To: Allen, Laura[Allen.Laura@epa.gov]
From: John Dyer
Sent: Fri 4/22/2016 8:05:26 PM
Subject: Re: VICE News Question for Friday Morning

Got this. Thanks. Waiting for others.

On Fri, Apr 22, 2016 at 3:56 PM, Allen, Laura <Allen.Laura@epa.gov> wrote:

John- info on your two original questions is below—and you most recent questions should be addressed as well. I highlighted some of the most important pieces. Please give it a read and feel free to give me a call at my desk.

Question: Please explain how the EPA is now dealing with methane leaks in oil and natural gas production (maybe the measures reported in the FT didn't take effect so quickly?) and what leaks it is not dealing with? There is some gray area here that I need explained to me. I think EPA does something, but not enough and is working to do more on leaks.

The GHG Inventory does account for leaks, but the methodology for leaks varies from source to source. The GHG Inventory does not have a distinct category for superemitters, but some of the data sources used to calculate emission factors from the inventory include emissions that are considered to be superemitters. In the memos released in late 2015 and early 2016, EPA requested stakeholder feedback on accounting for superemitters in the GHG Inventory. In addition, EPA requested stakeholder feedback on incorporation into its current estimate for storage wells an estimate of emissions for the Aliso Canyon leak, which began in October 2015. EPA plans to incorporate data on this source in next year's inventory, which will cover 2015 emissions. Here's more info on the memos: https://www3.epa.gov/climatechange/ghgemissions/usinventoryreport/natural-gas-systems.html

As I've already shared:

Below are a few examples (but not a comprehensive list) of how leaks are quantified in the GHG Inventory:

- Pipeline leaks from distribution systems are quantified by multiplying miles of pipeline by leaks per mile and by CH4 emitted per leak per year.

- Leaks from production equipment are quantified by multiplying the total number of equipment of each type (e.g. heaters, separators) by an emission factor for CH4 emitted from leaks for each type of equipment per year.

•□□□□□□□□ For gathering stations, a total station-level CH4 emission factor is applied that accounts for leaks, venting and other sources of methane, without distinguishing between leaks, venting, etc.

Here's more info on the rulemaking mentioned in the SciAm article: 2015 Greenhouse Gas Reporting Rule Revisions and Confidentiality Determinations for Petroleum and Natural Gas Systems: https://www.epa.gov/sites/production/files/2015-10/documents/2015-revisions-and-confidentiality-determinations-for-petroleum-and-natural-gas-systems-fs.pdf

Secondly, President Obama and the Canadian PM announced host of measures last month that included an agreement to cut down methane.

Under President Obama's Methane Strategy, EPA and other federal agencies are taking a number of steps to reduce methane emissions from the oil and natural gas sector. We are already seeing significant progress in specific areas. For example, although methane emissions from the production segment overall have increased, since the promulgation of the 2012 NSPS, we have seen substantial emission reductions in covered segments, such as from hydraulically fractured and re-fractured gas wells, and high bleed pneumatic controllers.

EPA is supporting both voluntary and regulatory approaches to reduce methane emissions from the oil and gas sector. The agency recently launched the Methane Challenge: https://www3.epa.gov/gasstar/methanechallenge/

In August 2015, EPA proposed rules to reduce methane and VOC emissions from new, reconstructed and modified sources in the oil and natural gas industry. The proposed rule would require owners/operators to conduct regular leaks monitoring surveys -- and if they find leaks, to fix them (leaks also are referred to as "fugitive emissions"). EPA proposed requirements for leaks monitoring and repair for sources at certain natural gas well sites, certain oil well sites, natural gas production gathering and boosting stations, and natural gas transmission stations. EPA received more than 900,000 comments on the proposed rule and held three public hearings. The agency anticipates issuing a final rule this spring.

More on the leaks monitoring and repair requirements by type of site:

- Natural gas well sites (PDF) (4 pp, 377 kb)
- Oil well sites (PDF) (5 pp, 491 kb)
- Natural gas production gathering and boosting stations (PDF) (4 pp, 468 kb)
- Natural gas transmission compressor stations (PDF) (4 pp, 477 kb)

The agency also released draft Control Techniques Guidelines, which will assist states in reducing VOC emissions from existing sources in certain areas with smog problems and states in the Ozone Transport Region. The CTGS also are expected to yield methane reductions as a co-benefit of reducing VOCs.

In addition to the standards for new sources, we are beginning the process of developing regulations for existing sources. The agency will begin with a formal process to require companies operating existing oil and gas sources to provide information to assist in the development of comprehensive regulations to reduce methane emissions. That process is known as an Information Collection Request, or ICR. Through the ICR, EPA will be seeking a broad range of information that will help us determine how to effectively reduce emissions, including information such as how equipment and emissions controls are, or can be, configured, and what installing those controls entails.

EPA will also be seeking information that will help the agency identify sources with high emissions and the factors that contribute to those emissions. The ICR will likely apply to the same types of sources covered by the current and proposed New Source Performance Standards for the oil and gas sector, as well as additional sources.

Laura Allen

Deputy Press Secretary
Office of the Administrator
U.S. Environmental Protection Agency

Email: Allen.Laura@epa.gov

Office: 202-564-1175

Mobile: 202-731-3005

Please consider the environment before printing this email.

From: John Dyer [mailto: Ex. 6 - Personal Privacy
Sent: Friday, April 22, 2016 2:58 PM

To: Allen, Laura <Allen.Laura@epa.gov>
Subject: Re: VICE News Question for Friday Morning

Thx

On Fri, Apr 22, 2016 at 2:56 PM, Allen, Laura <Allen.Laura@epa.gov> wrote:

Sending you info momentarily.

From: John Dyer [mailto: Ex. 6 - Personal Privacy
Sent: Friday, April 22, 2016 1:38 PM

To: Allen, Laura <Allen.Laura@epa.gov>
Subject: Re: VICE News Question for Friday Morning

Laura,

Sorry to be a pest, but I'm under the gun.

Here are the questions I need answered and my current understanding of them.

1) What methane leak data makes it into the inventory? (I'm told answer is: small leaks.)

2) What are current regulations governing methane leaks in the oil and natural gas industry? (I'm told there are none.)

3) The EPA proposed leak rules in August. Why have those not been made official? (I'm told they will be soon.)

4) Does President Obama and Canadian PM Trudeau's agreement include leaks? (The rules proposed in August mirror the agreement's goals.)

John

On Fri, Apr 22, 2016 at 12:30 PM, John Dyer <Ex. 6 - Personal Privacy> wrote:

Ok. Thx.

On Fri, Apr 22, 2016 at 12:30 PM, Allen, Laura <Allen.Laura@epa.gov> wrote:

Hi John- We are still working on it.

Thanks

From: John Dyer [mailto: Ex. 6 - Personal Privacy
Sent: Friday, April 22, 2016 11:58 AM
To: Allen, Laura <Allen.Laura@epa.gov>
Subject: Re: VICE News Question for Friday Morning

Laura,

Hi. Any news? I need to file in couple hours.

Thanks,

John

On Fri, Apr 22, 2016 at 9:31 AM, John Dyer < Ex. 6 - Personal Privacy > wrote:

> Yes. No problem. I told the editors it will take some time. We have some time.

> On Fri, Apr 22, 2016 at 9:26 AM, Allen, Laura <Allen.Laura@epa.gov> wrote:
>
> > Yes, I'm still trying to connect with my experts so it won't be for an hour or so. Hope that works. Thanks
> >
> > On Apr 22, 2016, at 9:22 AM, John Dyer < Ex. 6 - Personal Privacy > wrote:

Hi Laura. Just a friendly reminder that it would be great if we can speak early today.

Thanks,

John

On Thu, Apr 21, 2016 at 10:15 PM, Allen, Laura <Allen.Laura@epa.gov> wrote:

Thanks. Yes, let's connect in the morning

On Apr 21, 2016, at 9:08 PM, John Dyer <Ex. 6 - Personal Privacy> wrote:

Laura,

Hi. I am trying to get to the bottom of how the EPA regulates methane leaks in the oil and natural gas industry. See two questions below. It would be nice if we could talk in the late morning.

On one hand, you sent me some info about how the EPA estimates leaks. Also, I found this Financial Times story from August 2015 that says the EPA at that time was preparing to crack down on leaks.

http://www.ft.com/cms/s/0/d6cd65be-4556-11e5-b3b2-1672f710807b.html#axzz46VnWiqyv

But the folks from the Environmental Defense Fund say that while the EPA may have measures to tally emissions from leaks, the EPA does not include "superemitters," or big leaks, in the greenhouse gas

inventory.

The 2014 inventory published recently mentions how it doesn't consider those superemitters on page 3-84.

This 2015 story also discusses leaks that aren't counted:

http://insideclimatenews.org/news/23072015/study-gets-handle-gas-leaks-80-billion-cubic-feet

And this April 2016 story says "companies are not required to find and repair leaky gas wells, but the U.S. Environmental Protection Agency (EPA) is developing federal guidelines to address the nation's emissions."

https://www.sciencedaily.com/releases/2016/04/160420162705.htm

This Scientific American article also suggested that the EPA doesn't deal with leaks right now. (See Enesta Jones quote)

http://www.scientificamerican.com/article/epa-moves-to-count-methane-emissions-from-fracking/

Question: Please explain how the EPA is now dealing with methane leaks in oil and natural gas production (maybe the measures reported in the FT

didn't take effect so quickly?) and what leaks it is not dealing with? There is some gray area here that I need explained to me. I think EPA does something, but not enough and is working to do more on leaks.

Secondly, President Obama and the Canadian PM announced host of measures last month that included an agreement to cut down methane.

https://www.whitehouse.gov/the-press-office/2016/03/10/us-canada-joint-statement-climate-energy-and-arctic-leadership

Question: Does that agreement include anything about leaks? It doesn't mention leaks exactly but they clearly could be included.

Thanks,

John Dyer

VICE News

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To: Allen, Laura[Allen.Laura@epa.gov]
From: Amanda Reilly
Sent: Fri 4/15/2016 7:02:23 PM
Subject: RE: Today-- GHG

Great, thanks much.

From: Allen, Laura [mailto:Allen.Laura@epa.gov]
Sent: Friday, April 15, 2016 2:41 PM
To: Amanda Reilly <areilly@eenews.net>
Subject: RE: Today-- GHG

I'll get right back to you on this

From: Amanda Reilly [mailto:areilly@eenews.net]
Sent: Friday, April 15, 2016 2:30 PM
To: Allen, Laura <Allen.Laura@epa.gov>
Subject: RE: Today-- GHG

Reading through this release, I see that: "The oil and gas sector is the largest emitting-sector for methane and accounts for a third of total U.S. methane emissions."

That's different from the draft, correct? I believe the draft found that the oil and gas sector in 2014 was the third-largest source of methane in the country.

And I know the draft revised 2013 methane emissions estimates form the oil and gas sector up 27 percent. Is that figure the same in the final inventory? Did EPA revise up any other years' worth of methane data from the sector?

I'll take a look myself when the web goes live, but just wondering if you have the answers to these questions.

Thanks,

Amanda

From: Allen, Laura [mailto:Allen.Laura@epa.gov]
Sent: Friday, April 15, 2016 2:24 PM
To: Amanda Reilly <areilly@eenews.net>
Subject: RE: Today-- GHG

Apologies-- See below. The web will be live at 2:30pm

Let me know if we can answer any questions.

NEWS BRIEF
April 15, 2016

------UNDER EMBARGO UNTIL 2:30PM, 4/15------

EPA Publishes 21st Annual U.S. Greenhouse Gas Inventory

WASHINGTON – The U.S. Environmental Protection Agency (EPA) released its 21st annual Inventory of U.S. Greenhouse Gas Emissions and Sinks (GHG Inventory), today, which presents a national-level

overview of annual greenhouse gas emissions since 1990. The inventory shows a nine percent drop in emissions since 2005, and a one percent increase in greenhouse gas emissions in 2014 from 2013 levels.

Total U.S. greenhouse emissions were 6,108 million metric tons of carbon dioxide equivalent in 2014. By sector, power plants were the largest source of emissions, accounting for 30 percent of total U.S. greenhouse gas pollution. The transportation sector was the second largest source, at 26 percent. Industry and manufacturing was the third largest source, at 21 percent. As noted in the draft inventory released in February 2016, a one percent increase in total national greenhouse gas emissions between 2013 and 2014 was driven by increased fuel use –in the residential and commercial sectors, largely due to increased demand for heat that winter, and in the transportation sector.

Greenhouse gases are the primary driver of climate change. We are already seeing impacts of climate change in the United States, including warming temperatures, changes in precipitation, increases in the frequency or intensity of some extreme weather events, and rising sea levels. These impacts threaten Americans' health by affecting food safety as well as water and air quality.

Under President Obama's Climate Action Plan, EPA is taking important steps to cut greenhouse gas emissions from a wide range of sectors, including cutting pollution from U.S. power plants; reducing GHGs and increasing fuel efficiency for cars and heavy-duty trucks; reducing methane emissions from the oil and gas industry through regulatory and voluntary efforts, including the newly launched Methane Challenge program, and regulatory development for both existing and new sources; prohibiting the use of certain HFCs for specific end uses in favor of safer, more climate-friendly alternatives; and increasing energy efficiency through the Energy Star program.

National GHG emissions are going down over the long term, but minor variability year-to-year is to be expected. Over the last decade, there has been tremendous momentum in the energy sector toward low-carbon solutions. Today, the U.S. is generating three times as much wind power, and 30 times as much solar power, as when President Obama took office. The cost of renewable energy is getting cheaper, and growth in the U.S. energy efficiency sector is creating thousands of new jobs and opportunities.

EPA develops the GHG Inventory annually, revising its estimates with new, improved data when available. This year's inventory incorporates significant new emissions data, from EPA's Greenhouse Gas Reporting Program and other sources. Data on oil and gas show that methane emissions from the sector are higher than previously estimated. The oil and gas sector is the largest emitting-sector for methane and accounts for a third of total U.S. methane emissions.

The agency prepares the GHG Inventory annually in collaboration with other federal agencies, and submits the report to the Secretariat of the United National Framework Convention on Climate Change every year on April 15. The inventory covers seven key greenhouse gases: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride. In

addition to tracking U.S. greenhouse gas emissions, the inventory also calculates carbon dioxide that is removed from the atmosphere through the uptake of carbon in forests and other vegetation.

More on the U.S. Greenhouse Gas Inventory Report:
http://www.epa.gov/climatechange/ghgemissions/usinventoryreport.html

View and sort the data in EPA's Greenhouse Gas Inventory Data Explorer:
http://www.epa.gov/climatechange/ghgemissions/inventoryexplorer/

R069

------UNDER EMBARGO UNTIL 2:30PM, 4/15------

From: Amanda Reilly [mailto:areilly@eenews.net]
Sent: Friday, April 15, 2016 2:22 PM
To: Allen, Laura <Allen.Laura@epa.gov>
Subject: RE: Today-- GHG

Hi Laura,

Just checking in since it's coming up on 2:30. Thanks!

-Amanda

From: Allen, Laura [mailto:Allen.Laura@epa.gov]
Sent: Friday, April 15, 2016 1:47 PM
To: Amanda Reilly <areilly@eenews.net>
Subject: RE: Today-- GHG

Great—I'll send shortly.

From: Amanda Reilly [mailto:areilly@eenews.net]
Sent: Friday, April 15, 2016 1:42 PM
To: Allen, Laura <Allen.Laura@epa.gov>
Subject: RE: Today-- GHG

Hi Laura,

Thanks much for the heads-up! Yes, I would love an embargoed copy. We would hold until our PM edition, which is published around 4.

Thanks!

Amanda

From: Allen, Laura [mailto:Allen.Laura@epa.gov]
Sent: Friday, April 15, 2016 1:41 PM
To: Amanda Reilly <areilly@eenews.net>
Subject: Today-- GHG

Hey Amanda-- Off the record, we plan to release the GHG inventory this afternoon. I can send you an embargoed copy of the news brief now if you are able to hold on releasing the info until the embargo lifts at 2:30pm today. We can help answer any questions that you have as well.

Let me know if that would work for you, thanks!

Laura Allen

Deputy Press Secretary
Office of the Administrator
U.S. Environmental Protection Agency

Email: Allen.Laura@epa.gov

Office: 202-564-1175

Mobile: 202-731-3005

Please consider the environment before printing this email.

To: Allen, Laura[Allen.Laura@epa.gov]
From: Amanda Reilly
Sent: Fri 4/15/2016 7:22:14 PM
Subject: RE: Today-- GHG

Thanks! This is helpful.

From: Allen, Laura [mailto:Allen.Laura@epa.gov]
Sent: Friday, April 15, 2016 3:21 PM
To: Amanda Reilly <areilly@eenews.net>
Subject: RE: Today-- GHG

Here's some additional info--

"The oil and gas sector is the largest emitting-sector for methane and accounts for a third of total U.S. methane emissions."That's different from the draft, correct? I believe the draft found that the oil and gas sector in 2014 was the third-largest source of methane in the country.

When the public review draft was released, EPA was still reviewing feedback on the updates and calculating updated emissions estimates across the full time series. Therefore, the public review draft only contained updated numbers for the oil and gas sector for 2013, while the other categories had emissions presented for 2014 emissions. The final Inventory now shows the updated emissions estimates for the oil and gas sector for the entire 1990-2014 time series, allowing a complete comparison of methane sources.

And I know the draft revised 2013 methane emissions estimates from the oil and gas sector up 27 percent. Is that figure the same in the final inventory? Did EPA revise up any other years' worth of methane data from the sector?

As part of the annual update to the Inventory, EPA incorporated extensive, newly-

available data, including GHGRP (e.g. newly reported activity data) and data from recent studies. Across the sector, comparing the 2013 numbers from the previous inventory to the 2013 emissions in the most recent inventory, there was an upward revision in emissions estimates for this sector of around 30%, or 50 MMT CO2e. The oil and natural sector accounts for roughly 30 percent of total U.S. methane emissions, and approximately 3 percent of U.S. greenhouse gas emissions overall. The recalculations for this sector increased the sectors' share of total national GHG emissions by less than one percent.

Additional info on EPA Actions--

Under President Obama's Methane Strategy, EPA and other federal agencies are taking a number of steps to reduce methane emissions from the oil and natural gas sector. We are already seeing significant progress in specific areas. For example, although methane emissions from the production segment overall have increased, since the promulgation of the 2012 NSPS, we have seen substantial emission reductions in covered segments, such as from hydraulically fractured and re-fractured gas wells, and high bleed pneumatic controllers.

EPA is supporting both voluntary and regulatory approaches to reduce methane emissions from the oil and gas sector. Last year, the agency proposed updates to its 2012 New Source Performance standards for new sources that add methane to the pollutants covered and adds sources not covered in the 2012 rules. These sources include hydraulically fractured oil wells, equipment "downstream" in the transmission segment of the natural gas industry, and equipment leaks (also called fugitive emissions), which are a significant source of both VOC and methane emissions. The agency also released draft Control Techniques Guidelines, which will assist states in reducing VOC emissions from existing sources in certain areas with smog problems and states in the Ozone Transport Region. The CTGS also are expected to yield methane reductions as a co-benefit of reducing VOCs.

In addition to the rules, we intend to finalize this spring to set additional standards for new sources, we are beginning the process of developing regulations for existing sources. The agency will begin with a formal process to require companies operating existing oil and gas sources to provide information to assist in the development of comprehensive regulations to reduce methane emissions. That process, known as an Information Collection Request, is what we're focused on right now.

Other actions that will put the country on a path toward meeting the Administration's goals include the voluntary efforts, such as the Natural Gas STAR Methane Challenge program EPA recently announced, and actions by other federal agencies, such as the Bureau of Land Management and the Department of Transportation's Pipeline and Hazardous Materials Safety Administration.

Laura Allen

Deputy Press Secretary
Office of the Administrator
U.S. Environmental Protection Agency

Email: Allen.Laura@epa.gov

Office: 202-564-1175

Mobile: 202-731-3005

Please consider the environment before printing this email.

From: Amanda Reilly [mailto:areilly@eenews.net]
Sent: Friday, April 15, 2016 3:02 PM
To: Allen, Laura <Allen.Laura@epa.gov>
Subject: RE: Today-- GHG

Great, thanks much.

From: Allen, Laura [mailto:Allen.Laura@epa.gov]
Sent: Friday, April 15, 2016 2:41 PM
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From: Amanda Reilly [mailto:areilly@eenews.net]
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April 15, 2016

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R069

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Laura Allen

Deputy Press Secretary
Office of the Administrator
U.S. Environmental Protection Agency

Email: Allen.Laura@epa.gov

Office: 202-564-1175

Mobile: 202-731-3005

Please consider the environment before printing this email.

To: Allen, Laura[Allen.Laura@epa.gov]
Cc: Jordan Wirfs-Brock[JordanWirfs-Brock@rmpbs.org]
From: Alisa Barba
Sent: Wed 3/30/2016 2:54:51 PM
Subject: FW: TODAY: EPA Administrator McCarthy to Deliver Keynote at the Global Methane Forum

Hi Laura – Could we get an advance copy of the Administrator's address? Will there be audio available during or after the address? Thanks much for your help!

Alisa Barba

Alisa Barba
Executive Editor, Inside Energy
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Insideenergy.org
Abarba@insideenergy.org
@insideenergynow
Click to sign-up for our twice monthly newsletter
Want down-to-earth, approachable energy stories in your inbox twice a month? Sign up for our newsletter.

Have a question about energy? Share it at ask.insideenergy.org and your idea could become our next story.

From: Leigh Paterson <leighpaterson@rmpbs.org>
Date: Wednesday, March 30, 2016 at 7:19 AM
To: "IETeam@insideenergy.org" <IETeam@insideenergy.org>
Subject: Fwd: TODAY: EPA Administrator McCarthy to Deliver Keynote at the Global Methane Forum

Begin forwarded message:

From: "U.S. EPA Media Relations" <noreply-subscriptions@epa.gov>
Date: March 30, 2016 at 6:00:47 AM MDT
To: <leighpaterson@rmpbs.org>
Subject: TODAY: EPA Administrator McCarthy to Deliver Keynote at the Global Methane Forum

CONTACT:
Laura Allen
allen.laura@epa.gov
202-731-3005 (cell)

FOR IMMEDIATE RELEASE
March 30, 2016

TODAY: EPA Administrator McCarthy to Deliver Keynote at the Global Methane Forum

WASHINGTON – Today, EPA Administrator Gina McCarthy will deliver a keynote address at the re-charter ceremony for the Global Methane Initiative. The Global Methane Forum, a week-long conference hosted by the Global Methane Initiative and the Climate and Clean Air Coalition, brings together hundreds of policymakers and industry experts from more than 50 countries to discuss strategies to reduce global methane emissions. In addition, EPA will launch the Natural Gas STAR Methane Challenge Program in a special session of the Global Methane Forum.

WHERE:
Georgetown University Hotel and Conference City
3800 Reservoir Rd., NW
Washington, DC 20007

On-site registration will be available in the West Lobby, outside Salon ABG.

WHEN:
11:15 to 11:30 a.m. EST – Administrator McCarthy delivers keynote at Global Methane Initiative recharter event

More information on EPA's Natural Gas STAR Methane Challenge Program:
https://www3.epa.gov/gasstar/methanechallenge/

R057

If you would rather not receive future communications from Environmental Protection Agency, let us know by clicking here.
Environmental Protection Agency, 1200 Pennsylvania Avenue NW, Washington, DC 20460 United States

To: Allen, Laura[Allen.Laura@epa.gov]
Cc: Harrison, Melissa[Harrison.Melissa@epa.gov]
From: Andrew Restuccia
Sent: Thur 1/28/2016 9:33:42 PM
Subject: Re: Politico inquiry

Appreciate the response. Have a good night!

Andrew Restuccia
POLITICO
arestuccia@politico.com
202-380-6193
Twitter: @AndrewRestuccia

From: Allen, Laura <Allen.Laura@epa.gov>
Sent: Thursday, January 28, 2016 4:32 PM
To: Andrew Restuccia
Cc: Harrison, Melissa
Subject: RE: Politico inquiry

Not at this time. We plan to finalize the proposed methane standards by spring.

From: Andrew Restuccia [mailto:ARestuccia@politico.com]
Sent: Thursday, January 28, 2016 4:22 PM
To: Allen, Laura <Allen.Laura@epa.gov>
Cc: Harrison, Melissa <Harrison.Melissa@epa.gov>
Subject: Re: Politico inquiry

Thanks Laura. So nothing on my question about whether EPA has any plans to propose methane regulations for existing sources -- beyond the voluntary measures and state guidelines?

When is EPA slated to finalize the proposed methane standards for new and modified sources?

Andrew Restuccia

POLITICO

arestuccia@politico.com

202-380-6193

Twitter: @AndrewRestuccia

From: Allen, Laura <Allen.Laura@epa.gov>
Sent: Thursday, January 28, 2016 4:17 PM
To: Andrew Restuccia
Cc: Harrison, Melissa
Subject: RE: Politico inquiry

Andrew- here's more on the agency's actions. This is all I have for you before your deadline today. Thanks

Recognizing the importance of reducing methane emissions as part of an overall climate strategy, the Administration has announced a multi-pronged approach to address oil and gas methane emissions via regulatory and voluntary actions for both new and existing sources of methane. As part of that broad-based strategy, EPA will be finalizing the proposed methane and VOC standards for new and modified sources in the oil and gas industry, along with Control Techniques Guidelines for states to reduce VOCs from existing sources in the oil and gas industry. In addition, EPA has recently finalized the Best Management Practices Commitment framework for the Methane Challenge Program, a voluntary program that expands on the successful Natural Gas STAR program and focuses on existing sources. EPA plans to launch the Methane Challenge Program later this spring.

The agency is reviewing the more than 900,000 public comments on proposed updates to its New Source Performance Standards for the oil and gas industry. The proposed standards would add requirements for a number of new and modified sources of methane and VOCs in the oil and gas industry, including requirements that methane

and VOCs be captured during the completion of hydraulically fractured oil wells. The proposed standards also would extend emission reductions further “downstream,” covering equipment that was not covered in the agency’s 2012 rule, and requirements that operators find and repair leaks, which can be a significant source of both methane and VOC pollution.

Laura Allen

Deputy Press Secretary
Office of the Administrator
U.S. Environmental Protection Agency

Email: Allen.Laura@epa.gov

Office: 202-564-1175

Mobile: 202-731-3005

Please consider the environment before printing this email.

From: Andrew Restuccia [mailto:ARestuccia@politico.com]
Sent: Thursday, January 28, 2016 12:22 PM
To: Allen, Laura <Allen.Laura@epa.gov>
Cc: Harrison, Melissa <Harrison.Melissa@epa.gov>
Subject: Re: Politico inquiry

Thanks Laura. We're writing something by the end of the day, so our deadline is 5 pm.

Sent from my iPhone

On Jan 28, 2016, at 12:21 PM, Allen, Laura <Allen.Laura@epa.gov> wrote:

> Hey Andrew- I’ll be back in touch on this.

Are you working on a deadline that we should be aware of?

Thanks,

Laura Allen

Deputy Press Secretary
Office of the Administrator
U.S. Environmental Protection Agency

Email: Allen.Laura@epa.gov

Office: 202-564-1175

Mobile: 202-731-3005

Please consider the environment before printing this email.

From: Harrison, Melissa
Sent: Thursday, January 28, 2016 12:06 PM
To: Andrew Restuccia <ARestuccia@politico.com>
Cc: Purchia, Liz <Purchia.Liz@epa.gov>; Allen, Laura <Allen.Laura@epa.gov>
Subject: Re: Politico inquiry

Hey Andrew-sorry for the delay. I'm on the road. I've cc'd Laura who will help you on this one. Thanks! Melissa

Melissa J. Harrison

Press Secretary

U.S. Environmental Protection Agency

Office: (202) 564-8421

Mobile: (202) 697-0208

Harrison.Melissa@epa.gov

On Jan 28, 2016, at 8:54 AM, Andrew Restuccia <ARestuccia@politico.com> wrote:

Hi Liz and Melissa. Any comments or guidance on this?

Andrew Restuccia

POLITICO

arestuccia@politico.com

202-380-6193

Twitter: @AndrewRestuccia

From: Andrew Restuccia
Sent: Wednesday, January 27, 2016 9:57 AM
To: Harrison, Melissa; Purchia.Liz@epa.gov
Subject: Politico inquiry

Hi Liz and Melissa

Hope all is well. My colleague Elana and I are working on a story this week about the possibility that the EPA could promulgate methane regulations for existing oil and gas sources by the end of Obama's second term. It's part of a broader story on the climate-related measures the administration can take before Obama leaves office. Has Administrator McCarthy or anybody else at EPA said anything about the possibility of doing an existing source methane rule? If not, do you have any comment?

Thanks!

Andrew Restuccia

POLITICO

arestuccia@politico.com

202-380-6193

Twitter: @AndrewRestuccia

To: Allen, Laura[Allen.Laura@epa.gov]
Cc: Harrison, Melissa[Harrison.Melissa@epa.gov]
From: Andrew Restuccia
Sent: Thur 1/28/2016 9:21:43 PM
Subject: Re: Politico inquiry

Thanks Laura. So nothing on my question about whether EPA has any plans to propose methane regulations for existing sources -- beyond the voluntary measures and state guidelines?

When is EPA slated to finalize the proposed methane standards for new and modified sources?

Andrew Restuccia
POLITICO
arestuccia@politico.com
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Twitter: @AndrewRestuccia

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Laura Allen

Deputy Press Secretary
Office of the Administrator
U.S. Environmental Protection Agency

Email: Allen.Laura@epa.gov

Office: 202-564-1175

Mobile: 202-731-3005

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Mobile: 202-731-3005

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Press Secretary

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Harrison.Melissa@epa.gov

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Twitter: @AndrewRestuccia

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Thanks!

Andrew Restuccia

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arestuccia@politico.com

202-380-6193

Twitter: @AndrewRestuccia

To: Allen, Laura[Allen.Laura@epa.gov]
From: Kathleen McCleery
Sent: Fri 10/23/2015 3:42:54 PM
Subject: Re: Additional info from EPA

Thanks, Laura.
I know I have to simplify ... please confirm that these facts are accurate:
(1) The EPA regulations issued in August were the first ever on methane.
(2) The proposed standards would cut emissions nearly in half (40-45%)
(3) The proposed rules require semi-annual inspections (monitoring) - please clarify this.

Much appreciated.
--Kathleen

KATHLEEN McCLEERY
Producer, Writer and Media Consultant
Special Correspondent, PBS NewsHour
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kmccleery@newshour.org

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(b)(6) personal privacy (home office)
@kmccleery1

On Wed, Oct 21, 2015 at 2:13 PM, Allen, Laura <Allen.Laura@epa.gov> wrote:

Hey Kathleen- thanks for chatting on Monday. I wanted to follow up with some additional information. To your question about what the new EPA regulations will accomplish:

First, these proposed national standards will help combat climate change, reduce air pollution that harms public health, and provide greater certainty about Clean Air Act permitting requirements for the oil and natural gas industry.

The proposed standards for new and modified sources are expected to:

•□□□□□□□□ reduce 340,000 to 400,000 short tons of methane in 2025, the equivalent of reducing 7.7 to 9 million metric tons of carbon dioxide;

•□□□□□□□□ reduce 170,000 to 180,000 tons of ozone-forming VOCs in 2025, along with 1,900 to 2,500 tons of air toxics, such as benzene, toluene, ethylbenzene and xylene;

•□□□□□□□□ And it will yield net climate benefits of $120 to $150 million in 2025.

•□□□□□□□□ Here's more from the press release:
http://yosemite.epa.gov/opa/admpress.nsf/0/E5F2425E2E668A2B85257EA5005176FA

•□□□□□□□□ We also have a voluntary program: EPA's Methane Challenge Program

Second, you asked about emissions trends. Reported methane emissions *from gas well completions and workovers with hydraulic fracturing* dropped 83 percent between 2011 and 2014. You can see a chart of this at the bottom of this page:

http://www2.epa.gov/ghgreporting/ghgrp-2014-petroleum-and-natural-gas-systems

Third, I wanted to make sure that you had information on actions to reduce methane emissions on federal land by the Department of Interior. You should check in with Jessica Kershaw-- press secretary over at DOI—who can give you more info.

Jessica_kershaw@ios.doi.gov

Lastly, here is a blog that gives an overview of the Administration goal:
https://www.whitehouse.gov/blog/2015/08/18/continuing-drive-methane-emission-reductions

And the Administration's multi-agency strategy to reduce methane emissions:
https://www.whitehouse.gov/sites/default/files/strategy_to_reduce_methane_emissions_2014-03-28_final.pdf

Laura Allen

Deputy Press Secretary
Office of the Administrator
U.S. Environmental Protection Agency

Email: Allen.Laura@epa.gov

Office: 202-564-1175

Mobile: 202-731-3005

Please consider the environment before printing this email.

To: Mike Biesecker[mbiesecker@ap.org]
From: Allen, Laura
Sent: Wed 3/30/2016 3:08:32 PM
Subject: Re: Methane Challenge Founding Partners

And here's more on your first question:

Is the goal of the voluntary program to help companies come into compliance before mandatory restrictions kick in?
EPA is taking a multi-pronged approach to promote methane reductions from the oil and gas sector that includes both regulatory and voluntary actions. On the regulatory side, EPA is in the process of finalizing standards under Clean Air Act section 111(b) to address emissions from new and modified sources. EPA is also finalizing new guidelines to assist states in reducing ozone-forming VOCs from existing oil and gas sources in certain areas that do not meet the ozone health standard and in states in the Ozone Transport Region. And on March 11, 2016, the Administration announced additional measures to reduce oil and gas methane emissions, including regulating emissions from existing sources.

The voluntary Natural Gas STAR Methane Challenge Program ("Methane Challenge") will complement regulatory efforts by providing a new mechanism through which companies could make and track ambitious commitments to reduce methane emissions. Many of the founding partners are in the distribution sector, which is not covered by the 2012 rule or the 2015 proposal. For companies who are covered by these rules, voluntary action to reduce methane emissions will put leading companies ahead of the game in meeting future standards.

On Mar 30, 2016, at 9:11 AM, Allen, Laura <Allen.Laura@epa.gov> wrote:

> Mike- a list of the founding partners is attached. This is also embargoed until 11am. Still working on your other question. Thanks!
>
> <Methane Challenge Founding Partners-Final.docx>

Cc: Blackman, Jerome[Blackman.Jerome@epa.gov]
To: Pryor, Justin[Pryor.Justin@epa.gov]
From: John Osborne
Sent: Thur 4/21/2016 5:08:39 PM
Subject: Re: John Osborne/Methane Challenge Program

Justin
Many thx for this info.

In about 2 weeks we will have completed our survey of the existing Vermont pipeline system as well as the planned expansion route.

Separately, but at the same time, we will also have conducted:

a survey of a farmer site where organic emissions from the soil are being analyzed as well as natural gas production from a well recently drilled for water,
a cow farm manure power plant,
a composting operation,
a 50 MW wood chip power plant, and
a portion of the east side of Lake Champlain (algae).

I will speak to the Vermont utility about their writing an article on the VT survey for your Newsletter.

Look forward to attending one of your workshops.

Regards,

John

On Apr 21, 2016, at 11:11 AM, Pryor, Justin wrote:

John,

Thank you for this. As discussed, one avenue in the Natural Gas STAR Program to share technologies:

https://www3.epa.gov/gasstar/tools/service-provider-directory.html.

