIA: "…the review document provides a nice example of how the SC-CH4 estimates from Marten et al (2014) could be used in BCAs of proposed regulations" (See Question 1). Reviewer 1 continued to write in response to the fourth question, "In sum, no approach is perfect but in my opinion, the 'direct' approach used by Marten et al is preferred to the indirect GWP approach for the reasons outlined in the review document. However, the EPA should continue to seek improvements to the direct approach put forth by Marten et al." the EPA is continuing to seek improvements, as noted in the RIA, and has also adhered to the Reviewer's recommendation to provide details about the limitations associated with the analysis (see RIA Section 4.3).
- Reviewer 2: the EPA disagrees with the commenter that Reviewer 2 did not provide an explicit response supporting application of the SC-CH4 estimates. See Reviewer 2's response to Question 7: "As the paper itself points out, the current approach of using a social cost of 0 is clearly not right and so whatever the limitations of existing methods it seems better to use something rather than nothing. Of course one could use a value that is so high that zero would be preferable, but I don't see that error here. More to the point: Accepting the Social Cost of Carbon estimates, this approach consistently applies the concept to methane (and potentially other GHGs)."
- Reviewer 3: Reviewer 3 provided comments that went beyond the scope of the questions asked and focused on the social cost of carbon dioxide (SC-CO2). Reviewer 3 focused on long-term research to improve the SC-CO2 estimates and concluded that the SC-CH4 estimates lag the SC-CO2 process.

The EPA supports continued improvement in the SC-CO2 estimates developed by the IWG and agrees that improvements in the SC-CO2 estimates should also be reflected in the SC-CH4

estimates. However, the fact that the reviewers agree that the SC-CH4 estimates are generally consistent with the SC-CO2 estimates that are recommended by OMB's guidance on valuing CO2 emissions reductions, leads the EPA to conclude that use of the SC-CH4 estimates is an analytical improvement over excluding methane emissions from the monetized portion of the benefit cost analysis.

Moreover, the National Academies of Sciences, Engineering and Medicine has convened a committee, "Assessing Approaches to Updating the Social Cost of Carbon," (Committee) that is reviewing the state of the science on estimating the SC-CO2, and will provide expert, independent advice on the merits of different technical approaches for modeling and highlight research priorities going forward. While the Committee's review focuses on the SC-CO2 methodology, recommendations on how to update many of the underlying modeling assumptions will also likely pertain to the SC-CH4 estimates. Going forward, the EPA will evaluate its approach to estimating the SC-CO2 and SC-CH4 based upon any feedback received from the Academies' panel.

To date, the Committee has released an interim report, which recommended against doing a near term update of the SC-CO2 estimates. For future revisions, the Committee recommended the IWG move efforts towards a broader update of the climate system module consistent with the most recent, best available science, and also offered recommendations for how to enhance the discussion and presentation of uncertainty in the SC-CO2 estimates. At the time of this writing, the IWG is reviewing the interim report and considering the recommendations. The EPA looks forward to working with the IWG to respond to the recommendations and will continue to follow IWG guidance on SC-CO2.

Commenter Name: Margo Thorning, Senior Economic Advisor and Pinar Cebi Wilber, Senior Economist
Commenter Affiliation: American Council for Capital Formation (ACCF)
Document Control Number: EPA-HQ-OAR-2010-0505-6969
Comment Excerpt Number: 17

Comment: RECALCULATION OF SC-CH4 USING MORE REASONABLE ASSUMPTIONS

In Section III, we identified five specific issues including questionable assumptions (that we do not consider to be the most reasonable) used to compute EPA's SC-CH4 estimates. These questionable assumptions include the use of a 2.5% discount rate, use of a global geographic scope for benefits instead of a domestic (U.S.) geographic scope, increase radiative forcing due to indirect effects, and use of BaU emissions scenarios that reflect no incremental future mitigation policy.

To provide a quantitative assessment of the sensitivity of the RIA's estimates of benefits and net benefits to the technical issues, we have re-estimated the SC-CH4 values under several alternative assumptions that we consider more reasonable. All of these alternative SC-CH4

calculations have been made using the same IAMs that were used to compute EPA's SC-CH4 estimates.

These alternative calculations include:

A. Eliminating from consideration the 2.5% discount rate;

B. Limiting benefits to a domestic geographic scope instead of global geographic scope;

C. Alternative assumptions regarding the indirect effects on radiative forcing; and

D. Eliminating BaU emissions projections as the reference point for computing future damages from a ton of incremental emission that would occur today.

Figure 12 provides a summary range of EPA's SC-CH4 estimates in 2020 and 2025 based on assumptions we consider either more reasonable or subject to too much uncertainty for EPA to rely on a single point estimate. The values in the "Min" and the "Max" columns show the recomputed low and the high SC-CH4 estimates and percentage change relative to the RIA range assuming different discount rates. The first row (Case RIA) shows the range of SC-CH4 included in the RIA based on mean values using 2.5%, 3.0%, and 5.0% discount rates. Each subsequent row includes a revised range based on different cases we constructed to address some of the technical issues we identified in EPA's SC-CH4 estimates.

Case A removes from consideration the 2.5% discount rate because it is not appropriate given the shorter atmospheric lifespan of CH4 that reduces concerns about the welfare outcomes of far future generations.

Case B follows OMB's guidance of using U.S. benefits for preparing benefit-cost analysis of Federal regulations. Our range is therefore bounded by discount rates of 3% and 5%. Case B shows the range of SC-CH4 estimates when limited to a domestic geographic scope (while also not considering the 2.5% discount rate). The domestic SC-CH4 estimates are averaged across all socioeconomic scenarios from the PAGE and FUND models. We do not use the DICE model because it does not report U.S.-specific benefits.

Case C removes the assumption EPA made on a 40% enhancement of radiative forcing due to indirect atmospheric effects. This case also assumes U.S. benefits and discount rates of 3% and 5%. As with Case B, domestic SC-CH4 estimates are averaged across all socioeconomic scenarios from the PAGE and FUND models, for consistency.

Case D relies on an emissions projection that reflects future emissions control policies to complement current emissions reduction efforts (i.e., the "5th Scenario"), giving no weight to future emissions projections that assume no incremental reductions in GHG emissions in the future (i.e., the four socioeconomic scenarios that reflect BaU policy). For this case, we report domestic SC-CH4 estimates for the 5th Scenario only, for discount rates of 3% and 5%. Again, for consistency with the prior cases, we use only the PAGE and FUND models.

The alternative SC-CH4 estimates show the progressive drop in the SC-CH4 estimates as we move from Case A to Case D, incrementally altering an additional assumption in each case as described above. We summarize below the SC-CH4 estimates for each of the alternative cases:

1. EPA's range of SC-CH4 estimates per tonne of CH4 in the RIA is $587 to $1,721 in 2020 and $702 to $1,900 in 2025.

2. Removing consideration of the 2.5% discount rate. This lowers the upper end of EPA's SC-CH4 estimates from $1,721 to $1,309 in 2020 (24% reduction) and from $1,900 to $1,508 in 2025 (21% reduction).

3. Considering only domestic benefits. Applying this limitation to the SC-CH4 estimates in the RIA (in conjunction with removing the 2.5% discount rate) reduces the range of SC-CH4 estimates to $106 to $210 in 2020 (reductions of 82% and 88%, respectively) and to $130 to $248 in 2025 (reductions of 81% and 87%, respectively).

4. The indirect effects on CH4 radiative forcing should not be included as a reference point for calculating the SC-CH4. Making this change in addition to the above changes reduces the range of SC-CH4 estimates to $69 to $141 in 2020 (reductions of 88% and 92%, respectively) and to $84 to $158 in 2025 (reductions of 88% and 92%, respectively).

5. The 5th Scenario should be the reference point for calculating the SC-CH4, rather than the other four scenarios that do not include any response in emissions. Making this change in addition to the above changes reduces the range of SC-CH4 estimates to $58 to $99 in 2020 (reductions of 90% and 94%, respectively) and to $69 to $115 in 2025 (reductions of 90% and 94%, respectively).

[Figure 12 provides Alternative Estimates of SC-CH4 Reflecting Key Methodological Uncertainties]

The changes in the SC-CH4 translate to changes in the estimated benefits and net benefits for the Proposed Rule, since none of the changes have an impact on CH4 reductions or compliance costs. Using the revised SC-CH4 estimates from Figure 12, we then compared EPA's net benefits numbers with recalculated net benefits based on our four key assumption changes. The resulting sensitivity cases reflect uncertainties, discussed in the above sections that highlight the extent of EPA's overestimation of SC-CH4 and their net benefits in the Proposed Rule's RIA.

Each of the four alternative ranges of SC-CH4 estimates and the resulting net benefits are shown in Figure 13 (for 2020) and Figure 14 (for 2025). Figure 13 shows net benefits in 2020 for a 3% discount rate for the RIA and for the four alternative cases described above. The "red" bar on the graph indicates the total annualized costs – as estimated by EPA, which is constant across all cases. The "blue" bars show climate benefits for the cases. The difference between the black dotted line and the "blue" bars reflect net benefits or net costs.

For Case A, the SC-CH4 in 2020 is the same as that in the RIA because the change in Case A only impacts the range of results by eliminating the 2.5% discount rate from consideration. All of

the other scenarios (Case B, Case C, and Case D, which account for domestic benefits only, no indirect effects on radiative forcing and/or using the 5th Scenario) have net costs, rather than net benefits. The net costs could be as large as $120 million to $155 million in 2020 compared to the RIA's stated net benefits of $44 million to $52 million with a 3% discount rate.

[Figure 13 provides a bar graph showing Total Costs, Climate Benefits, and Net Benefits in 2020 for 3% Discount Rate]

As with the 2020 results, the net benefits for Case A are unchanged from the RIA. For all other cases, there are net costs that could be as large as $245 million to $380 million (see Figure 14).

[Figure 14 provides a bar graph showing Total Costs, Climate Benefits, and Net Benefits in 2025 for 3% Discount Rate]

Figure 21 and Figure 22 in Appendix A show the net costs in 2020 and 2025 for the 5% discount rate cases. With a higher discount rate, the SC-CH4 values are lower resulting in all cases showing net costs, including the EPA RIA estimate.

Figure 15 combines the net benefits/costs results for each case in 2020 and 2025 for the 3% and 5% discount rates (also 2.5% for the RIA case). For each case, the 3% and 5% discount rate results define the upper and lower values of the vertical bars. The figure shows that even using EPA's SC-CH4 estimates (labeled "RIA"), the Proposed Rule's net benefits could be negative (or, in other words, the Proposed Rule could have net costs). Figure 15 also shows that when sequentially adjusting for each of the technical issues we have identified, the range of net benefits estimates becomes entirely negative—by more than -$120 million per year and -$240 million even at the ranges' upper bounds in 2020 and 2025, respectively.

Although Figure 15 does not show results when each of the assumptions are changed individually, we did run the models for the individual changes, as we briefly summarize here. When using a discount rate range of 3% to 5% and changing each of the assumptions that define Case B and Case C individually, net benefits remain negative over the entire range by at least $33 million. When changing assumption that define Case D alone, the net benefits range remains mostly negative (i.e., -$88 million to +$13 million in 2020 and -$204 million to +$55 million in 2025).

Given this exceptional degree of sensitivity of the net benefits estimates to alternative reasonable assumptions, the lack of full scientific peer review of the science and approach used to estimate EPA's SC-CH4 renders it inappropriate for use in making major national policy decisions. We also note that the downward impact on net benefits associated with each individual assumption that we have explored makes it unsupportable for EPA to suggest that the Proposed Rule will produce positive net benefits.

[Figure 15 provides a whisker plot showing the Range of Net Benefits and Costs in 2020 and 2025 (Millions of 2012$)]

Response: The EPA disagrees with the approach that the commenter has used to develop its own estimates of the SC-CH4. Specifically, the commenter has used assumptions that differ from those that Marten et al. used to estimate the SC-CH4. The differences in the estimates developed by the commenter and those developed by Marten et al are not surprising, given the differences in the assumptions used. RIA section 4.3 provides a robust discussion about the basis for the Marten et al. approach and references to additional documents detailing the methodology. In addition, the EPA has responded directly to the commenter's criticisms of the Marten et al. methodology identified in this comment excerpt. The list below provides a reference to EPA's response for each aspect:

- Use of a 2.5 percent discount rate, see the EPA's response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 8;
- Use of global estimates, see the EPA's response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 7;
- Adjustment to radiative forcing to account for indirect effects, see the EPA's response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 9; and
- Use of business-as-usual scenarios to develop the SC-CH4 estimates, see the EPA's response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 10.

Commenter Name: Lee Fuller, Executive Vice President, and V. Bruce Thompson, President
Commenter Affiliation: Independent Petroleum Association of America (IPAA) and the American Exploration and Production Council (AXPC)
Document Control Number: EPA-HQ-OAR-2010-0505-6983
Comment Excerpt Number: 14

Comment: Now is Not the Time to Introduce a New Model to Justify EPA's Proposed Rules.

The benefits of the proposed rule are estimated using the social cost of methane (SC-CH4), which has been derived from the approach the United States Government (USG) uses for estimating the social cost of carbon (SCC). However, unlike the USG's SCC which has undergone formal public comment and review, EPA's selected value for SC-CH4 in this proposed rulemaking is arbitrarily taken from one scientific report that attempts to find an equivalent SC-CH4 from the SCC, and for which EPA only requested a "peer review" not formal public review and comment. The "peer review" was only concluded in 2014 and discussed as the basis for EPA's cost-effectiveness analysis for the first time in the RIA. The model has not been evaluated by Office of Management and Budget. Providing industry a mere 60 days (plus 17) to evaluate and comment on what amounts to "new math" is inadequate. Also, the selected value of SC-CH4 used for the Benefit-Cost Analysis in the RIA is based on an arbitrarily selected discount rate of 3 percent, which also was not proposed for public review and comment before being used to justify this proposed rulemaking. Even though now EPA belatedly "seeks comments on the use of these directly modeled estimates, from the peer reviewed literature, for the social cost of non-CO2 GHGs . . .," such a request, after EPA has already used its arbitrary value for SC-CH4 to justify methane emissions controls on numerous methane

emissions sources, is arbitrary and capricious. The only proper and legal way for EPA to apply a SC-CH4 value to methane emissions reductions for proposed rulemakings is to publish a proposal for a SC-CH4 value (based on scientific evidence and its arguments for a certain discount rate), take public comments on that proposed value, and finalize the value for future rulemakings. Otherwise, EPA can arbitrarily use one value of SC-CH4 to justify controls on methane emissions from one industrial sector source and then turn-around later and use some other arbitrary value for another industrial sector source, all presumably justified by taking comment on the arbitrary value already used to justify the proposed regulations.

Response: The EPA disagrees with the commenters' assertions that there was insufficient review of the Marten et al. SC-CH4 estimates, that there was insufficient opportunity for public comment, and that the selection of a 3 percent discount rate was arbitrary. For the EPA's response to the assertion about insufficient review of the estimates and that selection of a 3 percent discount rate is arbitrary, see the EPA response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18. For the EPA's response to the assertion that there was insufficient opportunity for public comment, see the EPA response to DCN EPA-HQ-OAR-2010-0505-5425, Excerpt 4.

The EPA also disagrees that use of the SC-CH4 estimates are arbitrary and capricious; see the EPA response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18, for discussion about the extensive reviews conducted before the estimates were applied to the RIA and for discussion about the EPA's conclusions regarding the validity and rigor of the estimates.

Furthermore, the EPA disagrees that the Agency should have published a separate proposal for the SC-CH4 estimates used in this rulemaking action. The application of SC-CH4 to regulatory impact analysis serves the same purpose as the SC-CO2 estimates in that it provides an estimate of the benefits of reductions in emissions (SC-CH4 is applied to methane emissions, SC-CO2 is applied to CO2 emissions). (Alternatively, the SC-CH4 and SC-CO2 could be applied to increases in methane and CO2 emissions, respectively, to estimate the burdens of increased emissions.) As discussed at length in the RIA and in the EPA's response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18, the Marten et al. estimates of the SC-CH4 are fully consistent with the modeling assumptions underlying the SC-CO2 estimates developed by the interagency working group and the application of the SC-CH4 estimates to regulatory impact analysis is analogous to the application of SC-CO2 estimates. The EPA has determined that the interagency working group's July 2015 response to comments on the SC-CO2 (as part of a comment solicitation separate from this rulemaking and incorporated by reference[36]) applies to this comment. The IWG disagreed with comments that "issuance of the SCC estimates constitutes an APA rulemaking" because the SC-CO2 "estimates are not designed to implement, interpret, or prescribe law or policy. Rather they are intended to provide guidance to agencies on a science-based methodology for estimating the benefits of CO2 reductions in regulatory impact analysis." Likewise, the EPA has determine that the SC-CH4 estimates do not constitute rulemaking because they are intended to provide information about the benefits of methane reductions in regulatory impact analysis. Through this rulemaking action, members of the public were provided the opportunity to comment on EPA's application of the SC-CH_4 estimates to

[36] Referred to as the "OMB Response to Comments on SC-CO2." Available at https://www.whitehouse.gov/sites/default/files/omb/inforeg/scc-response-to-comments-final-july-2015.pdf

inform the EPA's decisions. Commenters have raised no arguments to dissuade the EPA from applying the SC-CH_4 estimates to this rulemaking action.

Commenter Name: Institute for Energy Research
Commenter Affiliation: Institute for Energy Research
Document Control Number: EPA-HQ-OAR-2010-0505-6997
Comment Excerpt Number: 2

Comment: This rule uses the novel Social Cost of Methane (SCM) to justify on cost-benefit grounds an amendment of the new source performance standards (NSPS) for the oil and natural gas source category. Specifically, the rule sets standards for both methane and volatile organic compounds (VOC) for certain equipment, processes, and activities across this source category. The problem, however, is that the use of the Social Cost of Carbon (SCC) and (even more so) the SCM (which is derived from the SCC) as inputs into federal regulatory actions is totally inappropriate. The Administration is treating the SCC and SCM as if they were scientifically valid, objective facts of the external world, akin to the charge on an electron or the boiling point of water at sea level. However, the SCC and SCM are no such thing, at least in our present state of understanding. Rather, the SCC and SCM are arbitrary outputs from very speculative computer models. They can be adjusted up or down as the analyst wishes, simply by changing a few key parameter choices. For example, simply by adjusting the parameter and modeling choices in plausible ways, a knowledgeable economist can generate SCC estimates that are very high, very low, or even negative—meaning that carbon dioxide emissions actually shower "positive externalities" on humans beyond the direct benefits to the emitters, and therefore should (according to the Administration's logic) receive federal subsidies.

The ultimate reason federal agencies use the SCC and now SCM is in order to comply with Executive Order 12866, which requires agencies to "assess both the costs and the benefits of the intended regulation." Yet Executive Order 12866 also requires costs and benefits to be quantified "to the fullest extent that these can be usefully estimated."

This comment explains that the costs and benefits of proposed federal regulations cannot be "usefully estimated" by the inclusion of the SCC, let alone the SCM. Because the SCC and SCM as implemented by federal agencies are completely arbitrary and without theoretical or experimental support, not to mention a lack of data supporting the Working Group's calculations, this calculation of the SCC and SCM also violate the Information Quality Act of 2001 (IQA). According to OMB's own guidelines, the IQA requires information disseminated by agencies to be "accurate, reliable, and unbiased" and "presented in an accurate, clear, complete and unbiased manner."

Our objections can be classified as both theoretical and practical. First, in terms of the pure theory, the SCC and SCM are inappropriate for use in federal rule-making because of the malleability of the underlying concept itself; to repeat, neither the SCC nor the SCM is an objective feature of the world "out there" but is instead reliant on subjective modeling decisions made by the analyst.

Second, in terms of the practical implementation, use of the SCC (and now SCM) has lacked transparency and—more serious—has violated longstanding OMB guidelines. Even if the SCC and SCM were objective scientific parameters—which they are not—these procedural abuses in the use of the SCC and SCM would alone render them dubious elements for continued use in the regulatory process.

This comment deals with each category of objections—both theoretical and procedural—in sections I and II, respectively. In section III we explain why the Social Cost of Methane (SCM) is even more dubious than the Social Cost of Carbon (SCC) in federal regulatory analysis. We then conclude that in light of these serious problems, the SCC and SCM should no longer be used as inputs in federal regulatory analysis and rule-making.

As a final prefatory note, the reader should be aware that "the social cost of carbon" (SCC) is a bit of a misnomer in a discussion involving methane, which itself contains an atom of carbon (as well as four hydrogen atoms). Some authors therefore refer more accurately to the SC-CO2 versus the SC-CH4. However, because the label "SCC" is now so widespread, in this Comment we will retain it exclusively for reference to carbon dioxide and use "SCM" to refer to the social cost of methane.

Response: The EPA disagrees that the application of the SC-CO2 (referred to as the SCC by the commenter) and the SC-CH4 (referred to as the SCM by the commenter) is inappropriate. Estimates of the SC-CO2 and SC-CH4 allow the effects of CO2 and CH4 emission changes, respectively, on society to be counted in benefit cost analysis. Without estimates of the SC-CO2 and SC-CH4 the effect of a change in CO2 and CH4 emission changes, respectively, would be considered qualitatively, but could not be quantified in the bottom-line benefit cost estimates. In 2007 the Ninth Circuit Court remanded a fuel economy rule to DOT for failing to monetize the benefits of the CO2 emissions reductions in its regulatory impact analysis, noting that "the value of carbon emissions reduction is certainly not zero."[37]

The EPA also disagrees that the SC-CH4 estimates are arbitrary and capricious; see the EPA response to DCN EPA-HQ-OAR-2010-0505-6603, excerpt number 18, for discussion about the extensive reviews conducted before the estimates were applied to the RIA and for discussion about the EPA's conclusions regarding the basis for and the validity and rigor of the estimates. The commenter has asserted that one can "generate SCC estimates that are very high, very low, or even negative" by "simply by adjusting the parameter and modeling choices in plausible ways," but has failed to provide evidence of this assertion. In particular, the commenter has not identified any of the parameter or modeling choices that would drastically change the resulting estimates. The EPA response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18, also provides details about the selection of models used to develop the SC-CO2 and SC-CH4 estimates as well as the chosen discount rates. In addition, the RIA provides a detailed discussion about the methodology, including the basis for the input parameters, the limitations and uncertainty about the estimates, as well as references to the detailed supporting documentation, such as Marten et al. (2014) and the 2010 SC-CO2 Technical Support Document. The RIA also

[37] http://cdn.ca9.uscourts.gov/datastore/opinions/2007/11/14/0671891.pdf

summarizes the 2010 SC-CO2 TSD discussion about the sensitivity of SC-CO2 estimates to discount rates, presenting the rationale for each of the three discount rates chosen.

Regarding the commenter's assertion that the SC-CO2 and the SC-CH4 estimates have lacked transparency and that they have violated OMB guidelines, see the EPA response to DCN EPA-HQ-OAR-2010-0505-6997, Excerpt 14.

Commenter Name: Institute for Energy Research
Commenter Affiliation: Institute for Energy Research
Document Control Number: EPA-HQ-OAR-2010-0505-6997
Comment Excerpt Number: 3

Comment: THEORETICAL PROBLEMS WITH USING THE SOCIAL COST OF CARBON AND SOCIAL COST OF METHANE IN FEDERAL REGULATORY ANALYSIS AND RULE-MAKING

Even on a purely theoretical level, the SCC and SCM are dubious concepts that are inappropriate for use in federal regulatory analysis and rule-making.

A. Economic Theory Background: Market Failure, Negative Externalities, and Social Costs

In standard economic analysis, the decentralized market economy contains tendencies for equilibrium outcomes to correspond to socially "optimal" arrangements. Market prices, and the corresponding profits and losses that they imply, provide incentives for entrepreneurs to efficiently allocate resources across sectors. As Adam Smith's famous metaphor of the "Invisible Hand" illustrated, the self-interest of market participants leads them to promote (perhaps unwittingly) the general welfare.

However, the typical textbook economic analysis also categorizes examples of "market failure," where market forces do not guarantee socially desirable outcomes. One such example is the case of a "negative externality," in which a firm's market activities impose harms on others, even though the firm is not penalized for such harms.

Following in the framework established by A.C. Pigou, economists often distinguish between the private costs of the firm's actions versus the social costs. The owners of the firm want to maximize profits, and thus will adjust its activities in accordance with the private benefits and private costs of its actions. However, in the case of a negative externality, the firm will overproduce, because the owners are only considering the out-of-pocket expenses (such as wages) but are ignoring all of the social costs.

Response: The EPA disagrees that the SC-CO2 and the SC-CH4 are "dubious concepts that are inappropriate for use in federal regulatory analysis and rulemaking" and acknowledges the commenter's brief summary of externalities and market failures. For the EPA's response to the

commenter's assertion of theoretical problems, see the EPA response to DCN EPA-HQ-OAR-2010-0505-6997, Excerpts 4 through 9.

Commenter Name: Institute for Energy Research
Commenter Affiliation: Institute for Energy Research
Document Control Number: EPA-HQ-OAR-2010-0505-6997
Comment Excerpt Number: 4

Comment: Anthropogenic Global Warming and the SCC/SCM

The 2007 Nobel Peace Prize awarded to the Intergovernmental Panel on Climate Change (IPCC) and Al Gore underscored the public's growing awareness and concern over anthropogenic (manmade) global warming. Many climatologists and other relevant scientists claim that unchecked emissions of greenhouse gases (GHGs) from human activity will lead to significantly rising temperatures, which in turn will spell potentially catastrophic hardship for future generations. If this is true, then the economist will recognize what former Chief Economist of the World Bank Nicholas Stern described, in his famous report to the British government, as "the greatest example of market failure we have ever seen."

Within this context, we can understand that the "social cost of carbon" (SCC) is simply the particular label given to the social costs imposed on third parties from the negative externality of carbon dioxide emissions because of anthropogenic global warming (or climate change more generally). The "social cost of methane" (SCM) has a similar definition. For much of the rest of our Comment, we will focus on the more popular SCC but all of our points apply with equal (or greater) force to the SCM.

For a formal definition, we can turn to the White House Interagency Working Group. Its May 2013 report defines the SCC as:

an estimate of the monetized damages associated with an incremental increase in carbon emissions in a given year. It is intended to include (but is not limited to) changes in net agricultural productivity, human health, property damages from increased flood risk, and the value of ecosystem services due to climate change.

The quantitative estimates of the SCC are extremely significant. The Working Group document itself states that the purpose of the SCC estimates "is to allow agencies to incorporate the social benefits of reducing carbon dioxide (CO_2) emissions into cost-benefit analyses of regulatory actions that impact cumulative global emissions." Some obvious examples of the application of the SCC estimates are fuel economy standards, EPA greenhouse gas regulations of power plants, efficiency standards for household appliances, and programs to subsidize so-called "alternative" energy sources and transportation technologies. More recently rules that have a significant impact on methane emissions have begun citing the SCM.

Response: The EPA acknowledges this comment about public awareness of climate change and about the application of SC-CO2 and SC-CH4 to regulatory impact analyses. The EPA relies "primarily upon the major assessments by the USGCRP, IPCC, and the NRC to provide the technical and scientific information to inform the Administrator's judgment regarding the question of whether GHGs endanger public health and welfare", and has determined that "recent scientific assessments confirm and strengthen the conclusion that GHGs endanger public health, now and in the future".

Commenter Name: Institute for Energy Research
Commenter Affiliation: Institute for Energy Research
Document Control Number: EPA-HQ-OAR-2010-0505-6997
Comment Excerpt Number: 5

Comment: Computer-Simulated Damages

The Interagency Working Group chose three computer models from the economics of climate change literature in order to estimate the SCC. Specifically, they chose the PAGE, FUND, and DICE models. The specific label for such simulations is "Integrated Assessment Models" or IAMs, because they integrate computer models of the entire global economy and climate system, which is necessary in order to assess the marginal damages caused by the emission of an additional ton of carbon dioxide today. The Working Group ran thousands of simulations through the year 2300, and then analyzed the results in order to report its estimates of the SCC (based on various parameters) through time.

Note that these computer models are also relevant for discussion of the SCM, because the pioneering work in this field—specifically, Marten and Newbold (2011)—uses (components of) the DICE model coupled with the MAGICC model of GHGs in order to provide early estimates of the SCM. Their further work with other collaborators, as produced in Marten et al. (2014), uses the other IAMs from the Working Group in order to emulate its procedures when providing the latest estimate of the social cost of methane. Specifically, Marten et al. (2014) uses the PAGE, FUND, and DICE models, as well as the same socioeconomic and emissions scenarios, and climate sensitivity assumptions as the Working Group on the Social Cost of Carbon. Thus all of the problems associated with the Working Group's procedures for estimating the SCC now apply to estimates of the SCM.

One of the crucial steps in the computer models is to posit a "damage function" that relates a stipulated increase in global temperature with a corresponding impact on global GDP. The following diagram from the February 2010 Working Group report shows how each of the models handles global warming of varying intensity:

[Graph - "Annual Consumption Loss as a Fraction of Global GDP in 2100 Due to an Increase in Annual Global Temperature in the DICE, FUND, and PAGE models"]

Source: Figure 1A (page 9) of February 2010 Working Group TSD

As the diagram above indicates, the three models selected for the Working Group analysis yield different results. In particular, the FUND model shows much lower impacts from global warming, especially at higher temperatures. Indeed, the green line's initial (and slight) dip into negative territory shows that the FUND model assumes global warming will shower the world with *positive externalities* up through about 3 degrees Celsius. The fact that the FUND model yields (moderate) net *benefits* from global warming in the initial stages will be very significant when we consider the role of discount rates in the analysis.

Response: The EPA acknowledges this comment about the models the interagency working group used to estimate the SC-CO2, which are the same models that Marten et al used to estimate the SC-CH4, and the observation that some of the FUND results show moderate net benefits. In addition to RIA section 4.3, see EPA response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18, for discussion about the how the SC-CH_4 are fully consistent with the SC-CO_2 estimates, the modifications employed to explicitly model methane, and discussion about the limitations of the SC-CO_2 and the SC-CH_4 estimates.

Commenter Name: Institute for Energy Research
Commenter Affiliation: Institute for Energy Research
Document Control Number: EPA-HQ-OAR-2010-0505-6997
Comment Excerpt Number: 6

Comment: Discount Rates

When estimating the social cost of carbon (SCC) and social cost of methane (SCM), the choice of discount rate is crucial, because the computer simulations of large climate change damages occur decades and even centuries in the future, and also because some models show net *benefits* from global warming through mid-century.

Indeed, the Working Group generates its estimates of the SCC by equally weighting the estimates provided by the three computer models discussed above (namely the PAGE, FUND, and DICE models). As the diagram in the previous section illustrated, in the early decades (while the earth has only warmed one to two degrees Celsius) the cumulative impact of global warming is either close to zero or even positive.

Therefore, the rate at which we discount future damages into present monetary terms will have an enormous impact on the estimated SCC. For example, in the May 2013 Working Group update, the SCC in the year 2010 was reported as $11/ton at a 5% discount rate, but $52/ton at a 2.5% discount rate. In other words, cutting the discount rate in half caused the reported SCC to more than quadruple. Policymakers and citizens should realize just how influential the choice of discount rate is, when it comes to the SCC.

Regarding the SCM, we see a similar pattern. For example, the currently-authoritative work of Marten et al. (2014) has the following estimates:

TABLE: Social Costs Methane for Select Years (2012$/metric ton)			
Discount Rate	5.0%	3.0%	2.5%
Year			
2015	$490	$1,100	$1,500
2020	$580	$1,300	$1,700
2050	$1,400	$2,700	$3,300

SOURCE: Marten et al. (2014)

As the above table demonstrates, the discount rate has an enormous impact on the estimated "social costs" of three greenhouse gases. For example, depending on the year, cutting the discount rate in half from 5% to 2.5% can *triple* the estimated social cost of methane (SCM). The effect is not as pronounced as with carbon dioxide (because methane does not take as long to dissipate from the atmosphere), but nonetheless much of the impact (in the computer model) from an additional ton of methane emissions refers to simulated economic damages far out in the future, which must then be discounted back to the present for a cost assessment.

The problem is that the choice of discount rate *is not something that can be settled objectively* through technical analysis. If policymakers were going to use market rates of interest, there might be some hope of objectivity. There would still be significant "wiggle room" by selecting the time periods and particular interest rates to use in the computation, but at least market rates are externally generated and, in principle, could be measured objectively.

However, the trend in both academia and in policymaking circles is to use discount rates that are influenced by philosophical and ethical considerations, *not* based solely on observed market returns. Presumably the proponents of one discount rate versus another may have strong arguments on their side, but the critical point is that *these "ethical" discount rates are subjective and in an important sense, arbitrary*. There is no "objective" indicator of how many dollars of climate change damage in the year 2300 would need to be averted, in order to justify $100 of forfeited economic growth today because of regulations restricting carbon dioxide emissions.

Therefore, using the SCC and SCM as part of regulatory cost/benefit analyses gives great leeway to the analyst, who can alter the benefits and costs (as expressed in present value terms) just by tweaking the discount rate. Because the discount rate is arbitrary, there is no "right" or "wrong" one to use.

Response: Both RIA Section 4.3 and the 2010 SC-CO_2 Technical Support Document (TSD) explicitly discuss the lack of consensus about the appropriate discount rate to use in intergenerational problems. Specifically, the SC-CO_2 TSD states, "The choice of a discount rate, especially over long periods of time, raises highly contested and exceedingly difficult questions of science, economics, philosophy, and law. Although it is well understood that the discount rate has a large influence on the current value of future damages, there is no consensus about what rates to use in this context" (pg 17). The 2010 SC-CO_2 TSD continues to detail the interagency working group's review of the discounting literature and its rationale for choosing the three certainty-equivalent rates of 2.5, 3, and 5 percent. The EPA notes that the commenter's

recommendation to rely solely on observed market interest rates ignores the intergenerational issue.

See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18 for additional discussion about the selection of the discount rates applied to the SC-CO2, which were also applied to the SC-CH4. DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 8 discusses application of the 2.5 percent discount rate to estimate the SC-CH4.

Commenter Name: Institute for Energy Research
Commenter Affiliation: Institute for Energy Research
Document Control Number: EPA-HQ-OAR-2010-0505-6997
Comment Excerpt Number: 7

Comment: The Estimates of the SCC in the Literature Are Quite Dispersed

To illustrate just how tenuous is the scholarly understanding of the SCC—and to see why it is not a "fact of the world" in the same way that the boiling point of water is an objective and measurable concept—consider the following diagram taken from a survey article written by a world expert on the SCC literature (and creator of the FUND model):

[Graph - "Survey of Published Estimates of SCC That Use 3% "Pure Time Preference" Rate for Discounting (dot indicates individual estimate)."]

Source: Richard Tol. (2011) "The SCC," ESRI Working Paper #377.

The diagram above is quite striking. It show that the 90% confidence interval of the "true" SCC has widened over the last two decades. This is not what one would expect from a maturing science that is honing in on the "true" value. Even more shocking, from 2006 onward (at least until the time of Tol's survey, in 2011) the lower portion of the 90% confidence interval was in the negative region of the graph, meaning that one could not rule out (with 95% confidence) the possibility that further carbon dioxide emissions at that point would benefit humanity at large (beyond the private benefits accruing to the emitters).

Because the interval is 90% confidence, the bottom region (below the interval) corresponds to only 5% of the probability range, meaning that anything above that threshold contains the true SCC with 95% probability.

The final takeaway from the above diagram is the enormous dispersion in the point estimates of the SCC. In particular, the 2005 estimates show a range from about negative $5/ton up to an enormous $120/ton. (Note that the y-axis on the above chart refers to tons of carbon, not carbon dioxide. Thus these values would need to be multiplied by 3.67 to make them comparable to the SCC estimates that are typically used in U.S. policy discussions.) This chart alone should disqualify use of the SCC in federal regulatory analysis and rule-making.

Response: The EPA disagrees that the dispersion of estimates presented in the Tol (2011) graph presented by the commenter indicates that SC-CO2 (or SC-CH4) should not be used in regulatory impact analysis. First, while the graph identifies these values as estimated with a pure rate of time preference of 3 percent, it does not identify the other assumptions and modeling parameters used to develop the estimates, preventing the reader from understanding why the estimates vary. The modeling and parameter choices are important and would provide more useful information about the basis for variation among these estimates. The EPA has explained the rationale for the assumptions and modeling decisions, which were drawn from the peer-reviewed academic literature, made for the SC-CO2 and SC-CH4 estimates in RIA Section 4.3. In addition, the SC-CO2 TSDs fully discuss the sensitivities of the SC-CO_2 and how the interagency working group explored those sensitivities while Marten et al. (2014) discusses sensitivities they explored in the development of the SC-CH4.

Second, the Tol (2011) chart referenced by the commenter in this excerpt is five years old and relies on outdated models. The science underlying the assessment and valuation of climate change impacts is constantly evolving. Since the publication of the initial SC-CO_2 estimates in 2010, the representation of the science and economic consequences of climate change in the three IAMs has improved. For example, the 2013 SC-CO_2 technical update—published two years after the cited Tol chart—allowed the SC-CO_2 estimates to reflect these improvements. Some of the model revisions tended to increase the value of SC-CO_2 while others tended to decrease it. The updated values reflected the net effect of all of those changes.

Third, the EPA acknowledges uncertainty in the SC-CO2 and SC-CH4 estimates but disagrees that the uncertainty is so great as to undermine use of the estimates in regulatory impact analysis. The uncertainty in the estimates is fully acknowledged and comprehensively discussed in the TSDs and supporting academic literature. While uncertainty must be acknowledged and addressed in regulatory impact analyses, even an uncertain analysis provides useful information to decision makers and the public. For example, if an analysis shows that benefits of a policy option consistently do (or do not) justify costs even over a broad range of estimates, this may increase confidence in the robustness of this conclusion. Conversely, if choices among parameter estimates within a plausible range significantly affect the conclusions of the analysis, this is an important consideration in deciding how to weigh the analytical results in the decision making process. The presence of uncertainty is thus not a reason to exclude the best available estimates of quantified/monetized benefits, as long as it is appropriately characterized. Rather, good regulatory practice requires that agencies use the best available scientific, technical and economic information to derive the best estimates of costs and benefits that they can, and then communicate to the public the limitations and uncertainties of the analyses. This is what EPA and all of the members of the IWG have attempted to do in developing and discussing the SC-CO2 estimates and what the EPA has done in presenting the Marten et al SC-CH4 estimates.

As noted in the SC-CO2 TSDs, the EPA and the other IWG members are committed to periodic updates in the estimates to reflect ongoing developments in our understanding of the science and economics of climate change, including the treatment of uncertainty. Moreover, as previously stated, the EPA has determined that the current SC-CO2 estimates continue to represent the best scientific information on the impacts of climate change available in a form appropriate for incorporating the damages from incremental CO2 emissions changes into regulatory analyses. To further strengthen the robustness of the SC-CO2 estimates, the EPA and other members of the

U.S. Interagency Working Group on the social cost of carbon are seeking independent expert advice on technical opportunities to update these estimates from the National Academies of Sciences, Engineering, and Medicine. A committee convened by the Academies is reviewing the state of the science on estimating the SC-CO2, and will provide expert, independent advice on the merits of different technical approaches for modeling and highlight research priorities going forward. The Academies' review will focus on the SC-CO2 methodology, but recommendations on how to update many of the underlying modeling assumptions will also likely pertain to the SC-CH4 estimates. Going forward, the EPA will evaluate its approach to estimating the SC-CO2 and SC-CH4 based upon any feedback received from the Academies' panel.

To date, the Committee has released an interim report, which recommended against doing a near term update of the SC-CO2 estimates. For future revisions, the Committee recommended the IWG move efforts towards a broader update of the climate system module consistent with the most recent, best available science, and also offered recommendations for how to enhance the discussion and presentation of uncertainty in the SC-CO2 estimates. Specifically, the Committee recommended that "the IWG provide guidance in their technical support documents about how [SC-CO2] uncertainty should be represented and discussed in individual regulatory impact analyses that use the [SC-CO2]" and that the technical support document for each update of the estimates present a section discussing the uncertainty in the overall approach, in the models used, and uncertainty that may not be included in the estimates. At the time of this writing, the IWG is reviewing the interim report and considering the recommendations. The EPA looks forward to working with the IWG to respond to the recommendations and will continue to follow IWG guidance on SC-CO2.

Commenter Name: Institute for Energy Research
Commenter Affiliation: Institute for Energy Research
Document Control Number: EPA-HQ-OAR-2010-0505-6997
Comment Excerpt Number: 8

Comment: Computer-Generated SCC Values Are "Close to Useless"

To illustrate just how dubious are the Integrated Assessment Models (IAMs)—including the three particular IAMs chosen for the Working Group's calculations—we quote the abstract of a peer-reviewed article by MIT economist Robert Pindyck titled "Climate Change Policy: What Do the Models Tell Us?":

Very little. A plethora of integrated assessment models (IAMs) have been constructed and used to estimate the social cost of carbon (SCC) and evaluate alternative abatement policies. **These models have crucial flaws that make them close to useless as tools for policy analysis:** certain inputs (e.g. the discount rate) are arbitrary, but have huge effects on the SCC estimates the models produce; the models' descriptions of the impact of climate change are completely ad hoc, with no theoretical or empirical foundation; and the models can tell us nothing about the most important driver of the SCC, the possibility of a catastrophic climate outcome. **IAM-based**

analyses of climate policy create a perception of knowledge and precision, but that perception is illusory and misleading. [Bold added.]

In the above quotation, Pindyck echoes and confirms our analysis given above. Later in the paper, Pindyck explains the arbitrary nature of the damage functions, which of course underlie the SCC estimates generated by the computer models:

When assessing climate sensitivity, we at least have scientific results to rely on, and can argue coherently about the probability distribution that is most consistent with those results. When it comes to the damage function, however, we know almost nothing, so **developers of IAMs [Integrated Assessment Models] can do little more than make up functional forms and corresponding parameter values. And that is pretty much what they have done.** [Pindyck p. 11, bold added.]

Pindyck then goes on to say:

Most IAMs (including the three that were used by the Interagency Working Group to estimate the SCC) relate the temperature increase T to GDP through a "loss function" L(T), with L(0) = 1 and L'(T) < 0. For example, the Nordhaus (2008) DICE model uses [an] inverse-quadratic loss function…

Weitzman (2009) suggested the exponential-quadratic loss function…which allows for greater losses when T is large. But remember that **neither of these loss functions is based on any economic (or other) theory. Nor are the loss functions that appear in other IAMs. They are just arbitrary functions, made up** to describe how GDP goes down when T goes up.

The loss functions in PAGE and FUND, the other two models used by the Interagency Working Group, are more complex but equally arbitrary...[T]here is no pretense that the equations are based on any theory. [Pindyck p. 11, bold added.]

Furthermore, the previous administrator of the Office of Information Regulatory Affairs, Cass Sunstein, explains that "[m]any people believe that the TSD relies on unreliable integrated assessment models."

Note that although Pindyck reserved his harsh remarks for the SCC, his points apply with equal validity (indeed even more so) to the SCM. The estimates of the SCM are also derived from the same IAMs. Yet there has been even less work on the SCM than the SCC, so the results here are even more dubious.

Response: The EPA disagrees that either the SC-CO2 or the SC-CH4 estimates are "dubious." See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18 for discussion about the extensive reviews conducted before the SC-CH4 estimates were applied to the RIA, discussion about EPA's conclusions regarding the validity and rigor of the SC-CO2 and SC-CH4 estimates, and discussion of the statements by Pindyck referenced by the commenter. The interagency

working group has also responded to comments based on the Pindyck paper in the context of the SC-CO2 and incorporates them by reference in this response.[38]

The EPA also has determined that the quotation the commenter attributed to the previous administrator of the Office of Information Regulatory Affairs, Mr. Cass Sunstein, is misleading because the commenter fails to note that Mr. Sunstein was paraphrasing the very same Pindyck (2013) comments immediately preceding it. That is, Mr. Sunstein's quotation was a summary of the same information that the commenter discussed from Pindyck (2013). More importantly, the EPA notes that the text attributed to Mr. Sunstein characterizes a belief held by some individuals but it does not provide any evidence or factual information about reliability, or lack thereof, of integrated assessment models. The EPA further notes that Mr. Sunstein attributed this belief to "people," and not to the U.S. government or to himself.

Commenter Name: Institute for Energy Research
Commenter Affiliation: Institute for Energy Research
Document Control Number: EPA-HQ-OAR-2010-0505-6997
Comment Excerpt Number: 9

Comment: Theoretical Flaws With SCC and SCM: Summary

As the above analysis demonstrates, the "social cost of carbon" and "social cost of methane" are not objective, empirical facts of the world that could be measured by scientists. Instead, even at a conceptual level the SCC and SCM are driven by subjective and ultimately arbitrary choices made by the analyst, including the damage function to be used and the discount rate to apply to those future damages (or benefits). Because of these tremendous ambiguities in the concept, it is not surprising that even scholarly estimates of the SCC are widely dispersed. As an expert in the field—who is in favor of a carbon tax, proving he is not motivated by ideological reasons—describes the situation, the SCC estimates generated through current computer models are "close to useless." His analysis applies with equal or greater force to the SCM, which enjoys even less scholarly work at the moment.

Response: The EPA disagrees that either the SC-CO2 or SC-CH4 estimates are arbitrary. The commenter has failed to demonstrate how the analysis of this unnamed expert—presumably Dr. Pindyck, as quoted by the commenter in DCN EPA-HQ-OAR-2010-0505-6997, Excerpt 8—applies "with greater or equal force to the" SC-CH4. The statements the commenter attributed to Dr. Pindyck do not explicitly reference the SC-CH4 or provide comparisons of SC-CO2 to the social cost of other gases. See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18 for discussion about the extensive reviews conducted before the SC-CH4 estimates were applied to the RIA, discussion about the EPA's conclusions regarding the validity and rigor of the SC-CO2

[38] See OMB Response to Comments: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866, July 2015, pages 6-10, https://www.whitehouse.gov/sites/default/files/omb/inforeg/scc-response-to-comments-final-july-2015.pdf.

and SC-CH4 estimates, and discussion of the statements by Dr. Pindyck referenced by the commenter.