There are also other mechanisms, such as upcoming Technology Transfer Workshops to look out for on our website (none posted at this time), as well as the potential for a company that has implemented a specific technology to tell their story in a submission to our Newsletter (which we are currently working to gather content

for).

It was a pleasure talking to you, and please don't hesitate to call/email if you have any additional questions.

Best,

Justin

Justin Pryor
Climate Change Division
U.S. Environmental Protection Agency
202-343-9258

From: John Osborne [mailto:john.osborne@glowink.biz]
Sent: Thursday, April 21, 2016 11:09 AM
To: Pryor, Justin <Pryor.Justin@epa.gov>
Subject: John Osborne/Methane Challenge Program

Justin

Attached is a short article in last year's AAPG Newsletter (page 3) which gives you an idea of some of the projects we undertake.

We are also very interested in collaborating with groups who have a similar interest.

Regards,

John

John Osborne
Glowink LLC
PO Box 106
Montgomery Center, Vermont
USA 05471
(802) 933-2711
john.osborne@glowink.biz
www.glowink.biz

USA 05471
(802) 933-2711
john.osborne@glowink.biz
www.glowink.biz

To: Pryor, Justin[Pryor.Justin@epa.gov]; Haught, Jim[Jim.Haught@onegas.com]
Cc: Blackman, Jerome[Blackman.Jerome@epa.gov]
From: Haught, Jim
Sent: Mon 4/18/2016 6:14:07 PM
Subject: RE: [External] Methane Challenge Partner Commitments

Thank you Justin. The information will be useful in our discussion tomorrow. I plan to use it as statistics but will pass along that anyone interested in company specifics should watch the website. Jim

Jim Haught
ONE Gas, Inc.
(918) 947-7640 office
(918) 595-5551 cell

-------- Original message --------
From: "Pryor, Justin"
Date:04/18/2016 11:24 AM (GMT-06:00)
To: "Haught, Jim"
Cc: "Blackman, Jerome"
Subject: [External] Methane Challenge Partner Commitments

Hi Jim,

Sorry for the delay on this, I had to confirm a few of the commitments. We intend to post this information on the Methane Challenge website hopefully by the end of the week.

Hope this helps!

Respectfully,

Justin Pryor

Climate Change Division

U.S. Environmental Protection Agency

202-343-9258

From: Haught, Jim [mailto:Jim.Haught@onegas.com]
Sent: Wednesday, April 13, 2016 2:52 PM
To: Blackman, Jerome <Blackman.Jerome@epa.gov>
Cc: Pryor, Justin <Pryor.Justin@epa.gov>
Subject: RE: BMP Commitment "Breakout" information for Founding MC Partners

Will do. Thanks Jerome. Jim

Jim Haught

Director – Environment

P: (918) 947-7640, C: (918) 595-5551

jim.haught@onegas.com

ONE Gas

15 E Fifth St, Tulsa, OK 74103

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From: Blackman, Jerome [mailto:Blackman.Jerome@epa.gov]
Sent: Wednesday, April 13, 2016 1:50 PM

To: Haught, Jim
Cc: Pryor, Justin
Subject: [External] BMP Commitment "Breakout" information for Founding MC Partners

Hi Jim,

I spoke with Justin Pryor. He should be able to forward this information to you within a couple of days. Feel free to reach out to him directly if you don't hear anything by Monday (he is copied on this email).

All the best,

Jerome

Jerome Blackman

U.S. EPA - Natural Gas STAR Program

Phone: 202-343-9630

Blackman.jerome@epa.gov

To: Blackman, Jerome[Blackman.Jerome@epa.gov]
Cc: Pryor, Justin[Pryor.Justin@epa.gov]
From: Haught, Jim
Sent: Wed 4/13/2016 6:52:01 PM
Subject: RE: BMP Commitment "Breakout" information for Founding MC Partners

Will do. Thanks Jerome. Jim

Jim Haught

Director – Environment

P: (918) 947-7640, C: (918) 595-5551

jim.haught@onegas.com

ONE Gas

15 E Fifth St, Tulsa, OK 74103

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From: Blackman, Jerome [mailto:Blackman.Jerome@epa.gov]
Sent: Wednesday, April 13, 2016 1:50 PM
To: Haught, Jim
Cc: Pryor, Justin
Subject: [External] BMP Commitment "Breakout" information for Founding MC Partners

Hi Jim,

I spoke with Justin Pryor. He should be able to forward this information to you within a couple of days. Feel free to reach out to him directly if you don't hear anything by Monday (he is copied on this email).

All the best,

Jerome

Jerome Blackman

U.S. EPA - Natural Gas STAR Program

Phone: 202-343-9630

Blackman.jerome@epa.gov

To: Blackman, Jerome[Blackman.Jerome@epa.gov]
Cc: Tapan Patel[tapan@alphabetenergy.com]; Pryor, Justin[Pryor.Justin@epa.gov]
From: Matthew L. Scullin
Sent: Wed 4/6/2016 6:35:26 PM
Subject: Re: Introduction Jerome Blackman @ EPA Gas Star / Matt Scullin @ Alphabet Energy

Sure, that works. Let's use this dial-in:

Dial-In Number:

Ex. 6 - Personal Privacy

Participants: Ex. 6 - Personal Privacy

Host: Ex. 6 - Personal Privacy

Matt

Matthew L. Scullin, Ph.D.
Founder & CEO
Alphabet Energy, Inc. | 26225 Eden Landing Rd., Ste. D, Hayward, CA 94545
matt@alphabetenergy.com | c Ex. 6 - Personal Privacy

The information contained in this communication, including the information contained in any sent files, is legally privileged and confidential information intended only for the use of the addressee or addressees named above and is property of Alphabet Energy, Inc. If the reader of this message is not the intended recipient, or the employee or agent of the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited. If you have received this communication in error, please notify us immediately by telephone (415-813-1201), delete the original message from your system and destroy any copies. We will reimburse any costs you incur in notifying us.

On Wed, Apr 6, 2016 at 11:32 AM, Blackman, Jerome <Blackman.Jerome@epa.gov> wrote:

Thursday would be better for us. Could we do 1pm (eastern) on 4/14/16?

Jerome

From: Matthew L. Scullin [mailto:matt@alphabetenergy.com]
Sent: Wednesday, April 06, 2016 1:08 PM
To: Blackman, Jerome <Blackman.Jerome@epa.gov>
Cc: Tapan Patel <tapan@alphabetenergy.com>; Pryor, Justin <Pryor.Justin@epa.gov>

Subject: Re: Introduction Jerome Blackman @ EPA Gas Star / Matt Scullin @ Alphabet Energy

Jerome, sounds good. How about Weds 10am pacific?

Matt

Matthew L. Scullin, Ph.D.

Founder & CEO

Alphabet Energy, Inc. | 26225 Eden Landing Rd., Ste. D, Hayward, CA 94545

matt@alphabetenergy.com | c Ex. 6 - Personal Privacy

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On Wed, Apr 6, 2016 at 7:23 AM, Blackman, Jerome <Blackman.Jerome@epa.gov> wrote:

Hello Matt,

Thanks for reaching out to me. I would welcome the opportunity to speak with you.

Perhaps we could set up a call for next week. How's next Wednesday or Thursday for you?

Jerome

From: Matthew L. Scullin [mailto:matt@alphabetenergy.com]
Sent: Tuesday, April 05, 2016 8:07 PM
To: Tapan Patel <tapan@alphabetenergy.com>
Cc: Blackman, Jerome <Blackman.Jerome@epa.gov>
Subject: Re: Introduction Jerome Blackman @ EPA Gas Star / Matt Scullin @ Alphabet Energy

Jerome, great to meet you. We are about to launch a product that generates electricity from flare combustors. It uses our proprietary thermoelectrics. We've gotten some great traction for it. Would love to share more and brainstorm about how we could be helpful to the EPA.

All the best,

Matt

Matthew L. Scullin, Ph.D.

Founder & CEO

Alphabet Energy, Inc. | 26225 Eden Landing Rd., Ste. D, Hayward, CA 94545

matt@alphabetenergy.com | c Ex. 6 - Personal Privacy

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On Tue, Apr 5, 2016 at 5:05 PM, Tapan Patel <tapan@alphabetenergy.com> wrote:

Hi Jerome,

It's been a while since we last spoke -- I hope all is well. Congratulations on launching the Gas Star Methane Challenge! We saw the announcement a few days back -- my CEO pointed it out, which brings me to my reason for reaching out.

Alphabet's CEO, Matt Scullin (CC'ed here), is interested in learning about your work at the EPA and understanding how AE's work fits in. Would you mind making the time for a call?

Matt, meet Jerome Blackman, a Program Manager at EPA Gas Star. Jerome and I met a few months back while in DC and at the last EPA Gas Star conference. He's been very helpful and I'm sure wouldn't mind making the time. Can you please take it from here?

Best,

--

Tapan Patel

Product Manager

Alphabet Energy, Inc.

26225 Eden Landing Road

Suite D

Hayward, CA 94545

tapan@alphabetenergy.com | (949) 636-9200

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To: Blackman, Jerome[Blackman.Jerome@epa.gov]
Cc: Tapan Patel[tapan@alphabetenergy.com]; Pryor, Justin[Pryor.Justin@epa.gov]
From: Matthew L. Scullin
Sent: Wed 4/6/2016 5:08:08 PM
Subject: Re: Introduction Jerome Blackman @ EPA Gas Star / Matt Scullin @ Alphabet Energy

Jerome, sounds good. How about Weds 10am pacific?

Matt

Matthew L. Scullin, Ph.D.
Founder & CEO
Alphabet Energy, Inc. | 26225 Eden Landing Rd., Ste. D, Hayward, CA 94545
matt@alphabetenergy.com | c +1.917.575.8724

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On Wed, Apr 6, 2016 at 7:23 AM, Blackman, Jerome <Blackman.Jerome@epa.gov> wrote:

Hello Matt,

Thanks for reaching out to me. I would welcome the opportunity to speak with you.

Perhaps we could set up a call for next week. How's next Wednesday or Thursday for you?

Jerome

From: Matthew L. Scullin [mailto:matt@alphabetenergy.com]
Sent: Tuesday, April 05, 2016 8:07 PM
To: Tapan Patel <tapan@alphabetenergy.com>
Cc: Blackman, Jerome <Blackman.Jerome@epa.gov>
Subject: Re: Introduction Jerome Blackman @ EPA Gas Star / Matt Scullin @ Alphabet Energy

Jerome, great to meet you. We are about to launch a product that generates electricity from

flare combustors. It uses our proprietary thermoelectrics. We've gotten some great traction for it. Would love to share more and brainstorm about how we could be helpful to the EPA.

All the best,

Matt

Matthew L. Scullin, Ph.D.

Founder & CEO

Alphabet Energy, Inc. | 26225 Eden Landing Rd., Ste. D, Hayward, CA 94545

matt@alphabetenergy.com | c +1.917.575.8724

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On Tue, Apr 5, 2016 at 5:05 PM, Tapan Patel <tapan@alphabetenergy.com> wrote:

Hi Jerome,

It's been a while since we last spoke -- I hope all is well. Congratulations on launching the Gas Star Methane Challenge! We saw the announcement a few days back -- my CEO pointed it out, which brings me to my reason for reaching out.

Alphabet's CEO, Matt Scullin (CC'ed here), is interested in learning about your work at the EPA and understanding how AE's work fits in. Would you mind making the time for a call?

Matt, meet Jerome Blackman, a Program Manager at EPA Gas Star. Jerome and I met a few months back while in DC and at the last EPA Gas Star conference. He's been

very helpful and I'm sure wouldn't mind making the time. Can you please take it from here?

Best,

Tapan Patel

Product Manager

Alphabet Energy, Inc.

26225 Eden Landing Road

Suite D

Hayward, CA 94545

tapan@alphabetenergy.com | (949) 636-9200

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To: Blackman, Jerome[Blackman.Jerome@epa.gov]
Cc: Matt Scullin[matt@alphabetenergy.com]
From: Tapan Patel
Sent: Wed 4/6/2016 12:05:14 AM
Subject: Introduction Jerome Blackman @ EPA Gas Star / Matt Scullin @ Alphabet Energy

Hi Jerome,
It's been a while since we last spoke -- I hope all is well. Congratulations on launching the Gas Star Methane Challenge! We saw the announcement a few days back -- my CEO pointed it out, which brings me to my reason for reaching out.

Alphabet's CEO, Matt Scullin (CC'ed here), is interested in learning about your work at the EPA and understanding how AE's work fits in. Would you mind making the time for a call?

Matt, meet Jerome Blackman, a Program Manager at EPA Gas Star. Jerome and I met a few months back while in DC and at the last EPA Gas Star conference. He's been very helpful and I'm sure wouldn't mind making the time. Can you please take it from here?

Best,

--
Tapan Patel
Product Manager

Alphabet Energy, Inc.
26225 Eden Landing Road
Suite D
Hayward, CA 94545

tapan@alphabetenergy.com | (949) 636-9200

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To: Blackman, Jerome[Blackman.Jerome@epa.gov]
Cc: Erin Beddingfield[erin@imt.org]
From: Cliff Majersik
Sent: Thur 3/10/2016 5:37:08 PM
Subject: RE: Gas Star and the DC Comprehensive Energy Plan?

Thanks, Jerome!

I just spoke to Justin and we'll follow up with Washington Gas and likely with AGA.

Warm regards,

Cliff

From: Blackman, Jerome [mailto:Blackman.Jerome@epa.gov]
Sent: Thursday, March 10, 2016 12:03 PM
To: Cliff Majersik
Subject: RE: Gas Star and the DC Comprehensive Energy Plan?

Hi Cliff,

Our contacts at Washington Gas are Melissa Adams (Division Head, Sustainability & Economic Development) and Hillery Kelly (Sr. Environmental Specialist). I don't readily have Melissa's contact information, but here's the information for Hillery:

Phone: (703) 750-5846

Email: HKelly@washgas.com

My colleague, Justin Pryor can share greater details about EPA's Methane Challenge Program and the launch event on March 30th:

Phone: (202) 343-9258

Email: Pryor.Justin@epa.gov

Finally, I'm sure Pam Lacey at AGA would be very interested in hearing about the District's Comprehensive Energy Plan too:

Phone: (202) 824-7340

Email: placey@aga.org

All the best,

Jerome

From: Cliff Majersik [mailto:cliff@imt.org]
Sent: Thursday, March 10, 2016 10:33 AM
To: Blackman, Jerome <Blackman.Jerome@epa.gov>
Cc: Erin Beddingfield <erin@imt.org>
Subject: RE: Gas Star and the DC Comprehensive Energy Plan?

Jerome,

Yes, we'll call you then.

Thanks!

Cliff

From: Blackman, Jerome [mailto:Blackman.Jerome@epa.gov]
Sent: Thursday, March 10, 2016 10:27 AM
To: Cliff Majersik
Subject: RE: Gas Star and the DC Comprehensive Energy Plan?

Hi Cliff,

I have a minute around 11am, if that helps?

Jerome

343-9630

From: Cliff Majersik [mailto:cliff@imt.org]
Sent: Wednesday, March 09, 2016 4:32 PM
To: Blackman, Jerome <Blackman.Jerome@epa.gov>
Cc: Erin Beddingfield <erin@imt.org>; Pryor, Justin <Pryor.Justin@epa.gov>; Bylin, Carey <Bylin.Carey@epa.gov>
Subject: RE: Gas Star and the DC Comprehensive Energy Plan?

Jerome,

Thanks for the quick reply!

I need to get back to Washington Gas today. So, it would be great if you could talk for 3 minutes now. In any case, we're happy to talk at 3:30 tomorrow.

Thanks,

Cliff

From: Blackman, Jerome [mailto:Blackman.Jerome@epa.gov]
Sent: Wednesday, March 09, 2016 4:28 PM
To: Cliff Majersik

Cc: Erin Beddingfield; Pryor, Justin; Bylin, Carey
Subject: RE: Gas Star and the DC Comprehensive Energy Plan?

Hello Cliff,

Thanks for contacting me. Perhaps we could talk tomorrow around 3:30?

Let me know if that works for you.

Jerome

From: Cliff Majersik [mailto:cliff@imt.org]
Sent: Wednesday, March 09, 2016 4:11 PM
To: Blackman, Jerome <Blackman.Jerome@epa.gov>
Cc: Erin Beddingfield <erin@imt.org>
Subject: Gas Star and the DC Comprehensive Energy Plan?

Jerome,

I just left you a voicemail. IMT is part of a team hired by Washington DC to write its new Comprehensive Energy Plan. We are considering featuring Washington Gas and Gas STAR as part of the plan. Do you have 10 minutes in the next day or two to discuss?

Btw – we work closely with your colleagues in EPA Energy Star buildings (e.g. Jean, Mike, Tracy and Leslie).

Thanks and warm regards,

Cliff

Cliff Majersik
Executive Director
Institute for Market Transformation

1707 L Street NW | Suite 1050 | Washington, DC 20036

(202) 525-2883 x303 (direct) | (202) 297-0871 (mobile)

cliff@imt.org | www.imt.org | @IMTCliff

Please pass it on: IMT is hiring

To: Blackman, Jerome[Blackman.Jerome@epa.gov]
From: Lacey, Pam
Sent: Thur 1/21/2016 2:03:25 PM
Subject: Methane Challenge - status?

Hi Jerome – Do you have a prediction about when the final Methane Challenge program will be announced? My members are beginning to ask me. Thanks! - Pam

Pamela A. Lacey | Chief Regulatory Counsel

Office of General Counsel

American Gas Association

400 N. Capitol St., NW | Washington, DC | 20001

P: 202-824-7340 | M: 202-809-6565 | placey@aga.org

The American Gas Association represents more than 200 local energy companies committed to the safe delivery of clean natural gas to over 68 million customers throughout the nation.

From: Swonger, Chris (CWDC)
Location: EPA; 1201 Constitution Ave NW (Have the guard call Jerome upon arrival)
Importance: Normal
Subject: FSA Meeting with EPA - Methane Challenge & Life Cycle Calculator
Start Date/Time: Thur 8/27/2015 2:00:00 PM
End Date/Time: Thur 8/27/2015 3:00:00 PM

;

To: Blackman, Jerome[Blackman.Jerome@epa.gov]
From: Johnson, Darrell
Sent: Thur 1/7/2016 11:04:24 PM
Subject: RE: Reply to your question about the Administration's goal to cut methane emissions.

Greatly appreciated Sir!

From: Blackman, Jerome [mailto:Blackman.Jerome@epa.gov]
Sent: Thursday, January 07, 2016 2:47 PM
To: Johnson, Darrell
Subject: Re: Reply to your question about the Administration's goal to cut methane emissions.

No problem and wishing you all the best in responding to the Aliso Canyon leak.

JB

Sent from my iPhone

On Jan 7, 2016, at 4:50 PM, Johnson, Darrell <DJohnson@semprautilities.com> wrote:

Thank you both,very, very much!!!

Sent from my Windows Phone

From: Blackman, Jerome
Sent: 1/6/2016 11:51 AM
To: Johnson, Darrell
Subject: Reply to your question about the Administration's goal to cut methane emissions.

Hey Darrell,

I checked with Carey Bylin, and we really don't have anything that provides greater detail on the reduction goal other than what is available on the Methane Challenge website:

http://www3.epa.gov/gasstar/methanechallenge/

"The Methane Challenge Program is an integral part of the EPA's — and the

Administration's — ongoing commitment to address methane emissions and global climate change. In March 2014, the White House released the Strategy to Reduce Methane Emissions (PDF) that included EPA efforts to reduce methane emissions in the oil and natural gas sector. In January 2015, the Obama Administration further demonstrated its commitment by announcing a new goal to cut methane emissions from this sector by 40-45 percent from 2012 levels by 2025."

http://www3.epa.gov/gasstar/methanechallenge/goal.html

"The Administration announces a new goal to cut methane emissions from the oil and gas sector by 40-45 percent from 2012 levels by 2025. Building on prior actions by the Administration, and leadership in the States and industry, these series of steps encompass both commonsense standards and cooperative engagement with states, tribes and industry to put the U.S. on a path toward the 2025 goal."

If you have any further questions, please feel free to call Carey directly at (202) 343-9669.

All the best,

Jerome

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This email originated outside of Sempra Energy. Be cautious of attachments, web links, or requests for information.

To: Blackman, Jerome[Blackman.Jerome@epa.gov]
From: Johnson, Darrell
Sent: Thur 1/7/2016 9:50:08 PM
Subject: RE: Reply to your question about the Administration's goal to cut methane emissions.

Thank you both,very, very much!!!

Sent from my Windows Phone

From: Blackman, Jerome
Sent: 1/6/2016 11:51 AM
To: Johnson, Darrell
Subject: Reply to your question about the Administration's goal to cut methane emissions.

Hey Darrell,

I checked with Carey Bylin, and we really don't have anything that provides greater detail on the reduction goal other than what is available on the Methane Challenge website:

http://www3.epa.gov/gasstar/methanechallenge/

"The Methane Challenge Program is an integral part of the EPA's — and the Administration's — ongoing commitment to address methane emissions and global climate change. In March 2014, the White House released the Strategy to Reduce Methane Emissions (PDF) that included EPA efforts to reduce methane emissions in the oil and natural gas sector. In January 2015, the Obama Administration further demonstrated its commitment by announcing a new goal to cut methane emissions from this sector by 40-45 percent from 2012 levels by 2025."

http://www3.epa.gov/gasstar/methanechallenge/goal.html

"The Administration announces a new goal to cut methane emissions from the oil and gas sector by 40-45 percent from 2012 levels by 2025. Building on prior actions by the Administration, and leadership in the States and industry, these series of steps encompass both commonsense standards and cooperative engagement with states, tribes and industry to put the U.S. on a path toward the 2025 goal."

If you have any further questions, please feel free to call Carey directly at (202) 343-9669.

All the best,

Jerome

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To: Blackman, Jerome[Blackman.Jerome@epa.gov]
From: Raven Elliott
Sent: Tue 11/24/2015 11:40:41 PM
Subject: RE: 2015 Natural Gas STAR Annual Implementation Workshop Follow Up

Great! When will the presentations be available online?

Thank you,
Raven Elliott
Sent by Outlook for Android, therefore please excuse any typos.

On Tue, Nov 24, 2015 at 8:20 AM -0800, "Blackman, Jerome" <Blackman.Jerome@epa.gov> wrote:

Hi Raven,

I can be your initial point of contact for EPA's Natural Gas STAR and Methane Challenge programs. Please see our website for information on how to join Natural Gas STAR:

http://www3.epa.gov/gasstar/join/index.html

The Natural Gas STAR Program is a flexible, voluntary partnership that encourages oil and natural gas companies—both domestically and abroad—to adopt cost-effective technologies and practices that improve operational efficiency and reduce emissions of methane, a potent greenhouse gas and clean energy source. For information on the technologies and practices to reduce methane emissions from oil and gas systems, please visit

http://www.epa.gov/gasstar/tools/recommended.html

Regards,

Jerome

From: Raven Elliott [mailto:relliott@oasispetroleum.com]
Sent: Monday, November 23, 2015 6:54 PM
To: Blackman, Jerome <Blackman.Jerome@epa.gov>
Subject: 2015 Natural Gas STAR Annual Implementation Workshop Follow Up

Mr. Blackman,

It was a pleasure meeting you last week at the 2015 Natural Gas STAR Annual Implementation Workshop! With this being my first EPA conference, I was pleasantly surprised at how well organized and informative that it was. I left with some great take a ways, some good information on how my company can participate in the program, and new connections.

If I have any questions about the best approach to participation, who would be the key contact to assist? There were so many presenters that I am not sure of the key contact person.

Again, it was great to meet you and your colleagues. Please feel free to contact me if you have questions or ideas for how we can better reduce our carbon footprint.

Best Regards,

Raven

Raven M. Elliott

Senior EH&S Representative

1001 Fannin, Suite 1500

Houston, Texas 77002

713-770-6439 Direct

Ex. 6 - Personal Privacy Cell

RElliott@oasispetroleum.com

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To: Blackman, Jerome[Blackman.Jerome@epa.gov]
Cc: Anand Yegnan (Services - 6)[Anand.Yegnan@dom.com]
From: Alice G Prior (Services - 6)
Sent: Tue 10/27/2015 5:25:35 PM
Subject: RE: Dominion Hope Gas extension to submit NG Star Implementation PLan

We should make some decisions by the end of the year, if that works for you.

Alice Prior
Environmental Projects Advisor
Dominion Environmental Services
5000 Dominion Blvd., 2NW
Glen Allen, VA 23060
Tie Line 8-730-4127
(804) 273-4127 (o)
(804) 229-4186 (c)

-----Original Message-----
From: Blackman, Jerome [mailto:Blackman.Jerome@epa.gov]
Sent: Tuesday, October 27, 2015 1:24 PM
To: Alice G Prior (Services - 6)
Cc: Anand Yegnan (Services - 6)
Subject: Re: Dominion Hope Gas extension to submit NG Star Implementation PLan

No objections to your extension request.
Jerome

Sent from my iPhone

> On Oct 27, 2015, at 12:51 PM, Alice G Prior (Services - 6) <alice.g.prior@dom.com> wrote:
>
> Hi Jerome,
>
> I just left you a voicemail message. On June 2, 2015, we entered into and MOU for Dominion Hope Gas LDC to join the NG Star program (copy attached) This would make our implementation plan due next week.
>
> We would like to know if there is a mechanism for an extension. We are still evaluating participation in the proposed Methane Challenge program, which will impact what we want to commit to under NG Star for Hope Gas.
>
> Please advise. Thanks,
>
> Alice Prior
> Environmental Projects Advisor
> Dominion Environmental Services
> 5000 Dominion Blvd., 2NW
> Glen Allen, VA 23060
> Tie Line 8-730-4127
> (804) 273-4127 (o)
> (804) 229-4186 (c)
>
>

To: Blackman, Jerome[Blackman.Jerome@epa.gov]
Cc: Anand Yegnan (Services - 6)[Anand.Yegnan@dom.com]
From: Alice G Prior (Services - 6)
Sent: Tue 10/27/2015 4:50:04 PM
Subject: Dominion Hope Gas extension to submit NG Star Implementation PLan
2015 Hope Gas Natural Gas STAR MOU with EPA.pdf

Hi Jerome,

I just left you a voicemail message. On June 2, 2015, we entered into and MOU for Dominion Hope Gas LDC to join the NG Star program (copy attached). This would make our implementation plan due next week.

We would like to know if there is a mechanism for an extension. We are still evaluating participation in the proposed Methane Challenge program, which will impact what we want to commit to under NG Star for Hope Gas.

Please advise. Thanks,

Alice Prior

Environmental Projects Advisor

Dominion Environmental Services

5000 Dominion Blvd., 2NW

Glen Allen, VA 23060

Tie Line 8-730-4127

(804) 273-4127 (o)

(804) 229-4186 (c)

To: Blackman, Jerome[Blackman.Jerome@epa.gov]
From: Donatiello, Steven T.
Sent: Tue 10/27/2015 4:15:07 PM
Subject: Methane Challenge

Jerome,

The EPA Gas STAR program only allowed for counting pipe replacements methane reductions "beyond Mandatory".

In the 10-19-2015 proposal, are these values "beyond mandatory" or totals for the pipe replacements?

thanks

Steve

Steve Donatiello, P.E.

Environmental Engineer III

Laclede Gas Company

Environmental Compliance

3rd Floor

700 Market Street ***I have a new address.***

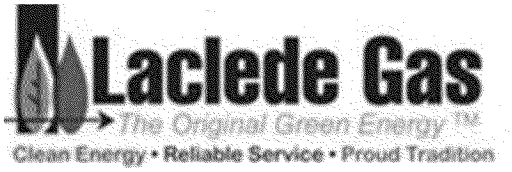
St. Louis, MO 63101

steven.donatiello@TheLacledeGroup.com

314-658-5541

314-852-0512 (cell)

314-535-9414 (fax)



To: Blackman, Jerome[Blackman.Jerome@epa.gov]; Zoe Lipman[zoel@bluegreenalliance.org]
From: Rob McCulloch
Sent: Thur 9/17/2015 6:47:40 PM
Subject: RE: Methane related introductions

Thanks Jerome! Good to know regarding the workshop – I'm due in New Orleans for the Pipeline Safety Trust conference later that week but the dates could work. Given our member presence both upstream and downstream, the Natural Gas Star program is something we'd like to amplify. I'll flag it for our partners as well – PA does appear to be ground zero on natural gas issues for the foreseeable future!

Rob

From: Blackman, Jerome [mailto:Blackman.Jerome@epa.gov]
Sent: Thursday, September 17, 2015 2:07 PM
To: Rob McCulloch; Zoe Lipman
Subject: RE: Methane related introductions

Zoe, thanks for the introduction and great meeting you ever so briefly last night!

Rob,

Thanks for the background. Glad to hear you have been in contact with the key people here at EPA! I work closely with Carey and Paul on the Natural Gas STAR Program. In fact, we are planning for our upcoming Natural Gas STAR Annual Implementation Workshop which will be held in Pittsburgh, PA the week of Nov. 16th. The meeting will provide an update on the feedback we've received on the proposed Methane Challenge Program as well as envisioned future voluntary efforts under the Natural Gas STAR Program.

The meeting is our major forum to address the oil and natural gas sector. For additional information about this event please click on the links below:

http://www3.epa.gov/gasstar/documents/workshops/2015_annimp_exhibitorinfo.pdf

https://www.starwoodmeeting.com/events/start.action?id=1506027568&key=152C0C39

Most of my work is on the non-regulatory side, in support of the Methane Challenge effort and our coordination with other key stakeholders in the oil and natural gas sector.

All the best,

Jerome

From: Rob McCulloch [mailto:robm@bluegreenalliance.org]
Sent: Thursday, September 17, 2015 1:40 PM
To: Zoe Lipman; Blackman, Jerome
Subject: RE: Methane related introductions

Zoe – thanks! And good to meet you Jerome – I suspect we have a few overlapping priorities!

Me and a few union colleagues (representing gas sector workers) just met with Paul Gunning and Joe Goffman two weeks ago to discuss the draft methane rule. We have a lot afoot with the upcoming hearings, developing technical comments and getting state folks engaged on CTGs. Also had a great conversation with Carey Bylin yesterday regarding EPA's Natural Gas Star program/downstream initiatives and interagency work on pipes with PHMSA. And all the above

topics I'll also be presenting on at the national Interunion Gas Conference next week to get labor folks attending up to speed on EPA methane work.

Would love to hear what you're working on – the Climate Change division has been on my list to follow up with, especially as the rule enters the formal comment period. Would love to hear your thoughts, thanks!

--

Rob McCulloch

Director, Infrastructure Programs

BlueGreen Alliance

202.706.6908

From: Zoe Lipman
Sent: Thursday, September 17, 2015 10:44 AM
To: 'blackman.jerome@epa.gov'; Rob McCulloch
Subject: Methane related introductions

Hello Jerome – Really good to chat at last nights reception.

Want to introduce you to my colleague Rob McCulloch (cc'd above) who, as I mentioned, handles all things methane and infrastructure in our shop, and particularly our program to speed repair of methane distribution pipelines. Rob, Jerome deals with methane and methane leakage in EPA's Air & Climate Change division.

Apologies if I've misrepresented either or both of your professional briefs, but close enough I hope that its worth connecting you directly.

Best,

Zoe Lipman

Senior Policy Advisor

BlueGreen Alliance

1020 19th Street NW, Suite 600

Washington, DC 20036

w. 202-706-6902

c. Ex. 6 - Personal Privacy

zoel@bluegreenalliance.org

Dominion Resources Services, Inc.
5000 Dominion Boulevard, Glen Allen, VA 23060

Web Address: www.dom.com

Dominion

June 2, 2015

BY U.S. MAIL, RETURN RECEIPT REQUESTED

Mr. Jerome Blackman
Program Manager
US EPA -Natural Gas STAR
1200 Pennsylvania Avenue, NW (6207J)
Washington DC 20460

Re: Dominion - Hope Gas, Inc.
Natural Gas STAR Program
Memorandum of Understanding for Distribution Companies

Dear Mr. Blackman:

Dominion – Hope Gas, Inc. (Hope Gas) is excited to become a member of EPA's Natural Gas STAR program. As such, attached is a completed Memorandum of Understanding (MOU) for Distribution Companies. It is our understanding that Hope Gas' next step will be to develop an Implementation Plan, which must be completed within six months of joining.

Hope Gas looks forward to partnering with EPA and incorporating Natural Gas STAR into our operations. If you have any questions regarding this submittal please contact Anand Yegnan at 804-273-3893 or via email at anand.yegnan@dom.com.

Sincerely,

Pamela Faggert

Pamela Faggert
Chief Environmental Officer & VP, Corporate Compliance

Enclosures – MOU for Distribution Companies

cc: Anand Yegnan, Dominion

ebc:

Mark Barnes
Karen Nickerson
Kenneth Smith
Diane Leopold
Ann Loomis
Paula Hamel
Jim Norvelle
Amanda Tornabene
Alice Prior
Paul Dickens
Liz Gayne

OMB Control No. 2060-0328
Expires 09/30/2015

NATURAL GAS STAR PROGRAM: MEMORANDUM OF UNDERSTANDING FOR DISTRIBUTION COMPANIES

This is a voluntary agreement between **Dominion – Hope Gas, Inc.** *(company name) and the U.S. Environmental Protection Agency (EPA) for the purpose of reducing methane releases to the atmosphere by implementing cost-effective emission reduction technologies and practices.*

Authorized Company Representative: **Mark E. Barnes** *(name)*

Signature: Mark E. Barnes *Date:* 5-26-2015

Paul Gunning: Director, Climate Change Division, U.S. Environmental Protection Agency

Signature: _____ *Date:* _____

Partner's Designated Natural Gas STAR Implementation Manager:

Name: **Mark E. Barnes**
Title: **Director, Gas Operations**
Address: **48 Columbia Blvd.**
City/State/Zip: **Clarksburg, WV 26301**
Telephone/Fax: **304-625-6475** *E-mail:* **mark.e.barnes@dom.com**

Partner's Media Liaison/Public Relations Manager:

Name: **Robert C. Orndorff**
Title: **Sr. Policy Advisor & Local Affairs, WV**
Address: **445 West Main Street**
City/State/Zip: **Clarksburg, WV 26302**
Telephone/Fax: **304-627-3146** *E-mail:* **robert.c.orndorff@dom.com**

EPA's Responsibilities

1. *Assign a STAR Service Representative responsible for assisting the partner in implementing the Program.*
2. *Assist partners with Program implementation by: (1) analyzing emerging technologies and practices; (2) developing workshops and training courses; and (3) assisting in the removal of regulatory barriers to implementing Program BMPs, when appropriate.*
3. *Provide partners with public recognition for their commitment to the Program through advertisements, press releases, articles, and awards.*
4. *Recognize partners for methane emission reductions achieved before joining the Program, back to 1993.*
5. *EPA will only release information obtained from the partner company without prior authorization from that company if required to do so under the Freedom of Information Act, the Agency's regulations at 40 CFR part 2, subpart B, or other applicable law.*

Natural Gas STAR Partner's Responsibilities

1. *Appoint a company representative as the Natural Gas STAR Program Implementation Manager responsible for implementing this voluntary agreement.*
2. *Submit an implementation plan within six months of signing this agreement outlining expected activities and scope of implementation.*
3. *Implement, within three years, applicable BMPs and PROs at facilities in the United States as outlined in the implementation plan when cost-effective (as defined by the partner).*
4. *Submit annual reports describing the BMPs and PROs implemented, the cost of implementation, and the associated methane emissions reductions. Annual reports must be signed to certify the accuracy of data contained in the report.*
5. *Communicate participation to employees and cooperate with EPA efforts to publicize the Program.*

General Terms

1. *This agreement can be terminated by either party at any time, with no notice or penalties and no further obligation. EPA agrees not to publicize a partner's withdrawal from the Program.*
2. *The partner agrees that the activities it undertakes connected with this MOU are not intended to provide services to the federal government and that the partner will not seek compensation from a federal agency.*
3. *The partner agrees that it will not claim or imply that its participation in the Program constitutes EPA approval or endorsement of anything other than the commitment to the Program.*
4. *The partner must report the previous year's emission reduction activities annually. If a partner does not submit an annual report, the Natural Gas STAR Program will initiate a three step removal process. Details of this process can be provided upon request.*

***The Natural Gas STAR Program** is a flexible, non-regulatory partnership between EPA and the oil and natural gas industry aimed at demonstrating the cost-effectiveness and environmental benefits of methane emission reduction opportunities.*

*The recommended Natural Gas STAR **Best Management Practices (BMPs)** for Distribution Companies have been jointly identified by EPA and the industry as cost-effective options for reducing methane emissions.*

***Partner Reported Opportunities (PROs)** are additional methane emission reduction options reported by partner companies. PROs can reduce gas loss, increase profits, and improve operational efficiency.*

Best Management Practices
- *Directed inspection and maintenance at gate stations and surface facilities.*
- *Identify and rehabilitate leaky distribution pipe.*

Partner Reported Opportunities
- *Identify and implement other cost-effective methane emission reduction management technologies and practices.*

Please fax this form to:

EPA Natural Gas STAR Program
c/o Jerome Blackman
Fax: (202) 343-2342

EPA Form No. 5900-98

The public reporting and recordkeeping burden for this collection of information is estimated to average 38 hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

To: Blackman, Jerome[Blackman.Jerome@epa.gov]
Cc: Savage, Mark (JCRA)[MSAVAGE@johncrane.com]; Hosking, Paul (JMOR)[PAHosking@johncrane.com]
From: Swonger, Chris (CWDC)
Sent: Thur 8/27/2015 6:42:46 PM
Subject: follow up
removed.txt
Methane Challenge Presentation August 27 Final.pptx

---------- INTERNAL ----------

Jerome –

Thanks for your time this morning. We appreciated the opportunity to walk you through the life cycle cost calculator. As discussed, attached is the presentation for your records. We will and plan to take full advantage of the upcoming conference in Pittsburgh and make sure we register to exhibit etc….We will also work with great effort on the end user option too.