Commenter Name: Institute for Energy Research
Commenter Affiliation: Institute for Energy Research
Document Control Number: EPA-HQ-OAR-2010-0505-6997
Comment Excerpt Number: 10

Comment: ***PROCEDURAL PROBLEMS WITH USING THE SOCIAL COST OF CARBON AND SOCIAL COST OF METHANE IN FEDERAL REGULATORY ANALYSIS AND RULE-MAKING***

In the first section of this comment, we showed the theoretical problems with using the SCC/SCM for regulatory purposes. In other words, we showed that the SCC/SCM is dependent on arbitrary assumptions and does not provide a coherent guide to cost/benefit analysis and rule-making.

Another problem with the Working Group's calculation of the SCC is a number of *process* problems where the Working Group consistently, and without theoretical justification, made arbitrary choices that increased the SCC. The same problems with the Working Group's estimate of the SCC plague the procedure by which the SCM is currently being estimated, so most of our analysis in this section applies to the SCM with equal validity.

Response: Regarding the commenter's statement about theoretical problems and assertion that the SC-CO2 and SC-CH4 rely on arbitrary assumptions and do not provide a coherent guide to rulemaking analysis, see responses to DCN EPA-HQ-OAR-2010-0505-6997, Excerpts 4 through 9. Regarding the commenter's concerns about the process-issues, see response to DCN EPA-HQ-OAR-2010-0505-6997, Excerpts 11 through 15.

Commenter Name: Institute for Energy Research
Commenter Affiliation: Institute for Energy Research
Document Control Number: EPA-HQ-OAR-2010-0505-6997
Comment Excerpt Number: 11

Comment: Ignoring Clear OMB Guidelines

The most obvious example of the dubious implementation of the SCC in federal cost/benefit analyses is the ignoring of clear OMB guidelines on how such analyses are to be quantified. Specifically, OMB requires that the costs and benefits of proposed policies be quantified at discount rates of 3% and 7% (with additional rates being optional), and OMB also requires that the costs and benefits be quantified at the domestic (not global) level. In practice, the Working

Group and agencies that have relied on its estimates of the SCC have simply ignored these two clear OMB guidelines. We explain each issue in the below subsections.

Response: Regarding OMB guidelines on discounting and the commenter's assertion that the SC-CO2/SC-CH4 estimates ignore those guidelines on discounting, see response DCN EPA-HQ-OAR-2010-0505-6997, Excerpt 12. Regarding OMB guidelines on use of domestic values and the commenter's assertion that the SC-CO2/SC-CH4 estimates ignore the OMB guidelines relevant to use of domestic or global values, see response DCN EPA-HQ-OAR-2010-0505-6997, Excerpt 13.

Regarding discounting of the SC-CO_2 and SC-CH_4 estimates:

- See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18 for additional discussion about the selection of the discount rates applied to the SC-CO2, which were also applied to the SC-CH4.
- See response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 8 which discusses application of the 2.5 percent discount rate to estimate the SC-CH4.

Commenter Name: Institute for Energy Research
Commenter Affiliation: Institute for Energy Research
Document Control Number: EPA-HQ-OAR-2010-0505-6997
Comment Excerpt Number: 12

Comment: Exclusion of 7% Discount Rate from Cost/Benefit Analysis

The Office of Management and Budget writes instructions for federal agencies in regulatory analysis. These are called "OMB Circulars." OMB Circular A-4 (relying in turn on Circular A-94) states that "a real discount rate of 7 percent should be used as a base-case for regulatory analysis," as this is the average before-tax rate of return to private capital investment. However, Circular A-4 acknowledges that in some cases, the displacement of consumption is more relevant to assess the impact of the policy under consideration, in which case a real discount rate of 3 percent should be used. Thus it states: "For regulatory analysis, you should provide estimates of net benefits using both 3 percent and 7 percent." Note that Circular A-4 does *not* say that a discount rate should be chosen based on the impacts, and which of the two rates is deemed more appropriate to the situation; instead it says quite clearly that estimates should be made *using both rates*. In addition, the agency is also free to use other discount rates, as long as both 3 and 7 percent are used.

In the economics of climate change academic literature, there are disputes over the proper discount rate, with some economists arguing that very low rates should be used in order to place future generations on a nearly equal footing with the present generation in policy analysis. Circular A-4 and the White House's primer on Circular A-4, explicitly cited the work of Martin Weitzman, one of the leading scholars in the field on this issue, who argues for a low discount rate in climate change analysis.

Nonetheless, after this discussion the 2011 primer still concluded:

If the regulatory action will have important intergenerational benefits or costs, the agency might consider a sensitivity analysis using a lower but positive discount rate, ranging from 1 to 3 percent, **in addition to calculating net benefits using discount rates of 3 percent and 7 percent.** ["Regulatory Impact Analysis: A Primer," p. 12, bold added.]

Note the significance of the above quotation: The 2011 primer is fully aware that some policies have intergenerational effects spilling into the distant future, and that a discount rate lower than even 3 percent might be appropriate for such analyses. Yet it *still* said that the cost/benefit analysis should be reported at the 7 percent rate.

Yet even though the guidance from OMB was quite explicit on this point, both the initial White House Working Group report from 2010, as well as the recent update in May, did *not* report the SCC using a 7 percent discount rate; they only used discount rates of 2.5, 3, and 5 percent. Furthermore, the various responses on this point, offered by Administration officials, dodge and dissemble on this crucial issue For example, last July Howard Shelanski, the Administrator of the Office of Information and Regulatory Affairs of the Office of Management and Budget, testified on the omission of the SCC at 7 percent:

We don't use 7 percent when what we are interested in understanding are effects on future consumption by individuals, by consumers, by citizens.

…

Now, that said, just two things. To be sure, 7 percent was not used in the range of numbers given for social cost of carbon ***because of the belief that it was inappropriate to discount to zero intergenerational effects***, effects that would occur one or two generations in the future.

…

So while it is clearly the case that a separate 7 percent number was not listed, and we generally do, where appropriate, ask regulatory agencies to include that in rulemakings, for the purpose of this estimate, which was not a rulemaking, it was an input to rulemakings, the judgment was reached that 7 percent was not appropriate.

Mr. Shelanski's statement is contrary to the plain language of Circular A-4. As noted above, Circular A-4 explicitly contemplates intergenerational discounting and still requires reporting the SCC (or other benefits and costs) at 3 percent ***and*** 7 percent rates. Despite Mr. Shelanksi's statement, the failure of the Working Group to report the SCC at 7 percent is arbitrary and capricious.

No one is arguing that the Working Group or federal agencies should be prohibited from reporting results using a low discount rate. Rather, the public deserves to know what the results would be, were the cost/benefit calculations performed at a 7 percent discount rate, as OMB guidelines clearly require.

This omission of a 7 percent figure masks just how dependent the SCC is on discount rates. The figure below is taken from the May 2013 Working Group update. It shows the distribution of simulation outcomes in which the SCC fell into a certain range, with the color coding representing the discount rate used. (The reason there are ranges of SCC estimates, as opposed to a single number, is that each simulation is unique, because it draws a random value of the "equilibrium climate sensitivity" from the distribution put into the computer models by the programmers.)

In the diagram, we can see that moving from the 2.5 percent discount rate (red bars) to the 3.0 percent (green) and then to the 5.0 percent rate (blue), causes the range of possible values for the SCC to fall drastically. Indeed, when the Working Group used a discount rate of 5 percent, more than a fifth of the computer simulations reported a SCC that was near-zero or even *negative*, and that was for the year 2020. (See the three left-most blue bars in the figure.) Once the pattern exhibited in the figure below is understood, we can see the tremendous relevance of the Working Group's decision to omit the 7 percent discount rate from its list of SCC estimates. At the 7 percent rate, the estimated SCC for early years would be close to $0/ton, if not negative.

[Graph - "SOCIAL COST OF CARBON AT VARIOUS DISCOUNT RATES."]

SOURCE: Figure 1 in May 2013 White House Working Group on Social Cost of Carbon.

Although the Working Group did not analyze its thousands of computer runs using a 7 percent discount rate, analysts at the Heritage Foundation have been able to conduct such an experiment using two of the models that the Working Group selected. (Specifically, Heritage used William Nordhaus' DICE model and Richard Tol's FUND model.) The following table shows their findings for the DICE model:

Average SCC Baseline, End Year 2300				
Year	Discount Rate: 2.5%	Discount Rate: 3%	Discount Rate: 5%	Discount Rate: 7%
2010	$46.57	$30.04	$8.81	$4.02
2015	$52.35	$34.32	$10.61	$5.03
2020	$56.92	$37.79	$12.10	$5.87
2025	$61.48	$41.26	$13.60	$6.70
2030	$66.52	$45.14	$15.33	$7.70
2035	$71.57	$49.03	$17.06	$8.70
2040	$76.95	$53.25	$19.02	$9.85
2045	$82.34	$57.48	$20.97	$11.00
2050	$87.69	$61.72	$23.06	$12.25
Source: Calculations based on Heritage Foundation Monte Carlo simulation results using the DICE model.				

SOURCE: Table 1 from "Loaded DICE: An EPA Model Not Ready for the Big Game." Heritage Foundation.

The table above shows that moving from the Working Group's highest discount rate of 5 percent to the OMB guideline of 7 percent would essentially cut the SCC *in half* for the years through 2050. This outcome yet again underscores the tremendous sensitivity of SCC estimates to the discount rate used in the analysis.

The results were even more striking when the Heritage programmers reran the FUND model, plugging in a 7 percent discount rate. They found that the SCC was *negative* at least through the year 2030:

Average SCC: Baseline				
Year	**Discount Rate: 2.50%**	**Discount Rate: 3%**	**Discount Rate: 5%**	**Discount Rate: 7%**
2010	$29.69	$16.98	$1.87	-$0.53
2020	$32.90	$19.33	$2.54	-$0.37
2030	$36.16	$21.78	$3.31	-$0.13
2040	$39.53	$24.36	$4.21	$0.19
2050	$42.98	$27.06	$5.25	$0.63

SOURCE: "Building on Quicksand: The Social Cost of Carbon." Heritage Foundation.

The results in the table above are simply astounding. To reiterate, the FUND model was one of the three *chosen by the Obama Administration's Working Group* to represent the academic community's understanding of climate change economics. This was not a product of the Heritage Foundation; they simply took the model and plugged in the parameter (a 7 percent discount rate) that OMB said was a necessary component of any federal cost/benefit analysis.

Heritage researchers have performed a similar analysis with the DICE model regarding the social cost of methane, after obtaining code from the EPA on how the DICE model was updated. The following table shows their results:

TABLE: Social Cost of Methane Using DICE Model, at Various Discount Rates		
Year	3% Discount Rate	7% Discount Rate
2015	$792	$212
2020	$922	$259
2030	$1,218	$369
2040	$1,593	$514
2050	$2,051	$700

SOURCE: Heritage Foundation

As the table indicates, there is an enormous drop in the estimated social cost of methane when using (the OMB required) 7 percent discount rate. The omission of the 7 percent rate thus skews the perception among policymakers and the public about the severity of the alleged problem.

The purpose of this discussion is not to argue for or against a particular discount rate. Rather, it demonstrates how crucial this apparently innocuous modeling choice is. Further, in neglecting the clear guidance from OMB on reporting costs and benefits using a 7 percent discount rate, the Working Group on Social Cost of Carbon has misled policymakers, most of whom probably had no idea of the significance of this parameter. If the choice of discount rate means the difference between a SCC of $50/ton versus $1/ton, this is clearly a matter that should not be left to a handful of regulators to decide. It underscores our position that the "social cost of carbon" is not an objective empirical feature of the world, but is rather an arbitrary, malleable figure dependent on subjective modeling assumptions, and can be made large, small, or even negative depending on parameter choices.

Response: The EPA disagrees that the discounting approach presented in the 2010 SC-CO2 TSD (reiterated in the current SC-CO2 TSD[39] and applied to the Marten et al SC-CH4 estimates) violates OMB Circular A-4 by not using a 7 percent rate. The EPA also disagrees that not using a 7 percent discount rate for either the SC-CO2 or SC-CH4 is arbitrary and capricious. This comment (DCN EPA-HQ-OAR-2010-0505-6997, Excerpt 120), mirrors those submitted to the Office of Management and Budget's separate comment solicitation on the SC-CO2 (78 FR 70586; November 26, 2013). As a member of the interagency working group (IWG) on SC-CO2, the EPA has carefully examined and evaluated comments submitted to OMB's separate solicitation. The EPA has also carefully examined and evaluated all comments received regarding SC-CO2 and SC-CH4 through this rulemaking process and determined that the IWG responses to the comments on the OMB solicitation address the comments on the SC-CO2 methodology, including the discounting approach. The comments submitted to OMB's separate solicitation focused on SC-CO2 but apply with equal force to the Marten et al SC-CH4 comments, given that the same methodology has been used. The EPA concurs with the IWG's response to the comments and hereby incorporates them by reference.[40]

In addition, the EPA has also determined the commenter's focus on publication dates (e.g., the 2010 SC-CO2 TSD, the 2011 primer on OMB Circular A-4, the 2013 testimony by the OIRA Administrator) is irrelevant and fails to demonstrate any inconsistencies because Circular A-4 is a living document. As stated on page 36 of the OMB Response to Comments on SC-CO2:

> "Circular A-4 is a living document, which may be updated as appropriate to reflect new developments and unforeseen issues. OMB was fully involved in the development of the SCC estimates as a working group co-chair and supports the working group's recommendations regarding the discount rate and the focus on global damages. The departure from the standard discount rate recommendations in Circular A-4 is explained

[39] The current version of the SC-CO_2 TSD is available at: ≤ https://www.whitehouse.gov/sites/default/files/omb/inforeg/scc-tsd-final-july-2015.pdf>.
[40] Referred to as the "OMB Response to Comments on SC-CO2." In particular, see pgs 20 to 25 and page 36 at https://www.whitehouse.gov/sites/default/files/omb/inforeg/scc-response-to-comments-final-july-2015.pdf.

in detail in the TSDs and in Section 5 of this document. Briefly, the use of 7 percent is not considered appropriate for intergenerational discounting. There is wide support for this view in the academic literature, and it is recognized in Circular A-4 itself."

The EPA disagrees that "omission of a 7 percent figure masks" the sensitivity of the SCC to discount rate or "skews the perception among policymakers and the public about the severity of the problem." Rather, the commenter's recommendation to use a 7 percent discount rate would inappropriately distort policymakers' and the public's perception of the problem. The detailed explanation as to why the use of a 7 percent rate is inappropriate for intergenerational discounting is elsewhere in this document; see

- Response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18, for discussion about the selection of the discount rates applied to the SC-CO2, which were also applied to the SC-CH4, and summary of why 7 percent is inappropriate.
- Response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 8, which discusses application of the 2.5 percent discount rate to estimate the SC-CH4.

Furthermore, the RIA, section 4.3, Table 4-3, clearly shows the effect of discount rate by presenting the SC-C4 estimates for the three discount rates (2.5, 3, and 5 percent). The table clearly demonstrates that the SC-CH4 estimates are lower at higher discount rates (e.g., 5 percent) relative to lower discount rates (e.g., 3 and 2.5 percent). The 2010 SC-CO2 TSD also clearly illustrates this effect and states directly that SC-CO2 estimates are sensitive to discount rate: "…it is well understood that the discount rate has a large influence on the current value of future damages" (page 17). See response to DCN EPA-HQ-OAR-2010-0505-6997, Excerpt 6, which details the discussion about the difficulty in discount rate selection.

Commenter Name: Institute for Energy Research
Commenter Affiliation: Institute for Energy Research
Document Control Number: EPA-HQ-OAR-2010-0505-6997
Comment Excerpt Number: 13

Comment: Domestic versus Global Social Cost of Carbon

Related to its decision regarding discount rates, the Working Group has also neglected clear OMB guidance to report costs and benefits from a *domestic* perspective. As the original 2010 Working Group report admits: "Under current OMB guidance contained in Circular A-4, analysis of economically significant proposed and final regulations from the domestic perspective is required, while analysis from the international perspective is optional" (p. 10). Nonetheless, the Working Group goes on to explain why it will instead use a global perspective in reporting its estimates of the SCC.

Were the Working Group to present its main findings from the domestic perspective, the impact would be striking. Using two different approaches, the Working Group in 2010 "determined that

a range of values from 7 to 23 percent should be used to adjust the global SCC to calculate domestic effects. Reported domestic values should use this range" (p. 11).

When the May 2013 update came out, the headline media reports typically focused on the SCC figure for the year 2010 at a 3 percent discount rate, which was $33/ton; this value was often reported as "the" social cost of carbon. Yet this was a *global* estimate of the SCC. If instead the default reports were expressed from the *domestic* perspective, then the same 2010 figure at a 3 percent discount rate would only have been in the range of $2 to $8 per ton.

To see the significance of this decision by the Working Group, consider the following scenario: Suppose the EPA issues a new regulation that causes private industry to restrict carbon emissions, and that the economic costs (in terms of forfeited economic output in the U.S. because of the new regulation) work out to $25/ton. Using the Working Group's May 2013 headline SCC estimate of $33/ton, this regulation would apparently pass a cost/benefit test, because the $25 cost to American industry and consumers for every ton of restricted emissions would be counterbalanced by $33 in avoided future climate change damage. However, *Americans* would still on net be hurt by the regulation, as they would only receive $2 to $8 of the stipulated benefits (i.e. avoiding the *domestic* social cost of carbon on each ton no longer emitted), while suffering the full $25 in compliance costs.

A related problem is that reporting the global cost and omitting the domestic cost ignores the well-known issues of "leakage." As the Resources for the Future explains, "If emissions regulation raises prices for domestic producers, the loss of competitive advantage would lead to the displacement of production and thereby emissions abroad." The result of "leakage" could be so great that leakage rates could be "as high as 130%, in which case GHG [greenhouse gas] control policies in the industrialized countries actually lead to higher global emissions," according to a paper by Mustafa H. Babiker published in the Journal of International Economics in 2005.

To understand why leakage rates could be very high, note that many of the regulations that use the SCC increase the cost of energy or the cost of using energy in the United States. This means a loss of competitive advantage for the United States and a displacement of production abroad.

By naively relying on a global SCC, the Working Group is implicitly assuming that if a ton of carbon dioxide is not emitted in the United States, then there would be no displacement and trade effects. This assumption is clearly wrong and contrary to standard economics. Because leakage could be as high as 130 percent, U.S. federal regulations could be given credit (in the form of the reduced social cost of carbon) even though they spur an *increase* in carbon dioxide emissions.

Response: The EPA disagrees that a focus on global values (SC-CO2 and SC-CH4) violates OMB Circular A-4. See response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 7, for complete discussion about global and domestic values and the consistency with OMB Circular A-4.

Regarding the highly simplified scenario the commenter used to demonstrate its application of a domestic SC-CO2 or SC-CH4 value, the EPA notes that the commenter has provided a

misleading comparison by failing to clearly discuss the limitations of the 7-23 percent range mentioned in the 2010 SC-CO2 TSD. These limitations and the finding that a purely domestic measure is likely to understate actual impacts in the U.S. is discussed in the response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 7.

Regarding leakage: the EPA recognizes that this is an important issue for analysts to consider in determining the net CO_2 (or net CH_4) reductions to be valued in an RIA but notes that it does not affect the calculation of the SC-CO_2 (or SC-CH_4) itself, which is an estimate of the marginal benefit of a net one-ton reduction in CO_2 (or CH_4) emissions. The SC-CO_2 and SC-CH_4 estimates are multiplied by estimates of net CO_2 and net CH_4 emissions changes, respectively, to calculate the value of benefits associated with a policy action in a given year. It is in the estimation of net greenhouse gas emissions, and not the SC-CO2 or the SC-CH_4, that any leakage should be accounted for. The EPA further notes that the commenter has neither quantified potential leakage nor provided evidence that leakage would occur under this rulemaking. Rather, the commenter has described the concept of emissions leakage at a theoretical level without linking it to this specific rulemaking or providing any evidence demonstrating that it would be likely to occur under this rulemaking. See also DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8, which discusses EPA's consideration of whether the final NSPS would lead to a market advantage for international competitors and an increase in emissions.

Commenter Name: Institute for Energy Research
Commenter Affiliation: Institute for Energy Research
Document Control Number: EPA-HQ-OAR-2010-0505-6997
Comment Excerpt Number: 14

Comment: Lack of Transparency

According to Cass Sunstein, the man who convened the SCC Working Group, "Neither the 2010 TSD nor the 2013 update was subject to peer review in advance, though an interim version was subject to public comment in 2009." This is a direct violation of the administration's stance on "Transparency and Open Government."

President Obama's transparency and open government initiative rests on three pillars: (1) the government should be transparent, (2) the government should be participatory, and (3) the government should be collaborative.

The estimation of the SCC, especially the 2013 update, is anything but transparent. Earlier we have explained the troubling omission of key data that would allow agencies to comply with OMB guidelines. Making matters worse, outside groups can't simply generate the 7 percent rates themselves, or even reproduce the Working Group's numbers. This is because one of the three computer models—specifically, the PAGE model—is not publicly available, as are the other two. (This is why the Heritage programming team was able to re-run the DICE and FUND results at a 7 percent discount rate.)

Chris Hope, the developer of the PAGE model, has insisted on either co-authorship of papers relying on his model, or asked for a fee in the thousands of dollars to train outsiders on how to use it. This is certainly Hope's right in his capacity as the developer of a computer model, but it places an excessive burden on outside groups who want to check the robustness of the Working Group's results, or who simply want to make sure it committed no error in its calculations. By picking a computer model that is not publicly available, the Working Group effectively established a "paywall" around its work. This situation is antithetical to the administration's stance on "Transparency and Open Government."

The announcement of the 2013 update to the SCC was especially nontransparent. Instead of announcing the update in a proposed rule, the administration made the announcement in a final rule, in the "Energy Conservation Program: Energy Conservation Standards for Standby Mode and Off Mode for Microwave Ovens; Final Rule."

The Office of Management and Budget has taken the appropriate action by establishing a comment period on the 2013 update, but because OMB has failed to provide key criteria, such as the SCC at 7 percent and domestic benefits, OMB has not been transparent and open with the public.

Response: First, the EPA notes that OMB's actions are outside the scope this rulemaking action. Notwithstanding, the EPA disagrees with the commenter's assertion that the interagency working group's development of the SC-CO_2 estimates was not transparent. This comment (DCN EPA-HQ-OAR-2010-0505-6997, Excerpt 14), mirrors those submitted to the Office of Management and Budget's separate comment solicitation on the SC-CO_2 (78 FR 70586; November 26, 2013). As a member of the interagency working group (IWG) on SC-CO_2, the EPA has carefully examined and evaluated comments submitted to OMB's separate solicitation. The EPA has also carefully examined and evaluated all comments received regarding SC-CO2 and SC-CH4 through this rulemaking process and determined that the IWG responses to the comments on the OMB solicitation address the comments on the SC-CO2 methodology, including the discounting approach. The comments submitted to OMB's separate solicitation focused on SC-CO2 but apply with equal force to the Marten et al SC-CH4 comments, given that the same methodology has been used. The EPA concurs with the IWG's response to the comments and hereby incorporates them by reference.[41]

In particular, the EPA has determined that the process to develop the SC-CO2 estimates fulfills the guidance outlined in the memo referenced by commenter, "*Memorandum for the heads of Executive Departments and Agencies on Transparency and Open Government*." (hereafter referred to as the "USG transparency memo")[42] Specifically, the interagency process was inclusive, transparent, and appropriately considered public input. The OMB Response to Comments on SC-CO2 discusses each of these elements—inclusiveness, transparency, and public input—in detail at pages 36-39. The EPA disagrees with the commenter's assertion that the SC-CO2 TSDs were not thoroughly reviewed and that not having a document peer reviewed

[41] Referred to as the "OMB Response to Comments on SC-CO2." In particular, see pgs 34-41 at https://www.whitehouse.gov/sites/default/files/omb/inforeg/scc-response-to-comments-final-july-2015.pdf.
[42] See https://www.whitehouse.gov/the_press_office/TransparencyandOpenGovernment

would "violat[e] the [A]dministration's stance on 'Transparency and Open Government.'" The commenter has conflated two important but separate practices: peer review and public comment. Peer review is a "documented process for enhancing a scientific or technical work product so that the decision or position taken by the Agency, based on that product, has a sound credible basis…It is conducted by qualified individuals (or organizations) who are independent of those who performed the work and who are collectively equivalent in technical expertise to those who performed the original work (i.e., peers)."[43] The USG transparency memo does not discuss guidelines or provide recommendations for peer review, which are covered in other U.S. government documents. Rather, the USG transparency memo focuses on opportunities for public input (along with transparency and inclusiveness), which is a much broader process with a fundamentally different objective than peer review. A public comment process is intended to gather perspectives from a broad spectrum of stakeholders and means that anyone, regardless of their expertise, can provide input on any aspect of the work under review. The peer review process, on the other hand, focuses on scientific and technical issues specific to the work product being reviewed and is meant to ensure sound scientific and technical information and analyses in the final work product.[44] The public comment opportunities provided for the SC-CO2 are discussed at length in the OMB Response to Comments at page 38-39. Moreover, the EPA provided the public an opportunity to comment on this rulemaking action, which included the opportunity to comment on how the Agency used the SC-CO2 estimates. As such, the EPA has determined that utilization of the SC-CO2 estimates in the context of this rulemaking action was appropriate.

Regarding peer review, the EPA notes that the assumptions and models employed in generating the SC-CO2 estimates are all drawn from the peer-reviewed academic literature. To further strengthen the robustness of the SC-CO2 estimates, EPA and other members of the U.S. Interagency Working Group on the social cost of carbon are seeking independent expert advice on technical opportunities to update these estimates from the National Academies of Sciences, Engineering, and Medicine. A committee convened by the Academies is reviewing the state of the science on estimating the SC-CO2, and will provide expert, independent advice on the merits of different technical approaches for modeling and highlight research priorities going forward. The Academies' review will focus on the SC-CO2 methodology, but recommendations on how to update many of the underlying modeling assumptions will also likely pertain to the SC-CH4 estimates. Going forward, the EPA will evaluate its approach to estimating the SC-CO2 and SC-CH4 based upon any feedback received from the Academies' panel.

To date, the Committee has released an interim report, which recommended against doing a near term update of the SC-CO2 estimates. For future revisions, the Committee recommended the IWG move efforts towards a broader update of the climate system module consistent with the most recent, best available science, and also offered recommendations for how to enhance the discussion and presentation of uncertainty in the SC-CO2 estimates. Specifically, the Committee recommended that "the IWG provide guidance in their technical support documents about how

[43] See U.S. EPA Peer Review Handbook, 4th Edition, October 2015, pg 20, https://www.epa.gov/sites/production/files/2016-03/documents/epa_peer_review_handbook_4th_edition.pdf
[44] See page 24 in the U.S. EPA Peer Review Handbook, "1.2.13. How Does Public Comment Differ From Peer Review?" and page 21, "1.2.2. Why Use Peer Review?"

[SC-CO2] uncertainty should be represented and discussed in individual regulatory impact analyses that use the [SC-CO2]" and that the technical support document for each update of the estimates present a section discussing the uncertainty in the overall approach, in the models used, and uncertainty that may not be included in the estimates. At the time of this writing, the IWG is reviewing the interim report and considering the recommendations. EPA looks forward to working with the IWG to respond to the recommendations and will continue to follow IWG guidance on SC-CO2.

Regarding the comments about replication of the interagency working group's estimates and access to the PAGE model: The use of proprietary model code does not necessarily imply the absence of transparency, as suggested by the commenter, and the EPA has developed guidance to ensure transparency in the case when proprietary model code is used. The EPA guidance states, "To promote the transparency with which decisions are made, the EPA prefers using nonproprietary models when available. However, the Agency acknowledges there will be times when the use of proprietary models provides the most reliable and best-accepted characterization of a system. When a proprietary model is used, its use should be accompanied by comprehensive, publicly available documentation. This documentation should describe: The conceptual model and the theoretical basis …for the model; the techniques and procedures used to verify that the proprietary model is free from numerical problems or "bugs" and that it truly represents the conceptual model …; the process used to evaluate the model… and the basis for concluding that the model and its analytical results are of a quality sufficient to serve as the basis for a decision… to the extent practicable." (http://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1003E4R.PDF)

While the computer code for one of the three models, the PAGE model, used by the IWG may not be freely accessible, the model is comprehensively documented in a series of technical documents and scientific articles in the peer reviewed literature.[45] These documents clearly lay out the theoretical underpinnings of the PAGE model and provide explanation of, and results from, numerical experiments that demonstrate the ability of the computer code to produce results consistent with both the conceptual model and best available science on climate change impacts. These documents include scientific articles that have gone through the scientific peer-review process, which provides a check on the model's fitness for the purpose of estimating the SC-CO2 (or other greenhouse gas). Furthermore, the freely available technical documentation provided by the developer of the PAGE model, provides the equations of the model and the parameters used

[45] See the following: (1) Hope, C. (2013) "Critical issues for the calculation of the social cost of CO2: why the estimates from PAGE09 are higher than those from PAGE2002." Climatic Change, 117(3): 531-543 (DOI: 10.1007/s10584-012-0633-z); (2) Hope, C (2011) "The PAGE09 Integrated Assessment Model: A Technical Description," https://www.jbs.cam.ac.uk/fileadmin/user_upload/research/workingpapers/wp1104.pdf (3) Hope, C (2011) "The Social Cost of CO2 from the PAGE09 Model," https://www.jbs.cam.ac.uk/fileadmin/user_upload/research/workingpapers/wp1105.pdf (4) Hope, C. (2006), "The Marginal Impact of CO2 from PAGE2002: An Integrated Assessment Model Incorporating the IPCC's Five Reasons for Concern." The Integrated Assessment Journal, Vol. 6, Iss. 1: 19-56. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&ved=0ahUKEwjA18PEu6LMAhUGXR4KHeYZDPsQFggrMAI&url=http%3A%2F%2Fjournals.sfu.ca%2Fint_assess%2Findex.php%2Fiaj%2Farticle%2Fdownload%2F227%2F190&usg=AFQjCNG_IAP79o9Z5_-_sqiRolnF_ouYw&sig2=UxVSH2-JCufh5l5NEX6JyA&cad=rja

in the model which may be used to study and verify the results from the model. Any additional inputs specific to the IWG SC-CO2 estimates have always been provided to public upon request. Because the PAGE model has been comprehensively documented and demonstrated, including its equations and inputs, the EPA concludes that proprietary status of the model's computer code does not prohibit transparency and is consistent with EPA guidance on the topic.

Regarding the comment about the release of the 2013 SC-CO2 update and its use in a DOE rulemaking: the EPA notes that concerns about the application of SC-CO2 estimates to a 2013 DOE rulemaking are beyond the scope of this rulemaking. Regarding the 2013 SC-CO2 update, no changes were made to the input assumptions developed by the IWG between the 2010 and 2013 estimates. The only changes were those made by the model developers themselves to the underlying models, which are documented in the academic literature. To assist the public in understanding these changes, the 2013 TSD provides a brief summary of the most important ones, as well as references to the relevant literature where more detailed information can be found. As with the 2010 TSD, the IWG did not attempt to evaluate the modeling choices made by the modelers. Rather, by selecting the three "most widely used impact assessment models" (NAS, 2010), the IWG intended to reflect a reasonable range of modeling choices and approaches that collectively reflect the current literature on the estimation of damages from CO2 emissions. See OMB Response to Comments, pg 37-38, for complete discussion.

Finally, the EPA has responded to the commenter's concerns about discount rates, and a 7 percent rate specifically, in DCN EPA-HQ-OAR-2010-0505-6997, Excerpt 12, and to the commenter's recommendation for domestic estimates in DCN EPA-HQ-OAR-2010-0505-6997, Excerpt 13.

Commenter Name: Institute for Energy Research
Commenter Affiliation: Institute for Energy Research
Document Control Number: EPA-HQ-OAR-2010-0505-6997
Comment Excerpt Number: 15

Comment: Cherry-Picking of "Updates"

Finally, it is troubling to note that the Working Group updated its estimates from 2010 to 2013 by heavily favoring those developments in the scientific literature that would *increase* the estimated SCC, while downplaying or ignoring those that would decrease it. This procedure results, of course, in an estimate of the SCC that is biased upward.

For example, as professional climate scientists Patrick Michaels and Paul Knappenberger explain in their own January 27, 2014 Comment submitted on behalf of the Cato Institute, the May 2013 TSD ignored the growing evidence in the peer-reviewed research that the "equilibrium climate sensitivity" parameter is lower than what had been used in the 2010 estimate. The equilibrium climate sensitivity (ECS) relates a doubling of atmospheric CO_2 concentrations (relative to the preindustrial benchmark) to the long-term (including feedback effects) increase in average global temperature. The ECS is thus a critical input into the three computer models chosen by the

Working Group to estimate the social cost of carbon. The higher the ECS, the more damaging a ton of carbon dioxide emissions will appear in these simulations, because it will cause a greater increase in global temperature and the assumed negative impacts following from this warming.

As Michaels and Knappenberger explain in their Comment, in the Working Group's original 2010 report, there was a lengthy discussion about the probability density function (pdf) plugged into the computer models, which would reflect the discussion in the IPCC's Fourth Assessment Report (published in 2007) on the distribution of possible values for the ECS.

Yet by the time the 2013 IPCC Report came out, there had been several papers calling into question the Fourth Assessment Report's discussion. Indeed, the IPCC itself in 2013 admitted that it was lowering the bottom limit of the "likely" range of the equilibrium climate sensitivity from 2°C down to 1.5°C.

Even though the IPCC from 2007 to 2013 has reduced its (probabilistic) ranges of where the true ECS lies, the Working Group failed to revise the specific probability distribution function that it plugged into the three computer models. Had the Working Group revised the distribution downward, it naturally would have reduced estimates of the social cost of carbon across the board.

At the same time, the Working Group relied on several changes to their three chosen computer models that *increased* the SCC. To give one specific comparison, illustrating the rapid escalation of the estimate: The February 2010 Working Group report estimated the 2030 SCC, using a 3 percent discount rate, at $32.80. Yet just three years later, the May 2013 TSD estimated the 2030 SCC (again at 3 percent) at $52, a 59 percent increase.

In addition to all of the other theoretical and procedural problems, the Working Group's apparent cherry-picking of developments casts serious doubts upon use of the SCC for federal regulatory purposes.

Response: The EPA disagrees that the interagency working group's update the SC-CO2 estimates in 2013 favored "developments in the scientific literature that would increase the estimated SCC, while downplaying or ignoring those that would decrease it." This comment (DCN EPA-HQ-OAR-2010-0505-6997, Excerpt 15), references a comment submitted to the Office of Management and Budget's separate comment solicitation on the SC-CO_2 (78 FR 70586; November 26, 2013). As a member of the interagency working group (IWG) on SC-CO_2, the EPA has carefully examined and evaluated comments submitted to OMB's separate solicitation. The EPA has also carefully examined and evaluated all comments received regarding SC-CO2 and SC-CH4 through this rulemaking process and determined that the IWG responses to the comments on the OMB solicitation address the comments on the SC-CO2 methodology, including the discounting approach. The comments submitted to OMB's separate solicitation focused on SC-CO2 but apply with equal force to the Marten et al SC-CH4 comments, given that the same methodology has been used. The EPA concurs with the IWG's

response to the comments and hereby incorporates them by reference.[46] In particular, the EPA refers the commenter to pages 11-12, which directly respond to the comments on equilibrium climate sensitivity. In addition, the OMB Response to Comments and the RIA Section 4.3 for this rulemaking note that the 2013 update was based on new versions of each IAM. The 2013 update did not revisit the 2010 modeling decisions with regards to the discount rate, reference case socioeconomic and emission scenarios, and equilibrium climate sensitivity distribution. Rather, improvements in the way damages are modeled are confined to those that have been incorporated into the latest versions of the models by the developers themselves and published in the peer-reviewed literature. The interagency working group did not, as the commenter has incorrectly suggested, pick and choose which developments to include in the update.

As noted in the SC-CO2 TSDs, the EPA and the other IWG members are committed to periodic updates in the estimates to reflect ongoing developments in our understanding of the science and economics of climate change, including the treatment of uncertainty. Moreover, as previously stated, the EPA has determined that the current SC-CO2 estimates continue to represent the best scientific information on the impacts of climate change available in a form appropriate for incorporating the damages from incremental CO2 emissions changes into regulatory analyses. To further strengthen the robustness of the SC-CO2 estimates, the EPA and other members of the U.S. Interagency Working Group on the social cost of carbon are seeking independent expert advice on technical opportunities to update these estimates from the National Academies of Sciences, Engineering, and Medicine. A committee convened by the Academies is reviewing the state of the science on estimating the SC-CO2, and will provide expert, independent advice on the merits of different technical approaches for modeling and highlight research priorities going forward. The Academies' review will focus on the SC-CO2 methodology, but recommendations on how to update many of the underlying modeling assumptions will also likely pertain to the SC-CH4 estimates. Going forward, the EPA will evaluate its approach to estimating the SC-CO2 and SC-CH4 based upon any feedback received from the Academies' panel.

To date, the Committee has released an interim report, which recommended against doing a near term update of the SC-CO2 estimates. In particular, the Committee concluded that the "equilibrium climate sensitivity (ECS) is only one parameter affecting the social cost of carbon (SCC). Each of the three SCC integrated assessment models also embodies a different representation of the climate system and its underlying uncertainties, including relationships and parameters beyond the ECS. Therefore, updating the ECS alone within the current SCC framework may not significantly improve the estimates." (PDF page 56).[47]

The Committee elaborated:

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[46] Referred to as the "OMB Response to Comments on SC-CO2." In particular, see pgs 11-17 at https://www.whitehouse.gov/sites/default/files/omb/inforeg/scc-response-to-comments-final-july-2015.pdf.

[47] National Academies of Sciences, Engineering, and Medicine. (2016). *Assessment of Approaches to Updating the Social Cost of Carbon: Phase 1 Report on a Near-Term Update.* Committee on Assessing Approaches to Updating the Social Cost of Carbon, Board on Environmental Change and Society. Washington, DC: The National Academies Press. doi: 10.17226/21898. See PDF page 56, for quoted text.

"…there would not be sufficient benefit of modifying the estimates to merit a near-term update that would be based on revising a specific parameter in the existing framework used by the IWG to reflect the most recent scientific consensus on how global mean temperature is, in equilibrium, affected by CO2 emissions. Furthermore, the committee does not recommend changing the distributional form used to capture uncertainty in the equilibrium CO2 emissions-temperature relationship. Rather than simply updating the distribution used for equilibrium climate sensitivity—the link that translates CO2 emissions to global temperature change—in the current framework, the IWG could undertake efforts toward the adoption or development of a common representation of the relationship between CO2 emissions and global mean surface temperature change, its uncertainty, and its profile over time" (page 12).

For future revisions, the Committee recommended the IWG move efforts towards a broader update of the climate system module consistent with the most recent, best available science, and also offered recommendations for how to enhance the discussion and presentation of uncertainty in the SC-CO2 estimates. Specifically, the Committee recommended that "the IWG provide guidance in their technical support documents about how [SC-CO2] uncertainty should be represented and discussed in individual regulatory impact analyses that use the [SC-CO2]" and that the technical support document for each update of the estimates present a section discussing the uncertainty in the overall approach, in the models used, and uncertainty that may not be included in the estimates. At the time of this writing, the IWG is reviewing the interim report and considering the recommendations. The EPA looks forward to working with the IWG to respond to the recommendations and will continue to follow IWG guidance on SC-CO2.

Commenter Name: Institute for Energy Research
Commenter Affiliation: Institute for Energy Research
Document Control Number: EPA-HQ-OAR-2010-0505-6997
Comment Excerpt Number: 16

Comment: PROBLEMS WITH EXTENDING THE "SOCIAL COST OF CARBON" APPROACH TO NON-CO2 GREENHOUSE GASES

In the first two sections of this comment, we documented theoretical and procedural problems with the use of "social cost" concepts when it comes to regulations affecting greenhouse gas emissions. In these sections, we made little distinction among the particular gases, because the problems applied to all of them.

However, as dubious as use of the social cost of carbon (SCC) has been, it is even less warranted for analysts to begin using the "social cost of methane" and/or the "social cost of nitrous oxide" in cost/benefit evaluations. In this section we will give three reasons.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6997, Excerpts 17 through 20.

Commenter Name: Institute for Energy Research
Commenter Affiliation: Institute for Energy Research
Document Control Number: EPA-HQ-OAR-2010-0505-6997
Comment Excerpt Number: 17

Comment: Paucity of Scholarly Research

The most obvious problem with using the "social cost" concept for other greenhouse gases is that almost all of the scholarly literature refers to carbon dioxide. In contrast, the pioneering work of Marten and Newbold (now with collaborators) is providing the federal government's numerical estimates for the SCM. As Marten and Newbold themselves wrote in 2012,

"Many estimates of the social cost of CO2 emissions (SCCO2) can be found in the climate economics literature. However, to date far fewer estimates of the social costs of other greenhouse gases have been published, and many of those that are available are not directly comparable to current estimates of the SCCO2."

Furthermore, as Marten and Newbold point out, many of the existing estimates of other greenhouse gases use a shortcut approach, by taking the gas' "Global Warming Potential" (GWP) and multiplying it by the social cost of *carbon dioxide* to estimate the "social cost" of the gas in question.

However, this approximation technique can lead to "large" (their term) errors in some applications, which is why in their earlier work Marten and Newbold used the MAGICC and DICE models to directly estimate the social cost of methane and nitrous oxide.

In short, our understanding of the social costs of methane and nitrous oxide is far less sophisticated than our understanding of the social costs of carbon dioxide. If the latter is inappropriate for federal rulemaking—which we believe to be the case—than the former is definitely not ready for such an application.

Response: The EPA disagrees that the estimates of the economic benefits of methane reductions, based on the Marten et al. (2014) social cost of methane estimates, are not ready for application to rulemaking analysis. As discussed in the RIA, Section 4.3, the Marten et al. (2014) estimates have been subject to extensive review. The EPA determined that the Marten et al. estimates are scientifically defensible for valuing methane impacts in regulatory analyses and improve upon prior treatment of methane impacts in regulatory analysis. See the EPA response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18, for discussion about the extensive reviews conducted before the estimates were applied to the RIA and for discussion about EPA's conclusions regarding the validity and rigor of the Marten et al (2014) SC-CH4 estimates as well as the interagency working group's SC-CO2 estimates.

Commenter Name: Institute for Energy Research
Commenter Affiliation: Institute for Energy Research
Document Control Number: EPA-HQ-OAR-2010-0505-6997
Comment Excerpt Number: 18

Comment: Magnitude of the Numbers Can Drive Draconian Outcome

Another problem with estimates of the social cost of other greenhouse gases is that their values are so large, relative to the estimates for carbon dioxide. Here let us reproduce a table from the 2011 version of Marten and Newbold's paper:

TABLE: Social Costs of Carbon Dioxide, Methane, and Nitrous Oxide for the Year 2010 (2007$/ton)

Discount Rate:	5.0%	3.0%	2.5%
Greenhouse Gas			
CO_2	$9.40	$33	$52
CH_4	$370	$810	$1,100
N_2O	$3,500	$13,000	$20,000

SOURCE: Marten and Newbold (2011)

As the table indicates, using Integrated Assessment Models to generate estimates of various social costs of greenhouse gases leads to enormous numbers for methane and nitrous oxide. Therefore, to the extent that several steps in this procedure are dubious at best, these enormous social cost estimates are far more dangerous if used to justify a federal regulation. For example, even if a particular regulation carries enormous *economic* damages, it would still seem to pass muster so long as the analyst could plausibly argue that it would modestly reduce emissions of methane and nitrous oxide.

To be sure, if we had good reason to trust the accuracy (within a fairly narrow confidence interval) of these "social cost" estimates, then their relatively large dollar values would simply be an unfortunate fact of life that policymakers needed to incorporate into their decisions. Yet as we've shown throughout this Comment, these numbers are the result of a very particular (and arbitrary) set of assumptions fed into a computer simulation.

Response: The EPA disagrees with the commenter's description of the methodology used to estimate the Marten et al SC-CH4 and SC-N2O as "dubious." The commenter has presented a table with estimates but fails to identify what they find problematic. The commenter's subjective view about the magnitude of the numbers does not constitute factual information or evidence of problems. See EPA response to the commenter's specific concerns about the methodology in DCN EPA-HQ-OAR-2010-0505-6997, Excerpts 4 through 15. See also the EPA response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18, for discussion about the extensive reviews conducted before the estimates were applied to the RIA and for discussion about the EPA's

conclusions regarding the validity and rigor of the Marten et al (2014) SC-CH4 estimates as well as the interagency working group's SC-CO2 estimates.

Commenter Name: Institute for Energy Research
Commenter Affiliation: Institute for Energy Research
Document Control Number: EPA-HQ-OAR-2010-0505-6997
Comment Excerpt Number: 19

Comment: Methane Has Shorter Atmospheric Life than Carbon Dioxide

Finally, another important difference between carbon dioxide and methane is that the latter has a shorter atmospheric life. Indeed as Marten and Newbold explain: *"the relatively short lifespan of CH4 causes the temperature impact of a perturbation in 2010 to drop from its peak level by nearly an order of magnitude by 2100, while an analogous effect for a CO2 perturbation does not occur before the end of the 300 year time horizon"* (p.14).