In terms of the newsletter, idea , we will be on standby.

We had a great lunch with Don Robinson, he sends his regards. Don might be able to assist us in our efforts.

In the meantime, please let us know if you need anything from us. We appreciate the opportunity to work with you.

Chris

Chris Swonger

SVP, Global Government Relations

Smiths Group

425 Third Street, SW

Suite 875

Washington, DC 20024

(202) 777-8447 (office)

(202) 258-5777 (mobile)

chris.swonger@smiths.com

smiths
bringing technology to life

To: Blackman, Jerome[Blackman.Jerome@epa.gov]
Cc: Franklin, Pamela[Franklin.Pamela@epa.gov]; Bylin, Carey[Bylin.Carey@epa.gov]; Waltzer, Suzanne[Waltzer.Suzanne@epa.gov]; Riegner, Sarah (CWDC)[sarah.riegner@smiths.com]
From: Swonger, Chris (CWDC)
Sent: Mon 8/10/2015 8:09:29 PM
Subject: RE: meeting request

Jerome -

We will plan accordingly and I will reaffirm our attendees when we get closer to the meeting date. Thanks for your time.

Chris

Chris Swonger
SVP, Global Government Relations
Smiths Group
425 Third Street, SW
Suite 875
Washington, DC 20024
(202) 777-8447 (office)
(202) 258-5777 (mobile)
chris.swonger@smiths.com

-----Original Message-----
From: Blackman, Jerome [mailto:Blackman.Jerome@epa.gov]
Sent: Monday, August 10, 2015 3:46 PM
To: Swonger, Chris (CWDC)
Cc: Franklin, Pamela; Bylin, Carey; Waltzer, Suzanne; Riegner, Sarah (CWDC)
Subject: RE: meeting request

Chris,

10:00 a.m. on August 27 should work. Our offices are located at 1201 Constitution Ave NW.
Please have the guard call me from the lobby when you arrive.

Jerome
202-343-9630

-----Original Message-----
From: Swonger, Chris (CWDC) [mailto:chris.swonger@smiths.com]
Sent: Monday, August 10, 2015 12:21 PM
To: Blackman, Jerome
Cc: Franklin, Pamela; Bylin, Carey; Waltzer, Suzanne; Riegner, Sarah (CWDC)
Subject: RE: meeting request

Hi Jerome -

Thanks for the come back.

Would at a meeting on Thursday, August 27th work at 10:00 a.m. My colleagues, Mark Savage and Paul Hosking, John Crane would plan to travel in and join us for the meeting. If that works, Sarah, (copied) can send a calendar invite? If I recall correctly, your offices are now in the EPA bldg. offices right?

Chris

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(202) 258-5777 (mobile)
chris.swonger@smiths.com

-----Original Message-----
From: Blackman, Jerome [mailto:Blackman.Jerome@epa.gov]
Sent: Monday, August 10, 2015 10:20 AM
To: Swonger, Chris (CWDC)
Cc: Franklin, Pamela; Bylin, Carey; Waltzer, Suzanne
Subject: RE: meeting request

Hi Chris,

How's the week of Aug. 24th for you? Any day except that Friday would work for most of us here. Please suggest a date for that week and I will coordinate.

Jerome

-----Original Message-----
From: Swonger, Chris (CWDC) [mailto:chris.swonger@smiths.com]
Sent: Friday, August 07, 2015 10:06 AM
To: Blackman, Jerome; Bylin, Carey
Cc: Riegner, Sarah (CWDC); Hosking, Paul (JMOR); Savage, Mark (JCRA)
Subject: RE: meeting request

Thanks Jerome. Have a great weekend and we will be on standby.

Chris

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(202) 258-5777 (mobile)
chris.swonger@smiths.com

-----Original Message-----
From: Blackman, Jerome [mailto:Blackman.Jerome@epa.gov]
Sent: Friday, August 07, 2015 10:01 AM
To: Swonger, Chris (CWDC); Bylin, Carey
Cc: Riegner, Sarah (CWDC); Hosking, Paul (JMOR); Savage, Mark (JCRA)
Subject: RE: meeting request

Hi Chris,

Let me check schedules here and get back to you.

Thanks,

Jerome

-----Original Message-----
From: Swonger, Chris (CWDC) [mailto:chris.swonger@smiths.com]
Sent: Thursday, August 06, 2015 4:52 PM
To: Blackman, Jerome; Bylin, Carey
Cc: Riegner, Sarah (CWDC); Hosking, Paul (JMOR); Savage, Mark (JCRA)
Subject: meeting request

Hi Jerome and Carey -

Hope you all are both well.

If you have time in August, on behalf of the Fluid Sealing Association, I would like to arrange a meeting to discuss the recently released "Methane Challenge".

Additionally, we have been working on a life cycle cost calculator for the centrifugal compressor issue and methane emissions that we would like to share. Paul Hosking and Mark Savage (copied) would join me for the meeting as well.

I have copied Sarah and she can work to help find a mutually convenient time to meet. Thanks for your time and consideration. We look forward to seeing you both soon.

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To: Blackman, Jerome[Blackman.Jerome@epa.gov]
Cc: Franklin, Pamela[Franklin.Pamela@epa.gov]; Bylin, Carey[Bylin.Carey@epa.gov]; Waltzer, Suzanne[Waltzer.Suzanne@epa.gov]; Riegner, Sarah (CWDC)[sarah.riegner@smiths.com]
From: Swonger, Chris (CWDC)
Sent: Mon 8/10/2015 4:20:58 PM
Subject: RE: meeting request

Hi Jerome -

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Would at a meeting on Thursday, August 27th work at 10:00 a.m. My colleagues, Mark Savage and Paul Hosking, John Crane would plan to travel in and join us for the meeting. If that works, Sarah, (copied) can send a calendar invite? If I recall correctly, your offices are now in the EPA bldg. offices right?

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Subject: RE: meeting request

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To: Blackman, Jerome[Blackman.Jerome@epa.gov]; Bylin, Carey[Bylin.Carey@epa.gov]
Cc: Riegner, Sarah (CWDC)[sarah.riegner@smiths.com]; Hosking, Paul (JMOR)[PAHosking@johncrane.com]; Savage, Mark (JCRA)[MSAVAGE@johncrane.com]
From: Swonger, Chris (CWDC)
Sent: Fri 8/7/2015 2:05:49 PM
Subject: RE: meeting request

Thanks Jerome. Have a great weekend and we will be on standby.

Chris

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Cc: Riegner, Sarah (CWDC)[sarah.riegner@smiths.com]; Hosking, Paul (JMOR)[PAHosking@johncrane.com]; Savage, Mark (JCRA)[MSAVAGE@johncrane.com]
From: Swonger, Chris (CWDC)
Sent: Thur 8/6/2015 8:52:15 PM
Subject: meeting request

Hi Jerome and Carey -

Hope you all are both well.

If you have time in August, on behalf of the Fluid Sealing Association, I would like to arrange a meeting to discuss the recently released "Methane Challenge".

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Methane Challenge Program and the benefits of Gas Seal Technology

August 27, 2015

FLUID SEALING ASSOCIATION FSA

Executive Summary

* The FSA appreciates the opportunity to provide feedback to the US EPA on it's Methane Challenge Program proposal

* The FSA agrees with the US EPA assessment that Centrifugal Compressors equipped with Wet (Oil) seals are a key existing source of Methane Emissions for 2 of the 3 sectors defined by the proposal

* The FSA proposes that the US EPA consider **Gas Seal Technology Retrofit** as a **Best Management Practice** for reducing Methane Emissions from Centrifugal Compressors equipped with Oil Seals

FLUID SEALING ASSOCIATION FSA

Executive Summary

- Gas Seal Technology is **proven** and the **current industry standard** for all new equipment including Natural Gas applications
- Oil Seal to Gas Seal Retrofits are **not new** and are applicable in the majority of cases
- For existing sources, while the actual benefit is specific to a given compressor
- Retrofit with Gas Seal Technology offers the **Maximum Environmental Benefit**
- Retrofit with Gas Seal Technology offers the industry **Safety Benefit**
- Retrofit with Gas Seal Technology offers the **Maximum Reliability Benefit**
- Retrofit with Gas Seal Technology offers the **Maximum Operational Savings**

FLUID SEALING ASSOCIATION FSA

Agenda

- Introduction
- The options for Methane Emissions Reduction
- Introducing the Lifecycle Cost Calculator (LCC)
- Summary

FLUID SEALING ASSOCIATION FSA

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- Introduction
- The options for Methane Emissions Reduction
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FLUID SEALING ASSOCIATION FSA

Methane Challenge Program

EPA Requests Your Feedback

- EPA encourages stakeholders to closely review the proposed Methane Challenge Program and provide feedback on any and all aspects of the proposal
- Specific feedback topics, identified in the framework, include:
  - Company interest in joining program and interest in ER commitment option
  - Incentives for companies to make commitments, including sources for which significant progress has not been made and commitments related to sources where new GHGRP Subpart W requirements are pending
  - Additions, deletions, and revisions to sources and BMPs
  - Definitions for companies and entities that will make BMP commitments
  - Appropriateness of a 5-year time limit for achieving commitments
  - Reporting requirements and value of using e-GGRT for collecting voluntary supplemental data
  - Importance of distinguishing voluntary actions from regulatory actions

U.S. EPA Natural Gas STAR
Methane Challenge Program

Natural Gas Transmission and Storage Sector Webinar
July 29, 2015

NaturalGas
EPA POLLUTION PREVENTER

U.S. EPA Natural Gas STAR
Methane Challenge Program

Onshore Production, Gathering and Boosting, and Processing Sector Webinar
July 30, 2015

NaturalGas
EPA POLLUTION PREVENTER

FLUID SEALING ASSOCIATION FSA

Proposed Sources and BMPs

Proposed Sector-specific Sources and BMPs for Onshore Production, Gathering and Boosting, and Processing

Sectors	Sources	BMPs
Onshore Production and Gathering and Boosting	Pneumatic Controllers	For gas-driven pneumatic controllers, use low- (defined as gas bleed rate < 6 standard cubic feet/hour) or no-bleed controllers for all applications except those requiring high-bleed controllers for certain purposes, including operational requirements and safety.
	Equipment Leaks/ Fugitive Emissions	Undertake monitoring and repair activities, at specified minimum intervals, following defined parameters governing repair activities.
	Liquids Unloading	Reduce methane emissions from liquids unloading actions during which gas is vented.
	Pneumatic pumps (only CIP)	Implement no- or low-emitting pumps, such as solar or electric pumps, or route bleed gas to flare or gas capture/use.
	Hydrocarbon Storage Tanks	Route gas to capture/use (e.g., VRU) or route gas to flare.
Natural Gas (NG) Processing	Reciprocating Compressors-venting	Route rod packing vent to capture/use or route gas to flare or replace rod packing every 26,000 hours of operation or every 36 months.
	Centrifugal Compressors-venting	Route wet seal de-gassing vent to capture/use or route wet seal de-gassing to flare.

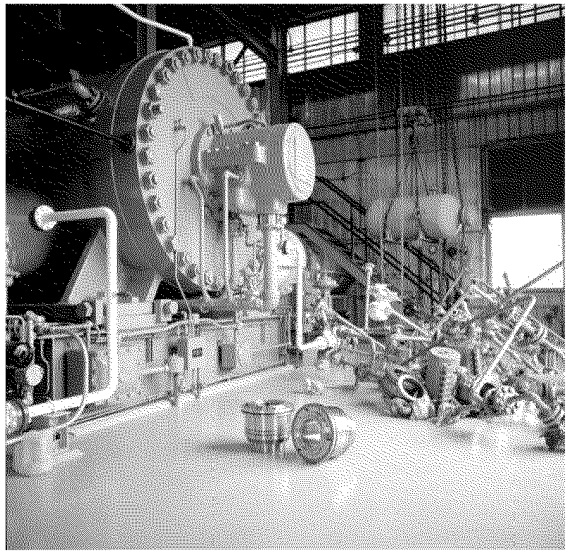
Proposed Sector-specific Sources and BMPs for the Natural Gas Transmission and Storage Sector

Sources	BMPs
Reciprocating Compressors-venting	Route rod packing vent to capture/use or route gas to flare or replace rod packing every 26,000 hours of operation or every 36 months.
Centrifugal Compressors-venting	Route wet seal de-gassing vent to capture/use or route wet seal de-gassing to flare.
Compressor Station Equipment Leaks/ Fugitive Emissions	Undertake monitoring and repair activities, at specified minimum intervals, following defined parameters governing repair activities.
Pipeline Venting & Blowdowns	Maximize gas recovery and/or emission reductions through the use of a combination of in-line compression (when available) to maximum engineering potential, and route remaining gas to portable compression or flare. Excludes emergency blowdown situations.
Pneumatic Controllers	For gas-driven pneumatic controllers, use low- (defined as gas bleed rate < 6 standard cubic feet/hour) or no-bleed controllers for all applications except those requiring high-bleed controllers for certain purposes, including operational requirements and safety.

FLUID SEALING ASSOCIATION FSA

Centrifugal Compressor Sealing 101

- Oil Seals are a **contacting** seal technology
- Gas Seals are a **non contacting** seal technology
  - Significantly reduced Emissions
  - No liquid required for lubrication
  - No liquid required for cooling
  - No liquid supply system required
  - No wear – long life and reliability
  - Safer – No Gas Entrapment
  - Very little power consumed
  - Reduced space and weight



FLUID SEALING ASSOCIATION FSA

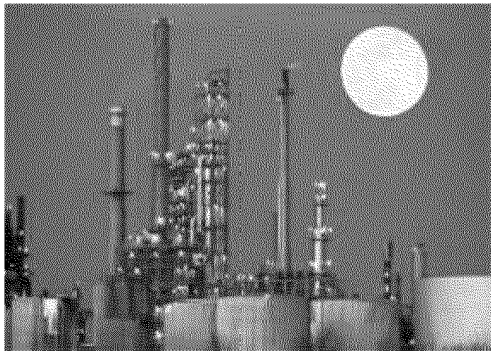
Gas Seals are fundamentally a superior seal

Gas Seal Technology Applications

Extraction & Production
Offshore
Onshore
Re-injection
CO2 Sequestration

Refineries
Catalytic Reformer
Hydro-treater
Hydrocracker
Fluid Catalytic Cracker

Petrochemical Plants
Ethylene
Methanol
Butyl Polymers



Gas Gathering & Transmission
Gas Treatment
Gas Storage
Pipeline
LNG
GTL

Organic Chemicals
Ammonia
Urea
Acetyls
Nitric Acid

Gas Seal Technology typical Customers

Centrifugal Compressor Original Equipment Manufacturers

SIEMENS

Solar Turbines
A Caterpillar Company

MITSUBISHI

沈鼓集团

MAN

DRESSER-RAND

ELLIOTT
EBARA GROUP

Operating Facilities

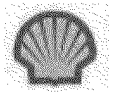
GAZPROM

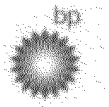
PEMEX

ارامكو السعودية
Saudi Aramco

SUNCOR ENERGY

ExxonMobil





PDVSA

BASF

VALERO ENERGY CORPORATION

ConocoPhillips

DOW

LYONDELL

FLUID SEALING ASSOCIATION FSA

Gas Seal Technology – The choice of Blue Chips globally

Agenda

- Introduction
- The options for Methane Emissions Reduction
- Introducing the Lifecycle Cost Calculator (LCC)
- Summary

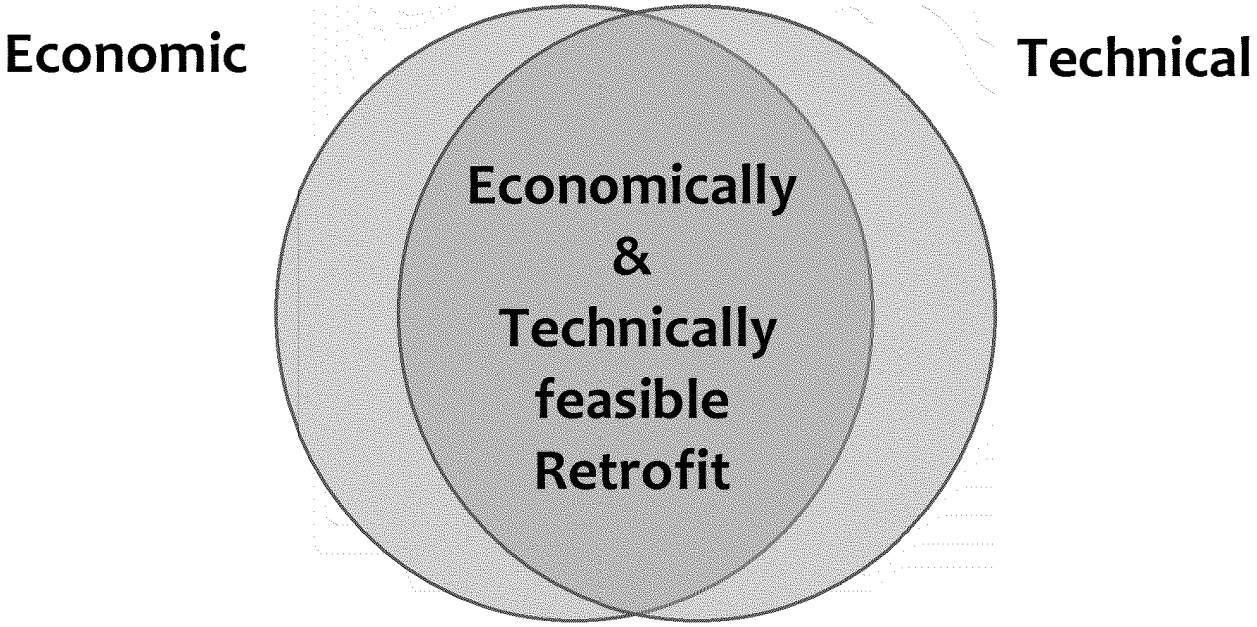
FLUID SEALING ASSOCIATION FSA

The options for Methane Emissions reduction

- New Centrifugal Compressor Applications
  - Gas Seal Technology
  - Oil Seal Technology with de-gassing vent to capture / use
  - Oil Seal technology with de-gassing vent to flare

- Existing Centrifugal Compressors equipped with Oil Seals
  - Retrofit Oil Seal technology with de-gassing vent to flare
  - Retrofit Oil Seals with Gas Seal Technology
  - Retrofit Oil Seal Technology with de-gassing vent to capture / use

“In market” perspective
Existing Equipment

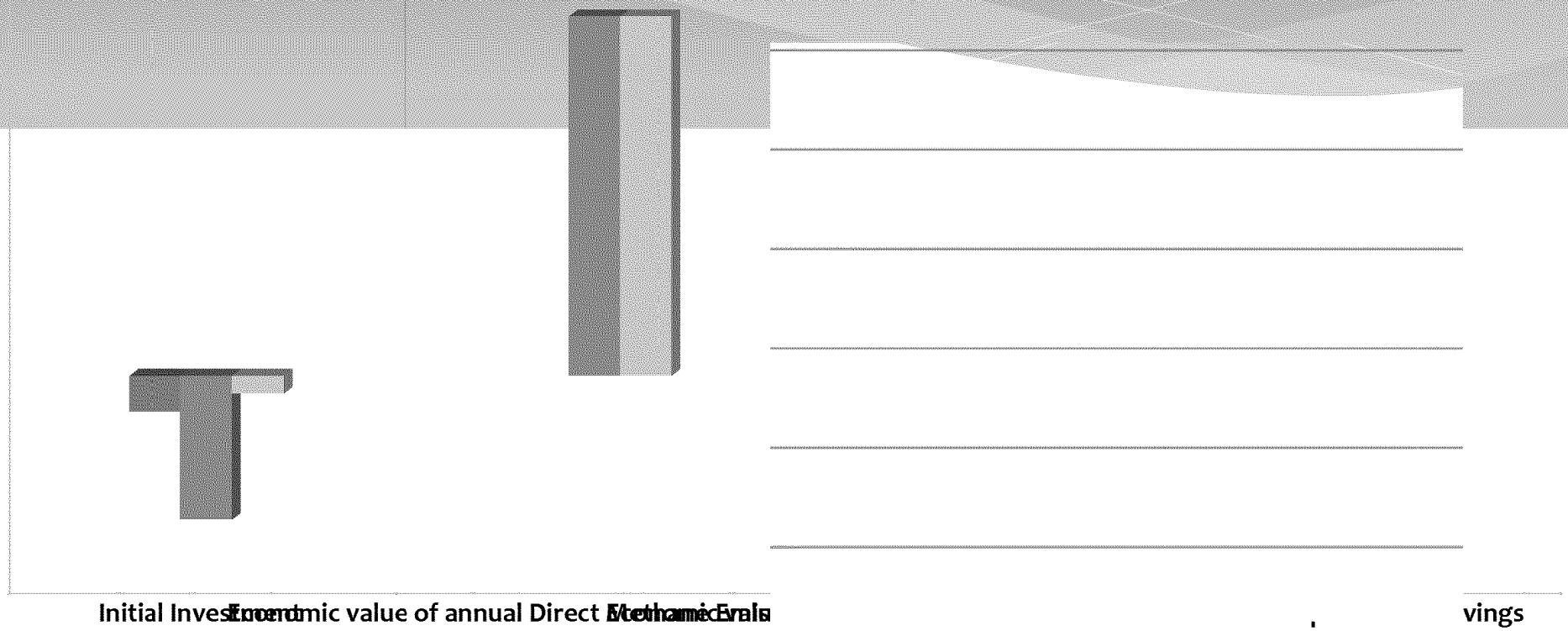


FLUID SEALING ASSOCIATION FSA

Oil Seal to Gas Seal retrofits are not a panacea

Qualitative Economic Comparison

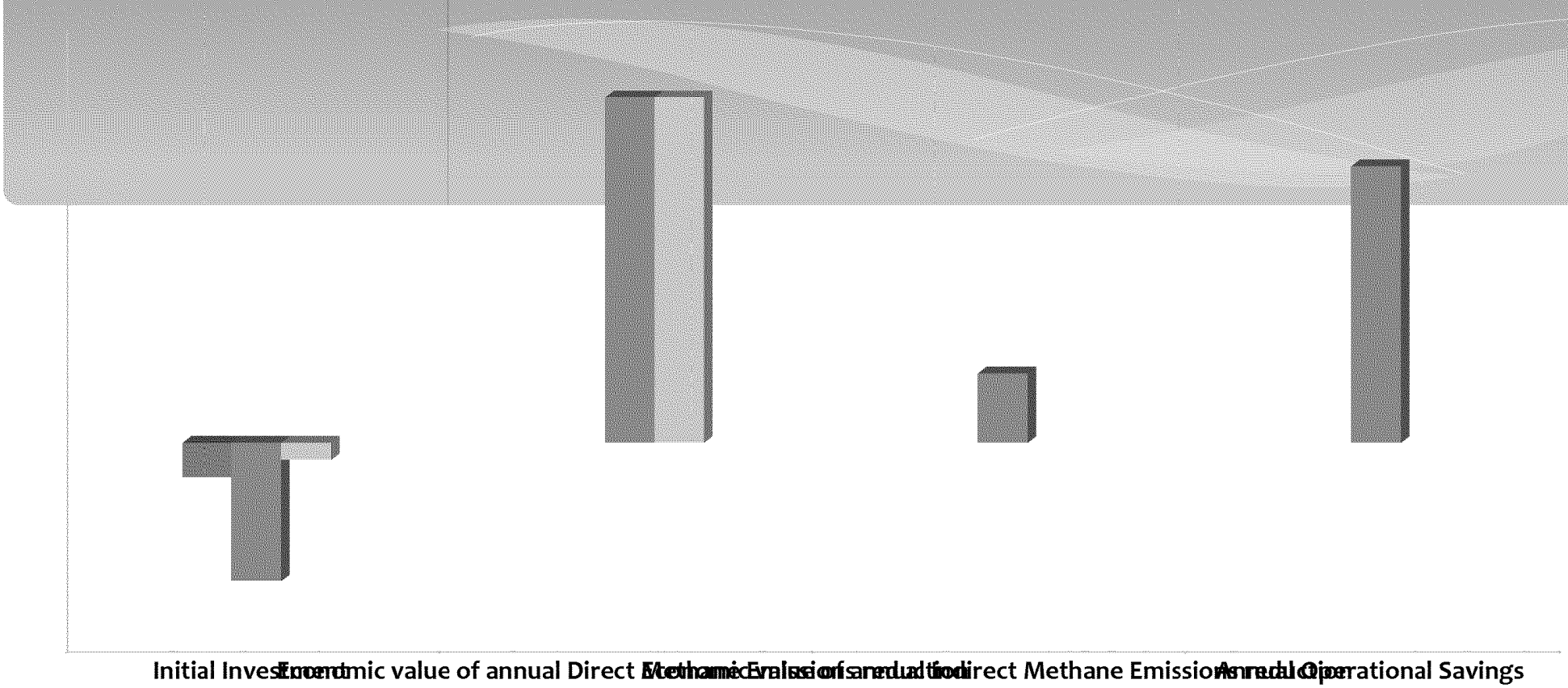
Oil Seal routed to flare vs Gas Seal Retrofit vs Oil Seal routed to capture / use



FLUID SEALING ASSOCIATION FSA

Qualitative Economic Comparison

Oil Seal routed to flare vs Gas Seal Retrofit vs Oil Seal routed to capture / use



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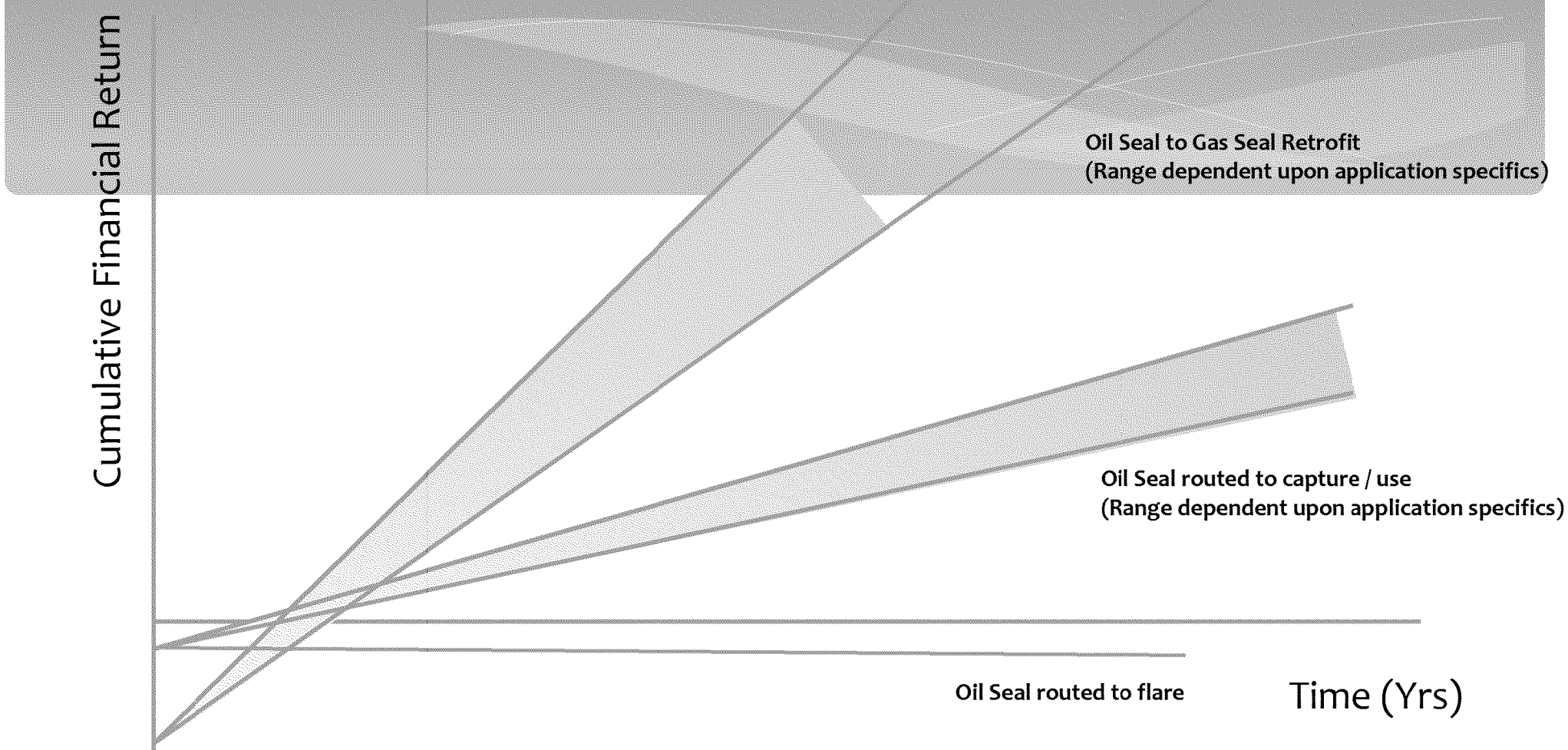
Economic Payback



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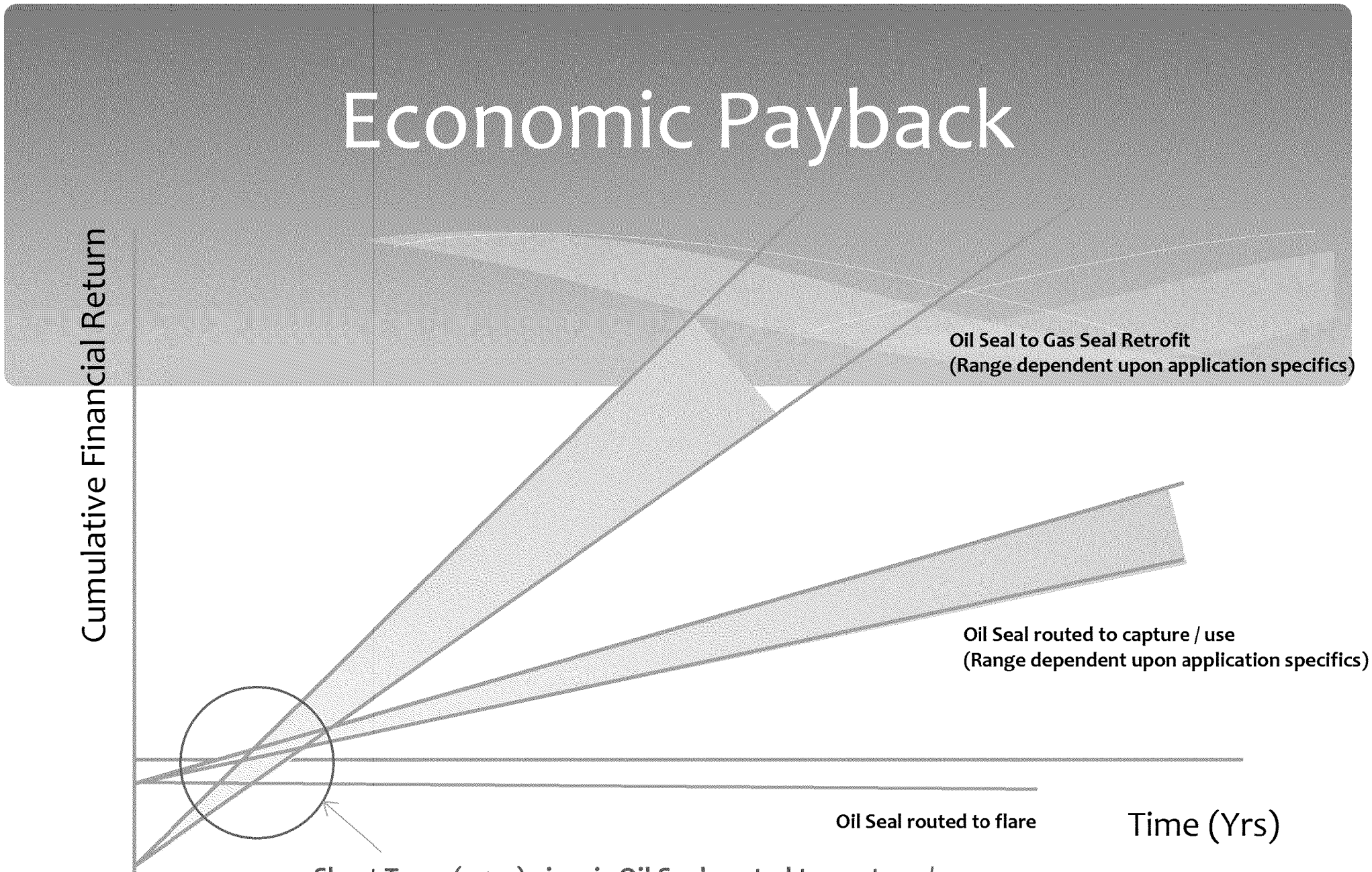
Economic Payback



Short Term (< 1yr) view is Oil Seal routed to capture / use
Long term (> 1yr) view is always Oil Seal to Gas Seal Retrofit
Switch over point is application specific (The role of LCC)

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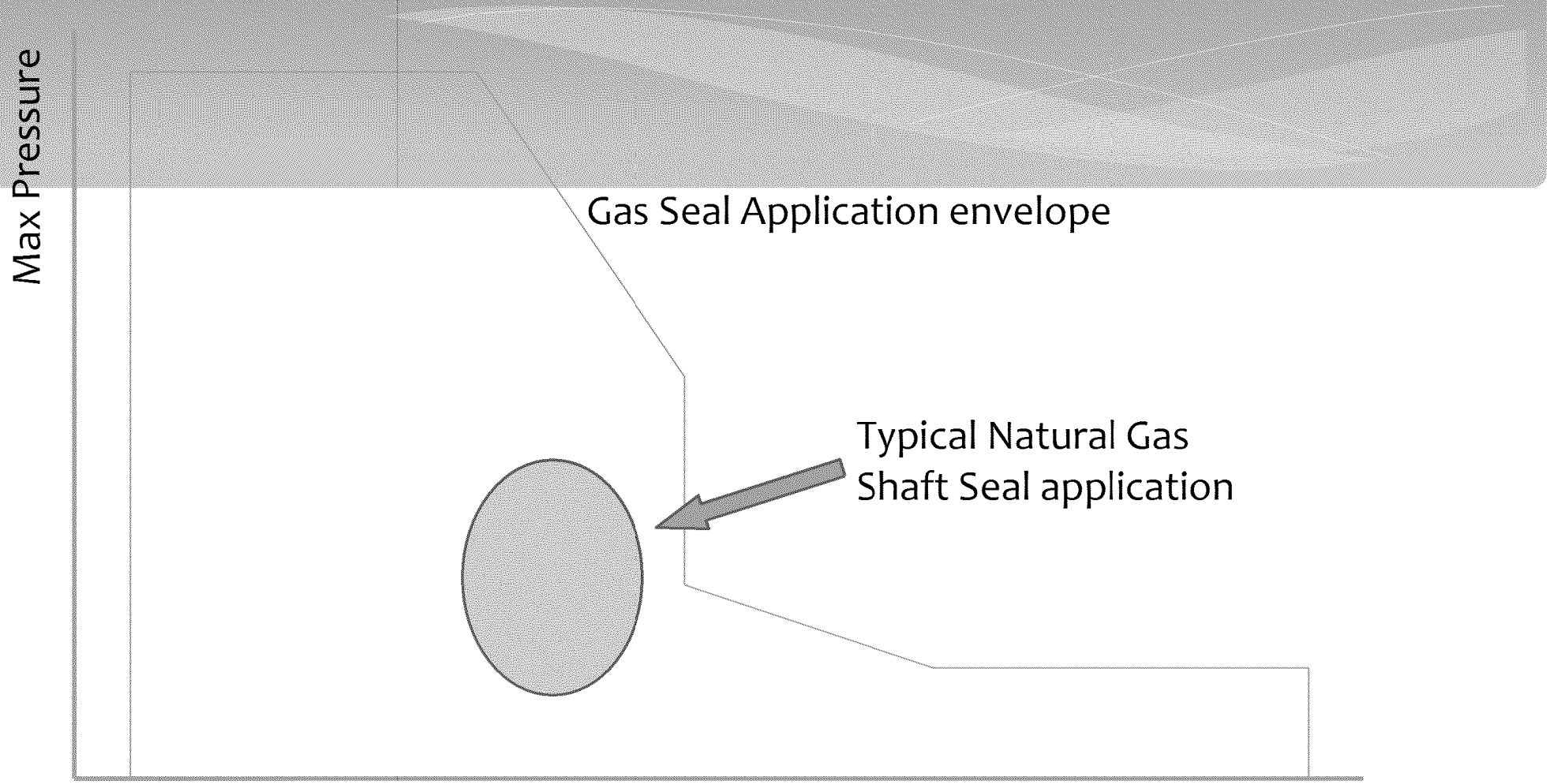
Gas Seal Technology is applicable



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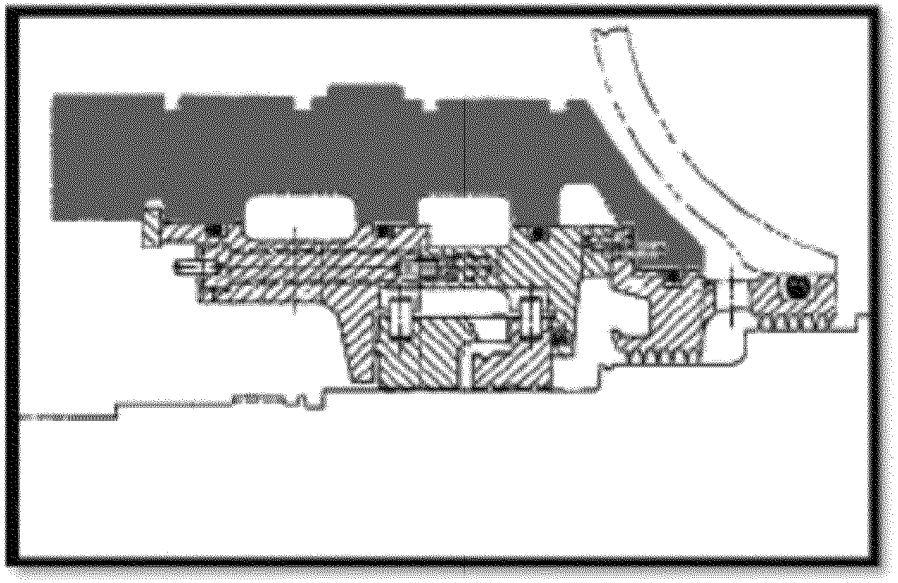
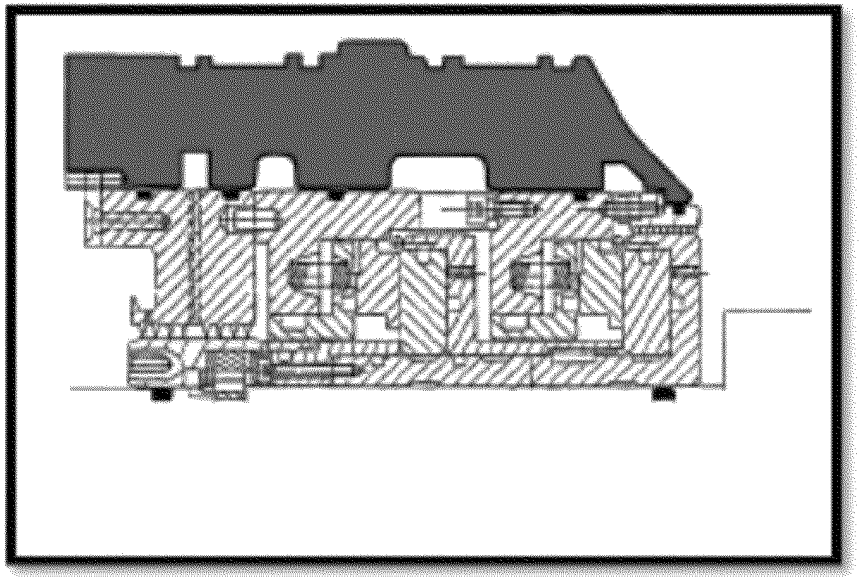
Natural Gas Applications are well within the Gas Seal Technology Envelope

Technical Review
The challenge

ORIGINAL SEALS DESIGN: Oil Film Rings



AFTER RETROFIT: Tandem Gas Seals



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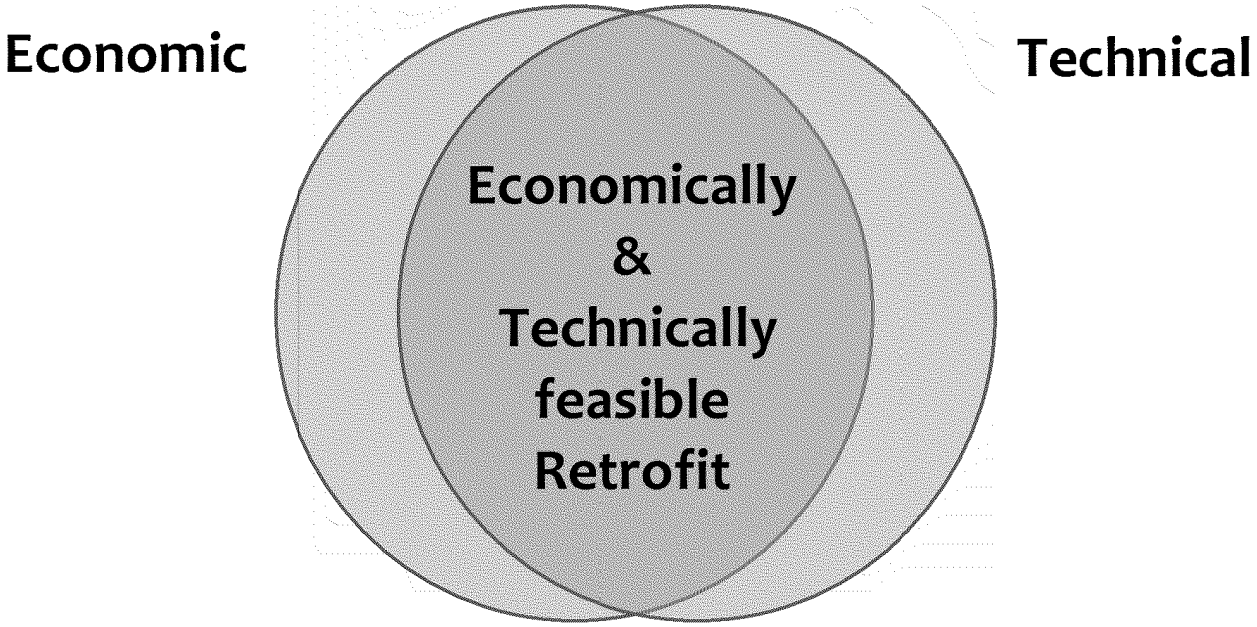
Technical Review

- Standard Gas Seal designs don't fit interchangeably with wet seal solutions
  - Radial Cross Section
  - Axial Length
  - Porting
  - Rotor Dynamics
- Machining the compressor housing and or shaft to retrofit a gas seal adds cost, and can extend lead time

“In market” perspective
Existing Equipment



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Oil Seal to Gas Seal retrofits are not a panacea

Agenda

- Introduction
- The options for Methane Emissions Reduction
- Introducing the Lifecycle Cost Calculator (LCC)
- Summary

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Sealing Solution Comparison

Short Term Investment Comparison

Shaft Sealing System	Implementation cost	Emission levels
Traditional Oil Sealing System Vented to Atmosphere	Base-line	High
Traditional Oil Sealing System routed to Flare	Small to Moderate Capital Investment	Low
Traditional Oil Sealing System routed to capture / use	Small to Moderate Capital Investment	Low
Dry Gas Seal System	Large Capital Investment	Low to Zero

However the life cycle costs and carbon footprint of each of the solutions are not considered.

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Sealing Solution Comparison

Long Term Operational Costs

Shaft Sealing System	Maintenance Cost	Leakage Cost	Parasitic Operational Cost	**Total Annual Operating Costs**
Traditional Oil Sealing System Vented to Atmosphere	Very High	High	High	High
Traditional Oil Sealing System routed to Flare	Very High (unchanged)	High (unchanged)	High (unchanged)	High (unchanged)
Traditional Oil Sealing System routed to capture / use	Very High (unchanged)	Low	High (unchanged)	High (unchanged)
Dry Gas Seal System	Low	Low to Zero	Low	Low

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Sealing Solution Comparison

CO_2 Equivalent Emissions

Shaft Sealing System	Emission Source			
	Leakage	Seal Support System	Parasitic Sources	TOTAL
Traditional Oil Sealing System Vented to Atmosphere	Very High	High	High	Very High
Traditional Oil Sealing System routed to Flare	High	High (unchanged)	High (unchanged)	High
Traditional Oil Sealing System routed to capture / use	Low	High (unchanged)	High (unchanged)	Low
Dry Gas Seal System	Low to Zero	Zero	Low to Zero	Lowest

Fluid Sealing Association FSA

What new insight does LCC provide

- Climate impact
- Energy impact
- Economics impact

The complete life cycle cost

LCC Inputs

Process Data

- Methane Content
- Flow Rate
- Pressure
- Operational Hours
- Process Gas Value

Reliability Data

- Planned Maintenance Costs
- Unplanned Maintenance Costs
- Spare Parts Cost
- Lost Production Time
- MTBR

Compressor Data

- Driver
- Power
- Efficiency
- Number of Seals
- Shaft Size

Seal Support System Data

- Power Requirements
- Cooling Configuration

Seal Data

- Frictional power
- Leakage Rate
- Gas Injection Source
- Leakage Destination

Retrofit / Upgrade Data

- New Seals and Spares Costs
- System Upgrade/Replacement Costs
- Equipment Modification Costs
- Electrical and Instrumentation Costs
- Site Materials and Installation Costs
- Decommissioning and Disposal Costs
- Lost Production Time

Utilities Data

- Driver Fuel Value
- Electricity Value
- Purge Gas Value

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LCC Outputs

Costs

Annual Operating Costs

- Maintenance Cost
- Value of Leaked Gas
- Consumables
- Energy Consumed by Seal
- Energy Consumed by Seal System

One-Time Costs

- Total Retrofit Costs
- Payback

Present Value

- Present Value of Annual Operating Costs over Lifespan Remaining

Total Life Cycle Cost

Energy Consumed

Energy Consumed From:

- Seal and Support System
- Compressed Gas Energy released
- Pipe Friction from Contamination

Carbon Footprint

Equivalent CO_2 Emissions From:

- Seal Leakage
- Compressor Blow Down
- Energy Required for the Seal and Support System
- Compressed Gas Energy Released
- Energy Required to Overcome Pipe Friction

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LCC Demonstration

John Crane Inc.

Compressor Seal Life-Cycle Cost Estimator

INPUTS

			Oil Seal Routed to Atmosphere	Oil Seal Routed to Flare	Oil Seal Routed to Capture/Use	Gas Seal
1) Select Units of Measure (click cell to see the drop-down menu)		Units →	Imperial ($)			
2) Enter the Financial Assumptions	Default	Units				
Cost of Capital (PV discount rate)	12%	-	12.0%	12.0%	12.0%	12.0%
3) Enter the Equipment Information	Default	Units				
Equipment ID/Number		(User info only)	Compressor 1			
Equipment Description		(User info only)	Description 1			
Number of Seal Chambers	2	Quantity	2	2	2	2
Days of Equipment Operation per Year	365	Days / Year	365	365	365	365
Is the Compressor Spared?	Yes	Yes / No	Yes	Yes	Yes	Yes
Equipment Lifespan Remaining	15	Years	15	15	15	15
4) Enter the Plant Utility Cost Data	Default	Units				
Cost of Electricity	0.10	$ / kWh	0.10	0.10	0.10	0.10
Cost of Purge Gas for Seal Support System and Compressor Blowdown	0.01	$ / SCF	0.01	0.01	0.01	0.01
5) Enter the Equipment Driver Information	Default	Units				
Compressor Driver Type (click cell to see the drop-down menu)	⇨	⇨	Gas Turbine (Natural Gas Powered)			
Driver Rated Power	6500	hP	6500	6500	6500	6500
Driver Load Factor (% of power delivered to the compressor)	70%	-	70%	70%	70%	70%
Compressor Driver Fuel Price	2.850	$ / 1000 ft³	2.850	2.850	2.85	2.85
Compressor Driver Fuel Net Calorific Value	950	BTU / ft³	950	950	950	950

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Agenda

- Introduction
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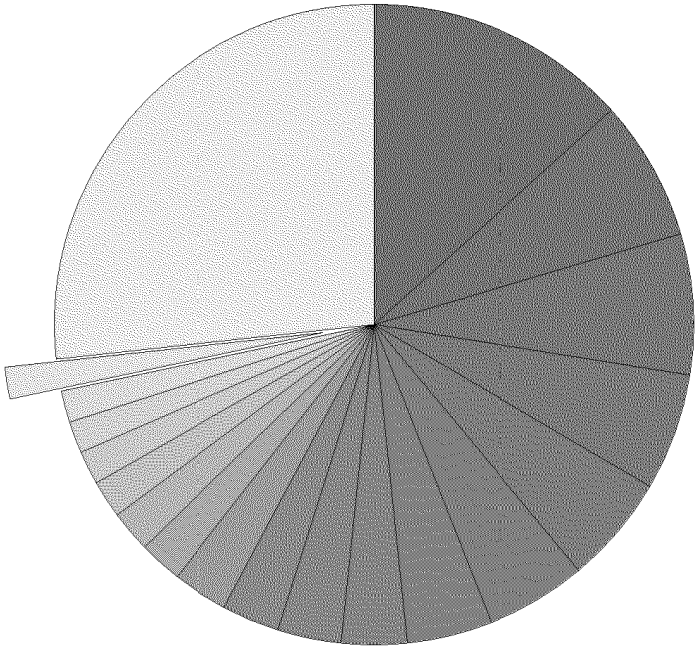
Executive Summary

* Why should US EPA consider **Gas Seal Technology** as the **Best Available Technology** for reducing Methane Emissions from Centrifugal Compressors equipped with Oil Seals?

  * Gas Seal Technology is **proven** and the **current industry standard** for all new equipment including Natural Gas applications
  * Oil Seal to Gas Seal Retrofits are **not new** and are applicable in the majority of cases
  * While the actual benefit is specific to a given compressor
  * Retrofit with Gas Seal Technology offers the **Maximum Environmental Benefit**
  * Retrofit with Gas Seal Technology offers the industry **Safety Benefit**
  * Retrofit with Gas Seal Technology offers the **Maximum Reliability Benefit**
  * Retrofit with Gas Seal Technology offers the **Maximum Operational Savings**

One final thought…

Centrifugal Compressors (Gas Seals)
1.6%



2018 Projected Onshore Methane Emissions
(Source: ICF/EDF March 2014)

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Appendices

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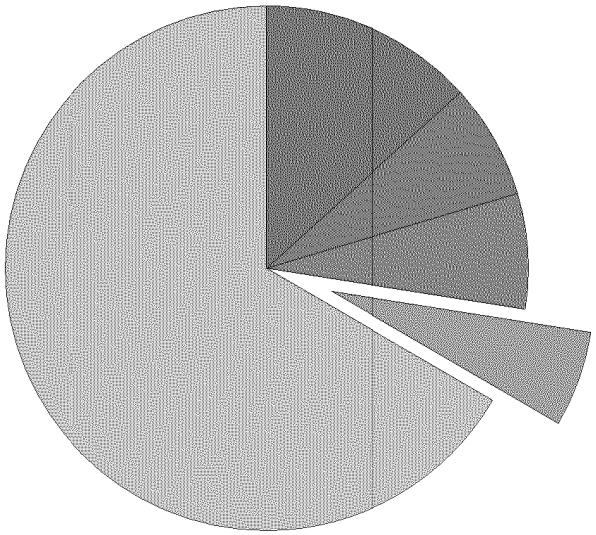
How the FSA can help the US EPA

2018 Projected Onshore Methane Emissions
(Source: ICF/EDF March 2014)



Centrifugal Compressors (Wet Seals)
5.9%

We are not here to convince you why we need to focus on emissions from Oil Seal equipped centrifugal compressors

We are here to discuss the best available technology to reduce Methane Emissions from this equipment

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INGAA & API Comment Summary

- "proposed rule assumed that the capital cost of a dry gas seal compressor is $75,000 more than the capital cost of a wet seal compressor … a reanalysis of the wet-to-dry seal cost-effectiveness is warranted, particularly for retrofit applications"
- "EPA analysis over estimates VOC emissions and under-estimates costs"
- "provide option allowing the use of wet seal systems, provided emissions are routed to a control device or back to a process"
- "retrofitting wet seals to dry seals can be cost prohibitive … estimates to be $100,000 for parts (uninstalled) and $250,000 (installed), and can be as high as $1,000,000 where a total rebuild of the compressor is required"
- "EPA should not preclude the use of a wet seal equipped centrifugal compressor with controls capable of meeting a 95% VOC control efficiency or routing captured seal-oil gas to a fuel gas system, recycle or another processing system"
- "seal-oil gas separation systems have atmospheric vent volumetric rates broadly similar to dry seal leak rates and may perform incrementally better in some instances"
- "conversion of a wet seal centrifugal compressor to dry seals costs from $250,000 to $1,000,000 per machine while retrofit with a seal oil gas separator is estimated to cost in the range of $22,000"

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(Source: Public Comments to New Source Standards 2012)

INGAA
Comment response

- "proposed rule assumed that the capital cost of a dry gas seal compressor is $75,000 more than the capital cost of a wet seal compressor … a reanalysis of the wet-to-dry seal cost-effectiveness is warranted, particularly for retrofit applications"
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- Invariably, Wet Seal to Dry Seal retrofits provide maximum environmental and economic benefit in the medium to long term. On a case by case basis, the LCC provides that detailed analysis comparing Wet to Dry seal retrofit and Oil Seal leakage recovery from an economic and environmental perspective.
- The LCC provides a specific and detailed comparison of the economic and environmental benefits.
- For new equipment, Gas Seal Technology is already the industry standard and can be regulated as such. Regarding existing equipment, Oil Seal Leakage recovery is the non preferred option - only when Oil Seal to Gas Seal retrofit is not technically feasible.
- Retrofit cost of $1M is a potential exceptional case rather than typical scenario. It is acknowledged that Oil Seal to Gas Seal Retrofits require higher up front investments. However, Gas Seal technology delivers equally significant reliability and operational benefits that simply do not exist with leakage recovery thus delivering attractive economic returns.

(Source: Public Comments to New Source Standards 2012)

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API
Comment response

- Such a solution may provide a broadly equivalent environmental benefit but does not deliver the substantial operational and economic benefits related to an Oil Seal to Gas Seal Retrofit. The win-win from an industry and environmental perspective is the Wet Seal to Gas seal Retrofit.
- As above.
- Retrofit cost of $1M is a potential exceptional case rather than typical scenario. It is acknowledged that Oil Seal to Gas Seal Retrofits require higher up front investments. However, Gas Seal technology delivers equally significant reliability and operational benefits that simply do not exist with leakage recovery thus delivering attractive economic returns. $22K for the implementation of the alternative is considered to be an under estimate of costs.

- "EPA should not preclude the use of a wet seal equipped centrifugal compressor with controls capable of meeting a 95% VOC control efficiency or routing captured seal-oil gas to a fuel gas system, recycle or another processing system"
- "seal-oil gas separation systems have atmospheric vent volumetric rates broadly similar to dry seal leak rates and may perform incrementally better in some instances"
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(Source: Public Comments to New Source Standards 2012)

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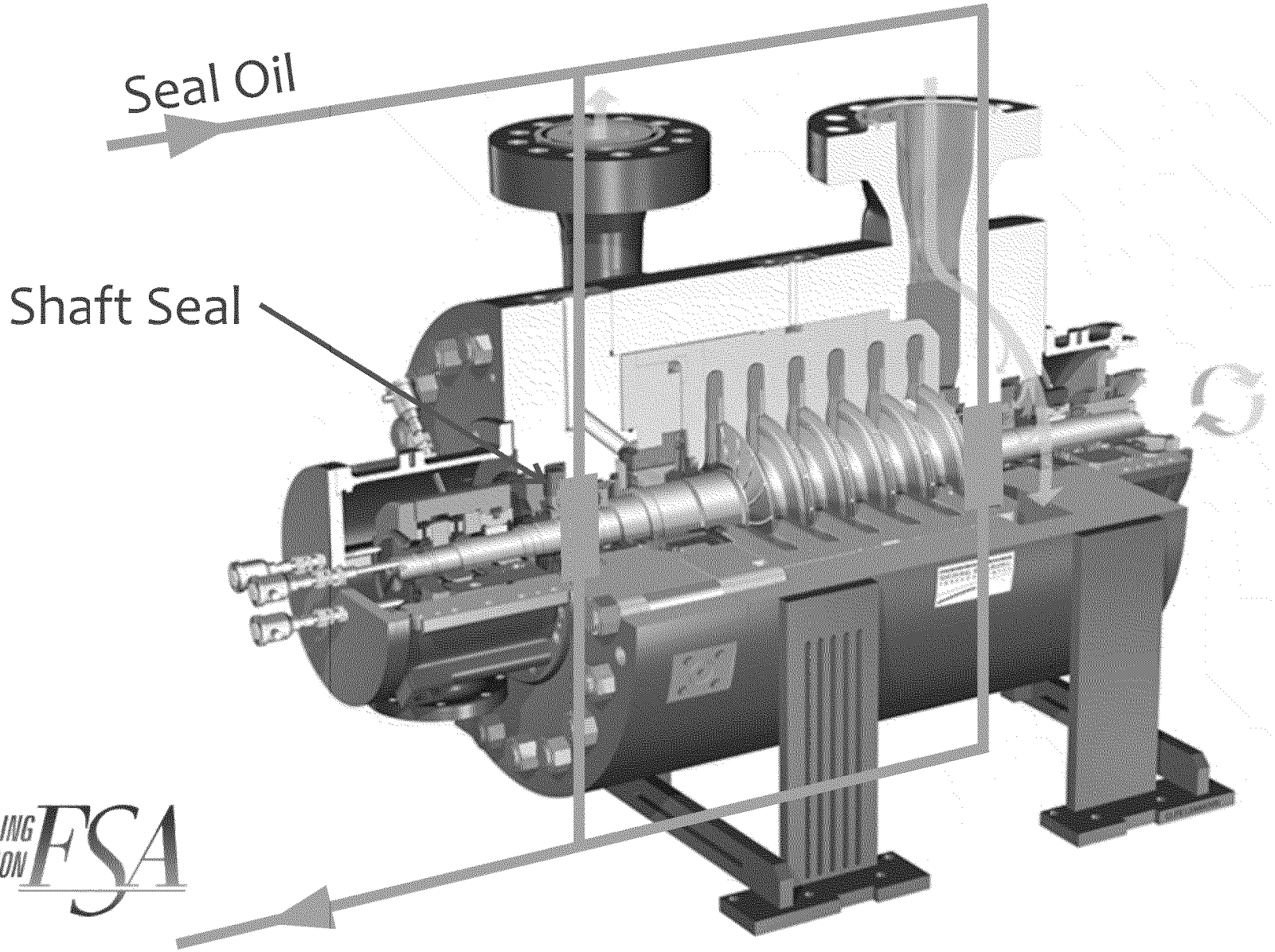
Traditional Oil Seal System



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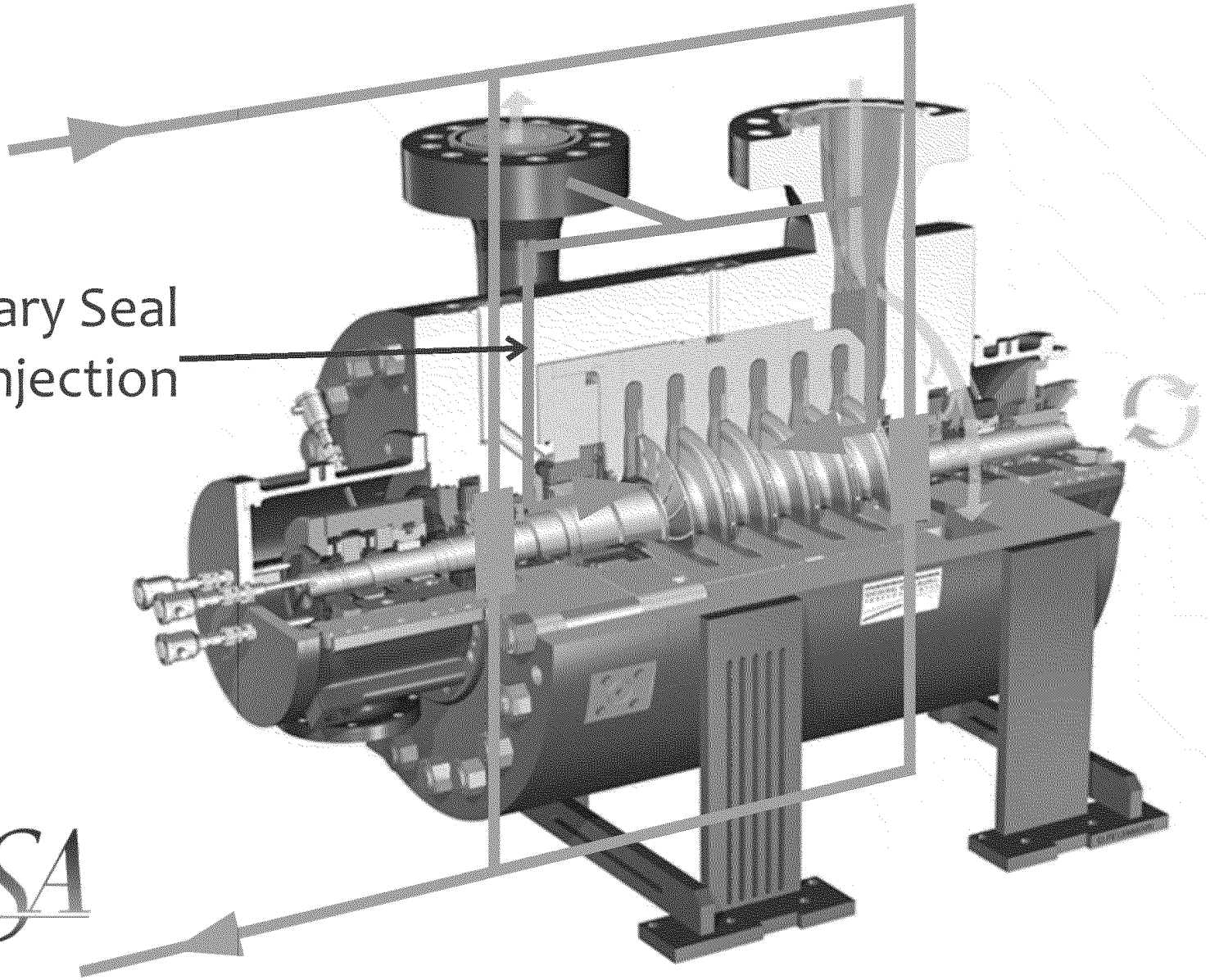
Traditional Oil Seal System



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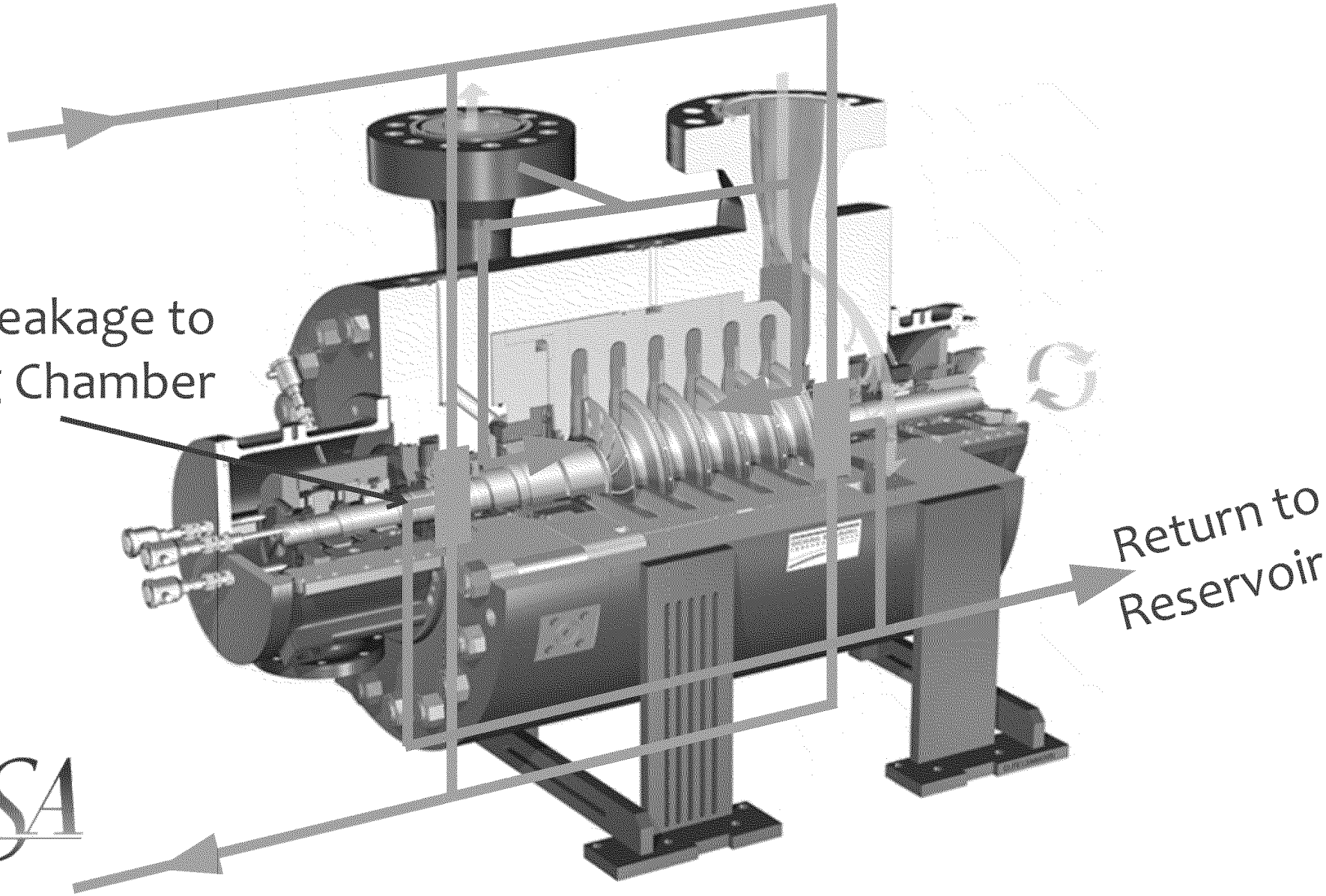
Traditional Oil Seal System