Given the large uncertainties of our current understanding of methane, the fact that it is relatively short-lived is an additional reason to defer the use of "the social cost of methane" in federal regulatory analysis. To put the argument differently: If proponents of a carbon tax and other regulations want to stress the *longevity* of carbon dioxide in the atmosphere as reasons for immediate action—and they do—then by consistency they should admit that humans have more flexibility when it comes to methane. Although it is a more powerful greenhouse gas (as measured by its Global Warming Potential), changes in *future* policy regarding methane emissions will be more effective than analogous policies regarding carbon dioxide.

Response: The EPA disagrees that the use of the SC-CH4 should be deferred and disagrees with the reasons given by the commenter, i.e., uncertainties and that methane is short-lived relative to other greenhouse gases. First, the EPA acknowledges uncertainty in the SC-CH4 estimates but disagrees that the uncertainty—either in the SC-CH4 or in general understanding of methane—is so great as to undermine use of these estimates in regulatory impact analysis. See DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 6, for additional discussion about uncertainty. The EPA also notes that the commenter has neither identified nor described the "large uncertainties" noted in this comment excerpt. See also the EPA response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18, for discussion about the extensive reviews conducted before the estimates were applied to the RIA and for discussion about the EPA's conclusions regarding the validity and rigor of the Marten et al (2014) SC-CH4 estimates as well as the interagency working group's SC-CO2 estimates.

Second, the commenter's statement that the EPA should defer use of the SC-CH_4 because methane is a short-lived gas, relative to long-lived gases, like CO_2, is neither compelling nor logical. The longevity of CO_2 in the atmosphere is one characteristic of that gas and an important one for understanding the damages associated with carbon dioxide. The longevity of CO_2, however, is completely irrelevant to the assessment of policies that aim to reduce damages associated with methane emissions. See RIA section 4.1 for discussion of the market failures

addressed by this rulemaking. Moreover, the EPA notes although CH_4 has a notably shorter lifetime than CO_2, methane impacts are not short-term. The CH_4 emissions changes estimated in the rulemaking for 2025 will have impacts on atmospheric concentrations of CH_4 beyond 2065, and impacts on temperatures and sea level rise beyond that because of the inertia of the Earth system and the oceans in particular. Such time frames will effect multiple generations to come. See DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 8, for details. See also the preamble, including sections III and IV, for discussion about the scope of the final rule and the legal basis.

Commenter Name: Institute for Energy Research
Commenter Affiliation: Institute for Energy Research
Document Control Number: EPA-HQ-OAR-2010-0505-6997
Comment Excerpt Number: 20

Comment: In the above Comment we have documented numerous flaws, both theoretical and procedural, with the use of the SCC and SCM for regulatory purposes. On the theoretical side, the SCC and SCM are arbitrary, malleable concepts, which can be made quite large, small, or (at least for the SCC) even negative simply by adjusting parameters in plausible ways. The estimates of the SCC and SCM are generated by computer simulations that stretch centuries into the future, and which rely on "damage functions" that are ad hoc, based neither on economic theory nor empirical observation.

As if the theoretical problems with use of the SCC/SCM weren't serious enough, the process by which the administration's Working Group has issued its updated estimates has also been deeply flawed. Most obvious, the Working Group's results failed to heed two clear OMB guidelines—namely, inclusion of a 7 percent discount rate and domestic (not global) calculations. Moreover, the process has been far from transparent, with the important 2013 update being buried in a microwave rule. Even worse, one of the three computer models used to generate the official SCC estimates is not publicly available. Finally, when incorporating the developments in the scientific literature to update the SCC, the Working Group seemed to heavily favor those changes that would increase the number, while downplaying those that would decrease it.

In conclusion, on both theoretical and procedural grounds, there are several fatal flaws in the use of the SCC and SCM for regulatory purposes. The SCC and SCM are arbitrary metrics that cannot be "usefully estimated" as required by Executive Order 12866. The administration should withdraw this proposed amendment for oil and gas new source performance standards because the estimated benefits are wholly arbitrary.

[Appendix I - testimony of OIRA Administrator Shelanski before the Subcommittee on Energy policy, Health Care and Entitlements of the Committee on Oversight and Government Reform of the House of Representatives]

Response: The EPA disagrees with the commenter's conclusion that there are "numerous flaws, both theoretical and procedural, with the use of the SCC and SCM for regulatory purposes." See EPA response to the commenter's specific concerns about the methodology in DCN EPA-HQ-

OAR-2010-0505-6997, Excerpts 4 through 15. See also the EPA response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18, for discussion about the extensive reviews conducted before the estimates were applied to the RIA and for discussion about the EPA's conclusions regarding the validity and rigor of the Marten et al (2014) SC-CH4 estimates as well as the interagency working group's SC-CO2 estimates.

Commenter Name: Cory Pomeroy, General Counsel
Commenter Affiliation: Texas Oil & Gas Association
Document Control Number: EPA-HQ-OAR-2010-0505-7058
Comment Excerpt Number: 17

Comment: EPA's estimates of the potential benefits of the Proposed Rule are based entirely on the Administration's recently developed estimate of the SC-CH_4. According to the draft RIA, the SC-CH_4 estimates the monetary value of the global impacts associated with a marginal change in methane emissions in a given year. The SC-CH_4 estimate was first developed by two researchers in EPA's National Center for Environment Economics (NCEE) in 2011 and later refined in a 2014 paper using modeling assumptions that are consistent with the Administration's social cost of carbon (SCC). However, compared to the Administration's SCC value of $48 per ton for carbon dioxide in 2025 (using a 3 percent discount), EPA estimates that SC-CH_4 in 2025 will be $1,500 per ton (using a 3 percent discount rate) due to the fact that methane is believed to be 28 to 36 times more potent than CO_2. The higher value per ton for SC-CH_4 magnifies the central concerns raised with the Administration's original SCC estimates and underscores their inappropriate application in this rulemaking.

Because the Administration's SC-CH_4 is based on the same integrated assessment models (IAMs) and assumptions as the SCC estimates, it shares the same fundamental weaknesses that render it unsuitable for regulatory analysis and decision-making. As noted in recent Congressional testimony, the IAMs are too sensitive to the modeler's assumptions to be legitimate tools for regulatory policy. In particular, relatively small changes in key inputs, such as the discount rate, time horizon for the analysis, and assumptions regarding climate sensitivities, can produce significant swings in the overall SCC estimates.

Response: The EPA disagrees that the application of either the SC-CH4 estimates or SC-CO2 estimates is inappropriate. The commenter's comparison of the magnitude of the SC-CH4 and SC-CO2, and observation that the SC-CH4 numbers are higher, does not constitute evidence of a problem with either the SC-CH4 or its use in this rulemaking. See the EPA response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18, for discussion about the IAMs, discussion about extensive reviews conducted before the estimates were applied to the RIA and for discussion about the EPA's conclusions regarding the validity and rigor of the Marten et al (2014) SC-CH4 estimates as well as the interagency working group's SC-CO2 estimates.

The RIA, Section 4.3, also provides a detailed discussion about the methodology, including the basis for the input parameters, the limitations and uncertainty about the estimates, as well as references to the detailed supporting documentation, such as Marten et al. (2014) and the 2010

SC-CO2 Technical Support Document.[48] The RIA also summarizes the 2010 SC-CO2 TSD discussion about the sensitivity of SC-CO2 estimates to discount rates, presenting the rationale for each of the three discount rates chosen.

The EPA also disagrees with the commenter that the sensitivity of the results to key factors have not been adequately explored. As discussed in the EPA's response to DCN EPA-HQ-OAR-0505-6969, Excerpt 13, Marten et al. (2014) consider sensitivity analysis over many of the key assumptions that might impact the results including: discount rates, complexity of modeling for CH4 emissions impacts on the climate, and extrapolations of the CH4 emissions scenarios.

In addition, the EPA has responded directly to criticisms about the parameters identified by this commenter. See EPA responses to:

- **Discount rates:** Regarding use of a 2.5 percent discount rate, see the EPA's response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 8. Regarding exclusion of the 7 percent discount rate, see DCN EPA-HQ-OAR-2010-0505-6997, Excerpt 12.
- **Time horizon*:*** The CH4 emissions changes estimated in the rulemaking for 2025 will have impacts on atmospheric concentrations of CH4 beyond 2065. Such time frames will effect multiple generations to come. See DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 8, for details.
- **Climate sensitivity:** Regarding climate equilibrium sensitivity, see response to DCN EPA-HQ-OAR-2010-0505-6997, Excerpt 15.

Commenter Name: Cory Pomeroy, General Counsel
Commenter Affiliation: Texas Oil & Gas Association
Document Control Number: EPA-HQ-OAR-2010-0505-7058
Comment Excerpt Number: 18

Comment: Contrary to Administration Guidance, EPA Incorrectly Provides Only a Global Estimate of SC-CH_4.

OMB Circular A-4 is clear in instructing agencies to provide estimates of the costs and benefits to U.S. citizens; benefits beyond the U.S. should be reported separately:

> Your analysis should focus on benefits and costs that accrue to citizens and residents of the United States. Where you choose to evaluate a regulation that is likely to have effects beyond the borders of the United States, these effects should be reported separately.

OMB's position on this important issue is clear. The requirement to present domestic estimates of the costs and benefits – those that accrue to citizens and residents of the U.S. – ensures

[48] See https://www.whitehouse.gov/sites/default/files/omb/inforeg/for-agencies/Social-Cost-of-Carbon-for-RIA.pdf

symmetry in the cost and benefit estimates such that domestic cost estimates can be compared against domestic benefit estimates. By failing to include an estimate of the domestic-only benefits, the draft RIA only allows for an inappropriate and misleading comparison of potential domestic costs with global benefits.

Presenting a domestic-only estimate would reduce the benefit estimates for this Proposed Rule by more than 75 percent. According to a recent paper by economists Ted Gayer and Kip Viscusi, based on one integrated assessment model that permitted a U.S.-only analysis, the U.S. received only 7 to 10 percent of the estimated global benefit. If one assumes that the domestic share of the benefits is proportional to the current U.S. share of global GDP, then the domestic benefit may represent 23 percent of the global benefit. Employing either of these ratios to the estimated global benefits included in the draft RIA would result in cost estimates for this rulemaking that exceed the projected benefits.

Relying on a Global Benefit Estimate Conflicts With the History of Section 111 and the Act's Requirements in Addressing International Air Pollution.

The exclusive presentation and use of a global benefit estimate also conflicts with the statutory basis and historical implementation of CAA Section 111 to regulate domestic sources of air pollution that may impact local air quality and the public health of U.S. citizens. To address international air pollution concerns, the Clean Air Act established separate and specific authorities under CAA Section 115 on "International Air Pollution". Specifically, CAA Section 115 expressly provides the Administrator with the authority to address air pollution that may cause or contribute to air pollution that may reasonably be anticipated to endanger public health or welfare in a *foreign* country. Under CAA Section 115, however, the Administrator's authority is constrained by the need to first assure reciprocity. Section 115 specifically states that the section shall apply "only to a foreign country which the Administrator determines has given the United States essentially the same rights with respect to the prevention or control of air pollution occurring in that country as is given that country by this section." In presenting only a global benefit estimate and in relying on this estimate to make regulatory decisions, EPA circumvents the clear statutory requirement to show that other major emitting countries have also taken equivalent action to protect U.S. citizens.

Response: The EPA disagrees that a focus on global values (SC-CO2 and SC-CH4) violates OMB Circular A-4. See response to DCN EPA-HQ-OAR-2010-0505-6969, Excerpt 7, for complete discussion about global and domestic values and the consistency with OMB Circular A-4.

In addition, the EPA notes that the range of 7 to 10 percent, which the commenter attributes to a working paper by Gayer and Viscusi (2014), was not based on new analysis. Rather, Gayer and Viscusi obtained that range from the 2010 SC-CO2 Technical Support Document (TSD). The 2010 SC-CO2 TSD provides crucial context for that range, as follows:

> "As an empirical matter, the development of a domestic SCC is greatly complicated by the relatively few region- or country-specific estimates of the SCC in the literature. One potential source of estimates comes from the FUND model. The resulting estimates

suggest that the ratio of domestic to global benefits of emission reductions varies with key parameter assumptions. For example, with a 2.5 or 3 percent discount rate, the U.S. benefit is about 7-10 percent of the global benefit, on average, across the scenarios analyzed. Alternatively, if the fraction of GDP lost due to climate change is assumed to be similar across countries, the domestic benefit would be proportional to the U.S. share of global GDP, which is currently about 23 percent…..It is recognized that these values are approximate, provisional, and highly speculative. There is no a priori reason why domestic benefits should be a constant fraction of net global damages over time. Further, FUND does not account for how damages in other regions could affect the United States (e.g., global migration, economic and political destabilization). If more accurate methods for calculating the domestic SCC become available, the Federal government will examine these to determine whether to update its approach." (2010 SC-CO2 TSD, pg 11).[49]

The EPA disagrees with the commenter's statement that presenting only a global estimate of the SC-CH4, and not a domestic SC-CH4 value, in the RIA "conflicts with the statutory basis and historical implementation of CAA Section 111 to regulate domestic sources of air pollution that may impact local air quality and the public health of U.S. citizens." The application of the SC-CH_4 to estimate the social benefits of emission reductions is separate from regulating emissions. Conducting an economic analysis does not itself confer any legal or regulatory obligations. Moreover, the final rule does not apply to sources that are located outside of the United States. The final rule does regulate domestic sources of air pollution, and the SC-CH4 analysis does not change this fact. See the preamble, including sections III and IV, for discussion about the scope of the final rule and the legal basis. Furthermore, EPA disagrees with the commenter's interpretation of Clean Air Action Section 115 and the implications for use of a global SC-CH_4. The EPA notes that the commenter has read into section 115 limitations and requirements that do not appear in the statutory text.

Section 115(a) of the Clean Air Act requires the Administrator to give formal notification to the Governor of a State in a very specific and limited circumstances. Specifically, the provision provides: "[w]henever the Administrator, upon receipt of reports, surveys or studies from any duly constituted international agency has reason to believe that any air pollutant or pollutants emitted in the United States cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare in a foreign country or whenever the Secretary of State requests [her] to do so with respect to such pollution which the Secretary of State alleges is of such a nature, the Administrator shall give formal notification thereof to the Governor of the State in which such emissions originate." Section 115(b) further provides that notices issued under 115(a) are deemed to be findings under section 110(a)(2)(H)(ii) of the Clean Air Act and thus any state receiving such a notice must revise its state implementation plan to address the offending emissions.

Section 115(c), in turn, provides that the section only applies "to a foreign country which the Administrator determines has given the United States essentially the same rights with respect to the prevention or control of air pollution occurring in that country as is given that country by this section." In other words, unless the Administrator determines a foreign country has given the

[49] See https://www.whitehouse.gov/sites/default/files/omb/inforeg/for-agencies/Social-Cost-of-Carbon-for-RIA.pdf.

United States the same rights that section 115 gives to foreign countries, the Administrator is not required to issue any notification that would otherwise be required under 115(a). Moreover, section 115(c) does not in any way limit the Administrator's discretion to act under other statutory provisions. It simply limits the reach of 115(a) by defining which countries are covered by the requirement for the Administrator to give formal notification under that section regarding pollution originating in the United States that affects health and welfare in a foreign country.

There is also no support in section 115 or any provision of the Clean Air Act for the commenters' assertion that EPA is forbidden from counting harms or benefits occurring in other countries without first taking action under section 115. Section 115 requires the Administrator to issue a formal notification in the specific circumstances outlined above and identifies the obligations that flow from the issuance of such notifications. It does not, as the commenters suggest, include language prohibiting the EPA from considering the impact of U.S. emissions on foreign countries in other contexts. Indeed, the United States has a long history of working together with other countries to address air quality issues. As explained above, the reciprocity provision in section 115(c) merely defines the applicability of section 115. Nothing in the text of the section addresses the extent to which the EPA may consider or address the impacts beyond its borders that are related to air pollution originating in the United States, or suggests that action under section 115 is a prerequisite to counting international harms and benefits in any analysis.

Finally, there is no support for the assertion that section 115 requires the EPA to list CH_4 and/or other GHGs as criteria pollutants and notify state Governors to submit plans under section 110 before taking any action to mitigate the impact of U.S. emissions on public health and welfare in foreign countries or counting international benefits in other rulemaking contexts. Not only does the limitation commenters identify simply not appear in the statutory text, but section 115(d) explicitly retains certain prior recommendations with respect to pollutants for which NAAQS have not been established. It would be absurd to interpret a section that explicitly retains recommendations relating to the impact of non-NAAQS pollutants on foreign countries as prohibiting the Administrator from considering such impacts unless a NAAQS has been established for the pollutant.

Commenter Name: Cory Pomeroy, General Counsel
Commenter Affiliation: Texas Oil & Gas Association
Document Control Number: EPA-HQ-OAR-2010-0505-7058
Comment Excerpt Number: 19

Comment: EPA's Benefit-Cost Analysis Also Conflicts With OMB Guidance by Failing to Include Benefit Estimates that are Based on a 7 Percent Discount Rate.

In instructing agencies with regard to employing appropriate discount rates, OMB Circular A-4 on "Regulatory Analysis" refers to OMB's basic guidance on the use of the discount rates included in OMB Circular A-94. Circulars A-4 and A-94 clearly instruct agencies to employ a real discount rate of 7 percent in its base case analysis:

> As a default position, OMB Circular A-94 states that a real discount rate of 7 percent should be used as a base-case for regulatory analysis. The 7 percent rate is an estimate of the average before-tax rate of return to private capital in the U.S. economy. It is a broad measure that reflects the returns to real estate and small business capital as well as corporate capital. It approximates the opportunity cost of capital, and it is the appropriate discount rate whenever the main effect of a regulation is to displace or alter the use of capital in the private sector.

OMB is also clear and convincing on the rationale for including this discount rate. The 7 percent discount rate presents an estimate of the average "before-tax" rate of return to private capital that must be dedicated to installing the pollution control equipment needed to comply with this rulemaking. While the results from lower discount rates may also be included in the regulatory analysis, these results should supplement rather than replace a regulatory analysis that employs a 7 percent discount rate.

Response: The EPA disagrees that the discounting approach, specifically not using a 7 percent rate for the SC-CH_4, violates OMB guidance. See EPA response to DCN EPA-HQ-OAR-2010-0505-6997, Excerpt 12.

Commenter Name: C. E. Venditti
Commenter Affiliation: Citizen
Document Control Number: EPA-HQ-OAR-2010-0505-7256
Comment Excerpt Number: 3

Comment: I also believe that the regulation misleads the American public with the benefits that this regulation will provide. The volume of methane that will be recovered through the leak detection and repair will be very small (170,000 to 180,000 tons of methane in 2020, which is equivalent to 4.254.5 MMT CO2 Eq using GWP of 25). The total methane emissions (for industry) reported on Page 79 of the preamble was 636.3 MMT CO2 Eq in 2013. The estimated reduction in 2020 will be less than 1% of the industry's 2013 emissions. When the methane emissions contributed by natural sources such as biomass decay and volcanic activity is considered, the change in methane emissions from this regulation are not measureable. This small change in emissions cannot possibly bring about the health and economic benefits that EPA has ascribed this regulation (Section VI.A).

Response: The EPA disagrees with this comment. The commenter does not dispute the EPA's estimate of methane emissions reductions presented in the proposal RIA. The methane emissions reductions estimated for the final rule are larger than the reductions estimated for the proposal for the reasons presented in Section 1.5 of the final RIA. With respect to the climate benefits estimated for this final rule, see EPA response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18, for complete discussion about the validity and rigor of the Marten et al estimates of the SC-CH_4. In addition, the EPA notes that, in addition to the monetized climate benefits estimated for the action, substantial health, welfare, and climate non-monetized benefits that are also likely to be produced by implementation of this rule. These non-monetized benefits are described in Section 4 of the final RIA.

12.10 Other Comments on the Regulatory Impact Analysis

Commenter Name: H. Pickett
Commenter Affiliation: Citizen
Document Control Number: EPA-HQ-OAR-2010-0505-5113
Comment Excerpt Number: 4

Comment: I see you are mostly interested in reducing GHG (in particular methane), VOC and SO2, which is of great importance. I sincerely hope you can cause a reduction in these emissions.

Response: The EPA agrees with the commenter. The final NSPS will reduce emissions from the oil and natural gas sector, and the health, welfare, and environmental benefits of this action once implemented will be significant.

Commenter Name: Haley Colson Lewis, Programs Manager and Michael Hansen, Interim Executive Director
Commenter Affiliation: GASP
Document Control Number: EPA-HQ-OAR-2010-0505-6436
Comment Excerpt Number: 2

Comment: GASP fully accepts and embraces EPA's cost-benefit analysis. If such aforementioned "super emitters" were to have been held to these standards, methane emissions likely could have been cut significantly. However, although delayed, Alabamians and all Americans will benefit from reductions of 170,000 to 180,000 tons of methane, 120,000 tons of VOC and 310 to 400 tons of hazardous air pollutants in 2020. These benefits are too significant and overdue to be reduced by any weakening of these proposals.

Response: The EPA agrees with the commenter. The final NSPS is needed to reduce emissions from the oil and natural gas sector, and the health, welfare, and environmental benefits of this action once implemented will be significant.