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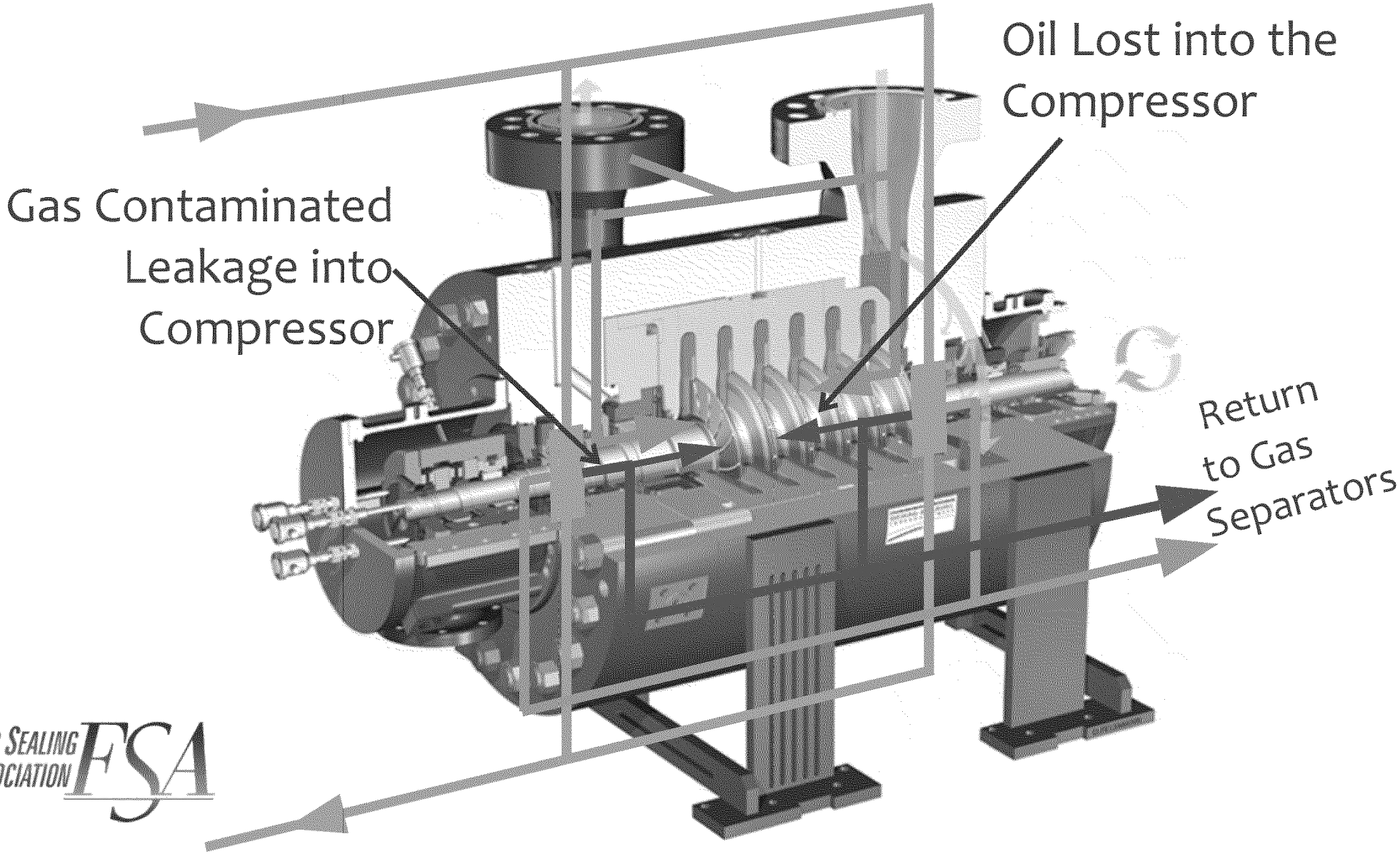
Traditional Oil Seal System



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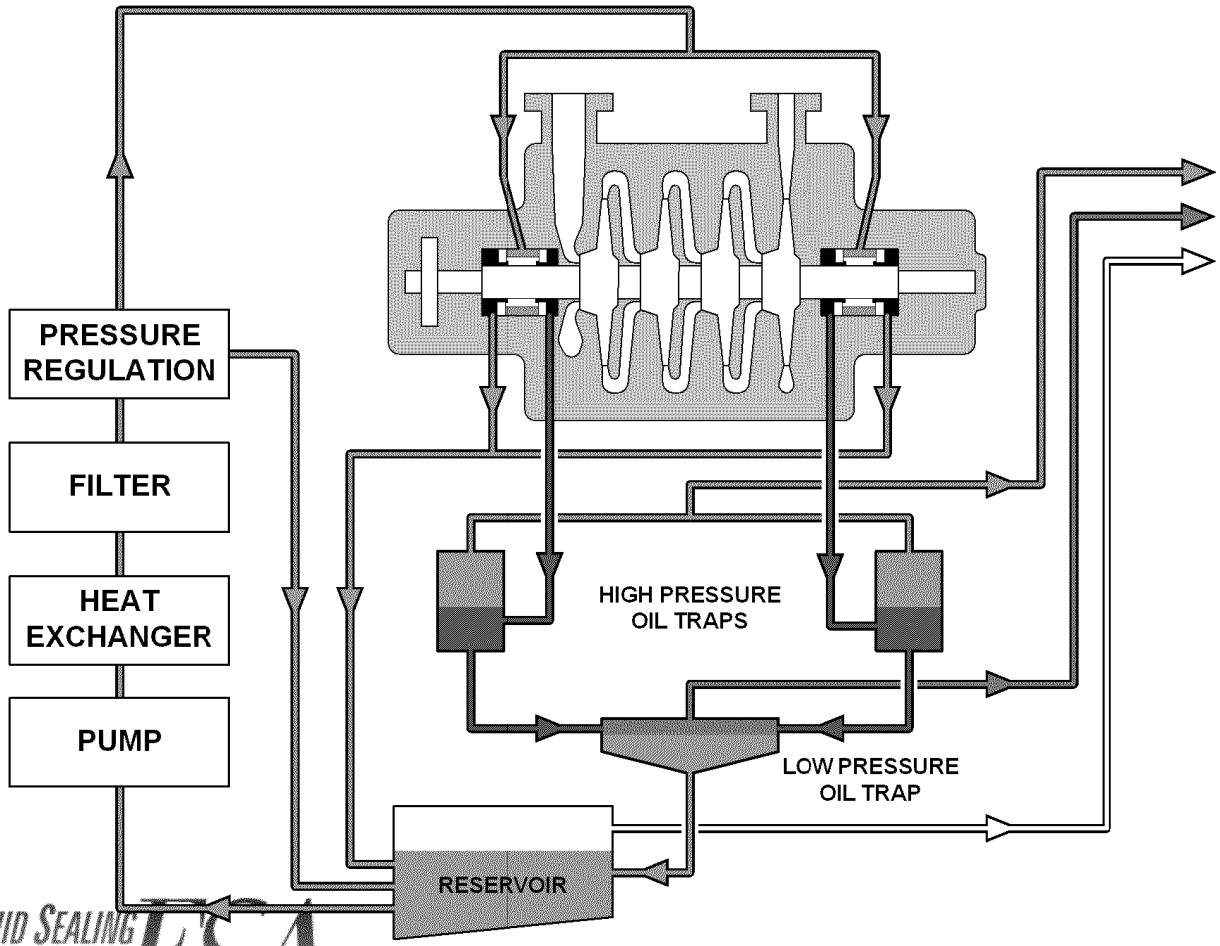
Traditional Oil Seal System Vented to Atmosphere

Where is the Problem?



High emissions levels release here

EMISSIONS RELEASED TO THE ATMOSPHERE

Low emissions levels release here

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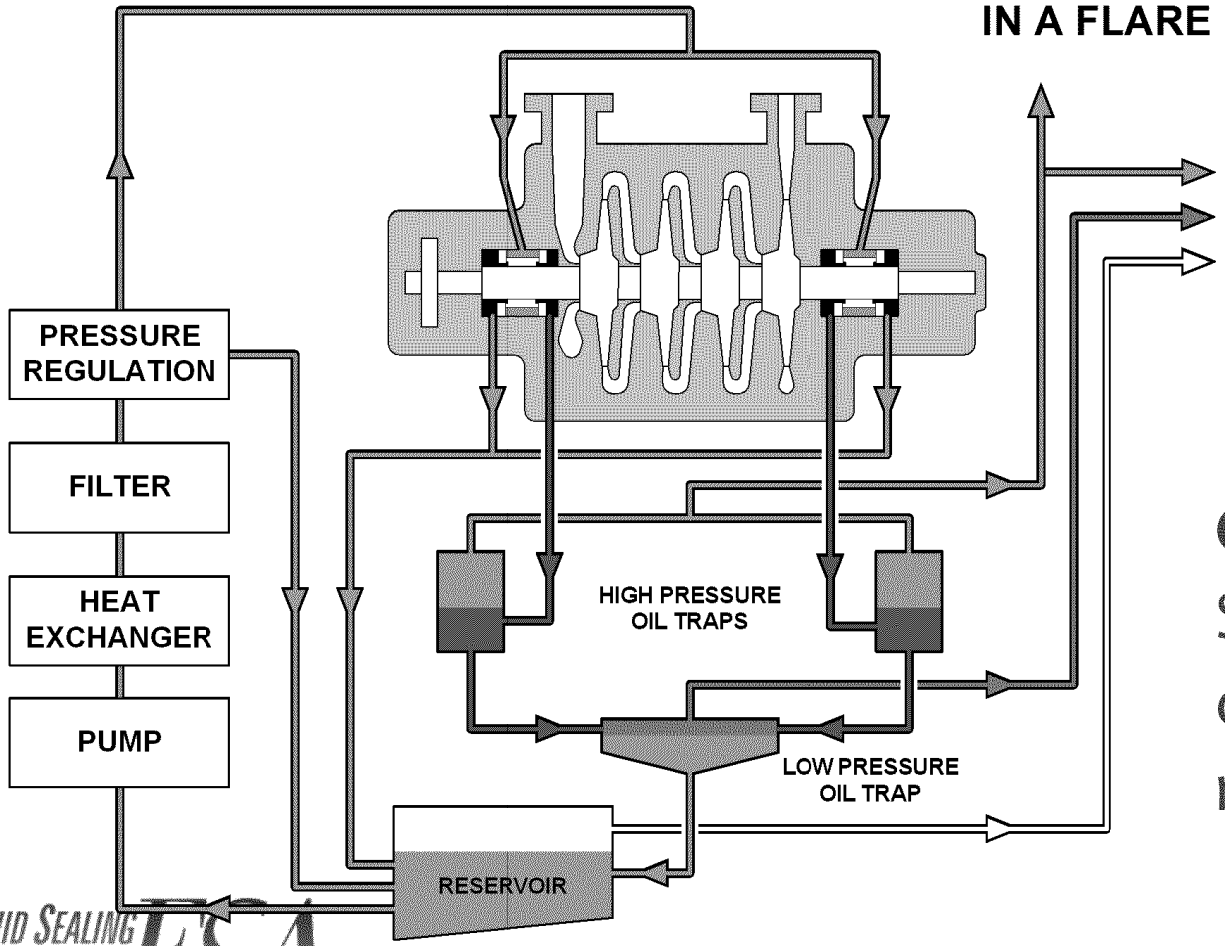
Traditional Oil Seal System Vented to Flare

A Simple Approach



Outcome:
Small capital investment delivers a large reduction in emissions

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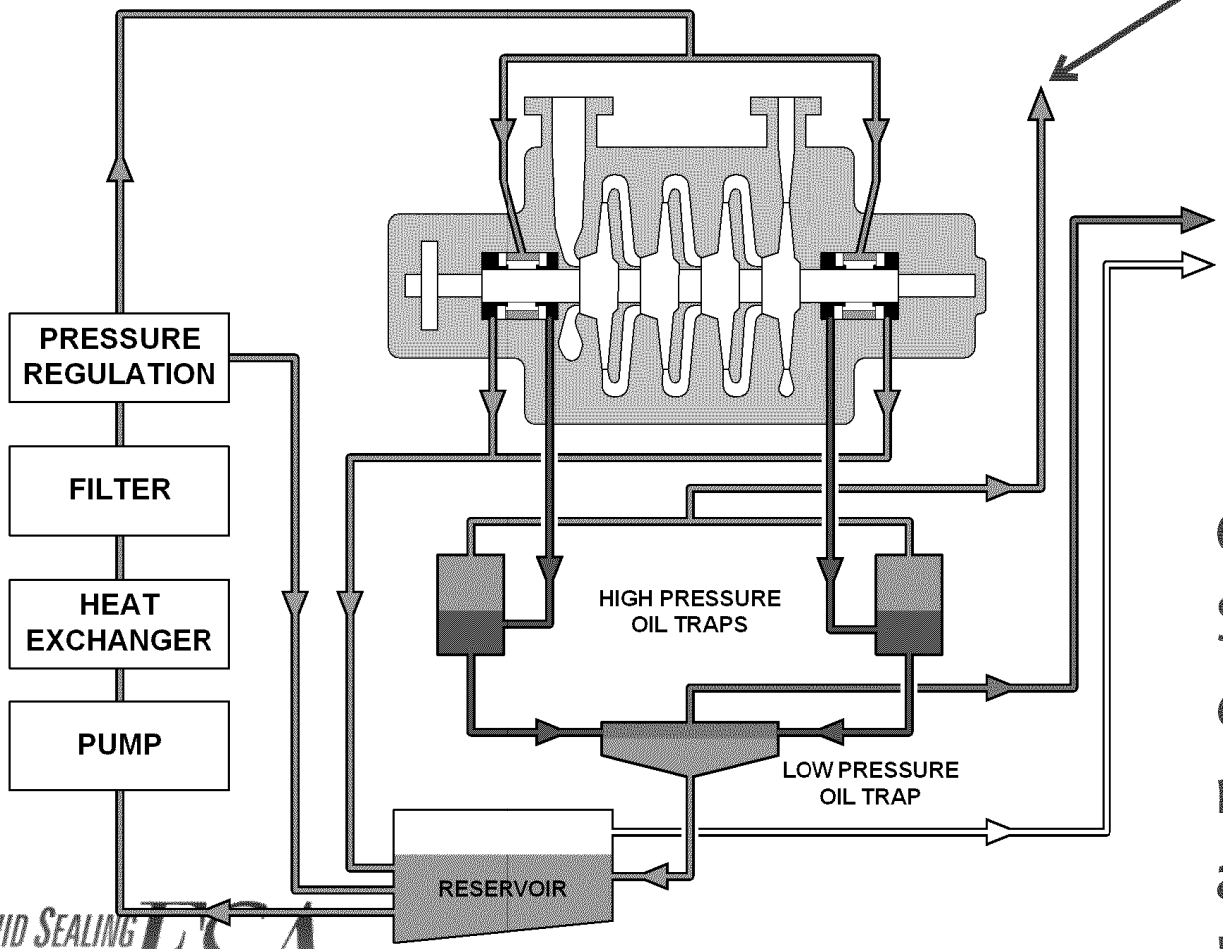
Enhanced Oil Seal System

An Alternate Solution

High emissions levels recovered by routing to:

- Compressor suction
- Low pressure fuel



Outcome:

Small capital investment delivers a large reduction in emissions **and recovers value of leaked methane**

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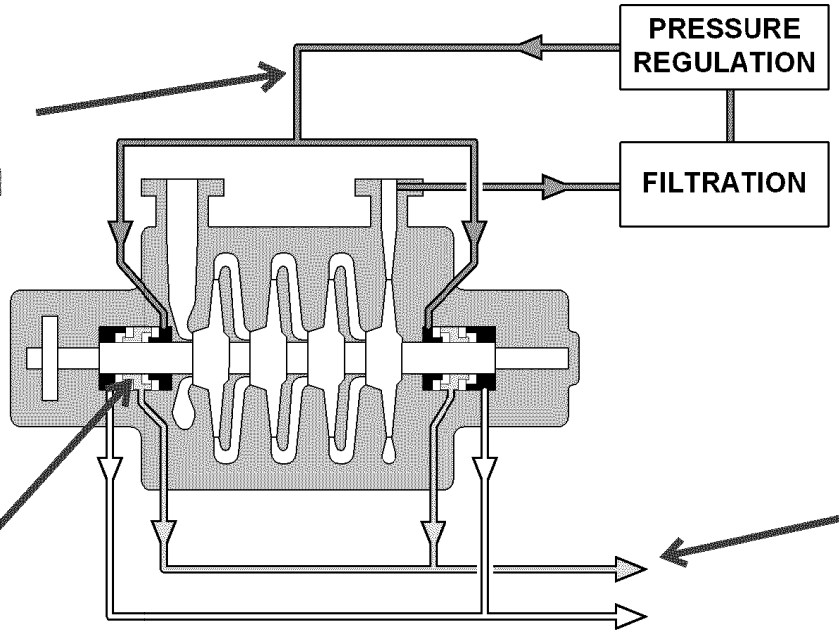
Gas Seal System

A More Advanced Solution

Primary Seal Gas Injection



These Emissions are either released to the atmosphere or combusted in a flare

Very low emissions levels release here

Oil seal replaced with a dry gas seal

Outcome:
Large capital investment delivers substantial reductions in emissions, **reduces operational costs** and **reduces carbon footprint**

FLUID SEALING ASSOCIATION FSA

To: Swonger, Chris (CWDC)[chris.swonger@smiths.com]; Bylin, Carey[Bylin.Carey@epa.gov]
Cc: Riegner, Sarah (CWDC)[sarah.riegner@smiths.com]; Hosking, Paul (JMOR)[PAHosking@johncrane.com]; Savage, Mark (JCRA)[MSAVAGE@johncrane.com]
From: Blackman, Jerome
Sent: Fri 8/7/2015 2:00:46 PM
Subject: RE: meeting request

Hi Chris,

Let me check schedules here and get back to you.

Thanks,

Jerome

-----Original Message-----
From: Swonger, Chris (CWDC) [mailto:chris.swonger@smiths.com]
Sent: Thursday, August 06, 2015 4:52 PM
To: Blackman, Jerome; Bylin, Carey
Cc: Riegner, Sarah (CWDC); Hosking, Paul (JMOR); Savage, Mark (JCRA)
Subject: meeting request

Hi Jerome and Carey -

Hope you all are both well.

If you have time in August, on behalf of the Fluid Sealing Association, I would like to arrange a meeting to discuss the recently released "Methane Challenge".

Additionally, we have been working on a life cycle cost calculator for the centrifugal compressor issue and methane emissions that we would like to share. Paul Hosking and Mark Savage (copied) would join me for the meeting as well.

I have copied Sarah and she can work to help find a mutually convenient time to meet. Thanks for your time and consideration. We look forward to seeing you both soon.

Chris

Chris Swonger
SVP, Global Government Relations
Smiths Group
425 Third Street, SW
Suite 875
Washington, DC 20024
(202) 777-8447 (office)
(202) 258-5777 (mobile)
chris.swonger@smiths.com

To: Bylin, Carey[Bylin.Carey@epa.gov]
From: Susan LeGros
Sent: Mon 4/25/2016 8:18:00 PM
Subject: METHANE CHALLENGE

Carey:

We have traded phone calls a couple times and last week I understand you were out of the office on travel. I'd like to schedule a time to talk about the Methane Challenge program and how it may fit with what we are doing in the Center for Sustainable Shale Development. We are a consortium of NGOs (including the Environmental Defense Fund and Clean Air Task Force) and gas exploration and production companies (Consol, Chevron, EQT, Shell) that has promulgated a set of 15 voluntary performance standards signifying leading practices in shale gas E&P and certifying companies that meet those practices. All of the performance standards do not relate to methane but a significant number do and I believe are consistent with the goals of the Challenge program.

Would you be available for a brief call tomorrow morning, April 26, sometime between 10 and noon or after 4:30?

Susan

Susan Packard LeGros

President and Executive Director

Center for Sustainable Shale Development

625 Liberty Avenue, Suite 395

Pittsburgh, PA 15222

412.804.4170 (Office)

412.616.8762 (Cell)

susan.legros@sustainableshale.org

www.sustainableshale.org

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From: Fiji George
Location: MeetingPlace: Ex. 6 - Personal Privacy ID: Ex. 6 - Personal Privacy
Importance: Normal
Subject: EPA-ONE Future Calls: Finalization of programmatic details related to ONE Future Methane Challenge Commitment Option
Start Date/Time: Mon 4/11/2016 6:30:00 PM
End Date/Time: Mon 4/11/2016 7:00:00 PM

-- Do not delete or change any of the following text. --

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To: Bylin, Carey[Bylin.Carey@epa.gov]
From: Richard Hyde
Sent: Thur 4/21/2016 12:07:27 PM
Subject: RE: Revised STI Document

Yes, how about Monday morning. I can send you an agenda and then we can chat about it.

-----Original Message-----
From: Bylin, Carey [mailto:Bylin.Carey@epa.gov]
Sent: Thursday, April 21, 2016 4:09 AM
To: Richard Hyde
Subject: Re: Revised STI Document

Hello Richard,

Thank you for this. We will review.

I'm in Geneva this week, but can we plan to touch base Friday afternoon or Monday morning to agree to an agenda for the next meeting?

Carey Bylin

> On Apr 19, 2016, at 11:20 PM, Richard Hyde <rhyde@aglresources.com> wrote:
>
> Carey here is our revised STI
>
>
>
> Sent with Good (www.good.com)
>
> _____
> From: Shires, Terri
> Sent: Tuesday, April 19, 2016 3:51:55 PM
> To: Fiji George; Edwin.Mongan@bhpbilliton.com; Richard Hyde
> Cc: Harrison, Matt
> Subject: Revised STI Document
>
> Attached is the updated STI document to provide to EPA.
>
>
> Terri Shires
> Senior Engineer and Project Manager, Design and Construction Services,
> Gulf Coast Region D +1-512-419-5466 M +1-512-497-6482
> Terri.Shires@aecom.com<mailto:Terri.Shires@aecom.com>
>
> AECOM
> 9400 Amberglen Blvd.
> Austin, Texas 78729, USA
> T +1-512-454-4797
> aecom.com<https://urldefense.proofpoint.com/v2/url?u=http-3A__www.aeco
> m.com&d=CwMFAg&c=rOvAD26T1QcK75GyLb6a7GqUuR23p33SZf-jUeqbghE&r=056KpDn
> RSoS2URB522qkYGiG_Afk4IwVeeG7CoM3tzM&m=4OGcOYcCCQSUIuZxxfK1JVNkD8_c3-j
> rNd3snJlDY5k&s=dxgc-sCCbGSCATiYoFhPFvUuiSQ520bTYKThJhOHTyI&e=>
>
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> LinkedIn<https://urldefense.proofpoint.com/v2/url?u=http-3A__www.linke
> din.com_company_aecom-5F15656&d=CwMFAg&c=rOvAD26T1QcK75GyLb6a7GqUuR23p
> 33SZf-jUeqbghE&r=056KpDnRSoS2URB522qkYGiG_Afk4IwVeeG7CoM3tzM&m=4OGcOYc
> CCQSUIuZxxfK1JVNkD8_c3-jrNd3snJlDY5k&s=CAD1sj9DoKhJ4WZnzS0LtgPVPuZkZ8g
> Cibo7Iktk45c&e=>
> Twitter<https://urldefense.proofpoint.com/v2/url?u=http-3A__twitter.co
> m_AECOM&d=CwMFAg&c=rOvAD26T1QcK75GyLb6a7GqUuR23p33SZf-jUeqbghE&r=056Kp
> DnRSoS2URB522qkYGiG_Afk4IwVeeG7CoM3tzM&m=4OGcOYcCCQSUIuZxxfK1JVNkD8_c3
> -jrNd3snJlDY5k&s=oWLMo4f42ZKEWmZ7USNb_AfD_KkAdH8hKmKeoCtV4L8&e=>
> Facebook<https://urldefense.proofpoint.com/v2/url?u=http-3A__www.faceb
> ook.com_AecomTechnologyCorporation&d=CwMFAg&c=rOvAD26T1QcK75GyLb6a7GqU
> uR23p33SZf-jUeqbghE&r=056KpDnRSoS2URB522qkYGiG_Afk4IwVeeG7CoM3tzM&m=4O
> GcOYcCCQSUIuZxxfK1JVNkD8_c3-jrNd3snJlDY5k&s=5NCwwAUP5_E8qLx0G4uWHOKzN9
> FvFkcV4AfZ4XGW7qk&e=>
> Instagram<https://urldefense.proofpoint.com/v2/url?u=http-3A__instagra
> m.com_aecom&d=CwMFAg&c=rOvAD26T1QcK75GyLb6a7GqUuR23p33SZf-jUeqbghE&r=0
> 56KpDnRSoS2URB522qkYGiG_Afk4IwVeeG7CoM3tzM&m=4OGcOYcCCQSUIuZxxfK1JVNkD
> 8_c3-jrNd3snJlDY5k&s=KkkwfliLUUq-jZfuSMOSE7gzGySqcBJCtz4WqhqorBU&e=>
>
> EXTERNAL EMAIL - Caution, this message was sent from an external source.
> <MC-ONE-Future-STI-11-24-15_OF Markups_19Apr2016.docx>

EXTERNAL EMAIL - Caution, this message was sent from an external source.

To: Bylin, Carey[Bylin.Carey@epa.gov]
From: John Osborne
Sent: Wed 4/20/2016 6:57:41 PM
Subject: Methane Challenge Program

Carey

Can you please let us know how we (Glowink) can become a partner in the MCP?

Regards,

John

John Osborne
Glowink LLC
PO Box 106
Montgomery Center, Vermont
USA 05471
(802) 933-2711
john.osborne@glowink.biz
www.glowink.biz

To: Richard Hyde[rhyde@aglresources.com]; Bylin, Carey[Bylin.Carey@epa.gov]
Cc: Pryor, Justin[Pryor.Justin@epa.gov]; Franklin, Pamela[Franklin.Pamela@epa.gov]
From: Fiji George
Sent: Mon 4/18/2016 1:56:20 PM
Subject: RE: Today's EPA-ONE Future Meeting

We should get you a slide deck by noon central?

We will also discuss our thoughts on the STI

Fiji George

Southwestern Energy

From: Richard Hyde [mailto:rhyde@aglresources.com]
Sent: Monday, April 18, 2016 8:55 AM
To: Bylin, Carey
Cc: Fiji George; Pryor, Justin; Franklin, Pamela
Subject: RE: Today's EPA-ONE Future Meeting

Carey

Thanks and it was my pleasure to meet you as well and I also appreciate the productive engagement.

Yes we will send a slide deck this morning like to help facilitate the discussion. I apologize that we didn't get it there Friday. The agenda you laid out is consistent with ours. Look forward to chatting.

From: Bylin, Carey [mailto:Bylin.Carey@epa.gov]
Sent: Monday, April 18, 2016 8:51 AM
To: Richard Hyde
Cc: Fiji George; Pryor, Justin; Franklin, Pamela
Subject: Today's EPA-ONE Future Meeting

Hello Richard,

I hope you had a nice weekend. It was great to meet you last week and we really appreciated the productive engagement to move our discussions forward.

When we left the meeting on Wednesday, my understanding was that ONE Future would provide - by last Friday - a timeline for delivering the various materials/answers we discussed. Is that in process/coming soon? We thought that it would be a good use of our meeting today to go through the timeline. We could also use today's meeting to go through ONE proposed "optional methodologies" for LNG and Processing if you have the final list (one of the action items was for OF to confirm if the LNG and Processing documents we have are final or if some sources will come off the list as happened with T&C). We are also eager to receive the Supplementary Technical Information document that Terri Shires was marking up with our agreed changes.

Are there other items you were planning to discuss today? Please advise.

Ms. Carey Bylin

International Programs Leader, Oil and Gas

Natural Gas STAR Program

Global Methane Initiative

U.S. Environmental Protection Agency

Phone: +1-202-343-9669

Visiting Address & Private Deliveries (courier, FedEx etc.)

1201 Constitution Ave NW, Room Number 4353 UU, Washington DC 20004

U.S. Mail Address:

Mail Code 6207M, 1200 Pennsylvania Ave NW, Washington DC 20460

From: Richard Hyde [mailto:rhyde@aglresources.com]
Sent: Thursday, April 14, 2016 11:14 AM
To: Bylin, Carey <Bylin.Carey@epa.gov>
Cc: Fiji George <Fiji_George@SWN.com>
Subject:

Carey this is the latest drafts. The EPA –ONE Future should have my address in it instead of BlueWater.

Thanks again for the time yesterday. I think we are on a good path.

Richard Hyde

Managing Director

External Affairs and Public Policy

832-397-8501 office

832-457-2279 mobile

rhyde@aglresources.com

To: Bylin, Carey[Bylin.Carey@epa.gov]
Cc: Fiji George[Fiji_George@SWN.com]; Pryor, Justin[Pryor.Justin@epa.gov]; Franklin, Pamela[Franklin.Pamela@epa.gov]
From: Richard Hyde
Sent: Mon 4/18/2016 1:54:50 PM
Subject: RE: Today's EPA-ONE Future Meeting

Carey

Thanks and it was my pleasure to meet you as well and I also appreciate the productive engagement.

Yes we will send a slide deck this morning like to help facilitate the discussion. I apologize that we didn't get it there Friday. The agenda you laid out is consistent with ours. Look forward to chatting.

From: Bylin, Carey [mailto:Bylin.Carey@epa.gov]
Sent: Monday, April 18, 2016 8:51 AM
To: Richard Hyde
Cc: Fiji George; Pryor, Justin; Franklin, Pamela
Subject: Today's EPA-ONE Future Meeting

Hello Richard,

I hope you had a nice weekend. It was great to meet you last week and we really appreciated the productive engagement to move our discussions forward.

When we left the meeting on Wednesday, my understanding was that ONE Future would provide - by last Friday - a timeline for delivering the various materials/answers we discussed. Is that in process/coming soon? We thought that it would be a good use of our meeting today to go through the timeline. We could also use today's meeting to go through ONE proposed "optional methodologies" for LNG and Processing if you have the final list (one of the action items was for OF to confirm if the LNG and Processing documents we have are final or if some sources will come off the list as happened with T&C). We are also eager to receive the Supplementary Technical Information document that Terri Shires was marking up with our agreed changes.

Are there other items you were planning to discuss today? Please advise.

Ms. Carey Bylin

International Programs Leader, Oil and Gas

Natural Gas STAR Program

Global Methane Initiative

U.S. Environmental Protection Agency

Phone: +1-202-343-9669

Visiting Address & Private Deliveries (courier, FedEx etc.)

1201 Constitution Ave NW, Room Number 4353 UU, Washington DC 20004

U.S. Mail Address:

Mail Code 6207M, 1200 Pennsylvania Ave NW, Washington DC 20460

From: Richard Hyde [mailto:rhyde@aglresources.com]
Sent: Thursday, April 14, 2016 11:14 AM
To: Bylin, Carey <Bylin.Carey@epa.gov>
Cc: Fiji George <Fiji_George@SWN.com>
Subject:

Carey this is the latest drafts. The EPA –ONE Future should have my address in it instead of BlueWater.

Thanks again for the time yesterday. I think we are on a good path.

Richard Hyde

Managing Director

External Affairs and Public Policy

832-397-8501 office

832-457-2279 mobile

rhyde@aglresources.com

EXTERNAL EMAIL – Caution, this message was sent from an external source.

From: Fiji George
Location: MeetingPlace: Ex. 6 - Personal Privacy ID: Ex. 6 - Personal Privacy
Importance: Normal
Subject: EPA-ONE Future Calls: Finalization of programmatic details related to ONE Future Methane Challenge Commitment Option
Start Date/Time: Mon 4/18/2016 6:30:00 PM
End Date/Time: Mon 4/18/2016 7:30:00 PM
EPA-ONE Future Next Steps 3-21-16 REVISED (2).docx

-- Do not delete or change any of the following text. --

Join WebEx meeting
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If you are the host, you can use the meeting host key to pass the host privilege to another participant or to start the meeting from a video conferencing system or application. To find the host key for this meeting, go here.

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Your Cisco Unified MeetingPlace meeting ID: Ex. 6 - Personal Privacy

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REVISED 3/22/16

ONE Future – EPA Methane Challenge
Proposed Next Steps

Possible weekly meeting dates/times: Mondays, 2:30-3:30PM OR Fridays, 1:30-2:30PM

This timeline provides opportunities for EPA and ONE Future to work towards agreement upon key programmatic details in a joint effort to finalize the ONE Future Commitment Option. This schedule will be adjusted as needed.

Key milestones: Finalize ONE Future Commitment Option Supplementary Technical Information
Finalize ONE Future Commitment Option Framework
Finalize and sign EPA-ONE Future MOU
Finalize and sign ONE Future company Partnership Agreements with EPA
Launch ONE Future Commitment Option with Founding Partners

Resolving key issues will entail the following:

- Ensuring that the topic and proposed approaches are clearly understood by both sides
- Evaluating alternatives to allow for common ground
- Making decisions about path forward, specifically how the framework document and Supplemental Technical Information document incorporate agreed-upon language

Proposed Schedule:

Week Of	Milestone / Topics of Discussion
April 11, 2016	Discuss key issues and possible alternatives related to E2 sources • Transmission and Storage Segment Reporting Level (different from GHGRP) • Exceptions to use of GHGRP methods applied to below threshold facilities (e.g., use of non-facility specific activity data and emission quantification methods) Agree to actions to be taken by EPA/ONE Future prior to next meeting
April 18, 2016	Agree to approach on elements discussed in prior meeting and discuss incorporation into the Supplementary Technical Information (STI) Discuss key issues and possible alternatives related to "R" term • Use of direct measurement/alternate emission factors • Concept of "R" overall (i.e., ONE Future expectations for level at which R would be "netted" from total reported emissions Agree to actions to be taken by EPA/ONE Future prior to next meeting
April 25, 2016	Continue discussion of key issues and possible alternatives related to "R" term • Use of direct measurement/alternate emission factors • Concept of "R" overall (i.e., ONE Future expectations for level at which R would be "netted" from total reported emissions

	Agree to approach on these elements and discuss incorporation into the STI (if possible); OR agree to actions to be taken by EPA/ONE Future prior to next meeting
May 2, 2016	Follow up to previous discussions with comprehensive summary of how the agreed-upon approaches will be incorporated into STI and Framework
May 9, 2016	EPA – ONE Future MOU signed
May 16, 2016	Finalize EPA-Methane Challenge ONE Future Framework and Supplemental Technical Information Document
May 23, 2016	Individual companies sign Partnership Agreement with EPA
June TBD	Launch Event of Methane Challenge ONE Future Commitment with founding partners

File As: Methane Challenge Response
First: Methane
Family: Response
Middle: Challenge

Hello Kelly,

This is great news, thank you for letting me know. Attached is information on the launch event. We will be following up with additional details specific to your company's participation in the launch event, pending your final confirmation. Please note that we have revised our Partnership Agreement on the web to allow for modification of the source commitment table if needed: https://www3.epa.gov/gasstar/documents/MC_Partnership_Agreement_Final.pdf

Note that the Partnership Agreement only includes a mailing address, but if you wish you can send a scanned copy of the Partnership Agreement to me via e-mail if that is preferable.

We look forward to working with you on the Methane Challenge Program.

Best,

Carey

From: Howe, James
Location: Dial-In: Ex. 6 - Personal Privacy
Importance: Normal
Subject: Methane Challenge
Start Date/Time: Wed 3/9/2016 8:30:00 PM
End Date/Time: Wed 3/9/2016 9:00:00 PM

;
3:30 eastern/12:30 pacific
Ex. 6 - Personal Privacy
Participant code Ex. 6 - Personal Privacy

From: Gunning, Paul
Location: DCRoomWJCS4232DOAPCCDDir/DC-OAR-OAP
Importance: Normal
Subject: Methane Challenge / Call-in: Ex. 6 - Personal Privacy Code: Ex. 6 - Personal Privacy
Start Date/Time: Mon 3/7/2016 8:00:00 PM
End Date/Time: Mon 3/7/2016 8:30:00 PM

From: Fiji George [mailto:Fiji_George@SWN.COM]
Sent: Friday, March 04, 2016 5:12 PM
To: Gunning, Paul <Gunning.Paul@epa.gov>
Cc: Bylin, Carey <Bylin.Carey@epa.gov>; Franklin, Pamela <Franklin.Pamela@epa.gov>; Hargrove, Anne <Hargrove.Anne@epa.gov>; Jim Kibler <jkibler@aglresources.com>; Richard Hyde <rhyde@aglresources.com>; lschaaff@hess.com; Webster, Anthony <AWebster@hess.com>; Hutchins, Thomas D (Tom) <Thomas_Hutchins@kindermorgan.com>; Edwin.Mongan@bhpbilliton.com; Tom Michels <tmichels@bwstrategies.com>
Subject: RE: Request for call

Thank you Paul for the note.

Would a 30 min. call between 3-4pm eastern work for Pamela, Carrie and yourself? Besides myself, it would include the One Future committee chairs (copied here) and Tom Michels. We want to ensure we are all on track for our Methane Challenge sign-ups as Founding Partners on March 30th.