Commenter Name: W. Michael Scott, General Counsel
Commenter Affiliation: Trilogy Operating, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6603
Comment Excerpt Number: 21

Comment: By hindering the profitability of U.S. oil and gas companies, these Rules will not lead to the decrease in global greenhouse gas emissions that EPA hopes to achieve. EPA has noted that climate change is not a localized problem, and that greenhouse gases disperse globally. Likewise, the oil market is global. These Rules will create a market advantage for our competitors abroad, who are not subject to the same level of environmental regulations, and who have not taken the same voluntary steps to limit emissions. EPA's rules may, therefore,

exacerbate the very problem that they are trying to solve by encouraging a greater percentage of oil and gas activities to occur in foreign jurisdictions with no limits on methane emissions.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: W. Michael Scott, Vice President and General Counsel
Commenter Affiliation: CrownQuest Operating, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6703
Comment Excerpt Number: 19

Comment: By hindering the profitability of U.S. oil and gas companies, these Rules will not lead to the decrease in global greenhouse gas emissions that EPA hopes to achieve. EPA has noted that climate change is not a localized problem, and that greenhouse gases disperse globally. Likewise, the oil market is global. These Rules will create a market advantage for our competitors abroad, who are not subject to the same level of environmental regulations, and who have not taken the same voluntary steps to limit emissions. EPA's rules may, therefore, exacerbate the very problem that they are trying to solve by encouraging a greater percentage of oil and gas activities to occur in foreign jurisdictions with no limits on methane emissions.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Bradley C. Cross, President/Partner
Commenter Affiliation: Big Star Oil & Gas, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6757
Comment Excerpt Number: 18

Comment: By hindering the profitability of U.S. oil and gas companies, these Rules will not lead to the decrease in global greenhouse gas emissions that EPA hopes to achieve. EPA has noted that climate change is not a localized problem, and that greenhouse gases disperse globally. Likewise, the oil market is global. These Rules will create a market advantage for our competitors abroad, who are not subject to the same level of environmental regulations, and who have not taken the same voluntary steps to limit emissions. EPA’s rules may, therefore, exacerbate the very problem that they are trying to solve by encouraging a greater percentage of oil and gas activities to occur in foreign jurisdictions with no limits on methane emissions.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Glenn Prescott
Commenter Affiliation: RK Petroleum Corporation
Document Control Number: EPA-HQ-OAR-2010-0505-6788
Comment Excerpt Number: 19

Comment: By hindering the profitability of U.S. oil and gas companies, these Rules will not lead to the decrease in global greenhouse gas emissions that EPA hopes to achieve. EPA has noted that climate change is not a localized problem, and that greenhouse gases disperse globally. Likewise, the oil market is global. These Rules will create a market advantage for our competitors abroad, who are not subject to the same level of environmental regulations, and who have not taken the same voluntary steps to limit emissions. EPA's rules may, therefore, exacerbate the very problem that they are trying to solve by encouraging a greater percentage of oil and gas activities to occur in foreign jurisdictions with no limits on methane emissions.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: W. Jeffrey Sparks
Commenter Affiliation: Discovery Operating, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6790
Comment Excerpt Number: 19

Comment: By hindering the profitability of U.S. oil and gas companies, these Rules will not lead to the decrease in global greenhouse gas emissions that EPA hopes to achieve. EPA has noted that climate change is not a localized problem, and that greenhouse gases disperse globally. Likewise, the oil market is global. These Rules will create a market advantage for our competitors abroad, who are not subject to the same level of environmental regulations, and who have not taken the same voluntary steps to limit emissions. EPA's rules may, therefore, exacerbate the very problem that they are trying to solve by encouraging a greater percentage of oil and gas activities to occur in foreign jurisdictions with no limits on methane emissions.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Josh W. Luig
Commenter Affiliation: Veritas Energy, LLC
Document Control Number: EPA-HQ-OAR-2010-0505-6797
Comment Excerpt Number: 20

Comment: By hindering the profitability of U.S. oil and gas companies, these Rules will not lead to the decrease in global greenhouse gas emissions that EPA hopes to achieve. EPA has noted that climate change is not a localized problem, and that greenhouse gases disperse globally. Likewise, the oil market is global. These Rules will create a market advantage for our competitors abroad, who are not subject to the same level of environmental regulations, and who

have not taken the same voluntary steps to limit emissions. EPA's rules may, therefore, exacerbate the very problem that they are trying to solve by encouraging a greater percentage of oil and gas activities to occur in foreign jurisdictions with no limits on methane emissions.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Rick D. Davis, Jr.
Commenter Affiliation: Midland Energy, Inc. and Petroplex Energy, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6801
Comment Excerpt Number: 19

Comment: By hindering the profitability of U.S. oil and gas companies, these Rules will not lead to the decrease in global greenhouse gas emissions that EPA hopes to achieve. EPA has noted that climate change is not a localized problem, and that greenhouse gases disperse globally. Likewise, the oil market is global. These Rules will create a market advantage for our competitors abroad, who are not subject to the same level of environmental regulations, and who have not taken the same voluntary steps to limit emissions. EPA's rules may, therefore, exacerbate the very problem that they are trying to solve by encouraging a greater percentage of oil and gas activities to occur in foreign jurisdictions with no limits on methane emissions.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Ben Shepperd
Commenter Affiliation: Permian Basin Petroleum Association
Document Control Number: EPA-HQ-OAR-2010-0505-6849
Comment Excerpt Number: 18

Comment: By hindering the profitability of U.S. oil and gas companies, these Rules will not lead to the decrease in global greenhouse gas emissions that EPA hopes to achieve. EPA has noted that climate change is not a localized problem, and that greenhouse gases disperse globally. Likewise, the oil market is global. These Rules will create a market advantage for our competitors abroad, who are not subject to the same level of environmental regulations, and who have not taken the same voluntary steps to limit emissions. EPA's rules may, therefore, exacerbate the very problem that they are trying to solve by encouraging a greater percentage of oil and gas activities to occur in foreign jurisdictions with no limits on methane emissions.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.

Commenter Name: Lisa Jacobson
Commenter Affiliation: Business Council for Sustainable Energy

Document Control Number: EPA-HQ-OAR-2010-0505-6860
Comment Excerpt Number: 2

Comment: Clean energy technologies, such as natural gas, renewable energy, energy efficiency and greenhouse gas emission offsets, are essential to U.S. environmental objectives under the EPA's Clean Power Plan and the Administration's Climate Action Plan and are essential to U.S. economic growth. Policies must be balanced, optimizing our energy mix and flexible compliance alternatives, in order to achieve these complementary objectives. As new considerations are contemplated as part of the EPA's proposed rule, BCSE encourages the EPA to keep in mind the important role natural gas plays in reducing greenhouse gas emissions and that a cleaner, reliable and more diverse energy system, depends on the ability of energy projects to access readily available natural gas.

Today's energy mix in the United States is radically different from that of a generation ago. The 2015 edition of the Sustainable Energy in America Factbook – produced for the Business Council for Sustainable Energy by Bloomberg New Energy Finance – documents this shift and demonstrates how energy efficiency, renewable energy and natural gas are contributing to the country's move towards cleaner energy production and more efficient energy usage. Findings from the 2015 Factbook include:

- Natural gas and renewable energy provided over 40 percent of U.S. electricity generation in 2014.
- 93% of new power capacity built in the U.S. since 2000 has come from natural gas and renewable energy; natural gas-fired power plants provided 27% of U.S. electricity in 2014 up from 22% in 2007.
- Natural gas production rose 25% between 2007 and 2014.
- Total energy use fell 2.4% between 2007 and 2014, while the gross domestic product grew by 8%.
- U.S. carbon emissions from the energy sector dropped 9% between 2007 and 2014.

The Factbook notes the complimentary relationship between natural gas and renewables, as natural gas-fired electricity generation can quickly ramp up or down to meet changes in demand, and can complement the integration of variable energy resources. This relationship is one way in which generators and grid operators are meeting the electricity needs of the country. For a complete copy of the Factbook please visit the Council's website.

As the clean energy trend has taken shape, the U.S. economy has been healthy and the prospects are bright. But stable and balanced policies that recognize the contribution of natural gas, renewables and efficiency are critical for continued growth in the power generation and industrial sectors.

The Business Council for Sustainable Energy looks forward to working with you to develop a final rule that ensures a viable path forward toward a cleaner environment.

Response: The EPA agrees with the commenter that natural gas, renewable energy, and energy efficiency each play important roles in power generation, industrial development, and in reducing emissions.

Commenter Name: Don Rendall
Commenter Affiliation: Vermont Gas Systems, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6861
Comment Excerpt Number: 3

Comment: Our customers are concerned about the climate impact of methane leakage. Recent studies and reports by the Environmental Defense Fund, in cooperation with industry partners, show the significance of methane leakage in parts of the oil and gas production, processing, and transportation chain. We appreciate the important progress made in reducing methane leakage in recent years. However, the fact is that methane constitutes a singular threat to the atmosphere, and both strong regulation and diligent enforcement to prevent methane leakage are critically important at the Federal level to help create and maintain a level playing field. Our customers and the public expect their natural gas and oil products to be produced and transported in an environmentally safe and responsible manner. We share our customers' environmental values. Firm, consistent and appropriately enforced regulation of production and transportation are an environmental imperative.

Response: The EPA agrees with the commenter. The final NSPS is needed to reduce emissions from the oil and natural gas sector, and the health, welfare, and environmental benefits of this action once implemented will be significant.

Commenter Name: Holly R. Hart
Commenter Affiliation: United Steelworkers (USW) Unity and Strength for Workers
Document Control Number: EPA-HQ-OAR-2010-0505-6864
Comment Excerpt Number: 2

Comment: The USW supports the proposed regulations by the EPA. The standards designed to reduce methane and VOC emissions in the oil and gas extraction sector are an important step to developing good jobs, increasing community safety and ensuring a clean environment. Methane emissions accounted for nearly 10 percent of U.S. greenhouse gas emissions in 2012, of which nearly 30 percent came from the production transmission and distribution of oil and natural gas. Without additional steps to lower them, emissions from the oil and gas sector are projected to rise more than 25 percent by 2025. The EPA's efforts to reduce methane emissions will incentivize the best technology to mitigate methane emissions in a timely fashion. The efforts by the EPA will also help to reduce the lost and leaking natural gas that costs billions of dollars' every year. Wasted gas from upstream activities, like leaking natural gas, is lost economic potential that could heat nearly 5 million homes.

The proposed regulations by the EPA will foster the emerging methane mitigation industry. Studies have shown that the energy sector could cut their emissions and leaks, using off-the-shelf technology, by up to half in five years. This will mean jobs for new and existing facilities. As highlighted by a Datu Research report conducted for the Environmental Defense Fund methane mitigation companies provide U.S. jobs in at least 531 locations across 46 states. This includes facilities like the Dresser-Rand facility in Olean New York represented by United Steelworkers local 4-4601 which manufacture methane mitigation products like compressors. These emissions reductions can be affordably done. Estimates by the EPA indicate an overall net economic benefit of nearly $40 million dollars in 2020 and up to $150 million in 2025 with a strong standard in place. Looking forward the USW would encourage additional discussions with EPA and stakeholders to consider methane and natural gas reduction standards for downstream/distribution sources. At the current rate of progress for pipeline replacement, it could take over 30 years to repair and replace the worst of our natural gas pipeline distribution. There are over 100,000 miles of leak-prone pipes made of materials such as cast iron and bare steel, which leak methane a level upwards of 50 times that of advanced materials being installed today.

Looking forward, the USW encourages continued discussions with EPA and stakeholders to consider methane and natural gas reduction standards for downstream/distribution sources.

Response: The EPA agrees with the commenter. The final NSPS is needed to reduce emissions from the oil and natural gas sector, and the health, welfare, and environmental benefits of this action once implemented will be significant. Additionally, the EPA agree that reducing emissions from the oil and natural gas sector will create employment opportunities in the environmental protection sector.

Commenter Name: Erik Schlenker-Goodrich
Commenter Affiliation: Western Environmental Law Center (WELC)
Document Control Number: EPA-HQ-OAR-2010-0505-6871
Comment Excerpt Number: 3

Comment: WELC's support is premised on five key benefits we believe the rules will provide:

- Improved public health, especially in Western counties in close proximity to oil and gas development such as La Plata (CO), San Juan County (NM), Uintah (UT) and Sublette (WY).
- Significant climate benefits due to methane's large near-term global warming potential (86 times greater than CO2 over a 20-year period) and ability to yield more immediate reductions in climate pollution.
- Reductions in methane waste, as reflected in the statement by Acting Assistant Administrator Janet McCabe that the rules were designed to ensure that oil and gas companies reduced waste and sold more gas that would otherwise be lost.
- Capture of royalties payments; and
- Reduced footprint on landscapes and harm to non-oil and gas resource values

Response: The EPA agrees with the commenter. The final NSPS is needed to reduce emissions from the oil and natural gas sector, and the health, welfare, and environmental benefits of this action once implemented will be significant. In addition, by capturing natural gas that would otherwise be emitted, additional revenues will be produced.

Commenter Name: Howard J Feldman
Commenter Affiliation: American Petroleum Institute
Document Control Number: EPA-HQ-OAR-2010-0505-6884
Comment Excerpt Number: 151

Comment: ***OVERVIEW OF THE IMPACT OF UNCERTAINT***Y

The uncertainties surrounding the benefits and costs are not adequately reflected in the RIA. The EPA guidelines for benefit-cost analysis indicate that quantitative information should typically include both a best estimate, and a range or confidence interval. The RIA reports a range of benefits and costs, but only to reflect uncertainty of whether low producing oil and gas wells are subject to fugitive emissions controls. However, there is uncertainty about the costs (at a minimum, a range should have been generated to reflect standard engineering cost uncertainties) and the SC-CH4. A recent RFF analysis of RIAs provides explicit support for evaluating the impact of uncertainty, because it can affect the RIA conclusions and may warrant the consideration of alternative regulatory designs (RFF 2015). [refers to footnote 1 of Appendix E, Morgenstern, Richard. 2015. The RFF Regulatory Performance Initiative: What Have We Learned? RFF Discussion Paper. RFF DP 15-47]

This review uses Monte Carlo analysis to provide a more complete picture of the impact of uncertainty. First, we provide a more robust characterization of the distribution of SC-CH4. This is accomplished by using Monte Carlo data provided by Marten et al. (2014) that shows the full distribution of SC-CH4 across IAMs, socio-economic scenarios, and discount rates (see Section 4.2 for details). Second, we construct ranges for the cost categories and emission reductions. Uncertainty about the costs is handled by estimating a range of potential costs for each of the major elements of the total costs. Depending on circumstances, the range can encompass both the EPA and ERM in Table 1-1 and/or standard engineering costing procedures.

Table 1-2 [Table 1-2. Summary of the Annual Net Benefits Monte Carlo Results – 2025, EPA Option 2**]** shows the results of a Monte Carlo analysis of the net benefits. Uncertainty about benefits is quantified by using data from Marten et al. (2014).

The results of the Monte Carlo simulation illustrate not only the high degree of uncertainty around EPA's point estimates, but also their improbability. Over all emissions sources/points ERM evaluated, the simulated distributions show that net benefits range between -$1.04 billion and $0.16 billion 90 percent of the time–a range of more than $1.0 billion in a single year. The extreme width of the distribution suggests there is not a meaningful way of concluding net benefits will be positive. Aside from well completions, there is less than a 10 percent chance that

net benefits exceed EPA's estimate for the other emission sources/sectors ERM modeled. In the case of fugitive emissions controls at oil wells, the probability is less than 1 percent.

Response: Regarding the comments about uncertainty and the Marten et al. SC-CH4 estimates: the EPA recognizes uncertainty as an important area of consideration and has fully acknowledged and discussed the limitations associated with the estimates. See response to DCN EPA-HQ-OAR-2010-0505-6884, Excerpts 150, 171, and 173.

Commenter Name: Howard J Feldman
Commenter Affiliation: American Petroleum Institute
Document Control Number: EPA-HQ-OAR-2010-0505-6884
Comment Excerpt Number: 172

Comment: ***UNCERTAINTY ANALYSIS***
The RIA did not adequately consider the uncertainty of both the benefits and the costs associated with the NSPS OOOOa. Both EPA guidelines (EPA, 2010) and OMB guidelines (OMB, 2003) indicate that evaluating the impact of uncertainty on benefits and costs is a key consideration in rule making. Moreover, the OMB explicitly states that when the degree of uncertainty has a significant impact on net benefits, agencies should consider conducting additional research prior to rulemaking. Instead of including plausible ranges for the key benefits and costs and acknowledging the uncertainty about the true values of underlying parameters and assumptions, EPA relied upon point-estimates for costs and benefits. As a result, the RIA gives an unrealistic assessment of the impact of the proposed rules.

ERM developed a Monte Carlo model to provide a more realistic assessment of the net benefits of the NSPS OOOOa. Monte Carlo simulation is a standard method for evaluating the impact of regulations when there is substantial uncertainty. It provides insights into the likelihood that benefits will exceed costs when there are multiple parameters and assumptions that are uncertain.

ERM developed the Monte Carlo model for five emission sources/points:

- Hydraulically fractured development oil well completions,
- Hydraulically fractured exploration oil well completions,
- Fugitive emissions from oil wells,
- Fugitive emissions from natural gas wells, and
- Pneumatic pump operations at well sites.

These emissions sources/points comprise over 90 percent of the control costs and over 80 percent of the controlled emissions EPA estimates.

The model is estimated by calculating costs and benefits for 5,000 draws from the probability distributions for the values of parameters and assumptions underlying the quantification of the number of regulated units, control costs, emission control volumes, natural gas recovery revenue and SC-CH4.

ERM's Monte Carlo analysis provides a more complete analysis of the net benefits. The results show that there is significant uncertainty about the costs and benefits of the proposed rule and that it is likely that costs will exceed benefits, especially when considering the net benefits accruing to the U.S.

The cumulative probability distribution functions (CDF) and 90 percent confidence interval for costs, benefits and net benefits in 2025 (i.e., a 90 percent change the true value is actually within that range) from all emissions sources/points are presented in Figure 4-1 [Estimate Cost, Benefits and Net Benefits of the NSPS OOOOa Under Uncertainty for All Emissions Points and Sources ($MM), shows four graphs; one each for compliance costs, methane emissions benefits, global net benefits and US net benefits for all sources and points]. The average 2025 global net benefit estimate is -$0.5 billion with a standard deviation of $0.41 billion. The degree of variation in net benefits means that there is a 90 percent chance that true global net benefits will be between -$0.92 and $0.17 billion. Based on the distribution, there is an 89 percent chance that net benefits in 2025 are lower than EPA's own estimate (uncorrected) of $0.12 billion. The difference is starker when considering that somewhere between 7 and 23 percent of methane control benefits accrue to the United States. Based on the model, there is a 90 percent chance that net benefits for the U.S. will range between -$1.07 and -$0.56 billion.

Table 4-1 [Table 4-1. Estimated Costs, Benefits and Net Benefits of the NSPS OOOOa Under Uncertainty for Selected Emissions Sources and Points ($MM) shows costs, benefits, global net benefits and US net benefits for well completions, fugitive emissions and pneumatic pumps at the different 5th, 50th and 95th percentile points compared to EPA value] summarizes the distributions of costs, benefits and net benefits in 2025 generated by ERM's Monte Carlo model for each emission source/point evaluated, compared with EPA's estimate. EPA's estimated costs are always towards the lower end of the distribution, while estimated benefits are well above the median. This implies that EPA's costs and benefits are less probable rather than more probable. For many emissions sources, EPA's estimated net benefits are positive, whereas net benefits are negative at the middle of the distributions generated by ERM's model. One example of this is fugitive emissions controls at gas wells. EPA's estimated 2025 net benefits are $0.62 billion, whereas the median of ERM's distribution is -$0.12 billion.

In the following sections, we describe parameters and assumptions underlying the estimates of total costs and benefits, and the probability distributions fit to those ranges to implement the Monte Carlo simulation.

EPA estimated total compliance costs by multiplying the projected number of regulated units by unit compliance costs. Tables 4-7 [Range in Inputs and Distribution of Hydraulically Fractured Well Completions Control Costs Used in ERM's Monte Carlo Model], 4-8 [Range in Inputs and Distribution of Fugitive Emissions Control Costs at Oil and Natural Gas Well Sites Used in ERM's Monte Carlo Model] and 4-9 [Range in Inputs and Distribution of Pneumatic Pumps Control Costs at Oil and Natural Gas Well Sites Used in ERM's Monte Carlo Model] report the ranges in the unit cost parameters ERM used to model uncertainty in compliance costs. The most likely value of the distribution for annualized costs and/or underlying parameters is most commonly the value ERM derived by correcting technical flaws in EPA's costing and finding estimates for key elements of costs omitted by EPA, as described in Section 2. Unless otherwise

noted, EPA's estimate is the lower bound, while the upper bound is a 30 percent increase in the most likely value. We use the Beta-PERT distribution to model uncertainty.

Response: The EPA agrees that there is uncertainty in the analysis of emissions reductions, benefits, and costs for the final NSPS. However, the EPA disagrees that the commenter's methodology to estimate the distribution of net benefits is appropriate given the parameters and data used by the EPA in the RIA.

The commenter first estimates activity levels, unit-level compliance cost and emission reductions either by slightly adjusting estimates from the proposal RIA, or by adjusting the underlying assumptions of the EPA's estimates to be consistent with revisions suggested to the EPA in other sections of the larger comment. While too numerous to address individually in this response, the EPA generally disagrees with the revised estimates provided by the commenter. With respect to the estimates used by the commenter, please see detailed responses to the comment DCN EPA-HQ-OAR-2010-0505-6884 elsewhere in this document for the following emissions sources:

- Hydraulically-fractured oil well completions
- Fugitive emissions from oil and natural gas well sites
- Pneumatic pumps at well sites

With respect to the commenter's alternative estimates of the climate benefits from the methane reductions expected under the final NSPS, see the response to DCN EPA-HQ-OAR-2010-0505-6884, Excerpt 173.

The commenter then imposed distributional assumptions onto these parameters for a series of emissions sources regulated by the NSPS. Activity levels, emissions and cost factors were then drawn randomly from the assumed distributions to inform the compliance costs, emissions reductions and benefits of the rule. For most parameters of interest, the commenter assumed a Beta-PERT distribution. A triangular distribution was assumed for pneumatic pumps at well sites. To inform the shape and scale of these distributions, the commenter assumed "minimum", "most likely", and "maximum" values for each parameter. The commenter also does not account for the likely covariance across random parameters.

The assumptions to use these particular distributions and the assumptions for the parameters of the distribution are highly influential on the results of the analysis, as is the absence of covariation across random parameters. To the extent that the EPA disagrees with the choice of central or "most likely" estimates for key parameters, the results of the Monte Carol analysis diverges from providing reasonable and useful central tendencies to compare with the EPA's RIA results. To the extent that the commenter's choices of minima and maxima for key parameters are arbitrary, the dispersion of the results from the Monte Carlo analysis will provide little to no meaningful information about the distribution of emissions reduction and costs of the NSPS, as well as the emissions reductions informing benefits estimates.

In addition, there may be a high degree of correlation between key parameters in the study. For example, the number of hydraulically fractured oil well completions in a given year is likely highly correlated with the number of oil well sites newly affected by fugitive emissions

requirements in that same year, yet the commenter performs random draws from assumed distributions while not accounting for this likely correlation. Similarly, the costs associated with emission reduction measures are likely correlated as these costs are generally composed of a mix of capital, material, fuel, and labor costs whose prices are determined in markets shared by producers. To the extent that control activities rely upon similar inputs, the costs of the control activities will move together with the input prices.

As the EPA disagrees with many of the unit-level cost and emissions reductions used by the commenter, and generally finds the distributional assumptions arbitrary, the EPA concludes that the results of the commenter's Monte Carlo analysis are not comparable to the EPA estimates in the proposal RIA. The commenter's analysis also does not provide a sufficiently rigorous approach to use in the final RIA or insights that are informative for the agency's final RIA for the NSPS.

However, to better communicate the range of uncertainties discussed throughout the RIA, the EPA added a summary section to the final RIA in Section 5, which lists a number of assumptions and limitations that lead to uncertainty in the EPA's assessment of potential regulatory impacts of the final NSPS.

Commenter Name: Sam Lipson, Director of Environmental Health
Commenter Affiliation: Cambridge Public Health Department
Document Control Number: EPA-HQ-OAR-2010-0505-6923
Comment Excerpt Number: 3

Comment: The growing problem of methane in the atmosphere indicates that existing oil and gas infrastructure currently produce higher methane emissions than have been estimated (Brandt et al., 2014). One recent report estimated that nearly 90 percent of projected emissions from oil and gas development in 2018 will come from existing infrastructure (ICF, 2014).

Response: See response to DCN EPA-HQ-OAR-2010-0505-7338, Excerpt 49 in Chapter 15 of this document.

Commenter Name: Kathleen M. Sgamma, Vice President, Government and Public Affairs
Commenter Affiliation: Western Energy Alliance
Document Control Number: EPA-HQ-OAR-2010-0505-6930
Comment Excerpt Number: 8

Comment: Attached as Exhibit "B" is an economic assessment report from the economics firm, John Dunham and Associates (the Dunham Report). The Dunham Report confirms two critical and legally fatal flaws with the proposed rule: (1) it is not grounded in sound science or economics rendering it arbitrary and capricious under the APA and the CAA; and (2) it is driven exclusively by the Administration's policy initiatives related to climate change as opposed to the

governing principles of the CAA—principally, protecting public health and welfare. As the Dunham report details, the proposal skirts the basic requirements of a RIA; and even where it does endeavor to engage in some regulatory impact analysis, the methodologies and assumptions are so flawed as to render the conclusions meaningless. One need look no further than EPA's conclusions in the preamble, which draws on the RIA, that reducing global GHGs by 0.0000092 percent to 0.000022 percent is "significant." In sum, while the proposed rule may conform to the Administration's climate change agenda, it fails to meet the basic requirements of the APA and the CAA. The following is a bulleted summary of the major conclusions in the Dunham Report:

- The Office of Management and Budget (OMB) sets forth 16 best management practices (BMPs) in its RIA agency checklist. The RIA failed to perform, in any respect, 10 of these 16 BMPs. Failing to follow those basic procedures casts into doubt the validity of the RIA.
- The RIA does not perform a meaningful alternatives analysis. Highlighting the notion that this proposed rule was a foregone conclusion before the results of the economic analysis were even finished, the RIA simply looks at reducing monitoring requirements from semi-annual to annual. It entirely omits consideration of other regulatory alternatives, including: not taking any action at all; deferral to state or local regulation; the use of economic incentives to drive behavior; market-oriented approaches; different compliance dates; or different requirements based on firm size. As a result, the proposed rule entirely fails to consider the costs and benefits of alternative approaches, or whether these costs of the rule (*e.g.*, $330 million in 2025 capital estimates) are not better spent on some other measure or activity.
- The reasons stated for the rule are solely to reduce the effect of methane emissions on climate change, yet the benefits calculated do not demonstrate how this rule will meet this need. This is because the RIA fails to establish in any meaningful way, beyond broad, passing discussion of global climate change effects, that the methane emissions avoided through this rule will impact climate change in some way. In fact, OMB requires agencies to establish a baseline assessment of what would happen in the absence of the rule, with a focus on the costs and benefits absent the rule accruing to U.S. citizens. The RIA is devoid of any such baseline calculation or assessment. Without this required assessment, it is *impossible* to determine whether there are any climate change benefits of the rule at all, much less climate change benefits that accrue to the U.S. economy. Similarly, it is *impossible* to determine if the rule will have any meaningful effect on the overall factor being measured—the perceived economic cost of climate change. In addition, the rule compares global climate benefits to domestic costs, vastly skewing the cost/benefit analysis in favor of the rule.
- There is no meaningful analysis of the distributional impacts of the proposed rule, *i.e.*, impacts of the proposed action across the population and economy divided up by a range of demographic and economic categories. Such analysis is particularly important where, as here, the proposed regulation focuses on one industry. Higher costs in one industry often encourage investment in another. With respect to domestic oil and gas and the well-recognized mobility of capital within this sector, there is a particularly acute risk for this industry that overly-burdensome regulation will result in the transfer of capital activity from the U.S. to other countries, such as Russia, Mexico, Iraq, or Nigeria. The RIA does not account for any of these potential consequences.

- The RIA completely ignores the potential impact the proposed rules may have on marginal wells. Higher regulatory costs may result in a significant increase in the number of marginal wells, with potentially dramatic effects on U.S. energy production and employment, particularly in a low commodity price environment. For example, even at high commodity prices, a prior analysis by John Dunham shows that in 13 western states about 72.5 percent of currently active oil wells and 63.7 percent of natural gas wells could be considered "marginal" and already operating at a loss once development and remediation costs were considered. It does not take a large additional operating expense to force the decision to shut-in such wells. This concern is especially great for the Alliance's members.
- The RIA does not conduct an uncertainty analysis, yet EPA's conclusions are replete with massive uncertainty about the ostensible benefits of the rule, which again are grounded only in climate change impacts. The mere fact that no credible health benefits were estimated is problematic and atypical of prior air quality rulemakings. And the benefits that are asserted are wildly inconsistent and based on cherry-picked data. The proposed rule relies on an EPA paper (Marten, 2014) to estimate methane-specific costs. The RIA also estimates a 239 percent difference in the potential range of "climate change" impacts from methane emissions and benefits ranging from $88 million to $550 million. The failure to perform an uncertainty analysis under these conditions is inexcusable and contravenes sound principles of economics, statistics, and public policy, and the APA.

In sum, the RIA is woefully deficient and does not meet minimum APA rulemaking standards. EPA's assessment of the potential costs and benefits from the proposed rule are unsupportable and strain credibility. On its face, it is difficult to comprehend how the elimination of an inconsequential amount of fugitive methane emissions from new and modified oil and natural gas sources (or existing sources in non-attainment areas) will have any climate change impact here in the U.S., or globally. Yet, neither the RIA nor the preamble directly addresses this very basic question. Instead, the preamble and RIA are replete with general statistics about climate change, climate change effects, GHG emissions generally, and a questionable assessment regarding the social cost of methane. More external review and public comment is needed on the issue of costs and benefits, given that tangible differences exist between CO_2 and methane (*e.g.*, atmospheric lifetimes and how those can change the appropriate discount rates), and the Alliance respectfully requests EPA offer the same to the public and interested stakeholders.

Response: As general matter, the EPA conducted the RIA assessing the potential impacts of the proposed and final NSPS consistent with the requirements of E.O. 12866 and E.O. 13563 for regulatory analysis and Section 317 of the CAA for economic impact analysis.

The EPA disagrees that the benefit-cost analysis is flawed, making the final NSPS "arbitrary and capricious". The EPA's standard-setting duties and authority are derived under section 111 of the CAA, and its decisions are made within the confines of that authority. Although the EPA must consider the costs of control, it may not base the setting of standards on a broad-ranging benefit-cost analysis. The RIA prepared by the EPA under Executive Order 12866 may inform the standard-setting process, but cannot provide the direct basis for the standards and does not "create any right or benefit, substantive or procedural, enforceable at law or equity by a party against the United States..." (Executive Order 12866, Section 10). For more information, please

see the responses to DCN EPA-HQ-OAR-2010-0505-6884, Excerpts 6 and 7 in Chapter 2 of this document, as well as the response to DCN EPA-HQ-OAR-2010-0505-7058, Excerpt 24.

To support the allegation that the RIA is flawed, the commenter alleges that the EPA did not perform a majority of the best practices listed in the OMB RIA checklist. The EPA disagrees with this allegation. Reponses to a series of specific allegations made by the commenter follow:

- The EPA disagrees that the RIA does not perform a meaningful analysis of alternatives. The proposal RIA included alternatives varying the monitoring frequency across options because monitoring frequency is the most consequential variation for national impacts analysis. In addition, in Option 2 of the proposal RIA, we considered exempting low production well sites from the fugitive emissions requirements. In the final RIA, EPA also considers a range of regulatory options focusing on varying the frequency of monitoring.
- The EPA disagrees that the RIA fails to establish that the methane emissions avoided through this rule will influence climate change. The preamble describes how climate impacts health and welfare through changes in air quality, sea level rise, changes in extreme weather, and a myriad of other ways in which the climate changes. The social cost of greenhouse gas methodology used in the RIA to estimate the climate benefits associated with methane reductions was developed precisely for providing a monetized estimate of the benefits resulting from a ton of emissions reduction, and is the most appropriate measure of these impacts.
- The EPA disagrees that the RIA provides no meaningful distributional analysis. For example, in both the proposal and final RIAs, the EPA estimates the potential impacts of the well completion and fugitive emissions provisions (the large majority of the impacts) of the rule on small producers.
- Related to the possibility that the regulatory impacts might shift oil and natural gas production abroad, see response to DCN EPA-HQ-OAR-2010-0505-6869, Excerpt 8.
- The EPA disagrees that the RIA ignores the potential impact the proposed rules may have on marginal wells. The proposal RIA examined the potential impacts of an exclusion from fugitive emissions requirements for low production (stripper) wells. In addition, both the proposal and final RIAs examined the potential impacts of the NSPS on onshore well drilling activities in the lower 48 states, finding no appreciable affect relative to the baseline. For more information, see section 6.2 of the final RIA.
- The EPA disagrees that the RIA lacks a consideration of uncertainty. In the proposal and final RIAs, uncertainty is addressed at numerous points, both qualitatively and quantitatively, including in the discussions of projections regulated activities, prices assumed for natural gas recovery, and discount rates used in the analysis. In the final RIA, these discussions can be seen in sections 3.5 and 5.2.
- With respect to air quality modeling, as stated in the RIA, we expect that the avoided emissions will result in improvements in ambient air quality and reductions in health effects associated with exposure to HAP, ozone, and fine particulate matter ($PM_{2.5}$), but we have determined that quantification of those benefits cannot be accomplished for this rule. This is not to imply that there are no health benefits anticipated from the proposed rule; rather, it is a reflection of the difficulties in modeling the direct and indirect impacts of the reductions in emissions for this industrial sector with the data currently available.

As a result, the monetized benefits in the RIA are underestimated because they do not include several categories of benefits, including the benefits from reducing emissions of VOCs (a precursor to formation of ozone and $PM_{2.5}$).

- The EPA has considered and discussed uncertainty associated with the social cost of methane estimates used to estimates this rulemakings benefits. See the EPA's response to DCN EPA-HQ-OAR-2010-0505-6997, Excerpt 7, which addresses concerns about this uncertainty and explains that the EPA has fully acknowledged the uncertainty in both the SC-CO2 and SC-CH4 estimates, that the EPA has used the best available scientific, technical and economic information to derive the best estimates of costs and benefits that they can, and that the EPA has communicated to the public the limitations and uncertainties, and concludes that this uncertainty does not undermine the use of the estimates in regulatory impact analysis.
- The EPA disagrees that the estimates of the economic benefits of methane reductions, based on the Marten et al. (2014) social cost of methane estimates, are not ready for application to rulemaking analysis. As discussed in the RIA, section 4.3, the Marten et al. (2014) estimates have been subject to extensive review. The EPA determined that the Marten et al. estimates are scientifically defensible for valuing methane impacts in regulatory analyses and improve upon prior treatment of methane impacts in regulatory analysis. See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 18, for a discussion about the extensive reviews conducted before the estimates were applied to the RIA, and for discussion about the EPA's conclusions regarding the validity and rigor of the Marten et al (2014) SC-CH4 estimates as well as the interagency working group's SC-CO2 estimates.

Commenter Name: Cory Hansen, et al.
Commenter Affiliation: Institute for Policy Integrity at New York University School of Law
Document Control Number: EPA-HQ-OAR-2010-0505-6931
Comment Excerpt Number: 5

Comment: EPA estimates that the Proposed Rule will prevent 340,000 to 400,000 short tons of methane emissions by 2025, as well as 170,000 to 180,000 short tons of VOCs, and 1,900 to 2,500 short tons of hazardous air pollutants. These are likely conservative figures. For example, a study published in the *Environmental Science & Technology Journal* in August 2015 estimated that natural gas-gathering facilities lose 100 billion cubic feet of natural gas a year; this is eight times the number previously estimated by EPA. Further, EPA's Regulatory Impact Analysis does not consider the effects of the Clean Power Plan, which could spur the replacement of some coal-fired power plants with natural gas-fired power plants, and consequently, increase domestic natural gas production and corresponding methane emissions. Natural gas production is projected to continue to increase for the next several decades.

Response: The EPA disagrees with the commenter's assertion that the impacts of the rule are underestimated. The EPA acknowledges uncertainty in the number of affected facilities and equipment in future years, but for the purposes of estimating national impacts has constructed its best estimate of those impacts. With respect to the point on emissions from natural gas gathering

facilities, the EPA assessed the emissions estimates in the article, but could not use this data for this analysis as the study did not attribute emissions to specific sources (e.g. pneumatic controllers) in the gathering segment, but instead measured emissions at the station level. The article confirms that emissions from this segment are substantial. The EPA's estimate of emissions from new, modified, and reconstructed gathering and boosting facilities is the agency's best estimate given the data available to estimate emissions for this purpose.

The EPA notes that, as of the promulgation of the final oil and natural gas NSPS, the Clean Power Plan has been stayed by the U.S. Supreme Court. However, as the RIA for the final Clean Power Plan shows, by 2030, the Clean Power Plan is projected to lead to lower power sector natural gas use, which is contrary to what the commenter is asserting.[50]

Commenter Name: Don Anderson, Director of Environmental
Commenter Affiliation: MarkWest Energy Partners, L.P.
Document Control Number: EPA-HQ-OAR-2010-0505-6957
Comment Excerpt Number: 4

Comment: Moreover, as a policy matter, the rule simply does not advance the Administration's policies in any meaningful way. In fact, by making development of natural gas development more expensive and time consuming, the result will be less American natural gas production than without this rule, which is directly at odds with the President's overall climate goals by any reasonable measure. Since increased natural gas electricity generation is the primary reason that the United States has significantly reduced greenhouse gas emissions since 2007, as recognized by the International Energy Agency, the Energy Information Administration, and EPA's own data, this rule is actually counterproductive to any meaningful efforts to address climate change. By focusing on globally insignificant methane emissions at the upstream production end, which represents just 3.4% of U.S. greenhouse gas emissions (adjusted for global warming potential, or "GWP"), EPA is actually proposing to reduce the much larger climate benefit that natural gas can deliver for the power sector. Thus, in its zeal to appear effective at "methane regulation," EPA has lost sight of the bigger picture.

Response: The EPA disagrees with this comment. See response to DCN EPA-HQ-OAR-2010-0505-7336, Excerpt 98.

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[50] The RIA for the final Clean Power Plan can be found at: https://www.epa.gov/sites/production/files/2015-08/documents/cpp-final-rule-ria.pdf.

Commenter Name: Brandon M. Black, Vice President
Commenter Affiliation: BC Operating, Inc.
Document Control Number: EPA-HQ-OAR-2010-0505-6968
Comment Excerpt Number: 3

Comment: EPA's cost benefit analysis is fundamentally flawed to the point that neither the agency nor the public can actually assess the impacts of the Methane NSPS. EPA made a number of faulty assumptions in its calculations of the Methane NSPS's costs and benefits.

First, EPA estimated the total costs to the oil and gas industry to implement the Methane NSPS. EPA then reduced those costs by the value of the natural gas that EPA estimates that operators will recover from repairing leaks and otherwise complying with the Methane NSPS. EPA asserted that operators would gain revenues of $4/thousand cubic feet (met) for this recovered gas. By using this recovered-gas-revenue figure, EPA was able to reduce its calculation of the total annual engineering costs of complying with the Methane NSPS by tens of millions of dollars, from a range of $180 to $200 million in 2020 and $370 to $500 million in 2025, down to $150 to $170 million in 2020 and $320 to $420 million in 2025. EPA is incorrect in concluding that owners and operators will be able to recover any amount, let alone $4/mcf, for the captured fugitive gases because the amount of gas captured is within the industry margin of error for gas measurement and, therefore, will not be valued in any sale. EPA's cost estimate simply misunderstands the way that natural gas is measured and sold.

Orifice meters are the most common and economic measuring equipment used in the industry today. Oil wells typically produce gas at variable rates that create uncertainty in the operating ranges of orifice meters, which increases the margin of error above the perfect condition error of 0.55% inherent to best condition orifice measurement. These differences result in a variance that puts the small volumes per facility anticipated to be captured by compliance with this rule within the error measurement range of the custody transfer equipment. The result of this is that there will be no additional revenue from gas sales generated by compliance with this rule. The EPA's high estimates of 12,000,000 Mcf that might be recovered by compliance with this rule is only 0.04% of the 2014 U.S. gas production. EPA's estimates indicate that gas captured at most exploration and production ("E&P") facilities as a result of the Methane NSPS will fall beneath the meter's margin of error, and, therefore, will not result in any incremental revenue. Even if the industry could generate revenue from the recovered gas, EPA's $4/mcf estimate ignores the current market realities. According to the Henry Hub Natural Gas Futures Quotes, natural gas is currently valued around $2/mcf, and is predicted to stay below $4/mcf until then end of 2024.

By including these "cost savings," which the industry will never actually realize, EPA has skewed its cost analysis and prevented the public from understanding the actual costs associated with this rule. This problem is further exacerbated by the fact that EPA failed to consider the potentially costly equipment upgrades necessary to comply with this rule. As detailed in the discussion of atmospheric tanks, if the Methane NSPS or CTG require operators to replace their atmospheric tanks with pressurized tanks in order to meet fugitive emissions survey requirements, then the industry will eventually bear a far heavier financial burden. EPA has not

considered these costs in its analysis, and must either reevaluate its cost analysis or clarify that the ordinary breathing from atmospheric tanks are not "fugitive emissions" under the Rules.

EPA's estimates on the cost of labor for compliance are also wholly unreasonable. The Methane NSPS is a highly complex and technical rule with a number of overlapping requirements. Upstream oil and gas operations frequently fall beneath the air emissions thresholds for permitting requirements . As a result, this portion of the industry has not historically been subject to similar federal air regulations, and their staff is largely unfamiliar with the monitoring, reporting, and recordkeeping requirements that accompany such rules. This means that these entities will have to expend far more resources either training their own personnel, or hiring personnel with expertise in federal air regulatory matters. This is particularly true for operators in states that already have overlapping state air regulations, as the businesses will need to understand and convey to personnel the differences between the two sets of requirements. For example, the Texas Railroad Commission places limits on the venting or flaring of gas, and Colorado, Wyoming, Ohio, and Pennsylvania have state regulations regarding natural gas emissions and leaks. Differentiating between the requirements from state and federal regimes-particularly when those requirements conflict or overlap will take additional time and resources.

For most upstream companies, well sites are spread out over a large geographic area. This dispersion of activities across a large geographic area is significantly different from the physical set up of larger facilities, such as natural gas processing plants or refineries, where EPA has mposed these kinds of monitoring requirements in the past. Unlike those larger sites, which have full-time personnel dedicated to one particular facility, most E&P companies assign one employee to multiple small sites. Well sites simply do not have the concentration of activity (including activity that would give rise to air emissions) to justify dedicating a single air compliance employee to each well site. Instead, the air compliance employee will have to spend substantial amounts of time traveling in order to visit each site semi-annually or quarterly, and will then have to keep up with the continual recordkeeping and reporting requirements for each of these small sites. BC estimates that operators will need to hire one full-time employee or contractor dedicated to implementing the requirements of the Methane NSPS for every 25 affected well sites operated. Given that there are almost 200,000 producing wells in Texas alone, this means the industry will eventually need to hire thousands of new employees merely to track and fix small equipment leaks.

According to EPA's analysis, "[t]he annual public reporting and recordkeeping burden for this collection of information is estimated to average 3.9 hours per response. Respondents must monitor all specified criteria at each affected facility and maintain these records for 5 years." BC estimates that the actual annual burden imposed by these Rules will be closer to 40- 60 hours per affected well site, which will result in an additional cost of $3,500-$5,000 in labor per well site per year. Given that there are hundreds of thousands, if not more than a million, well sites around the nation, these reporting and recordkeeping requirements will eventually balloon into tremendous industry-wide compliance costs.

EPA is also relying on revenue estimates that no longer reflect the reality of the oil and gas market. For oil prices, EPA "estimated revenues using two alternative prices, $70/bbl and $50/bbl. In the results, EPA refers to the case using $70/bbl the 'primary scenario' and the case

using the $50/bbl as the 'low oil price scenario. '" In contrast to EPA's estimates, the U.S. Energy Information Administration ("EIA") expects the price of Brent Crude Oil to average $53.96 for the year and the West Texas Intermediate spot average is expected to be $53.57 for the year. Prices have fallen below EPA's "low oil price scenario" of $50/bbl, and many industry experts predict that this trend will continue. For example, Brent crude prices remained below $50/bbl for 20 consecutive days in September 2015, and the West Texas Intermediate price fell to $44. 74/bbl on October 1, 2015. Goldman Sachs has forecasted that crude prices will average around $45/bbl in 2016, and has even predicted that oil could fall as low as $20/bb1. EPA's cost analysis fails to consider the reality that many industry analysts have repeatedly voiced: lower oil and gas prices are likely to continue for the foreseeable future. EPA should therefore reevaluate its cost estimates based on more realistic revenue figures of the oil and gas sector. As discussed above, natural gas prices are likewise lower than EPA's estimates.

In addition, the model that EPA used to estimate the economic benefits for the reductions in methane emissions associated with this rule is deeply flawed and has not been subject to public notice and comment. In the past, EPA has used a model known as the "social cost of carbon" or "SCC" to place a dollar value on the reduction of carbon dioxide emissions resulting from regulations. This sec model has come under criticism by those arguing that flaws in the modeling technique and use of discount rates result in inaccurate and inflated estimates of the value of reducing emissions. The SCC model used by EPA has been the subject of Congressional oversight hearings, and is currently under review by the National Academies of Sciences, Engineering, and Medicine. Indeed, some-including Robert Pindyck of the Massachusetts Institute of Technology-have argued that these types of models are so flawed that they are "close to useless as tools for policy analysis." Worse yet, the inclusion of these models "create a perception of knowledge and precision that is illusory, and can fool policy-makers into thinking that the forecasts the models generate have some kind of scientific legitimacy. " These models "can be misleading-and are inappropriate-as guides for policy, and yet they have been used by the government to estimate the social cost of carbon (SCC) and evaluate tax and abatement policies." "Because the modeler has so much freedom in choosing functional forms, parameter values, and other inputs, the model can be used to obtain almost any result one desires, and thereby legitimize what is essentially a subjective opinion about climate policy." In fact, EPA acknowledges some of these shortcomings with the SCC model in the Methane NSPS preamble. While the SCC model used by EPA has many of its own flaws, it has, at least, been used by EPA and other federal agencies for many years, and repeatedly re-evaluated by the Office of Management and Budget ("OMB"). By contrast, the "social cost of methane" model used by EPA to estimate the benefits of methane reductions for the Methane NSPS was developed by an outside organization, has not been vetted for accuracy by the OMB, and has not been subjected to public scrutiny through the notice and comment process. The public has not had the chance to review the accuracy of the inputs or the results of this highly complex climate model, and is therefore unable to meaningfully evaluate the resulting figures that EPA used in its analysis. EPA also notes in the preamble of the Methane NSPS proposal that the social cost of methane model used to evaluate this rulemaking was the first set of published social cost of methane estimates in the peer-reviewed literature that are consistent with the modeling assumptions underlying the sec model used by federal agencies. This statement indicates both that social cost of methane model is likely to share many of the same flaws as the SCC model used by EPA, and that methane modeling is still very new and untested. These are two good reasons why EPA

should not rely on these models to estimate the benefits of the emission reductions from the Methane NSPS.