Thanks,

Fiji George
Southwestern Energy

-----Original Message-----
From: Gunning, Paul [mailto:Gunning.Paul@epa.gov]
Sent: Friday, March 04, 2016 2:30 PM
To: Fiji George
Cc: Bylin, Carey; Franklin, Pamela; Hargrove, Anne
Subject: RE: Request for call

Fiji, good to hear from you. I would be happy to talk and I am looping in Pamela and Carey who have been working closely with Tom. Would this be with all of the members or just a subset? Please let me know what times might work

Paul

-----Original Message-----
From: Fiji George [mailto:Fiji_George@SWN.COM]
Sent: Friday, March 04, 2016 12:18 PM
To: Gunning, Paul <Gunning.Paul@epa.gov>
Subject: Request for call

Paul,

Hope all is well with you. Will you have a few minutes on Monday to discuss One Future/Methane Challenge sign up with a few members?

Thanks,

Fiji George
Southwestern Energy
Notice: This e-mail may contain privileged and/or confidential information and is intended only for the addressee. If you are not the addressee or the person responsible for delivering it to the addressee, you may not copy or distribute this communication to anyone else. If you received this communication in error, please notify us immediately by telephone or return e-mail and promptly delete the original message from your system.

Notice: This e-mail may contain privileged and/or confidential information and is intended only for the addressee. If you are not the addressee or the person responsible for delivering it to the addressee, you may not copy or distribute this communication to anyone else. If you received this communication in error, please notify us immediately by telephone or return e-mail and promptly delete the original message from your system.

From: Butcher, Callee (Kern River)
Location: Teleconference
Importance: Normal
Subject: Methane Challenge
Start Date/Time: Mon 3/7/2016 3:30:00 PM
End Date/Time: Mon 3/7/2016 4:00:00 PM

.....
,,,,,,,,,
All,
Berkshire Hathaway Energy's Pipeline Group would like to discuss EPA's Methane Challenge Program. Below is a call in number to attend this meeting. Please let me know if you have any questions.

Callee Butcher
Manager, Land & Environment
Kern River Gas Transmission
2755 E. Cottonwood Parkway, Suite 300
Salt Lake City, UT 84121
801-937-6056 (office)
801-518-3342 (cell)
callee.butcher@kernrivergas.com

.....

Join Skype Meeting

This is an online meeting for Skype for Business, the professional meetings and communications app formerly known as Lync.

Join by phone

Ex. 6 - Personal Privacy (Kern River) English (United States)
Ex. 6 - Personal Privacy (Kern River) English (United States)
Find a local number
Conference ID: Ex. 6 - Personal Privacy
Forgot your dial-in PIN? | Help

.....

From: Tom Michels
Location: Ex. 6 - Personal Privacy
Importance: Normal
Subject: Carey Byline/ONE Future Call
Start Date/Time: Thur 2/25/2016 6:30:00 PM
End Date/Time: Thur 2/25/2016 7:00:00 PM

Carey,
As I noted in my earlier email, several of our member company reps would like to join our call at 1:30, and I think their presence will help us more quickly resolve some key issues. Please use my teleconference line:
Dial In: Ex. 6 - Personal Privacy
Participant Passcode: Ex. 6 - Personal Privacy

From: Kurtovich, Martin
Location: Call in number is Ex. 6 - Personal Privacy passcode - Ex. 6 - Personal Privacy
Importance: Normal
Subject: Conference Call with EPA Methane Challenge Staff
Start Date/Time: Wed 1/6/2016 5:00:00 PM
End Date/Time: Wed 1/6/2016 6:00:00 PM

;
Conference Call with Carey Bylin, Justin Pryor, and Suzanne Waltzer with EPA Global Methane Initiative to share information on Federal Methane Challenge program efforts and California development of regulations for methane emissions from natural gas distribution systems.
I will put together an agenda for the call in the next couple of weeks. Let me know if you have specific topics you want included in the conference call.

From: Goffman, Joseph
Location: 1200 Pennsylvania Avenue, NW, William Jefferson Clinton Building, Washington, DC 20460
Importance: Normal
Subject: ONE Future Meeting | Conference: Ex. 6 - Personal Privacy Participant Code: Ex. 6 - Personal Privacy
Start Date/Time: Tue 12/1/2015 5:00:00 PM
End Date/Time: Tue 12/1/2015 6:00:00 PM
RE: ONE Future Meeting Request

To: Tsirigotis, Peter; Gunning, Paul; Bylin, Carey
Outside Attendees: Tom Michels + TBD

From: Bylin, Carey
Importance: Normal
Subject: One future
Start Date/Time: Wed 11/25/2015 2:30:00 PM
End Date/Time: Wed 11/25/2015 3:30:00 PM

From: Harrison, Matt
Location: webmeeting
Importance: Normal
Subject: FW: ONE Future Weekly Technical Meeting
Start Date/Time: Thur 10/15/2015 7:00:00 PM
End Date/Time: Thur 10/15/2015 8:15:00 PM

...
,,,
-----Original Appointment-----
From: Harrison, Matt [mailto:matt.harrison@aecom.com]
Sent: Monday, September 21, 2015 5:52 PM
To: Harrison, Matt; 'Fiji_George@SWN.COM'; Tom Michels; 'edwin.mongan@bhpbilliton.com'; Richard Hyde; Kay-Linh Pham; Shires, Terri; Bluestein, Joel; Lesley Schaaff; Chahbazpour, Donald; CJ Doiron; David Crawford; Douglas Jordan; Farrah Lowe; Greg Corbett; Greg Jones; James_Tangeman@kindermorgan.com; jason.buckner@bhpbilliton.com; Jim Bolander; John Williams; MFord@hess.com; 'Taft, Alexander G.'; vwagner@nisource.com; awebster@hess.com; Charles Moran (cmoran@cpg.com); Edward White; Fred Hagemeyer; Jim Kibler; Jon Graham; Mark Boling; Thomas Hutchins
Subject: ONE Future Weekly Technical Meeting
When: Thursday, October 15, 2015 3:00 PM-4:15 PM (UTC-05:00) Eastern Time (US & Canada).
Where: webmeeting

Dear ONE Future Members and Experts,

This is the renewal of the weekly OF technical call. (Others are copied just for reference) Renewed through November 2015.

Terri Shires (512-419-5466) will lead any meetings that occur while I am travelling.

Matt Harrison
512-694-0572

To connect to the AT&T Web Conference, use these 2 steps:

1. Click here: **Ex. 6 - Personal Privacy**
2. Select "call me back" when prompted. As long as you don't have to go through a switchboard, you can enter your direct dial phone number and it will call you back. That's it, you in the web meeting and call.

Note: If you have never joined an AT&T webmeeting, you may need a few minutes to upload the software that allows you to join. The system will ask you to Select "participant application" or "web-only". We-only is easier and quicker. THE ADVANTAGE OF THE "PARTICIPANT APPLICATION" IS THAT WE CAN MAKE YOU THE PRESENTER, IF NEEDED. IF YOU ARE LOGGED ON ONLY THROUGH THE WEBLINK, YOU CANNOT BE A PRESENTER. If you do not need to present, then Web-only is usually easier to upload.

Backup plan: NOTE: IN CASE YOU WISH TO CONNECT WITH YOUR ***TELEPHONE ONLY*** (no computer):

1. Choose one of the following numbers to dial:

- Toll-Free Number (in USA): Ex. 6 - Personal Privacy
- Caller-Paid number: Ex. 6 - Personal Privacy
- Blackberry (Toll-Free Number): **Ex. 6 - Personal Privacy**
- A number in your country or in a country close to you (may be toll free):

Ex. 6 - Personal Privacy

2. When prompted, enter the meeting access code: Ex. 6 - Personal Privacy

From: Brian Jones
Location: Ex. 6 - Personal Privacy
Importance: Normal
Subject: DSI-EPA Call - Methane Challenge Program
Start Date/Time: Fri 9/11/2015 2:00:00 PM
End Date/Time: Fri 9/11/2015 4:00:00 PM

On this call we will continue our discussion with EPA of the BMP commitment option.

From: Brian Jones
Location: Ex. 6 - Personal Privacy
Importance: Normal
Subject: DSI-EPA Call - Methane Challenge Program
Start Date/Time: Fri 8/28/2015 2:00:00 PM
End Date/Time: Fri 8/28/2015 4:00:00 PM

;
On this call we will continue our discussion of the BMP commitment option.

From: Brian Jones
Location: Ex. 6 - Personal Privacy
Importance: Normal
Subject: DSI-EPA Call - Methane Challenge Program
Start Date/Time: Thur 8/13/2015 7:00:00 PM
End Date/Time: Thur 8/13/2015 8:00:00 PM

;

From: Matthew Todd
Importance: Normal
Subject: Meeting at API on EPA Methane Challenge (Ex. 6 - Personal Privacy)
Start Date/Time: Tue 8/11/2015 5:00:00 PM
End Date/Time: Tue 8/11/2015 6:30:00 PM

;
Carey,
Please join us at API to discuss the Methane Challenge voluntary program. Feel free to forward the meeting and conference call information to others at EPA. As we discussed, we can use the following agenda to guide the discussion:

- Introductions - All
- Latest Info and Supplemental Material – EPA
- API Feedback - API
- Review of API Leak Program - API
- Questions/Discussion - API
- Next Steps

Date: August 11th
Time: 1 pm to 2:30 pm
Phone: Ex. 6 - Personal Privacy
Code: Ex. 6 - Personal Privacy
Location: API, 1220 L ST NW
Room: 1200
Thanks,
Matt

From: Matthew Todd
Importance: Normal
Subject: Agenda for API Meeting on Methane Challenge
Start Date/Time: Thur 8/6/2015 5:00:00 PM
End Date/Time: Thur 8/6/2015 5:30:00 PM

;
Carey – I'll plan to be in my office @ 202-682-8319.
Thanks,
Matt

To: Goffman, Joseph[Goffman.Joseph@epa.gov]
Cc: Gunning, Paul[Gunning.Paul@epa.gov]; Tsirigotis, Peter[Tsirigotis.Peter@epa.gov]; Browne, Cynthia[Browne.Cynthia@epa.gov]
From: Tom Michels
Sent: Mon 11/30/2015 5:29:03 PM
Subject: RE: ONE Future Meeting Request

;;;;;;
Joe et al,

Two questions:

1. Would it be possible to have a few of our members join by phone tomorrow afternoon? If so just let me know if you need us to provide a dial-in.

2. Secondly, what room will we meet in, and who will be the contact name/number we should provide to security?

Many thanks!

Tom Michels

Direct – 202-589-1759

Office – 202-589-0015

Mobile –202-413-2059

From: Goffman, Joseph [mailto:Goffman.Joseph@epa.gov]
Sent: Wednesday, November 25, 2015 3:07 PM
To: Tom Michels
Cc: Gunning, Paul; Tsirigotis, Peter; Browne, Cynthia
Subject: Re: ONE Future Meeting Request

Feel free to give me a call if you feel like it. Thanks

- Joseph Goffman

Sent from my iPhone

On Nov 25, 2015, at 2:57 PM, Tom Michels <tmichels@bwstrategies.com> wrote:

The later slot would be preferable, but either will work. Many thanks for the rapid response!

Tom Michels

Direct – 202-589-1759

Office – 202-589-0015

Mobile –202-413-2059

From: Goffman, Joseph [mailto:Goffman.Joseph@epa.gov]
Sent: Wednesday, November 25, 2015 2:56 PM
To: Tom Michels
Cc: Gunning, Paul; Tsirigotis, Peter; Browne, Cynthia
Subject: Re: ONE Future Meeting Request

Let's try to set something up. Looks like I have openings between 10:30 and 11:30 and between noon and 1:00 on December 1. Thanks

- Joseph Goffman

Sent from my iPhone

On Nov 25, 2015, at 2:52 PM, Tom Michels <tmichels@bwstrategies.com> wrote:

Joe, Peter, and Paul-

I hope this note finds you well. I'm writing to see if it would be possible to schedule a meeting with the three of you for early next week to discuss ONE Future's views on the interplay between the Methane Challenge program and the proposed OOOOa/CTGs/Aggregation rules that are pending.

It's important that we convey our concerns with regard to how the rules are shaking out, and what the implications are for the future of the voluntary methane reduction initiatives now underway. I've discussed the subject briefly with Paul Gunning today, but we'd like to the opportunity to thresh out the issues with the three of you if at all possible.

We have at least a few of our Board members willing to fly to DC, and the rest would try to call in. Tuesday, Dec 1 would be optimal, but we'll take what we can get.

We know it's a very busy time for everyone, and we're grateful for your consideration. Don't hesitate to call or email with any questions.

Thank you and Happy Thanksgiving!

-Tom

Tom Michels

Executive Director,

ONE Future Coalition

www.onefuture.us

Principal,

BlueWater Strategies llc

25 Massachusetts Avenue, NW

Suite 820

Washington, DC 20001

tmichels@bwstrategies.com

Direct – 202-589-1759

Office – 202-589-0015

Mobile –202-413-2059

This message may contain information that is privileged or confidential. If you receive this transmission in error, please notify the sender by reply e-mail and delete the message and any attachments.

To: Michael Grenz[Michael.Grenz@nblenergy.com]; Kate Fay[Kate.Fay@nblenergy.com]; Bylin, Carey[Bylin.Carey@epa.gov]; Angela Perry (Contractor)[Angela.Perry@nblenergy.com]
Cc: Franklin, Pamela[Franklin.Pamela@epa.gov]
From: Pryor, Justin
Sent: Wed 4/13/2016 8:01:44 PM
Subject: RE: April 20 conference call with AXPC Environmental Committee

Hi Michael,

Anytime between 10:00-12:00 (eastern) would work well for me.

Thank you,

Justin

Justin Pryor

Climate Change Division

U.S. Environmental Protection Agency

202-343-9258

From: Michael Grenz [mailto:Michael.Grenz@nblenergy.com]
Sent: Wednesday, April 13, 2016 3:59 PM
To: Kate Fay <Kate.Fay@nblenergy.com>; Bylin, Carey <Bylin.Carey@epa.gov>; Angela Perry (Contractor) <Angela.Perry@nblenergy.com>
Cc: Pryor, Justin <Pryor.Justin@epa.gov>; Franklin, Pamela <Franklin.Pamela@epa.gov>
Subject: RE: April 20 conference call with AXPC Environmental Committee

Thank you Carey, Justin and Pamela for taking the time to talk with AXPC on this item.

Angie, can you please send out an invite for the 5 of us to meet, via teleconference, preferably tomorrow morning. My availability before 1 eastern is between 9:30-11:30 eastern. Are there any preferences for scheduling this meeting based on people's availability? Also is 30 minutes enough time or do we need longer?

Thank you

Michael Grenz

Offshore EHSR Sr. Manager

Michael.Grenz@nblenergy.com

Please note that my email has recently changed.

1001 Noble Energy Way

Houston, TX 77070

Cell: 281-435-7091

Office: 281-872-2668

Fax: 281-569-2307

www.nobleenergyinc.com

From: Kate Fay
Sent: Wednesday, April 13, 2016 2:10 PM
To: Bylin, Carey

Cc: Pryor, Justin; Franklin, Pamela; Michael Grenz
Subject: Re: April 20 conference call with AXPC Environmental Committee

Oops. Never looped Mike in.

Sent from my iPhone

Kate Fay

Ex. 6 - Personal Privacy (cell)

On Apr 12, 2016, at 4:34 PM, Kate Fay <Kate.Fay@nblenergy.com> wrote:

Carey:

Great! Thanks. I am looping in Mike Grenz so he knows the time slot for his agenda. Also, Mike, could you schedule a time for us all to talk so we can help the EPA team prepare for this meeting? Thursday works for me, as it appears it does for Justin and Carey.

Thanks again, EPA team. This is much appreciated.

Kate

Please note my new email address: **kate.fay@nblenergy.com**

Kate Fay

Manager, Environmental and Regulatory Policy

Noble Energy, Inc.

1625 Broadway, Suite 2200

Denver, Colorado 80202

Ex. 6 - Personal Privacy (cell)

720.587.2397 (office)

From: Bylin, Carey [mailto:Bylin.Carey@epa.gov]
Sent: Tuesday, April 12, 2016 1:33 PM
To: Kate Fay
Cc: Pryor, Justin; Franklin, Pamela
Subject: EXTERNAL: RE: April 20 conference call with AXPC Environmental Committee

Hi Kate,

Thanks again for organizing this opportunity for us to present to AXPC. We'd like to take the 3-3:30p slot and Justin Pryor and Pamela Franklin will be representing the EPA.

Justin and I can plan to have a call with you and Mike this week to discuss. Would Thursday work? WE are available any time before 1p on that day. Also, do you have a preference on us sharing a presentation vs. talking through the program?

Ms. Carey Bylin

International Programs Leader, Oil and Gas

Natural Gas STAR Program

Global Methane Initiative

U.S. Environmental Protection Agency

Phone: +1-202-343-9669

Visiting Address & Private Deliveries (courier, FedEx etc.)

1201 Constitution Ave NW, Room Number 4353 UU, Washington DC 20004

U.S. Mail Address:

Mail Code 6207M, 1200 Pennsylvania Ave NW, Washington DC 20460

<image001.gif>

From: Kate Fay [mailto:Kate.Fay@nblenergy.com]
Sent: Tuesday, April 12, 2016 9:06 AM
To: Bylin, Carey <Bylin.Carey@epa.gov>
Cc: Gunning, Paul <Gunning.Paul@epa.gov>
Subject: Re: April 20 conference call with AXPC Environmental Committee

Perfect. And Geneva is lovely! All of Switzerland this lovely. I've been able to go many times. If you have a couple of extra days there are other wonderful things to do. And you're really close to France

Sent from my iPhone

Kate Fay

Ex. 6 - Personal Privacy (cell)

On Apr 12, 2016, at 6:55 AM, Bylin, Carey <Bylin.Carey@epa.gov> wrote:

> I will be in Geneva for a meeting – I don't know about magnificent but I've never been so it will be interesting.

Regarding the tough questions, I have asked if two people can participate on my behalf for exactly that reason! We will be prepared and also will make use of the "stage setting" meeting you've kindly offered.

Ms. Carey Bylin

International Programs Leader, Oil and Gas

Natural Gas STAR Program

Global Methane Initiative

U.S. Environmental Protection Agency

Phone: +1-202-343-9669

Visiting Address & Private Deliveries (courier, FedEx etc.)

1201 Constitution Ave NW, Room Number 4353 UU, Washington DC 20004

U.S. Mail Address:

Mail Code 6207M, 1200 Pennsylvania Ave NW, Washington DC 20460

<image001.gif>

From: Kate Fay [mailto:Kate.Fay@nblenergy.com]
Sent: Tuesday, April 12, 2016 8:50 AM
To: Bylin, Carey <Bylin.Carey@epa.gov>
Cc: Gunning, Paul <Gunning.Paul@epa.gov>
Subject: Re: April 20 conference call with AXPC Environmental Committee

I hope you are going somewhere magnificent. Thanks for checking on an alternate. Disappointed it won't be you. My only suggestion is to make sure there is someone who can answer some polite but possibly tough questions.

Thanks.
Sent from my iPhone

Kate Fay

Ex. 6 - Personal Privacy (cell)

On Apr 12, 2016, at 6:31 AM, Bylin, Carey <Bylin.Carey@epa.gov> wrote:

Kate,

Thank you for getting in touch and for your efforts to help promote Methane Challenge. We really appreciate it.

I will be on international travel on April 20 but I'm fairly certain we can cover. I will check with my colleagues and come back to you on who can participate in my place.

Best,

Carey

Ms. Carey Bylin

International Programs Leader, Oil and Gas

Natural Gas STAR Program

Global Methane Initiative

U.S. Environmental Protection Agency

Phone: +1-202-343-9669

Visiting Address & Private Deliveries (courier, FedEx etc.)

1201 Constitution Ave NW, Room Number 4353 UU, Washington DC 20004

U.S. Mail Address:

Mail Code 6207M, 1200 Pennsylvania Ave NW, Washington DC 20460

<image001.gif>

From: Kate Fay [mailto:Kate.Fay@nblenergy.com]
Sent: Monday, April 11, 2016 5:31 PM
To: Bylin, Carey <Bylin.Carey@epa.gov>
Cc: Gunning, Paul <Gunning.Paul@epa.gov>
Subject: April 20 conference call with AXPC Environmental Committee

Carey:

You may recall that we spoke about a month ago regarding having you participate in a short meeting with AXPC's environmental leadership to answer questions about the voluntary methane program. There is no need to fly to OK for this (not that you had committed to doing so:). However, would you be able to make yourself available for 20 to 30 minutes on April 20 between 2 pm and 4 pm eastern time? If so, I will arrange a short call with the Committee Chair (Mike Grenz, also of Noble), you and me to "set the stage" for you. Personally, I think this would be a great opportunity to help generate more interest in the program among oil and gas producers. I am always an optimist!!

Please advise

Thanks

Kate

Please note my new email address: kate.fay@nblenergy.com

Kate Fay

Manager, Environmental and Regulatory Policy

Noble Energy, Inc.

1625 Broadway, Suite 2200

Denver, Colorado 80202

Ex. 6 - Personal Privacy (cell)

720.587.2397 (office)

To: Bylin, Carey[Bylin.Carey@epa.gov]
Cc: Gunning, Paul[Gunning.Paul@epa.gov]
From: Kate Fay
Sent: Tue 4/12/2016 12:50:12 PM
Subject: Re: April 20 conference call with AXPC Environmental Committee

I hope you are going somewhere magnificent. Thanks for checking on an alternate. Disappointed it won't be you. My only suggestion is to make sure there is someone who can answer some polite but possibly tough questions.

Thanks.
Sent from my iPhone
Kate Fay
Ex. 6 - Personal Privacy (cell)

On Apr 12, 2016, at 6:31 AM, Bylin, Carey <Bylin.Carey@epa.gov> wrote:

Kate,

Thank you for getting in touch and for your efforts to help promote Methane Challenge. We really appreciate it.

I will be on international travel on April 20 but I'm fairly certain we can cover. I will check with my colleagues and come back to you on who can participate in my place.

Best,

Carey

Ms. Carey Bylin

International Programs Leader, Oil and Gas

Natural Gas STAR Program

Global Methane Initiative

U.S. Environmental Protection Agency

Phone: +1-202-343-9669

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1201 Constitution Ave NW, Room Number 4353 UU, Washington DC 20004

U.S. Mail Address:

Mail Code 6207M, 1200 Pennsylvania Ave NW, Washington DC 20460

<image001.gif>

From: Kate Fay [mailto:Kate.Fay@nblenergy.com]
Sent: Monday, April 11, 2016 5:31 PM
To: Bylin, Carey <Bylin.Carey@epa.gov>
Cc: Gunning, Paul <Gunning.Paul@epa.gov>
Subject: April 20 conference call with AXPC Environmental Committee

Carey:

You may recall that we spoke about a month ago regarding having you participate in a short meeting with AXPC's environmental leadership to answer questions about the voluntary methane program. There is no need to fly to OK for this (not that you had committed to doing so:). However, would you be able to make yourself available for 20 to 30 minutes on April 20 between 2 pm and 4 pm eastern time? If so, I will arrange a short call with the Committee Chair (Mike Grenz, also of Noble), you and me to "set the stage" for you. Personally, I think this would be a great opportunity to help generate more interest in the program among oil and gas producers. I am always an optimist!!

Please advise

Thanks

Kate

Please note my new email address: kate.fay@nblenergy.com

Kate Fay

Manager, Environmental and Regulatory Policy

Noble Energy, Inc.

1625 Broadway, Suite 2200

Denver, Colorado 80202

Ex. 6 - Personal Privacy **(cell)**

720.587.2397 (office)

To: Pryor, Justin[Pryor.Justin@epa.gov]
Cc: Bylin, Carey[Bylin.Carey@epa.gov]
From: Keeble, Gwen
Sent: Mon 4/11/2016 2:31:48 PM
Subject: RE: Additional information pertaining to the Natural Gas STAR Methane Challenge Program -- Orange and Rockland Utilities, Inc. <External Sender>

Hi! Sorry for the delay, we are happy with September 30th as our start date, with reporting starting in 2017. Thank you!

From: Pryor, Justin [mailto:Pryor.Justin@epa.gov]
Sent: Monday, April 11, 2016 10:28 AM
To: Keeble, Gwen
Cc: Bylin, Carey
Subject: RE: Additional information pertaining to the Natural Gas STAR Methane Challenge Program -- Orange and Rockland Utilities, Inc. <External Sender>

Good Morning Gwen,

I work on the Methane Challenge Program with Carey Bylin, and we were wondering if you have been able to confirm a start date yet for the Mains and Services commitment? I will update the Partnership Agreement once this information is confirmed and send you a revised copy.

Thank you for your assistance!

Respectfully,

Justin Pryor

Climate Change Division

U.S. Environmental Protection Agency

202-343-9258

From: Bylin, Carey
Sent: Monday, March 28, 2016 2:23 PM
To: 'Keeble, Gwen' <keebleg@oru.com>
Subject: RE: Additional information pertaining to the Natural Gas STAR Methane Challenge Program -- Orange and Rockland Utilities, Inc. <External Sender>

Hi Gwen,

I hope you had a good weekend. Just checking in on this, as I'd like to return the signed Agreement to you today. Please advise on start date. Thank you!

Ms. Carey Bylin

International Programs Leader, Oil and Gas

Natural Gas STAR Program

Global Methane Initiative

U.S. Environmental Protection Agency

Phone: +1-202-343-9669

Visiting Address & Private Deliveries (courier, FedEx etc.)

1201 Constitution Ave NW, Room Number 4353 UU, Washington DC 20004

U.S. Mail Address:

Mail Code 6207M, 1200 Pennsylvania Ave NW, Washington DC 20460

From: Keeble, Gwen [mailto:keebleg@oru.com]
Sent: Friday, March 25, 2016 10:52 AM
To: Bylin, Carey <Bylin.Carey@epa.gov>
Subject: RE: Additional information pertaining to the Natural Gas STAR Methane Challenge Program -- Orange and Rockland Utilities, Inc. <External Sender>

Great thank you! Let me check with our Gas folks to confirm the start date they'd like to go with. Thank you!

From: Bylin, Carey [mailto:Bylin.Carey@epa.gov]
Sent: Friday, March 25, 2016 10:45 AM
To: Keeble, Gwen
Subject: RE: Additional information pertaining to the Natural Gas STAR Methane Challenge Program -- Orange and Rockland Utilities, Inc. <External Sender>

Hi Gwen,

Thank you for getting in touch. Yes, we received your Partnership Agreement and will get a countersigned version to you today or Monday.

The Start Date is listed as "2016" for Mains and Services. The Start Date is supposed to be a specific date that is within six months of joining the Program, so the latest it can be is September 30, 2016. Are you okay with our recognizing your Start Date as 9/30/16? Or you can choose another date between the launch and that point. The significance of the start date is that is when companies need to start collecting the data they need to track commitments (though for founding

partners comprehensive reporting will start for the 2017 calendar year).

Please advise what you would like your start date to be and I will make the needed change to the Partnership Agreement.

Ms. Carey Bylin

International Programs Leader, Oil and Gas

Natural Gas STAR Program

Global Methane Initiative

U.S. Environmental Protection Agency

Phone: +1-202-343-9669

Visiting Address & Private Deliveries (courier, FedEx etc.)

1201 Constitution Ave NW, Room Number 4353 UU, Washington DC 20004

U.S. Mail Address:

Mail Code 6207M, 1200 Pennsylvania Ave NW, Washington DC 20460

From: Keeble, Gwen [mailto:keebleg@oru.com]
Sent: Friday, March 25, 2016 10:19 AM

To: 'bylin.carey@epa.gov'
Subject: RE: Additional information pertaining to the Natural Gas STAR Methane Challenge Program -- Orange and Rockland Utilities, Inc.

Good morning – I am confirming you have received our agreement document and checking to see if you need anything further. I spoke with Bill Slade this morning who suggested I might want to check in to be sure our information was received, and the start date is appropriate.

Thanks!

Gwen Keeble

845-577-3534

917-418-5764

From: Keeble, Gwen
Sent: Wednesday, March 23, 2016 3:17 PM
To: 'elina.bouloubasis@erg.com'; 'bylin.carey@epa.gov'
Subject: FW: Additional information pertaining to the Natural Gas STAR Methane Challenge Program -- Orange and Rockland Utilities, Inc.

Today, Orange and Rockland Utilities, Inc. filed its signed Methane Challenge Partnership Agreement via email, with a hard copy sent overnight. Below please see the additional requested information.

Orange and Rockland will be represented at the forum by our colleagues from Con Ed Co. of NY, Mr. Kyle Kimball, VP of Government Relations, and Mr. Bill Slade the Emerging Issues Manager. Please feel free to reach out to me with any questions or concerns.

Gwen Keeble

Section Manager – Environmental Services

Orange and Rockland Utilities, Inc.

845-577-3534

917-418-5764

keebleg@oru.com

See below for additional requested information from Orange and Rockland Utilities.

-----Original Message-----
From: U.S. EPA's Natural Gas STAR Program [mailto:gasstar@erg.com]
Sent: Wednesday, March 16, 2016 5:15 PM
To: Slade, William
Subject: Thank You For Your Interest in the Natural Gas STAR Methane Challenge Program
<External Sender>

EXTERNAL SENDER. Do not click on links if sender is unknown and never provide user ID or password.

Dear Bill:

On behalf of the U.S. Environmental Protection Agency (EPA), I am pleased to hear of your interest in joining the Natural Gas STAR Methane Challenge Program as a founding partner. We will be officially launching this new program at the Global Methane Forum (GMF) at 10:00am on March 30, 2016 in Washington, D.C.

The launch event will be hosted by Janet McCabe, EPA's Acting Assistant Administrator for Air and Radiation. If you confirm your participation as a founding partner, we encourage you to

attend this exciting event. We will recognize your company even if you are not able to participate in person. Please be aware of the following next steps:

-By March 23, please contact us (see contact information below) to confirm that you will be joining as a founding partner, and provide your signed Partnership Agreement.

The Orange and Rockland partnership agreement was emailed today, and sent via hard copy today.

o Provide us a short bio (approximately 75 words) describing your company, your commitments, and highlighting reasons for becoming a Methane Challenge partner.

Orange and Rockland has participated in the Natural Gas STAR program since 1994, and welcomes the opportunity to join the Methane Challenge. Orange and Rockland distributes natural gas to 133,267 customers in Orange and Rockland counties in New York.

Last year the Company made significant improvements in reducing the total leak backlog, replacing 17 miles of leak prone pipe in each of the past three years. Our goal with this Partnership Agreement is to replace 6.5% of our cast iron and unprotected (bare) steel mains by the end of 2016.

o If your company plans to attend the Launch Event, provide the name, title, and contact information of the person who will be representing your company at the event and, if different, the contact information for the individual coordinating your company's participation at the event.

Orange and Rockland will be represented by our colleagues at Con Ed Co. of NY:

Mr. Kyle Kimball

Vice President, Government Relations

Consolidated Edison Company of New York

4 Irving Place

New York, NY 10003

kimballk@coned.com

212-460-2706

Coordinating:

Mr. William V. Slade

(b)(6) personal privacy **(cell)**

sladew@coned.com

-Also, by March 23, please provide a link to your company's website as well as the specific way your company should be listed on the Methane Challenge Program website.

Orange and Rockland Utilities, Inc.

www.oru.com

-Be sure to register for the GMF as soon as possible (http://globalmethane.org/forum/).

Both Kyle Kimball and Bill Slade are registered for the Global Methane Forum

Please send the above information to myself and Elina Bouloubasis (elina.bouloubasis@erg.com). Once we receive confirmation of your participation, we will provide more specific details about the launch event agenda, which will include recognition of each partner and individual and group photos. Please note that due to time constraints, we do not anticipate that partner companies will be able to give individual remarks at the event.

As a new Methane Challenge Program partner, there are a few next steps to be aware of. Within six months after joining the Program, each partner must develop an Implementation Plan to provide details on their planned participation, such as anticipated rate of progress, key milestones, and other relevant context. See the following Guidelines document for more information about how to develop an Implementation Plan: http://www3.epa.gov/gasstar/documents/MC_IP_Guidelines_Final.pdf.

We will also be working with partners as we develop the Program's reporting system, and will be seeking input and feedback in the coming months. Finally, in an effort to further highlight our partners' accomplishments, we aim to work with partners to develop "Fact Sheets" that cover notable historical actions taken in advance of the Methane Challenge Program in efforts to mitigate methane emissions.

We encourage you to attend the full GMF event that will offer high-level plenary sessions on cross-cutting issues such as project financing, joint Global Methane Initiative (GMI)-Climate & Clean Air Coalition (CCAC) discussions on projects and policy, and ample opportunities for networking with methane experts in the public and private sectors from around the world. A draft agenda is available at http://globalmethane.org/forum/. We hope you are able to attend and participate in the sessions.

Please feel free to contact me or Justin Pryor (202-343-9258 or pryor.justin@epa.gov) with any questions you may have about the Methane Challenge Partnership. Please contact Elina Bouloubasis (703-373-0149 or elina.bouloubasis@erg.com) with any questions about the launch event. Thank you again for your support of the Methane Challenge Program and we hope to see you at the launch event in Washington, D.C.

Sincerely,

Ms. Carey Bylin

U.S. Environmental Protection Agency

202-343-9669

bylin.carey@epa.gov

To: Bylin, Carey[Bylin.Carey@epa.gov]
From: Richard Hyde
Sent: Thur 4/21/2016 12:28:45 PM
Subject: RE: Revised STI Document

That works perfectly, can I call you? What is best number?

-----Original Message-----
From: Bylin, Carey [mailto:Bylin.Carey@epa.gov]
Sent: Thursday, April 21, 2016 7:27 AM
To: Richard Hyde
Subject: Re: Revised STI Document

Yes, that works, and thank you for taking the first draft of the agenda. Does 930a Eastern work for you?

Carey Bylin

> On Apr 21, 2016, at 2:07 PM, Richard Hyde <rhyde@aglresources.com> wrote:
>
> Yes, how about Monday morning. I can send you an agenda and then we can chat about it.
>
> -----Original Message-----
> From: Bylin, Carey [mailto:Bylin.Carey@epa.gov]
> Sent: Thursday, April 21, 2016 4:09 AM
> To: Richard Hyde
> Subject: Re: Revised STI Document
>
> Hello Richard,
>
> Thank you for this. We will review.
>
> I'm in Geneva this week, but can we plan to touch base Friday afternoon or Monday morning to agree to an agenda for the next meeting?
>
> Carey Bylin
>
>> On Apr 19, 2016, at 11:20 PM, Richard Hyde <rhyde@aglresources.com> wrote:
>>
>> Carey here is our revised STI
>>
>>
>>
>> Sent with Good (www.good.com)
>>
>> _____
>> From: Shires, Terri
>> Sent: Tuesday, April 19, 2016 3:51:55 PM
>> To: Fiji George; Edwin.Mongan@bhpbilliton.com; Richard Hyde
>> Cc: Harrison, Matt
>> Subject: Revised STI Document
>>
>> Attached is the updated STI document to provide to EPA.
>>
>>
>> Terri Shires
>> Senior Engineer and Project Manager, Design and Construction

To: Bylin, Carey[Bylin.Carey@epa.gov]
From: Richard Hyde
Sent: Tue 4/19/2016 9:20:24 PM
Subject: FW: Revised STI Document
MC-ONE-Future-STI-11-24-15_OF Markups_19Apr2016.docx

Carey here is our revised STI

Sent with Good (www.good.com)

From: Shires, Terri
Sent: Tuesday, April 19, 2016 3:51:55 PM
To: Fiji George; Edwin.Mongan@bhpbilliton.com; Richard Hyde
Cc: Harrison, Matt
Subject: Revised STI Document

Attached is the updated STI document to provide to EPA.

Terri Shires
Senior Engineer and Project Manager, Design and Construction Services, Gulf Coast Region
D +1-512-419-5466
M +1-512-497-6482
Terri.Shires@aecom.com<mailto:Terri.Shires@aecom.com>

AECOM
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Austin, Texas 78729, USA
T +1-512-454-4797
aecom.com<https://urldefense.proofpoint.com/v2/url?u=http-3A__www.aecom.com&d=CwMFAg&c=rOvAD26T1QcK75GyLb6a7GqUuR23p33SZf-jUeqbghE&r=056KpDnRSoS2URB522qkYGiG_Afk4IwVeeG7CoM3tzM&m=4OGcOYcCCQSUIuZxxfK1JVNkD8_c3-jrNd3snJlDY5k&s=dxgc-sCCbGSCATiYoFhPFvUuiSQ520bTYKThJhOHTyI&e=>

Built to deliver a better world

LinkedIn<https://urldefense.proofpoint.com/v2/url?u=http-3A__www.linkedin.com_company_aecom-5F15656&d=CwMFAg&c=rOvAD26T1QcK75GyLb6a7GqUuR23p33SZf-jUeqbghE&r=056KpDnRSoS2URB522qkYGiG_Afk4IwVeeG7CoM3tzM&m=4OGcOYcCCQSUIuZxxfK1JVNkD8_c3-jrNd3snJlDY5k&s=CAD1sj9DoKhJ4WZnzS0LtgPVPuZkZ8gCibo7Iktk45c&e=>
Twitter<https://urldefense.proofpoint.com/v2/url?u=http-3A__twitter.com_AECOM&d=CwMFAg&c=rOvAD26T1QcK75GyLb6a7GqUuR23p33SZf-jUeqbghE&r=056KpDnRSoS2URB522qkYGiG_Afk4IwVeeG7CoM3tzM&m=4OGcOYcCCQSUIuZxxfK1JVNkD8_c3-jrNd3snJlDY5k&s=oWLMo4f42ZKEWmZ7USNb_AfD_KkAdH8hKmKeoCtV4L8&e=>
Facebook<https://urldefense.proofpoint.com/v2/url?u=http-3A__www.facebook.com_AecomTechnologyCorporation&d=CwMFAg&c=rOvAD26T1QcK75GyLb6a7GqUuR23p33SZf-jUeqbghE&r=056KpDnRSoS2URB522qkYGiG_Afk4IwVeeG7CoM3tzM&m=4OGcOYcCCQSUIuZxxfK1JVNkD8_c3-jrNd3snJlDY5k&s=5NCwwAUP5_E8qLx0G4uWHOKzN9FvFkcV4AfZ4XGW7qk&e=>
Instagram<https://urldefense.proofpoint.com/v2/url?u=http-3A__instagram.com_aecom&d=CwMFAg&c=rOvAD26T1QcK75GyLb6a7GqUuR23p33SZf-jUeqbghE&r=056KpDnRSoS2URB522qkYGiG_Afk4IwVeeG7CoM3tzM&m=4OGcOYcCCQSUIuZxxfK1JVNkD8_c3-jrNd3snJlDY5k&s=KkkwfliLUUq-jZfuSMOSE7gzGySqcBJCtz4WqhqorBU&e=>

To: Franklin, Pamela[Franklin.Pamela@epa.gov]; Pryor, Justin[Pryor.Justin@epa.gov]
Cc: Bylin, Carey[Bylin.Carey@epa.gov]; Kate Fay[Kate.Fay@nblenergy.com]
From: Michael Grenz
Sent: Tue 4/19/2016 1:18:15 AM
Subject: RE: April 20 conference call with AXPC Environmental Committee

Pamela and Justin,

Please see below for the call in information for Wednesday at 3:00 pm eastern / 2:00 pm central. Thank you again for taking the time to chat with us.

JOIN BY PHONE

Number: Ex. 6 - Personal Privacy

Participant Passcode: Ex. 6 - Personal Privacy

Michael Grenz

Offshore EHSR Sr. Manager

Michael.Grenz@nblenergy.com

Please note that my email has recently changed.

1001 Noble Energy Way

Houston, TX 77070

Cell: 281-435-7091

Office: 281-872-2668

Fax: 281-569-2307

www.nobleenergyinc.com

From: Bylin, Carey [mailto:Bylin.Carey@epa.gov]
Sent: Wednesday, April 13, 2016 3:07 PM
To: Michael Grenz; Kate Fay; Angela Perry (Contractor)
Cc: Pryor, Justin; Franklin, Pamela
Subject: EXTERNAL: RE: April 20 conference call with AXPC Environmental Committee

Hello Michael,

Thanks to you for engaging us on this. I now have a meeting 10-1030a eastern time but other than that I'm open. I think 30 minutes should be enough.

Ms. Carey Bylin

International Programs Leader, Oil and Gas

Natural Gas STAR Program

Global Methane Initiative

U.S. Environmental Protection Agency

Phone: +1-202-343-9669

Visiting Address & Private Deliveries (courier, FedEx etc.)

1201 Constitution Ave NW, Room Number 4353 UU, Washington DC 20004

U.S. Mail Address:

Mail Code 6207M, 1200 Pennsylvania Ave NW, Washington DC 20460

From: Michael Grenz [mailto:Michael.Grenz@nblenergy.com]
Sent: Wednesday, April 13, 2016 3:59 PM
To: Kate Fay <Kate.Fay@nblenergy.com>; Bylin, Carey <Bylin.Carey@epa.gov>; Angela Perry (Contractor) <Angela.Perry@nblenergy.com>
Cc: Pryor, Justin <Pryor.Justin@epa.gov>; Franklin, Pamela <Franklin.Pamela@epa.gov>
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Thank you

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Sent: Wednesday, April 13, 2016 2:10 PM
To: Bylin, Carey
Cc: Pryor, Justin; Franklin, Pamela; Michael Grenz
Subject: Re: April 20 conference call with AXPC Environmental Committee

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Sent from my iPhone

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Ex. 6 - Personal Privacy (cell)

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Cc: Fiji George[Fiji_George@SWN.com]; Pryor, Justin[Pryor.Justin@epa.gov]; Franklin, Pamela[Franklin.Pamela@epa.gov]; Jim Kibler[jkibler@aglresources.com]
From: Richard Hyde
Sent: Mon 4/18/2016 8:38:46 PM
Subject: RE: Today's EPA-ONE Future Meeting

Carey, Pamela and Justin

Thanks again for the time today and especially since we ran over. I think there was some confusion on our part probably my rookie mistake and about the timeline on the STI. We have done an extensive review of the draft that y'all provided earlier. We will send that redlined document to COB tomorrow. We understand that this will not be the last time that we will see this, but in the spirit of moving the ball forward I think this will work. I know y'all will need time to digest it so maybe an agenda item next Monday can be to go over part of the draft.

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(b)(6) personal privacy **(cell)**

720.587.2397 (office)

To: Bylin, Carey[Bylin.Carey@epa.gov]
Cc: Gunning, Paul[Gunning.Paul@epa.gov]
From: Kate Fay
Sent: Tue 4/12/2016 1:06:05 PM
Subject: Re: April 20 conference call with AXPC Environmental Committee

Perfect. And Geneva is lovely! All of Switzerland this lovely. I've been able to go many times. If you have a couple of extra days there are other wonderful things to do. And you're really close to France

Sent from my iPhone
Kate Fay
(b)(6) personal privacy (cell)

On Apr 12, 2016, at 6:55 AM, Bylin, Carey <Bylin.Carey@epa.gov> wrote:

I will be in Geneva for a meeting – I don't know about magnificent but I've never been so it will be interesting.

Regarding the tough questions, I have asked if two people can participate on my behalf for exactly that reason! We will be prepared and also will make use of the "stage setting" meeting you've kindly offered.

Ms. Carey Bylin

International Programs Leader, Oil and Gas

Natural Gas STAR Program

Global Methane Initiative

U.S. Environmental Protection Agency

Phone: +1-202-343-9669

Visiting Address & Private Deliveries (courier, FedEx etc.)

1201 Constitution Ave NW, Room Number 4353 UU, Washington DC 20004

U.S. Mail Address:

Mail Code 6207M, 1200 Pennsylvania Ave NW, Washington DC 20460

<image001.gif>

From: Kate Fay [mailto:Kate.Fay@nblenergy.com]
Sent: Tuesday, April 12, 2016 8:50 AM
To: Bylin, Carey <Bylin.Carey@epa.gov>
Cc: Gunning, Paul <Gunning.Paul@epa.gov>
Subject: Re: April 20 conference call with AXPC Environmental Committee

I hope you are going somewhere magnificent. Thanks for checking on an alternate. Disappointed it won't be you. My only suggestion is to make sure there is someone who can answer some polite but possibly tough questions.

Thanks.
Sent from my iPhone

Kate Fay

(b)(6) personal privacy (cell)

On Apr 12, 2016, at 6:31 AM, Bylin, Carey <Bylin.Carey@epa.gov> wrote:

Kate,

Thank you for getting in touch and for your efforts to help promote Methane Challenge. We really appreciate it.

I will be on international travel on April 20 but I'm fairly certain we can cover. I will check with my colleagues and come back to you on who can participate in my place.

Best,

Carey

Ms. Carey Bylin

International Programs Leader, Oil and Gas

Natural Gas STAR Program

Global Methane Initiative

U.S. Environmental Protection Agency

Phone: +1-202-343-9669

Visiting Address & Private Deliveries (courier, FedEx etc.)

1201 Constitution Ave NW, Room Number 4353 UU, Washington DC 20004

U.S. Mail Address:

Mail Code 6207M, 1200 Pennsylvania Ave NW, Washington DC 20460

<image001.gif>

From: Kate Fay [mailto:Kate.Fay@nblenergy.com]
Sent: Monday, April 11, 2016 5:31 PM
To: Bylin, Carey <Bylin.Carey@epa.gov>
Cc: Gunning, Paul <Gunning.Paul@epa.gov>
Subject: April 20 conference call with AXPC Environmental Committee

Carey:

You may recall that we spoke about a month ago regarding having you participate in a short meeting with AXPC's environmental leadership to answer questions about the voluntary methane program. There is no need to fly to OK for this (not that you had committed to doing so:). However, would you be able to make yourself available for 20 to 30 minutes on April 20 between 2 pm and 4 pm eastern time? If so, I will arrange a short call with the Committee Chair (Mike Grenz, also of Noble), you and me to "set the stage" for you. Personally, I think this would be a great opportunity to help generate more interest in the program among oil and gas producers. I am always an optimist!!

Please advise

Thanks

Kate

Please note my new email address: kate.fay@nblenergy.com

Kate Fay

Manager, Environmental and Regulatory Policy

Noble Energy, Inc.

1625 Broadway, Suite 2200

Denver, Colorado 80202

(b)(6) personal privacy **(cell)**

720.587.2397 (office)

To: placey@aga.org[placey@aga.org]; 'elina.bouloubasis@erg.com'[elina.bouloubasis@erg.com]; Bylin, Carey[Bylin.Carey@epa.gov]
From: Wojcik, Gary
Sent: Thur 3/31/2016 6:32:39 PM
Subject: yesterday's methane challenge kick-off event

Pam, Elina, Carey

Congratulations on coordinating such a successful event yesterday.

FYI – in case you use captions with names under the photos taken yesterday –

For Peoples Natural Gas LLC (Pittsburgh) – the person who went on stage for the individual picture with Ms. McCabe and who appears in the group photo was me (Gary Wojcik). The name read by Ms. Dunham was the other person we had in attendance (Paul Becker).

No big deal – and thanks for pulling this all together.

Gary Wojcik

Peoples

225 North Shore Drive, 2nd Floor

Pittsburgh, PA 15212

Cell: Ex. 6 - Personal Privacy

Work: 412-208-6571

Gary.W.Wojcik@Peoples-Gas.com

To: Bylin, Carey[Bylin.Carey@epa.gov]
Cc: Gunning, Paul[Gunning.Paul@epa.gov]; Franklin, Pamela[Franklin.Pamela@epa.gov]; Fiji George[Fiji_george@swn.com]; Richard Hyde[rhyde@aglresources.com]; Edwin Mongan[edwin.mongan@bhpbilliton.com]; Tom Michels[tmichels@bwstrategies.com]
From: Hutchins, Thomas D (Tom)
Sent: Wed 3/30/2016 6:53:33 PM
Subject: Re: Methane Challenge - BMP Founding Partners Announced

Carey,

I appreciate the quick response.

Your revised language is good.

Thank you for making the change.

Thomas D. Hutchins
713-420-7918 Office
713-705-0683 Mobile
Thomas_hutchins@kindermorgan.com
Sent from my iPhone

> On Mar 30, 2016, at 1:52 PM, Bylin, Carey <Bylin.Carey@epa.gov> wrote:
>
> Tom,
>
> Thank you for getting in touch on this. We will make the proposed change, though we prefer to say "in the near term" rather than "the second quarter of 2016." I hope this change is acceptable to you. The quote would read as follows:
>
> At this time, EPA is actively working to finalize the ONE Future Commitment option (which was included in the July 2015 proposal). We expect to launch the ONE Future Commitment option in the near term. Those joining the Methane Challenge Program using the ONE Future option will be considered and recognized as Founding Members.
>
> We will make the change now.
> _____
> Ms. Carey Bylin
> International Programs Leader, Oil and Gas
> Natural Gas STAR Program
> Global Methane Initiative
> U.S. Environmental Protection Agency
> Phone: +1-202-343-9669
>
> Visiting Address & Private Deliveries (courier, FedEx etc.)
> 1201 Constitution Ave NW, Room Number 4353 UU, Washington DC 20004
>
> U.S. Mail Address:
> Mail Code 6207M, 1200 Pennsylvania Ave NW, Washington DC 20460
>
>
>
> -----Original Message-----
> From: Hutchins, Thomas D (Tom) [mailto:Thomas_Hutchins@kindermorgan.com]
> Sent: Wednesday, March 30, 2016 2:12 PM
> To: Gunning, Paul <Gunning.Paul@epa.gov>; Bylin, Carey <Bylin.Carey@epa.gov>

> Cc: Franklin, Pamela <Franklin.Pamela@epa.gov>; Fiji George <Fiji_george@swn.com>; Richard Hyde <rhyde@aglresources.com>; Edwin Mongan <edwin.mongan@bhpbilliton.com>; Tom Michels <tmichels@bwstrategies.com>
> Subject: Fwd: Methane Challenge - BMP Founding Partners Announced
>
> Paul and Carey,
>
> The Methane Challenge website has the language shown below.
>
> "At this time, EPA is not finalizing the ONE Future Commitment option (which was included in the July 2015 proposal) and is actively working on developing those programmatic details."
>
> May I propose a change to the language below.
>
> "At this time, EPA is actively working to finalize the ONE Future Commitment option (which was included in the July 2015 proposal). We expect to launch the ONE Future Commitment option in the second quarter of 2016. Those joining the Methane Challenge Program using the ONE Future option will be considered and recognized as Founding Members."
>
> The "EPA is not finalizing the ONE Future Commitment option" language is confusing and some may stop reading at that point.
>
> Will the revised language work for you?
>
> There are three additional companies close to joining ONE Future and the existing language could cause them to decide otherwise.
>
> I appreciate your leadership and look forward to working with you to finalize the ONE Future option.
>
> Thomas D. Hutchins
> V.P. EH&S, Kinder Morgan
> Office - 713-420-7918
> Mobile - 713-705-0683
>
> Sent from my iPad
>
> Begin forwarded message:
>
> From: Tom Michels <tmichels@bwstrategies.com<mailto:tmichels@bwstrategies.com>>
> Date: March 30, 2016 at 11:26:27 AM CDT
> To: Curt Moffat <Curt_Moffatt@kindermorgan.com<mailto:Curt_Moffatt@kindermorgan.com>>, "Fannon, Frank (Frank.Fannon@bhpbilliton.com<mailto:Frank.Fannon@bhpbilliton.com>)" <Frank.Fannon@bhpbilliton.com<mailto:Frank.Fannon@bhpbilliton.com>>, "Fiji George (Fiji_George@SWN.COM<mailto:Fiji_George@swn.com>)" <Fiji_George@SWN.COM<mailto:Fiji_George@swn.com>>, Jason Buckner <jason.buckner@bhpbilliton.com<mailto:jason.buckner@bhpbilliton.com>>, Jim Bolander <jim_bolander@swn.com<mailto:jim_bolander@swn.com>>, "Jim Kibler" <jkibler@aglresources.com<mailto:jkibler@aglresources.com>>, John Williams <john.williams@apachecorp.com<mailto:john.williams@apachecorp.com>>, Lesley Schaaff <lschaaff@hess.com<mailto:lschaaff@hess.com>>, "Nelson Perez" <Nelson.Perez@nationalgrid.com<mailto:Nelson.Perez@nationalgrid.com>>, Richard Hyde <rhyde@aglresources.com<mailto:rhyde@aglresources.com>>, Thomas Hutchins <Thomas_Hutchins@kindermorgan.com<mailto:Thomas_Hutchins@kindermorgan.com>>, "Wagner, Victoria (vwagner@cpg.com<mailto:vwagner@cpg.com>)" <vwagner@cpg.com<mailto:vwagner@cpg.com>>, "Carter, Georgia (gcarter@cpg.com<mailto:gcarter@cpg.com>)" <gcarter@cpg.com<mailto:gcarter@cpg.com>>,

"Chahbazpour, Donald"
<Donald.Chahbazpour@nationalgrid.com<mailto:Donald.Chahbazpour@nationalgrid.com>>, CJ Doiron
<CJ.Doiron@apachecorp.com<mailto:CJ.Doiron@apachecorp.com>>, David Crawford
<david.j.crawford@bhpbilliton.com<mailto:david.j.crawford@bhpbilliton.com>>, Doug Jordan
<doug_jordan@swn.com<mailto:doug_jordan@swn.com>>, Edward White
<Edward.White@nationalgrid.com<mailto:Edward.White@nationalgrid.com>>, "Ford, Michael
(MFord@hess.com<mailto:MFord@hess.com>)" <MFord@hess.com<mailto:MFord@hess.com>>, Greg
Corbett <gcorbett@aglresources.com<mailto:gcorbett@aglresources.com>>, Greg Jones
<gljones@aglresources.com<mailto:gljones@aglresources.com>>, "Jeff McCombs"
<jmccombs@nisource.com<mailto:jmccombs@nisource.com>>, "Joel Bluestein
(Joel.Bluestein@icfi.com<mailto:Joel.Bluestein@icfi.com>)"
<Joel.Bluestein@icfi.com<mailto:Joel.Bluestein@icfi.com>>, Jon Graham
<jon.graham@apachecorp.com<mailto:jon.graham@apachecorp.com>>, "Matt Harrison
(matt.harrison@aecom.com<mailto:matt.harrison@aecom.com>)"
<matt.harrison@aecom.com<mailto:matt.harrison@aecom.com>>, "Mongan, Ed
(edwin.mongan@bhpbilliton.com<mailto:edwin.mongan@bhpbilliton.com>)"
<edwin.mongan@bhpbilliton.com<mailto:edwin.mongan@bhpbilliton.com>>, Robert Mosher
<Robert.Mosher@nationalgrid.com<mailto:Robert.Mosher@nationalgrid.com>>, Sandy Taft
<Sandy.Taft@nationalgrid.com<mailto:Sandy.Taft@nationalgrid.com>>, "Shires, Terri
(terri.shires@aecom.com<mailto:terri.shires@aecom.com>)"
<terri.shires@aecom.com<mailto:terri.shires@aecom.com>>, "Tangeman, James G (Jim)"
<James_Tangeman@kindermorgan.com<mailto:James_Tangeman@kindermorgan.com>>, Tom
Lumadue <tlumadue@cpg.com<mailto:tlumadue@cpg.com>>, Tom Michels
<tmichels@bwstrategies.com<mailto:tmichels@bwstrategies.com>>, Tony Webster
<AWebster@hess.com<mailto:AWebster@hess.com>>, "Tucker, Michael"
<Michael.Tucker@nationalgrid.com<mailto:Michael.Tucker@nationalgrid.com>>, Fred Hagemeyer
<Fred.Hagemeyer@bhpbilliton.com<mailto:Fred.Hagemeyer@bhpbilliton.com>>,
"Mark_Boling@SWN.COM<mailto:Mark_Boling@swn.com>"
<Mark_Boling@SWN.COM<mailto:Mark_Boling@swn.com>>
> Subject: Methane Challenge - BMP Founding Partners Announced
>
> Greetings all,
>
> I just returned from the Global Methane Initiative Conference, where the founding partners of EPA's Methane Challenge - BMP Commitment Option were announced. You can find them here: https://www3.epa.gov/gasstar/methanechallenge/partners.html
>
> I counted about 42 companies, nearly all of whom were LDC's, but for TransCanada, Kern River Transmission, and Dominion Transmission.
>
> Janet McCabe did give a brief shout out to ONE Future - only to indicate that the ONE Future Commitment Option is still under development.
>
> Tom Michels, Principal
> [cid:image003.png@01CE0A2C.C7AF3430]
> BlueWater Strategies
> 25 Massachusetts Avenue, NW
> Suite 820
> Washington, DC 20001
> tmichels@bwstrategies.com<mailto:tmichels@bwstrategies.com>
> Direct - 202-589-1759
> Office - 202-589-0015
> Mobile -202-413-2059
> This message may contain information that is privileged or confidential. If you receive this transmission in error, please notify the sender by reply e-mail and delete the message and any attachments.
>

To: Gunning, Paul[Gunning.Paul@epa.gov]; Bylin, Carey[Bylin.Carey@epa.gov]
Cc: Franklin, Pamela[Franklin.Pamela@epa.gov]; Fiji George[Fiji_george@swn.com]; Richard Hyde[rhyde@aglresources.com]; Edwin Mongan[edwin.mongan@bhpbilliton.com]; Tom Michels[tmichels@bwstrategies.com]
From: Hutchins, Thomas D (Tom)
Sent: Wed 3/30/2016 6:11:57 PM
Subject: Fwd: Methane Challenge - BMP Founding Partners Announced
image003.png

Paul and Carey,

The Methane Challenge website has the language shown below.

"At this time, EPA is not finalizing the ONE Future Commitment option (which was included in the July 2015 proposal) and is actively working on developing those programmatic details."

May I propose a change to the language below.

"At this time, EPA is actively working to finalize the ONE Future Commitment option (which was included in the July 2015 proposal). We expect to launch the ONE Future Commitment option in the second quarter of 2016. Those joining the Methane Challenge Program using the ONE Future option will be considered and recognized as Founding Members."

The "EPA is not finalizing the ONE Future Commitment option" language is confusing and some may stop reading at that point.

Will the revised language work for you?

There are three additional companies close to joining ONE Future and the existing language could cause them to decide otherwise.

I appreciate your leadership and look forward to working with you to finalize the ONE Future option.

Thomas D. Hutchins
V.P. EH&S, Kinder Morgan
Office - 713-420-7918
Mobile - 713-705-0683

Sent from my iPad

Begin forwarded message:

From: Tom Michels <tmichels@bwstrategies.com<mailto:tmichels@bwstrategies.com>>
Date: March 30, 2016 at 11:26:27 AM CDT
To: Curt Moffat <Curt_Moffatt@kindermorgan.com<mailto:Curt_Moffatt@kindermorgan.com>>, "Fannon, Frank (Frank.Fannon@bhpbilliton.com<mailto:Frank.Fannon@bhpbilliton.com>)" <Frank.Fannon@bhpbilliton.com<mailto:Frank.Fannon@bhpbilliton.com>>, "Fiji George (Fiji_George@SWN.COM<mailto:Fiji_George@swn.com>)" <Fiji_George@SWN.COM<mailto:Fiji_George@swn.com>>, Jason Buckner <jason.buckner@bhpbilliton.com<mailto:jason.buckner@bhpbilliton.com>>, Jim Bolander <jim_bolander@swn.com<mailto:jim_bolander@swn.com>>, "Jim Kibler" <jkibler@aglresources.com<mailto:jkibler@aglresources.com>>, John Williams <john.williams@apachecorp.com<mailto:john.williams@apachecorp.com>>, Lesley Schaaff <lschaaff@hess.com<mailto:lschaaff@hess.com>>, "Nelson Perez" <Nelson.Perez@nationalgrid.com<mailto:Nelson.Perez@nationalgrid.com>>, Richard Hyde <rhyde@aglresources.com<mailto:rhyde@aglresources.com>>, Thomas Hutchins

<Thomas_Hutchins@kindermorgan.com<mailto:Thomas_Hutchins@kindermorgan.com>>, "Wagner, Victoria (vwagner@cpg.com<mailto:vwagner@cpg.com>)" <vwagner@cpg.com<mailto:vwagner@cpg.com>>, "Carter, Georgia (gcarter@cpg.com<mailto:gcarter@cpg.com>)" <gcarter@cpg.com<mailto:gcarter@cpg.com>>, "Chahbazpour, Donald" <Donald.Chahbazpour@nationalgrid.com<mailto:Donald.Chahbazpour@nationalgrid.com>>, CJ Doiron <CJ.Doiron@apachecorp.com<mailto:CJ.Doiron@apachecorp.com>>, David Crawford <david.j.crawford@bhpbilliton.com<mailto:david.j.crawford@bhpbilliton.com>>, Doug Jordan <doug_jordan@swn.com<mailto:doug_jordan@swn.com>>, Edward White <Edward.White@nationalgrid.com<mailto:Edward.White@nationalgrid.com>>, "Ford, Michael (MFord@hess.com<mailto:MFord@hess.com>)" <MFord@hess.com<mailto:MFord@hess.com>>, Greg Corbett <gcorbett@aglresources.com<mailto:gcorbett@aglresources.com>>, Greg Jones <gljones@aglresources.com<mailto:gljones@aglresources.com>>, "Jeff McCombs" <jmccombs@nisource.com<mailto:jmccombs@nisource.com>>, "Joel Bluestein (Joel.Bluestein@icfi.com<mailto:Joel.Bluestein@icfi.com>)" <Joel.Bluestein@icfi.com<mailto:Joel.Bluestein@icfi.com>>, Jon Graham <jon.graham@apachecorp.com<mailto:jon.graham@apachecorp.com>>, "Matt Harrison (matt.harrison@aecom.com<mailto:matt.harrison@aecom.com>)" <matt.harrison@aecom.com<mailto:matt.harrison@aecom.com>>, "Mongan, Ed (edwin.mongan@bhpbilliton.com<mailto:edwin.mongan@bhpbilliton.com>)" <edwin.mongan@bhpbilliton.com<mailto:edwin.mongan@bhpbilliton.com>>, Robert Mosher <Robert.Mosher@nationalgrid.com<mailto:Robert.Mosher@nationalgrid.com>>, Sandy Taft <Sandy.Taft@nationalgrid.com<mailto:Sandy.Taft@nationalgrid.com>>, "Shires, Terri (terri.shires@aecom.com<mailto:terri.shires@aecom.com>)" <terri.shires@aecom.com<mailto:terri.shires@aecom.com>>, "Tangeman, James G (Jim)" <James_Tangeman@kindermorgan.com<mailto:James_Tangeman@kindermorgan.com>>, Tom Lumadue <tlumadue@cpg.com<mailto:tlumadue@cpg.com>>, Tom Michels <tmichels@bwstrategies.com<mailto:tmichels@bwstrategies.com>>, Tony Webster <AWebster@hess.com<mailto:AWebster@hess.com>>, "Tucker, Michael" <Michael.Tucker@nationalgrid.com<mailto:Michael.Tucker@nationalgrid.com>>, Fred Hagemeyer <Fred.Hagemeyer@bhpbilliton.com<mailto:Fred.Hagemeyer@bhpbilliton.com>>, "Mark_Boling@SWN.COM<mailto:Mark_Boling@swn.com>" <Mark_Boling@SWN.COM<mailto:Mark_Boling@swn.com>>
Subject: Methane Challenge - BMP Founding Partners Announced

Greetings all,

I just returned from the Global Methane Initiative Conference, where the founding partners of EPA's Methane Challenge – BMP Commitment Option were announced. You can find them here: https://www3.epa.gov/gasstar/methanechallenge/partners.html

I counted about 42 companies, nearly all of whom were LDC's, but for TransCanada, Kern River Transmission, and Dominion Transmission.

Janet McCabe did give a brief shout out to ONE Future – only to indicate that the ONE Future Commitment Option is still under development.

Tom Michels, Principal
[cid:image003.png@01CE0A2C.C7AF3430]
BlueWater Strategies
25 Massachusetts Avenue, NW
Suite 820
Washington, DC 20001
tmichels@bwstrategies.com<mailto:tmichels@bwstrategies.com>
Direct – 202-589-1759
Office – 202-589-0015

Mobile –202-413-2059
This message may contain information that is privileged or confidential. If you receive this transmission in error, please notify the sender by reply e-mail and delete the message and any attachments.

To: Bylin, Carey[Bylin.Carey@epa.gov]
From: Brady, William J:(BSC)
Sent: Wed 3/30/2016 5:01:23 PM
Subject: RE: Update: Natural Gas STAR Methane Challenge Program - Exelon

Carey,

Thank you for handling the logistics this morning; we really appreciate the opportunity to collaborate with EPA and the other companies on the Methane Challenge. If you could forward copies of the photos to me I would appreciate that.

Best,

Bill

Bill Brady

Director, Corporate Safety & Environmental Sustainability

Corporate Strategy and Sustainability

Exelon

2301 Market Street S23-3

Office: 215.841.3555 | Fax: 215.841.5648

williamj.brady@exeloncorp.com www.exeloncorp.com

From: Bylin, Carey [mailto:Bylin.Carey@epa.gov]
Sent: Tuesday, March 29, 2016 9:39 PM
To: Dickersbach, Melanie Carrow:(BSC); elina.bouloubasis@erg.com; Lacey, Pam
Cc: Heffron, Michael:(Exelon Utilities); Brady, William J:(BSC); Elsberg, Paul:(BSC)
Subject: RE: Update: Natural Gas STAR Methane Challenge Program - Exelon

HI Melanie,

Just confirming we received this and will make the change. Thanks!

Ms. Carey Bylin

International Programs Leader, Oil and Gas

Natural Gas STAR Program

Global Methane Initiative

U.S. Environmental Protection Agency

Phone: +1-202-343-9669

Visiting Address & Private Deliveries (courier, FedEx etc.)

1201 Constitution Ave NW, Room Number 4353 UU, Washington DC 20004

U.S. Mail Address:

Mail Code 6207M, 1200 Pennsylvania Ave NW, Washington DC 20460

From: Dickersbach, Melanie Carrow:(BSC) [mailto:Melanie.Dickersbach@exeloncorp.com]

Sent: Tuesday, March 29, 2016 9:09 AM
To: Bylin, Carey <Bylin.Carey@epa.gov>; elina.bouloubasis@erg.com; Lacey, Pam <PLacey@aga.org>
Cc: Heffron, Michael:(Exelon Utilities) <Michael.Heffron@exeloncorp.com>; Brady, William J:(BSC) <williamj.brady@exeloncorp.com>; Elsberg, Paul:(BSC) <Paul.Elsberg@exeloncorp.com>
Subject: RE: Update: Natural Gas STAR Methane Challenge Program - Exelon
Importance: High

Hi Carey and Pam –

Following the close of the Exelon / PHI merger last week, I just wanted to pass along the revised Summary to use for Exelon Utilities as it will now also cover the Delmarva Power gas system as well.

Thank you for your help with this and all the best for the launch event tomorrow,

Melanie

Summary:

Exelon is the leading U.S. competitive energy provider and delivers natural gas to more than 1.2 million customers in central Maryland (through BGE), northern Delaware (through Delmarva Power), and southeastern Pennsylvania (through PECO). BGE, Delmarva Power and PECO have been Natural Gas STAR partners for 20 years or more, and Exelon is proud to be a founding partner of the Natural Gas STAR Methane Challenge Program. The company has accepted EPA's challenge by pledging to reduce methane emissions from the Exelon utilities' natural gas distribution systems. Exelon has committed to replace its utilities' combined inventory of cast/ductile iron and bare steel distribution mains at a minimum replacement rate of 2% per year by 2017 and to maintain this rate for at least five years. Exelon also has committed to replace cast iron and bare steel services when an associated main is replaced.

Company website: www.exeloncorp.com

Name to be listed on Methane Challenge Program website: Exelon Utilities (BGE, PECO, and Delmarva Power gas systems)

Person representing your company at the launch event:

Bill Brady, Director Corporate Environmental Strategy, (215) 841-3555

Individual coordinating your company's participation at the launch event:

Paul Elsberg, Sr. Manager External Communications, (312) 394-4879

Please contact me if there is any other information that is needed at this time, or an original of the partnership agreement needs to also be submitted by mail.

Sincerely,

Melanie Dickersbach

Climate and Environment Strategy Manager

Exelon Corporation

2301 Market Street S23-3

Philadelphia, PA 19103

Office: 215.841.6371 | Cell: 215.316.8426

melanie.dickersbach@exeloncorp.com www.exeloncorp.com

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To: Bylin, Carey[Bylin.Carey@epa.gov]
From: Gary Clyne
Sent: Wed 3/30/2016 1:07:44 PM
Subject: Natural Gas STAR Methane Challenge Program

Hi Carey,

My firm would like to join the methane challenge. You can find out more about my firm at www.eaglees.com.

Thank you in advance for your kind consideration of my request.

Gary Clyne

VP Low Emission Development

Eagle Energy Solutions LLC

200 E Yuma Ave Suite 17

McAllen, Texas, USA

78503.

Cell: 956.340.9103

To: Bylin, Carey[Bylin.Carey@epa.gov]
From: Booth, Kevin
Sent: Tue 3/29/2016 5:54:02 PM
Subject: RE: [External] RE: Avista Utilities signed Partnership Agreement for the Natural Gas STAR Methane Challenge

Hi Carey,

A start date of 9/30/16 works for us. Please revise the Partnership Agreement accordingly.

Thanks, Kevin

Kevin Booth | Avista Corp.
509-495-4738 | 509-990-5915 (Cell) | 509-777-5892 (Fax)
kevin.booth@avistacorp.com

From: Bylin, Carey [mailto:Bylin.Carey@epa.gov]
Sent: Friday, March 25, 2016 8:58 AM
To: Booth, Kevin
Cc: Simock, Debbie; Tyrie, Mary; Howard, Bruce; Webb, Jeff
Subject: [External] RE: Avista Utilities signed Partnership Agreement for the Natural Gas STAR Methane Challenge

Hi Kevin,

Thank you very much for this. We are in the process of countersigning the documents and will send you a fully executed version shortly.

I wanted to follow up on one small detail that we will need to correct on the Partnership Agreement. The Start Date is listed as "2016" for Excavation Damages. The Start Date should be a specific date that is within six months of joining the Program, so the latest it can be is September 30, 2016. Are you okay with our recognizing your Start Date as 9/30/16? Or you can choose another date between the launch and that point. The significance of the start date is that is when companies need to start collecting the data they need to track commitments (though for founding partners comprehensive reporting will start for the 2017 calendar year).

If you are okay with this, I will hand-write the revisions to the Partnership Agreement. Please reply with your concurrence (if you agree) so we can have written confirmation in our file.