This is particularly true when the magnitude of the "benefits" resulting from the use of this model is considered. EPA used this social cost of methane model to calculate an estimated benefit range of $200 to $210 million in 2020 and $460 to $550 million in 2025. These numbers eclipse the total estimated cost ranges associated with the rule of $150 to $170 million in 2020 and $320 to $420 million, and creates the public impression that this costly rule actually has a net economic benefit of hundreds of millions of dollars. In addition, EPA selected a three percent discount rate to apply to the modeling result associated with this social cost of methane model, while simultaneously applying a much higher (seven percent) discount rate to the costs that the industry will incur. Economists have noted that these models are very sensitive to the discount rate that is applied, which can have huge impacts on the resulting value placed on the reduction of a ton of emissions. As one economist explained, there is no scientific justification for using the monetary values that result from a three percent discount rate for these reductions. Indeed, the federal interagency working group tasked with selecting the SCC model used by the EPA did not try to determine the "correct" values for the discount rate. Instead, they used middle of the road assumptions. . . . But other well-known studies have deviated from using these middle of-the-road assumptions and arrived at very different estimates of the sec .... The problem here is that there is no consensus regarding the "correct" discount rate. . . . Because reasonable arguments can be made for a low discount rate or for a high rate, the modeler simply has too much flexibility.

While EPA includes the modeling results and cost estimates at additional discount rates, this information is tucked away in the text of the Methane NSPS and supporting technical documents, while the costs to industry at a seven percent discount rate, and benefits from the model at a three percent discount rate are used to reach the EPA's net-benefit estimate. As a result, the public is unable to fairly compare the costs and benefits associated with this rule. Recommendations: EPA should reconduct its cost assessment, and do so in a way which:

1. Takes into account the full costs of compliance that the industry will bear, and removes the cost savings which the industry will never recover;

2. Incorporates a more realistic estimate of the amount of time and labor the Methane NSPS will require;

3. Considers the reduced revenue from oil and natural gas under current market conditions; and

4. Removes the comparison to a social cost of methane model that has not yet been reviewed by the Science Advisory Board; National Academies of Sciences, Engineering, and Medicine, or OMB.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6978, Excerpt 7.

Commenter Name: Patrick Von Bargen, Executive Director
Commenter Affiliation: Center for Methane Emissions Solutions (CMES)
Document Control Number: EPA-HQ-OAR-2010-0505-6980
Comment Excerpt Number: 2

Comment: In response to publication of the proposed rule, CMES offers its comments to help EPA produce a final rule that provides the most practical, economic, and effective structure to capture methane emissions that would otherwise be released into the atmosphere. Capturing these emissions both enhances the revenue lines of oil and gas producers because they can monetize natural gas that would otherwise be wasted and also slows the detrimental environmental damage done by a greenhouse gas 84 times more potent than carbon dioxide.

Response: The EPA agrees with the commenter. The final NSPS is needed to reduce emissions from the oil and natural gas sector, and the health, welfare, and environmental benefits of this action once implemented will be significant. In addition, by capturing natural gas that would otherwise be emitted, additional revenues will be produced.

Commenter Name: Cory Pomeroy, General Counsel
Commenter Affiliation: Texas Oil & Gas Association
Document Control Number: EPA-HQ-OAR-2010-0505-7058
Comment Excerpt Number: 12

Comment: The Benefit and Cost Analysis is Also Based on Equally Uncertain Estimates of the Before and After-Control Emission Rates From These Sources.

As EPA states in its draft RIA, the Agency's estimates of national emission reductions for the industry are derived by simply multiplying the unit-level emission reductions associated with each applicable control and facility type by the number of affected sources. This approach, while transparent, underscores the deficiencies with the Agency's estimating techniques. Not only is EPA making unsupportable projections with regard to the number of affected facilities that will be in production in the U.S. in 2020 and 2025, the Agency is also making equally uncertain assumptions regarding their pre- and post-control emission levels.

Response: With respect to the EPA's projections of affected facilities in 2020 and 2025, see response to DCN EPA-HQ-OAR-2010-0505-7058, Excerpt 8. The comment regarding the comment on pre- and post-control emissions at the unit-level is very general; please see responses to comments elsewhere in this document that pertain to unit-level emissions estimates.

Commenter Name: Darin Schroeder, David McCabe, Lesley Fleishman and Conrad Schneider
Commenter Affiliation: Clean Air Task Force et al.
Document Control Number: EPA-HQ-OAR-2010-0505-7062
Comment Excerpt Number: 11

Comment: The True Impact and Extent of Methane Emissions for Oil and Gas Sources Are Likely Greater Than EPA's Estimates.

The emissions estimates in the proposal significantly understate methane's true environmental impact for several reasons. First, in both the 2013 GHGI and the RIA for the proposed methane NSPS, EPA relied on the 100-year global warming potential ("GWP") for methane—a value of 25—that appeared in the Intergovernmental Panel on Climate Change's ("IPCC") Fourth Assessment Report ("AR4") from 2007. In 2013, the IPCC released its Fifth Assessment Report ("AR5"), providing its most up-to-date conclusions on the science of climate change.

AR5 revised the earlier report's 100-year GWP for fossil methane from 25 to 36, yet EPA continues to use the lower, outdated figure from AR4. Had the agency instead relied on the most accurate value of 36, its estimate of 100-year climate impacts of methane from oil and gas sources would have been 44% higher - 217 MMT CO2e rather than 151 MMT.

Second, EPA relies exclusively on the 100-year GWP for methane in its analysis, even though shorter timeframes more accurately capture the climate-forcing impacts of methane emissions. Because methane stays in the atmosphere for an average of 12 years before decaying into CO2, its impacts are concentrated in the near-term. It is critical to assess those shorter term impacts on the climate system in evaluating methane reduction measures. AR5 reports a 20-year methane GWP of 87, which corresponds to a total of roughly 525 MMT CO2e from domestic oil and gas methane emissions in 2013 (approximately 348% higher than the 2013 GHGI estimate).

Third, EPA likely underestimates the total amount of methane pollution emitted by the oil and gas sector. The agency's GHGI takes a "bottom-up" approach to quantify sector-wide methane emissions. This involves estimating the average pollution associated with each type of source (*e.g.*, the average annual emissions from each pneumatic controller) in a given year, then multiplying each per-unit emission figure by the total estimated number of units in the sector for each source type (*e.g.*, the total number of pneumatic controllers in the country). This technique contrasts with the "top-down" approach, in which researchers sample atmospheric concentrations of methane in areas with heavy oil and gas development, and then estimate the extent to which oil and gas sources contribute to the measured concentration levels. Comparisons between the GHGI and top-down studies support the conclusion that the GHGI, and other bottom-up estimates, significantly underestimate the methane emissions from oil and natural gas sources. Other top-down analyses support this conclusion. One top-down analysis of emissions of Colorado's Denver-Julesberg Basin estimates an emission rate of 2.6 to 5.6 percent, and another study of Utah's Uinta Basin indicated an emission rate of 6 to 12 percent, as compared to the approximately 1.4 percent assumed in last year's GHGI (representing estimates from 2012). Similarly, a recent study sponsored by the Environmental Defense Fund indicates sector-wide emissions 1.5 to 2 times EPA's reported estimates. These analyses support that EPA's bottom-up data significantly underestimates the true extent of methane emissions from oil and gas sources.

Therefore, both the environmental impact of methane emissions from domestic oil and gas sources and the quantity of those emissions likely exceed EPA's estimates in its 2013 GHGI and supporting materials for the proposed rule. The need to regulate these sources is therefore even more urgent than reflected by the agency's own data and analyses.

Response: The EPA has reviewed the suggestion to use the IPCC AR5 GWPs when calculating inventories, but has determined that the benefits of comparability and consistency with other international and domestic inventories support the continued use of AR4 GWPs at this time. The EPA disagrees that the 20 year GWP is more appropriate than the 100 year GWP – see the response to DCN EPA-HQ-OAR-2010-0505-7000, Excerpt 1 in Chapter 2 of this document.

Commenter Name: Darin Schroeder, David McCabe, Lesley Fleishman and Conrad Schneider
Commenter Affiliation: Clean Air Task Force et al.
Document Control Number: EPA-HQ-OAR-2010-0505-7062
Comment Excerpt Number: 12

Comment: The Proposed Methane NSPS Is Necessary, But Not Sufficient, For the United States to Meet its International Climate Commitments.

President Obama announced in November 2014 a bilateral agreement with President Xi Jinping of China in which the United States committed to a 26-28 percent GHG reduction by 2025, relative to 2005 levels. The President's Climate Action Plan likewise includes a 17 percent reduction from 2005 levels by 2020. To aid in achieving these goals, the Administration committed to cut oil and gas sector methane emissions 40 to 45 percent below 2012 levels by 2025. The proposed NSPS is an important and necessary step—but not nearly sufficient—toward the goal of a 40-45 percent reduction, and accordingly, we urge EPA to move forward with comprehensive standards addressing methane from existing sources in the oil and natural gas sector.

According to EPA's GHGI, oil and gas sources emitted over six million metric tons of methane in 2013. A 40 to 45 percent reduction from this total would require cuts on the order of 2.6 to 3 million metric tons if there is no additional growth in emissions between now and 2025 (an unlikely scenario). In its RIA, EPA estimates that the proposed methane NSPS will reduce sector-wide emissions by between 340,000 and 400,000 short tons in 2025 (308,000 to 363,000 metric tons). While other regulatory efforts—particularly the 2012 VOC-based NSPS—will provide additional reductions, it is clear that EPA must not only finalize strong methane rules for new sources, but must expeditiously move forward with existing sources to protect the public health and welfare of all Americans; satisfy its international commitments; and help avert the worst impacts of climate change.

Response: See response to DCN EPA-HQ-OAR-2010-0505-7338, Excerpt 49 in Chapter 15 of this document.

Commenter Name: Interfaith Center on Corporate Responsibility (ICCR)
Commenter Affiliation: Interfaith Center on Corporate Responsibility (ICCR)
Document Control Number: EPA-HQ-OAR-2010-0505-7068
Comment Excerpt Number: 4

Comment: We would like to suggest several ways to strengthen the proposal:

We are concerned that the EPA continues to use an outdated global warming potential for methane of 25x C02. In 2013, the IPCC increased the GWP of methane from 72x to 86x over a 20-year timescale, and from 25x to 34x over a 100-year time horizon. Given that we are approaching real, irreversible tipping points in the climate system, climate studies should, at the very least, include analyses that use this 20-year time horizon.

Response: The EPA disagrees that the 20 year GWP is more appropriate than the 100 year GWP – see the response to DCN EPA-HQ-OAR-2010-0505-7000, Excerpt 1 in Chapter 2 of this document.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:10 AM - 8:00 PM; Public Hearing #1 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 98

Comment: The oil and gas markets are struggling. Prices have dropped in half, and the rigs are in half right now. OPEC and Saudi Arabia by not reducing their productions have achieved their goal of shutting the U.S. drilling and production down which will have a major downward economic effect on the U.S.

These proposed rules and potential carbon tax will do nothing but be an economic detriment for our economy. As stated in a recent report from the Center for Regulatory Solutions, and I quote, the EPA's plan to move the ozone goalpost threatens Pennsylvania's economy, especially the transportation, construction, and energy industries. Pennsylvania is the center of the great Marcellus natural gas production. The statement by the Regulatory Solutions is true for every state in the U.S.

Response: The EPA does not believe that the final rules are overly burdensome or will harm the U.S. economy or, specifically, oil and natural gas production. For the final rule, we carefully considered the comments received on all aspects of the proposed rules. While our approach and methodology for establishing the final standards remained the same, we made several changes to make the final rules more flexible and cost-effective, address concerns with equipment availability, streamline recordkeeping and reporting requirements, and improve clarity, while fully preserving or improving the public health and environmental protection required by the CAA. These changes are discussed in more detail in the preamble to the final rule and in the

other sections of this document. The final NSPS establishes several performance standards that give regulated entities flexibility in determining how to best comply with the regulation. In an industry that is geographically and economically heterogeneous, this flexibility is an important factor in reducing regulatory burden.

We used the National Energy Modeling System (NEMS) to estimate the impacts of the final NSPS on the U.S. oil and natural gas drilling, production, prices, and trade. The NEMS is a publically available model of the U.S. energy economy developed and maintained by the Energy Information Administration of the U.S. DOE and is used to produce the Annual Energy Outlook, a reference publication that provides detailed forecasts of the United States energy economy. We disagree with the commenters' belief that the rules will "be an economic detriment" for the U.S. economy, as all impacts to oil and natural gas markets, as presented in Section 6 of the final RIA are relatively small.

Additionally, emission measures required by the final rules capture natural emissions that otherwise would be vented to the atmosphere. A large proportion of the averted methane emissions can be directed into natural gas production streams and sold. The revenues from additional natural gas are expected to partly offset the costs of implementing the final rules. The revenue from additional natural gas product recovery will also lead to increased revenues from taxes and royalties.

The comments regarding a potential carbon tax and the ozone NAAQS are out of scope of this final action, which establishes performance standards for new, modified, and reconstructed emissions sources in the oil and gas sector.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:00 AM - 2:40 PM; Public Hearing #2 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 11

Comment: One of the biggest issues that they often hear is that it's a job killer to regulate methane and other issues dealing with the fracking. As far as labor is concerned, there has been many coalitions, BlueGreen Alliance for one, that has called for these type of regulations.

Just a handful of the labor unions that support these type of regulations are the United Steel Workers, the United Association of Plumbers and Pipefitters, Utility Workers of America, International Brotherhood of Electric Workers, International Brotherhood of Boilermakers and the Laborers International Union.

One of the biggest issues -- first of all, from a personal experience, I was a union boilermaker for several years. And with my experience in the industry, when you do regulate, it actually leads to more job creation that we had to go in more often and actually replace parts and so forth.

Usually, the common philosophy is that that actually is a job killer. And from my own personal experience, I know for a fact that it's not.

From studies that have been done by the BlueGreen Alliance, 300,000 jobs could be created with -- dealing with pipeline -- with the leaks and stuff dealing with the pipeline industry. With 1.5 billion in charges for lost gas actually found, it would actually cost the taxpayer less money -- the consumer, I'm sorry.

And in the end it would actually -- it would take 30 years to actually clean up all the leaks and the holes and stuff dealing with America's pipeline industry. And I just want you to take that into consideration, that, you know, not everyone in labor is against these type of regulations because it's common philosophy that we are, but oftentimes that it actually puts food on the table for us.

Response: The EPA agrees with the commenter. The final NSPS is needed to reduce emissions from the oil and natural gas sector, and the health, welfare, and environmental benefits of this action once implemented will be significant. Additionally, the EPA agree that reducing emissions from the oil and natural gas sector will create employment opportunities in the environmental protection sector.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:00 AM - 2:40 PM; Public Hearing #2 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 39

Comment: I understand the need for finding and producing cheap energy and the benefits it has to our economy. However, this should not prevent measures to be taken to reduce the threats that oil and gas drilling creates.

Response: The EPA agrees with the commenter. The final NSPS is needed to reduce emissions from the oil and natural gas sector, and the health, welfare, and environmental benefits of this action once implemented will be significant.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:00 AM - 2:40 PM; Public Hearing #2 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 83

Comment: Reducing leakages would also lead to safer operations and better public safety, as methane is particularly flammable and can cause explosions. Although the methane is -- needed to reduce methane leakage and is cost-effective and, in fact, leaks usually lose profits. Many in the oil and gas industry are pillaging investments in capacity instead. That is why government action is needed.

Response: The EPA agrees with the commenter. The final NSPS is needed to reduce emissions from the oil and natural gas sector, and the health, welfare, and environmental benefits of this action once implemented will be significant.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:00 AM - 2:40 PM; Public Hearing #2 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 91

Comment: On July 1st, 2015, EPA received a letter from the Coalition of Investors representing 1.5 trillion in assets in support of the president's plan to cut emissions 45 percent of the levels by 2015.

The letter states, As widely diversified long-term investors with holdings in the oil and gas industry, we are concerned that methane emissions pose a serious threat to climate stability. The investors add that methane regulation reduces reputational and legal risks and in many cases, generates positive economic returns.

Response: The EPA agrees with the commenter. The final NSPS is needed to reduce emissions from the oil and natural gas sector, and the health, welfare, and environmental benefits of this action once implemented will be significant.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:00 AM - 2:40 PM; Public Hearing #2 - Dallas, Texas
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7336
Comment Excerpt Number: 120

Comment: And capturing methane has the additional benefit of reducing waste. All the cost of pollution really should be considered when new regulations are being formulated. Not just the dollar cost that can be most immediately identified, but there's also human costs. And the cost that we can foresee -- that we can reasonably foresee but may not be able to quantify totally effectively down the road, you know, commonly known as externalities.

Those externalities should be accounted for, and right now they're not being accounted for. That is the gaping hole right now in pollution control is that externalities are not accounted for. And we really need more of these gaps to be covered in this regulation.

Response: The EPA agrees with the commenter that air pollution can cause externalities that require regulation to correct. The market failure the final NSPS is designed to improve is discussed in Section 1.2 of the final RIA for the rule.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:00 AM - 7:55 PM; Public Hearing #1 - Denver, Colorado
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7337
Comment Excerpt Number: 102

Comment: We also believe that the rule will provide health co-benefits to those who live close to the thousands of oil and gas facilities covered by this rule, and we believe that the rule will provide an economic benefit to this industry through the capture of additional product that can be sold in the marketplace.

Response: The EPA agrees with the commenter. The final NSPS is needed to reduce emissions from the oil and natural gas sector, and the health, welfare, and environmental benefits of this action once implemented will be significant.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Wednesday, September 23, 2015; 9:00 AM - 7:55 PM; Public Hearing #1 - Denver, Colorado
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7337
Comment Excerpt Number: 108

Comment: Anadarko offers the following specific comments to the proposed rules:

Regarding Quad O and the CTGs, we share the concerns of our industry that EPA's one-size-fits-all approach to methane reduction will significantly and unnecessarily increase costs. Such an approach would also carry the unintended consequences of curbing further emissions reductions by discouraging voluntary efforts by oil and gas producers and providing states the opportunity to come up with state-specific rules that fit operations in their region. Detailed, prescriptive regulations restrict innovation and can inadvertently set limits on actual emission reductions. By contrast, a combination of collaboration and voluntary actions often lead to more workable and constructive regulatory structures. We urge the EPA to allow the development of these strategies and provide flexibility.

Response: With respect to comments on the NSPS, see response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 45 in Chapter 13 of this document. With respect to comments on CTG's, the final rule establishes standards for new, modified, and reconstructed sources. The CTGs are outside the scope of the final rule.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Tuesday, September 29, 2015; 9:05 AM - 8:00 PM; Public Hearing #1 - Pittsburgh, Pennsylvania
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7338
Comment Excerpt Number: 18

Comment: The gas industry has, for years, been reaping the benefits of publicly-funded infrastructure and enjoying tax incentives to produce gas, while the public has been paying the costs of health issues caused by methane pollution. Enactment of the proposed methane standards, along with a robust inspection schedule to enforce them, will not only improve the health of millions of Pennsylvanians, but also help future generations by slowing the warming of the Earth that is caused by extraction and burning of fossil fuels.

Response: The EPA agrees with the commenter. The final NSPS is needed to reduce emissions from the oil and natural gas sector, and the health, welfare, and environmental benefits of this action once implemented will be significant.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Tuesday, September 29, 2015; 9:05 AM - 8:00 PM; Public Hearing #1 - Pittsburgh, Pennsylvania
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7338
Comment Excerpt Number: 107

Comment: My second point, even as U.S. oil and natural gas production has surged, methane emissions have declined significantly. For example, methane emissions from hydraulically fractured natural gas wells has fallen nearly 79 percent since 2005; and total methane emissions from the natural gas systems are down 11 percent over the same period. These reductions have occurred during a time when total U.S. gas production has increased 44 percent. This industry has also played a significant role in the 27 year limits on power sector fields in emissions we see today. These trends are indicative of what our industry, when given the freedom to innovate, can achieve to improve the environment and our nation's energy security.

What our industry has and will continue to achieve under the current regulatory system without directly regulating methane, dwarfs the emission reduction EPA has estimated in these proposed rules.

Response: See response to DCN EPA-HQ-OAR-2010-0505-6603, Excerpt 49.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Tuesday, September 29, 2015; 9:00 AM - 11:55 AM; Public Hearing #2 - Pittsburgh, Pennsylvania
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7338
Comment Excerpt Number: 5

Comment: EPA should quantify and report cost savings that will improve due to the new methane pollution standards, which will not only reduce useful conditions of the worst greenhouses gas on the planet, but also reduce bio-organic compounds which form smog, soot, and hazardous air pollution.

Response: The EPA agrees with the commenter. Section 3.4.4 of the RIA for the final NSPS presents estimates of the revenues from product recovery predicted to result from emissions reductions. The EPA also agrees that the final NSPS, once implemented, will achieve significant health, welfare, and environmental benefits.

Commenter Name: Public Hearing Comments On Proposed Climate, Air Quality, and Permitting Rules for the Oil and Natural Gas Industry; Tuesday, September 29, 2015; 9:00 AM - 11:55 AM; Public Hearing #2 - Pittsburgh, Pennsylvania
Commenter Affiliation: None
Document Control Number: EPA-HQ-OAR-2010-0505-7338
Comment Excerpt Number: 39

Comment: I won't spend my limited time today talking about how potent the climate-warming effects of methane are, more than 80 times more powerful than carbon dioxide in a 20-year time span, or the fact that the oil and gas sector releases more methane from already existing sources than any other class of industrial activity in the U.S. I won't spend time talking about the fact that without new limits, those emissions are likely to increase by 25 percent in the next decade, or the fact that curbing methane emissions is essential if we're going to meet our international commitments to reduce greenhouse gases. The EPA knows all of this. It's why you're proposing these controls.

I'd like to emphasize specifically how critically important EPA's proposed methane standards are for Pennsylvania, as well as the entire world. In 2004, 5 percent of all dry gas produced in the U.S. came from shale deposits, and Pennsylvania ranked 13th among states in total dry gas production. Now, 56 percent of dry gas produced in this country comes from shale deposits, and because of drilling into Marcellus and using the formations, Pennsylvania produces more gas than any state except Texas. Since 2008 the quantity of proven gas reserves in Pennsylvania has risen eightfold from less than five trillion cubic feet in 2008 to more than 40 trillion in 2013.

As of 2013, some eight trillion cubic feet of gas had been produced from Marcellus formation alone. U.S. Energy Information Administration projects that between 2014 and 2040, that Marcellus alone without the Utica will produce more gas than any other shale formation, more than 130 trillion cubic feet.

All of which is to say that a lot of oil and gas infrastructure has been built in Pennsylvania in the last ten years, and a lot more will be built in the decades ahead. Without some strong action by the EPA to control emissions, there will be ecological ramifications.

Response: The EPA agrees with the commenter. The final NSPS will reduce emissions from the oil and natural gas sector, and the health, welfare, and environmental benefits of this action once implemented will be significant.