Ms. Carey Bylin

International Programs Leader, Oil and Gas

Natural Gas STAR Program

Global Methane Initiative

U.S. Environmental Protection Agency

Phone: +1-202-343-9669

Visiting Address & Private Deliveries (courier, FedEx etc.)

1201 Constitution Ave NW, Room Number 4353 UU, Washington DC 20004

U.S. Mail Address:

Mail Code 6207M, 1200 Pennsylvania Ave NW, Washington DC 20460

From: Booth, Kevin [mailto:Kevin.Booth@avistacorp.com]
Sent: Wednesday, March 23, 2016 3:42 PM
To: Bylin, Carey <Bylin.Carey@epa.gov>
Cc: Simock, Debbie <Debbie.Simock@avistacorp.com>; Tyrie, Mary <Mary.Tyrie@avistacorp.com>; Howard, Bruce <Bruce.Howard@avistacorp.com>; Webb, Jeff <Jeff.Webb@avistacorp.com>
Subject: Avista Utilities signed Partnership Agreement for the Natural Gas STAR Methane Challenge

Ms. Bylin,

Attached are the signed Partnership Agreement and Appendix A - Commitment Table for the Natural Gas STAR Methane Challenge Program. Avista has committed via this agreement to establishing a best management practice for documenting excavation damages in the local distribution companies it operates in the natural gas distribution sector. Avista will use the collected data to set a goal for reducing excavation damages and methane emissions from excavation damages.

Avista Utilities is involved in the production, transmission and distribution of energy. We provide energy services, electricity and natural gas to customers in eastern Washington, northern Idaho and parts of southern and eastern Oregon. Avista Utilities is an operating division of Avista Corp.

Kevin Booth | Avista Corp.
509-495-4738 | 509-990-5915 (Cell) | 509-777-5892 (Fax)
kevin.booth@avistacorp.com

USE CAUTION - EXTERNAL SENDER
Do not click on links or open attachments that are not familiar.
For questions or concerns, please e-mail phishing@avistacorp.com

To: Bylin, Carey[Bylin.Carey@epa.gov]
Cc: Hoeferlin, Craig R.[Craig.Hoeferlin@thelacledegroup.com]; Lauber, Mark D.[Mark.Lauber@thelacledegroup.com]; elina.bouloubasis@erg.com[elina.bouloubasis@erg.com]; Lacey, Pam[PLacey@aga.org]; Piry-Haines, Michelle P.[Michelle.Piry@thelacledegroup.com]
From: Donatiello, Steven T.
Sent: Tue 3/29/2016 4:39:51 PM
Subject: RE: Final Logistics for EPA's Methane Challenge Launch Event

Hi Carey,

Please revise as shown below.

The Laclede Group– Craig Hoeferlin, Vice President of Operations Services

We believe in a world where energy enriches people's lives. Our mission is to make that idea a reality. Across the regions we serve, we at The Laclede Group dedicate ourselves to helping our 1.56 million residential, commercial and industrial customers across Missouri and Alabama to reach their personal and professional goals every day.

We are committed to upgrading pipelines across our regions to provide even safer and more reliable natural gas to our customers. Last year, we replaced 235 miles of pipeline, and plan to continue at this rate.

Steve

Steve Donatiello, P.E.

Environmental Engineer III

Laclede Gas Company

Environmental Compliance

5th Floor

700 Market Street ***I have a new address.***

St. Louis, MO 63101

steven.donatiello@TheLacledeGroup.com

314-658-5541

314-307-5948 (cell) ***I have a new cell phone number.***

314-535-9414 (fax)

From: Bylin, Carey [mailto:Bylin.Carey@epa.gov]
Sent: Tuesday, March 29, 2016 11:22 AM
To: Donatiello, Steven T.
Cc: Hoeferlin, Craig R.; Lauber, Mark D.; elina.bouloubasis@erg.com
Subject: RE: Final Logistics for EPA's Methane Challenge Launch Event

Hi Steve,

This is what we have for Laclede, please let me know if there are any changes that need to be made.

The Laclede Group– Craig Hoeferlin, Vice President of Operations Services

The Laclede Group believes in a world where energy enriches people's lives. Across the regions they serve, The Laclede Group dedicates themselves to helping 1.56 million residential,

commercial and industrial customers across Missouri and Alabama. The company is committed to upgrading pipelines across their regions to provide even safer and more reliable natural gas to its customers. Last year, The Laclede Group replaced 235 miles of pipeline, and plans to continue at this rate.

Ms. Carey Bylin

International Programs Leader, Oil and Gas

Natural Gas STAR Program

Global Methane Initiative

U.S. Environmental Protection Agency

Phone: +1-202-343-9669

Visiting Address & Private Deliveries (courier, FedEx etc.)

1201 Constitution Ave NW, Room Number 4353 UU, Washington DC 20004

U.S. Mail Address:

Mail Code 6207M, 1200 Pennsylvania Ave NW, Washington DC 20460

From: Donatiello, Steven T. [mailto:Steven.Donatiello@thelacledegroup.com]
Sent: Tuesday, March 29, 2016 12:16 PM

To: Bylin, Carey <Bylin.Carey@epa.gov>
Cc: Hoeferlin, Craig R. <Craig.Hoeferlin@thelacledegroup.com>; Lauber, Mark D. <Mark.Lauber@thelacledegroup.com>
Subject: FW: Final Logistics for EPA's Methane Challenge Launch Event
Importance: High

Carey,

Elina is unavailable. Can you address my question below?

We are double checking everything.

Please send me the name, title and the brief statement that will be read as our representative, Mr. Craig Hoeferlin walks onto the stage.

Thanks

Steve

Steve Donatiello, P.E.

Environmental Engineer III

Laclede Gas Company

Environmental Compliance

5th Floor

700 Market Street ***I have a new address.***

St. Louis, MO 63101

steven.donatiello@TheLacledeGroup.com

314-658-5541

314-307-5948 (cell) ***I have a new cell phone number.***

314-535-9414 (fax)

From: Elina Bouloubasis [mailto:Elina.Bouloubasis@erg.com]
Sent: Friday, March 25, 2016 3:18 PM
Cc: Bylin, Carey
Subject: Final Logistics for EPA's Methane Challenge Launch Event

Hi all,

Thank you again for participating in the Methane Challenge Launch Event next Wednesday, March 30. We look forward to seeing you there! Attached is the **final agenda**. Please note, there has been a slight time shift and the event now starts at 10:15 am; however, we're still encouraging partner representatives to arrive at 10:00 am to address logistics. In addition, there will be an informal opportunity from 12:30 to 1:30 pm for partners to discuss the Methane Challenge with EPA representatives–we hope you can attend! (The location will be announced at the Launch Event.)

Please feel free to contact Carey Bylin (202-343-9669 or bylin.carey@epa.gov) with any questions about the Methane Challenge Partnership and contact me (703-373-0149 or elina.bouloubasis@erg.com) with any questions about the launch event.

Sincerely,

Elina Bouloubasis

ERG - Contractor Support to the

EPA's Methane Challenge Program

To: Bylin, Carey[Bylin.Carey@epa.gov]
Cc: Pryor, Justin[Pryor.Justin@epa.gov]; Elina.Bouloubasis@erg.com[Elina.Bouloubasis@erg.com]
From: Tylor, Bernie
Sent: Tue 3/29/2016 3:51:11 PM
Subject: RE: Methane Challenge - Washington Gas - Press Release Q's
EPA Challenge Release_EPA.pdf

Thanks Carey, really appreciate it and we're looking forward to promoting.

Attached is a PDF version if you could pass that along to your contact. Thanks, I look forward to hearing back.

Regards, Bernie

From: Bylin, Carey [mailto:Bylin.Carey@epa.gov]
Sent: Tuesday, March 29, 2016 11:42 AM
To: Tylor, Bernie; Pryor, Justin; Elina.Bouloubasis@erg.com
Subject: RE: Methane Challenge - Washington Gas - Press Release Q's

Hi Bernie,

Thank you for getting in touch on this. I have forwarded your e-mail to our communications person, Isabel Deluca, so you should here from her soon. We appreciate your efforts to promote your participation in the program.

Ms. Carey Bylin

International Programs Leader, Oil and Gas

Natural Gas STAR Program

Global Methane Initiative

U.S. Environmental Protection Agency

Phone: +1-202-343-9669

Visiting Address & Private Deliveries (courier, FedEx etc.)

1201 Constitution Ave NW, Room Number 4353 UU, Washington DC 20004

U.S. Mail Address:

Mail Code 6207M, 1200 Pennsylvania Ave NW, Washington DC 20460

From: Tylor, Bernie [mailto:BTylor@washgas.com]
Sent: Tuesday, March 29, 2016 11:05 AM
To: Bylin, Carey <Bylin.Carey@epa.gov>; Pryor, Justin <Pryor.Justin@epa.gov>; Elina.Bouloubasis@erg.com
Subject: Methane Challenge - Washington Gas - Press Release Q's

Hi Carey, Justin and Elina:

As a quick introduction, I'm with the Corp Comms team at WGL, and am reaching out about the participation of Washington Gas in the EPA Methane Challenge. Melissa Adams and her team are our main internal contacts and we're very excited.

A couple areas I wanted to bring to your attention/clarify:

Wanted to provide a courtesy head up that we plan to issue a press release tomorrow -

- So that we are careful about timing of when we issue it, when do you plan to issue your press release? Ie., we'd release ours after yours

I'll follow up with a phone call too to introduce myself. I know that it must be very busy this close to the event. Looks like it will be a top notch launch. Thanks for your input, Bernie

Bernie Tylor

WGL

Manager - Media Relations

101 Constitution Avenue, NW

Washington, DC 20080

202-624-6778 (office)

Ex. 6 - Personal Privacy (mobile)

btylor@washgas.com

From: Elina Bouloubasis [mailto:Elina.Bouloubasis@erg.com]
Sent: Wednesday, March 23, 2016 5:43 PM
To: Adams, Melissa E <MelissaAdams@washgas.com>
Cc: Bylin, Carey <Bylin.Carey@epa.gov>; Pryor, Justin <Pryor.Justin@epa.gov>; Dallas, Sarah <SDallas@washgas.com>; Kelly, Hillery A <HKelly@washgas.com>
Subject: Methane Challenge Follow-Up

Ms. Adams,

Congratulations! On behalf of the U.S. Environmental Protection Agency (EPA), I am pleased to

welcome you to the Natural Gas STAR Methane Challenge Program. The Partnership Agreement between your company and the U.S. EPA signifies your intent to undertake and document ambitious voluntary methane emission reductions. We will be countersigning the Partnership Agreement and providing you with a final version shortly.

In addition, thank you for sending the requested information to us. If you're able to attend the launch event next week, we still need the following items from you:

- Launch participant's name, title, and contact information
- Short bio (approximately 75 words) describing your company, commitments, and highlighting reasons for becoming a Methane Challenge Partner
- Company website and company name that should be listed on our website

Please be sure to provide these items to me (Elina.bouloubasis@erg.com) **as soon as possible**.

Below is the Launch Event Agenda for an understanding of how the event will be structured.

Methane Challenge Program Launch Event

When: **Wednesday, March 30, 2016, 10:00-10:45AM**

Global Methane Forum Plenary Session, immediately following Policy Roundtable: Different Approaches to Methane Policies 08:30-10:00AM)

**Reserved seating at the front of the room for Methane Challenge Founding Partners.*

Where: **Georgetown University Hotel and Conference Center**

Washington, DC

Agenda:

10:00 AM -10:05 AM Welcome remarks

Janet McCabe, Acting Assistant Administrator for Air and Radiation, US EPA

10:05 AM -10:15 AM Brief Remarks from Supportive Industry Associations

American Gas Association (AGA)

Downstream Initiative

10:15 AM - 10:35 AM Introduce Program Partners

Introduce each partner in alphabetical order.

Read brief partner statements (30 seconds pre partner) that summarizes the company's business and their planned commitment as a Methane Challenge partner. While the short company statement is being read, each partner representative walks on stage and shakes hands with Janet McCabe [pause for individual photo]

10:35 AM – 10:40 AM Closing remarks

10:40 AM - 10:45 AM Group Photo

Group photo (all companies) with Janet McCabe on the stage

Additionally, from 12:30 - 1:30 pm, there will be an informal opportunity for you to discuss the Methane Challenge with EPA representatives–we hope you can attend! (The location will be announced at the Launch Event.)

If you haven't yet registered for the Global Methane Forum, please do so as soon as possible at http://globalmethane.org/forum/. On the day of the event, staff will be available at the registration desk to answer questions and provide assistance.

Please feel free to contact Carey Bylin (202-343-9669 or bylin.carey@epa.gov) or Justin Pryor (202-343-9258 or pryor.justin@epa.gov) with any questions about the Methane Challenge Partnership and contact Elina Bouloubasis (703-373-0149 or elina.bouloubasis@erg.com) with any questions about the launch event.

Thank you again for your support of the Methane Challenge Program and we look forward to working with you.

Sincerely,

Elina Bouloubasis

ERG - Contractor Support to the

EPA's Methane Challenge Program

To: Bylin, Carey[Bylin.Carey@epa.gov]
Cc: Harris, Alisa[aharris@ugi.com]
From: Osnick, Kristen
Sent: Mon 3/28/2016 2:16:53 PM
Subject: Revised - UGI Methane Challenge Partnership Agreement
REVISED UGI Partnership Agreement.pdf

Carey,

Sorry for the late response, I just returned to the office today.

Attached please find the revised first page of the Partnership Agreement. I have added the dates for the services and the % for our commitment rate.

Please let me know if you need any additional information.

Kristen Osnick | Environmental Coordinator
UGI Utilities, Inc.
2121 City Line Road
Bethlehem, Pa 18017
Desk: 610.807.3179 | Cell: Ex. 6 - Personal Privacy

kosnick@ugi.com
http://www.ugi.com

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To: Elina Bouloubasis[Elina.Bouloubasis@erg.com]; Bylin, Carey[Bylin.Carey@epa.gov]
From: Jim Cormack
Sent: Sat 3/26/2016 11:55:45 PM
Subject: RE: Methane Challenge Follow-Up

Short bio: TransCanada has a decades long history of proactive and collaborative Research and Development directly related to methane emission reductions. TransCanada has publicly documented its climate change related activities for more than 20 years. As such, we are proud to be a Methane Challenge Partner. We are initially committing to the Best Management Practice of Reciprocating Compressors - Rod Packing Venting; and we continue to evaluate opportunities to commit to further Best Management Practices. The societal goal of reducing methane emission sources, along with the overarching goal of managing Greenhouse Gas emissions is at the forefront of TransCanada's environmental interests and is aligned with our corporate values.

Company name: TransCanada Pipelines, Ltd.

www.transcanada.com/

From: Elina Bouloubasis [mailto:Elina.Bouloubasis@erg.com]
Sent: Wednesday, March 23, 2016 4:14 PM
To: Jim Cormack; Randall Schmidgall; Chad Edwards
Cc: Bylin, Carey; Pryor, Justin
Subject: Methane Challenge Follow-Up

Dear Mr. Cormack, Mr. Schmidgall, and Mr. Edwards,

Congratulations! On behalf of the U.S. Environmental Protection Agency (EPA), I am pleased to welcome you to the Natural Gas STAR Methane Challenge Program. The Partnership Agreement between your company and the U.S. EPA signifies your intent to undertake and document ambitious voluntary methane emission reductions. We will be countersigning the Partnership Agreement and providing you with a final version shortly.

In addition, thank you for sending the requested information to us. If you're able to attend the launch event next week, we still need the following items from you:

- Launch participant's name, title, and contact information
- Short bio (approximately 75 words) describing your company, commitments, and highlighting reasons for becoming a Methane Challenge Partner
- Company website and company name that should be listed on our website

Please be sure to provide these items to me (Elina.bouloubasis@erg.com) **as soon as possible.**

Below is the Launch Event Agenda for an understanding of how the event will be structured.

Methane Challenge Program Launch Event

When: **Wednesday, March 30, 2016, 10:00-10:45AM**

Global Methane Forum Plenary Session, immediately following Policy Roundtable: Different Approaches to Methane Policies 08:30-10:00AM)

**Reserved seating at the front of the room for Methane Challenge Founding Partners.*

Where: **Georgetown University Hotel and Conference Center**

Washington, DC

Agenda:

10:00 AM -10:05 AM Welcome remarks

Janet McCabe, Acting Assistant Administrator for Air and Radiation, US EPA

10:05 AM -10:15 AM Brief Remarks from Supportive Industry Associations

American Gas Association (AGA)

Downstream Initiative

10:15 AM - 10:35 AM Introduce Program Partners

Introduce each partner in alphabetical order.

Read brief partner statements (30 seconds pre partner) that summarizes the company's business and their planned commitment as a Methane Challenge partner. While the short company statement is being read, each partner representative walks on stage and shakes hands with Janet McCabe [pause for individual photo]

10:35 AM – 10:40 AM Closing remarks

10:40 AM - 10:45 AM Group Photo

Group photo (all companies) with Janet McCabe on the stage

Additionally, from 12:30 - 1:30 pm, there will be an informal opportunity for you to discuss the Methane Challenge with EPA representatives–we hope you can attend! (The location will be announced at the Launch Event.)

If you haven't yet registered for the Global Methane Forum, please do so as soon as possible at http://globalmethane.org/forum/. On the day of the event, staff will be available at the registration desk to answer questions and provide assistance.

Please feel free to contact Carey Bylin (202-343-9669 or bylin.carey@epa.gov) or Justin Pryor (202-343-9258 or pryor.justin@epa.gov) with any questions about the Methane Challenge

Partnership and contact Elina Bouloubasis (703-373-0149 or elina.bouloubasis@erg.com) with any questions about the launch event.

Thank you again for your support of the Methane Challenge Program and we look forward to working with you.

Sincerely,

Elina Bouloubasis

ERG - Contractor Support to the

EPA's Methane Challenge Program

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To: Bylin, Carey[Bylin.Carey@epa.gov]
From: Keeble, Gwen
Sent: Fri 3/25/2016 2:51:47 PM
Subject: RE: Additional information pertaining to the Natural Gas STAR Methane Challenge Program -- Orange and Rockland Utilities, Inc. <External Sender>

Great thank you! Let me check with our Gas folks to confirm the start date they'd like to go with. Thank you!

From: Bylin, Carey [mailto:Bylin.Carey@epa.gov]
Sent: Friday, March 25, 2016 10:45 AM
To: Keeble, Gwen
Subject: RE: Additional information pertaining to the Natural Gas STAR Methane Challenge Program -- Orange and Rockland Utilities, Inc. <External Sender>

Hi Gwen,

Thank you for getting in touch. Yes, we received your Partnership Agreement and will get a countersigned version to you today or Monday.

The Start Date is listed as "2016" for Mains and Services. The Start Date is supposed to be a specific date that is within six months of joining the Program, so the latest it can be is September 30, 2016. Are you okay with our recognizing your Start Date as 9/30/16? Or you can choose another date between the launch and that point. The significance of the start date is that is when companies need to start collecting the data they need to track commitments (though for founding partners comprehensive reporting will start for the 2017 calendar year).

Please advise what you would like your start date to be and I will make the needed change to the Partnership Agreement.

Ms. Carey Bylin

International Programs Leader, Oil and Gas

Natural Gas STAR Program

Global Methane Initiative

U.S. Environmental Protection Agency

Phone: +1-202-343-9669

Visiting Address & Private Deliveries (courier, FedEx etc.)

1201 Constitution Ave NW, Room Number 4353 UU, Washington DC 20004

U.S. Mail Address:

Mail Code 6207M, 1200 Pennsylvania Ave NW, Washington DC 20460

From: Keeble, Gwen [mailto:keebleg@oru.com]
Sent: Friday, March 25, 2016 10:19 AM
To: 'bylin.carey@epa.gov'
Subject: RE: Additional information pertaining to the Natural Gas STAR Methane Challenge Program -- Orange and Rockland Utilities, Inc.

Good morning – I am confirming you have received our agreement document and checking to see if you need anything further. I spoke with Bill Slade this morning who suggested I might want to check in to be sure our information was received, and the start date is appropriate.

Thanks!

Gwen Keeble

845-577-3534

917-418-5764

From: Keeble, Gwen
Sent: Wednesday, March 23, 2016 3:17 PM
To: 'elina.bouloubasis@erg.com'; 'bylin.carey@epa.gov'
Subject: FW: Additional information pertaining to the Natural Gas STAR Methane Challenge Program -- Orange and Rockland Utilities, Inc.

Today, Orange and Rockland Utilities, Inc. filed its signed Methane Challenge Partnership Agreement via email, with a hard copy sent overnight. Below please see the additional requested information.

Orange and Rockland will be represented at the forum by our colleagues from Con Ed Co. of NY, Mr. Kyle Kimball, VP of Government Relations, and Mr. Bill Slade the Emerging Issues Manager. Please feel free to reach out to me with any questions or concerns.

Gwen Keeble

Section Manager – Environmental Services

Orange and Rockland Utilities, Inc.

845-577-3534

917-418-5764

keebleg@oru.com

See below for additional requested information from Orange and Rockland Utilities.

-----Original Message-----

From: U.S. EPA's Natural Gas STAR Program [mailto:gasstar@erg.com]
Sent: Wednesday, March 16, 2016 5:15 PM
To: Slade, William
Subject: Thank You For Your Interest in the Natural Gas STAR Methane Challenge Program
<External Sender>

EXTERNAL SENDER. Do not click on links if sender is unknown and never provide user ID or password.

Dear Bill:

On behalf of the U.S. Environmental Protection Agency (EPA), I am pleased to hear of your interest in joining the Natural Gas STAR Methane Challenge Program as a founding partner. We will be officially launching this new program at the Global Methane Forum (GMF) at 10:00am on March 30, 2016 in Washington, D.C.

The launch event will be hosted by Janet McCabe, EPA's Acting Assistant Administrator for Air and Radiation. If you confirm your participation as a founding partner, we encourage you to attend this exciting event. We will recognize your company even if you are not able to participate in person. Please be aware of the following next steps:

-By March 23, please contact us (see contact information below) to confirm that you will be joining as a founding partner, and provide your signed Partnership Agreement.

The Orange and Rockland partnership agreement was emailed today, and sent via hard copy today.

o Provide us a short bio (approximately 75 words) describing your company, your commitments, and highlighting reasons for becoming a Methane Challenge partner.

Orange and Rockland has participated in the Natural Gas STAR program since 1994, and welcomes the opportunity to join the Methane Challenge. Orange and Rockland distributes natural gas to 133,267 customers in Orange and Rockland counties in New York.

Last year the Company made significant improvements in reducing the total leak backlog, replacing 17 miles of leak prone pipe in each of the past three years. Our goal with this Partnership Agreement is to replace 6.5% of our cast iron and unprotected (bare) steel mains by the end of 2016.

o If your company plans to attend the Launch Event, provide the name, title, and contact information of the person who will be representing your company at the event and, if different, the contact information for the individual coordinating your company's participation at the event.

Orange and Rockland will be represented by our colleagues at Con Ed Co. of NY:

Mr. Kyle Kimball

Vice President, Government Relations

Consolidated Edison Company of New York

4 Irving Place

New York, NY 10003

kimballk@coned.com

212-460-2706

Coordinating:

Mr. William V. Slade

(b)(6) personal privacy **(cell)**

sladew@coned.com

-Also, by March 23, please provide a link to your company's website as well as the specific way your company should be listed on the Methane Challenge Program website.

Orange and Rockland Utilities, Inc.

www.oru.com

-Be sure to register for the GMF as soon as possible (http://globalmethane.org/forum/).

Both Kyle Kimball and Bill Slade are registered for the Global Methane Forum

Please send the above information to myself and Elina Bouloubasis (elina.bouloubasis@erg.com). Once we receive confirmation of your participation, we will provide more specific details about the launch event agenda, which will include recognition of each partner and individual and group photos. Please note that due to time constraints, we do not anticipate that partner companies will be able to give individual remarks at the event.

As a new Methane Challenge Program partner, there are a few next steps to be aware of. Within six months after joining the Program, each partner must develop an Implementation Plan to provide details on their planned participation, such as anticipated rate of progress, key milestones, and other relevant context. See the following Guidelines document for more information about how to develop an Implementation Plan: http://www3.epa.gov/gasstar/documents/MC_IP_Guidelines_Final.pdf.

We will also be working with partners as we develop the Program's reporting system, and will be seeking input and feedback in the coming months. Finally, in an effort to further highlight our partners' accomplishments, we aim to work with partners to develop "Fact Sheets" that cover notable historical actions taken in advance of the Methane Challenge Program in efforts to mitigate methane emissions.

We encourage you to attend the full GMF event that will offer high-level plenary sessions on cross-cutting issues such as project financing, joint Global Methane Initiative (GMI)-Climate & Clean Air Coalition (CCAC) discussions on projects and policy, and ample opportunities for networking with methane experts in the public and private sectors from around the world. A draft agenda is available at http://globalmethane.org/forum/. We hope you are able to attend and participate in the sessions.

Please feel free to contact me or Justin Pryor (202-343-9258 or pryor.justin@epa.gov) with any questions you may have about the Methane Challenge Partnership. Please contact Elina Bouloubasis (703-373-0149 or elina.bouloubasis@erg.com) with any questions about the launch event. Thank you again for your support of the Methane Challenge Program and we hope to see you at the launch event in Washington, D.C.

Sincerely,

Ms. Carey Bylin

U.S. Environmental Protection Agency

202-343-9669

bylin.carey@epa.gov

To: Brian Jones[bjones@mjbradley.com]; Bylin, Carey[Bylin.Carey@epa.gov]
From: DeLuca, Isabel
Sent: Wed 3/23/2016 3:16:46 PM
Subject: RE: Launch Event

Hi Brian,

Apologies for the delay in responding! Here's a short run-down of what we're planning comms-wise around the Methane Challenge launch:

- Press advisory announcing Methane Challenge Launch and other events (still tentative, would be issued 8:30 am on 3/30)

- Press release (after launch event, scheduled for 11:30 am)

- Updates to website announcing founding partners

- Social media (in tandem with press release—follow-on messages TBD)

I'm happy to chat with you, if it would be helpful. I'm available between 2:30 and 4:30.

Best,

Isabel DeLuca

Director of Communications

Climate Change Division, US EPA

(202) 343-9247

From: Brian Jones [mailto:bjones@mjbradley.com]
Sent: Wednesday, March 23, 2016 9:08 AM

To: Bylin, Carey <Bylin.Carey@epa.gov>
Cc: DeLuca, Isabel <DeLuca.Isabel@epa.gov>
Subject: RE: Launch Event

Hi Carey, Thank you.

Hi Isabel,

Please let me know if you have time to touch base on the press strategy for the methane challenge launch event – I am open this morning (other than 11 am eastern) and this afternoon. I am developing an press strategy for the Downstream Natural Gas Initiative and several individual member companies are interested in coordinating with EPA.

Thanks

Brian

Brian M. Jones

Senior Vice President

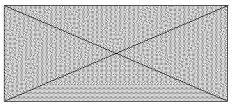
M.J. Bradley & Associates, LLC

47 Junction Square Drive

Concord, MA 01742

Main: 978-369-5533 | Direct: 978-405-1269

www.mjbradley.com



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From: Bylin, Carey [mailto:Bylin.Carey@epa.gov]
Sent: Wednesday, March 23, 2016 9:04 AM
To: Brian Jones <bjones@mjbradley.com>
Cc: DeLuca, Isabel <DeLuca.Isabel@epa.gov>
Subject: Re: Launch Event

Hi Brian, Isabel Deluca, copied, is our press contact.

Carey Bylin

On Mar 23, 2016, at 8:47 AM, Brian Jones <bjones@mjbradley.com> wrote:

Thanks Carey. Who is the EPA press contact for the event?

Brian Jones

(b)(6) personal privacy

On Mar 22, 2016, at 9:24 PM, Bylin, Carey <Bylin.Carey@epa.gov> wrote:

Okay, great, thank you for confirming. I'm not sure if you need a formal invite that you can forward, I've attached one below. Please let me know if you need more information, and thank you very much for your help with this.

****

Dear Brian,

On behalf of the US EPA, I would like to invite a representative of the Downstream

Initiative to make opening remarks during our Methane Challenge launch ceremony on March 30, 2016 at the Global Methane Forum in Washington, DC. The launch event will be hosted by Janet McCabe, EPA's Acting Assistant Administrator for Air and Radiation, and will follow a plenary session "Different Approaches to Methane Policies", allowing EPA to highlight Methane Challenge as a significant new action to address US oil and gas methane emissions. The GMF agenda is available at the following link:
http://www.globalmethane.org/forum/docs/Draft_CombinedAgenda.pdf#page=5.

We have appreciated the productive and collaborative engagement of Downstream Initiative and its partner companies as this Program was developed, and would value your participation at this event. The event agenda is provided below. Due to our strong founding partner turnout and time limitations of the event, we ask that you limit your remarks to five minutes.

Methane Challenge Program Launch Event

When: **Wednesday, March 30, 2016, 10:00-10:45AM**

Global Methane Forum Plenary Session, immediately following Policy Roundtable: Different Approaches to Methane Policies 08:30-10:00AM

**Reserved seating at the front of the room for Methane Challenge launch participants*

Where: Georgetown University Hotel and Conference Center, Washington, DC

Agenda:

10:00 AM -10:05 AM Welcome remarks

Janet McCabe, Acting Assistant Administrator for Air and Radiation, US EPA

10:05 AM -10:15 AM Brief Remarks from Supportive Industry Associations

American Gas Association (AGA)

Downstream Initiative (invited)

10:15 AM - 10:35 AM Introduce Program Partners

Introduce each partner in alphabetical order.

Read brief partner statements (30 seconds pre partner) that summarizes the company's business and their planned commitment as a Methane Challenge partner. While the short company statement is being read, each partner representative walks on stage and shakes hands with Janet McCabe [pause for individual photo]

10:35 AM – 10:40 AM Closing remarks

10:40 AM - 10:45 AM Group Photo

Group photo (all companies) with Janet McCabe on the stage

Additionally, from 12:30 - 1:30 pm, there will be an informal opportunity for you to discuss the Methane Challenge with EPA representatives. The location will be announced at the Launch Event.

If you haven't yet registered for the Global Methane Forum, please do so as soon as possible at http://globalmethane.org/forum/. On the day of the event, staff will be available at the registration desk to answer questions and provide assistance.

Please feel free to contact me (202-343-9669 or bylin.carey@epa.gov) with any questions. We hope you will be able to join us at this important event.

Best regards,

Carey Bylin

International Programs Leader, Oil and Gas

Natural Gas STAR Program

Global Methane Initiative

U.S. Environmental Protection Agency

Ms. Carey Bylin

International Programs Leader, Oil and Gas

Natural Gas STAR Program

Global Methane Initiative

U.S. Environmental Protection Agency

Phone: +1-202-343-9669

Visiting Address & Private Deliveries (courier, FedEx etc.)

1201 Constitution Ave NW, Room Number 4353 UU, Washington DC 20004

U.S. Mail Address:

Mail Code 6207M, 1200 Pennsylvania Ave NW, Washington DC 20460

<image001.gif>

From: Brian Jones [mailto:bjones@mjbradley.com]
Sent: Tuesday, March 22, 2016 4:23 PM
To: Bylin, Carey <Bylin.Carey@epa.gov>
Subject: Launch Event

Hi Carey

Speaking on behalf of DSI will likely be Robert LaCount, Executive Vice President, MJB&A. Can you send along an "invite" to Downstream Initiative to participate and the draft agenda for the event?

Thanks

Brian

Brian M. Jones

Senior Vice President

M.J. Bradley & Associates, LLC

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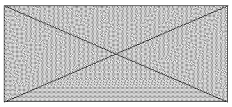

To: Bylin, Carey[Bylin.Carey@epa.gov]
From: Brian Jones
Sent: Wed 3/23/2016 12:47:06 PM
Subject: Re: Launch Event

Thanks Carey. Who is the EPA press contact for the event?

Brian Jones
(b)(6) personal privacy

On Mar 22, 2016, at 9:24 PM, Bylin, Carey <Bylin.Carey@epa.gov> wrote:

Okay, great, thank you for confirming. I'm not sure if you need a formal invite that you can forward, I've attached one below. Please let me know if you need more information, and thank you very much for your help with this.

****

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We have appreciated the productive and collaborative engagement of Downstream Initiative and its partner companies as this Program was developed, and would value your participation at this event. The event agenda is provided below. Due to our strong founding partner turnout and time limitations of the event, we ask that you limit your remarks to five minutes.

Methane Challenge Program Launch Event

When: **Wednesday, March 30, 2016, 10:00-10:45AM**

Global Methane Forum Plenary Session, immediately following Policy Roundtable: Different Approaches to Methane Policies 08:30-10:00AM

**Reserved seating at the front of the room for Methane Challenge launch participants*

Where: **Georgetown University Hotel and Conference Center, Washington, DC**

Agenda:

10:00 AM -10:05 AM Welcome remarks

Janet McCabe, Acting Assistant Administrator for Air and Radiation, US EPA

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Group photo (all companies) with Janet McCabe on the stage

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If you haven't yet registered for the Global Methane Forum, please do so as soon as possible at http://globalmethane.org/forum/. On the day of the event, staff will be available at the registration desk to answer questions and provide assistance.

Please feel free to contact me (202-343-9669 or bylin.carey@epa.gov) with any questions. We hope you will be able to join us at this important event.

Best regards,

Carey Bylin

International Programs Leader, Oil and Gas

Natural Gas STAR Program

Global Methane Initiative

U.S. Environmental Protection Agency

Ms. Carey Bylin

International Programs Leader, Oil and Gas

Natural Gas STAR Program

Global Methane Initiative

U.S. Environmental Protection Agency

Phone: +1-202-343-9669

Visiting Address & Private Deliveries (courier, FedEx etc.)

1201 Constitution Ave NW, Room Number 4353 UU, Washington DC 20004

U.S. Mail Address:

Mail Code 6207M, 1200 Pennsylvania Ave NW, Washington DC 20460

<image001.gif>

From: Brian Jones [mailto:bjones@mjbradley.com]
Sent: Tuesday, March 22, 2016 4:23 PM
To: Bylin, Carey <Bylin.Carey@epa.gov>
Subject: Launch Event

Hi Carey

Speaking on behalf of DSI will likely be Robert LaCount, Executive Vice President, MJB&A. Can you send along an "invite" to Downstream Initiative to participate and the draft agenda for the event?

Thanks

Brian

Brian M. Jones

Senior Vice President

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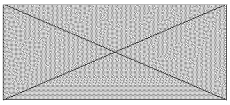

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To: Bylin, Carey[Bylin.Carey@epa.gov]
From: McDonald, Andy
Sent: Wed 3/23/2016 3:13:44 AM
Subject: RE: Methane Challenge Founding Partner

Carey,

Thank you for the additional information. I still believe we will be able to get everything into you by tomorrow. I don't believe that we will have representation at the launch event or the GMF but I will confirm that tomorrow. Thanks again.

Andy McDonald

-----Original Message-----
From: Bylin, Carey [Bylin.Carey@epa.gov]
Sent: Tuesday, March 22, 2016 08:44 PM Central Standard Time
To: McDonald, Andy
Subject: RE: Methane Challenge Founding Partner

*** This is an EXTERNAL email. Exercise caution. ***

Andy,

Thank you, and sorry again for the delay. We had sent the following information last week, but it occurs to me that it may not have gone to you. I wanted to make you aware of the following that we had communicated last week. You will see that there are several items we need by tomorrow, the 23rd. I'm not sure if that will be possible?

On behalf of the U.S. Environmental Protection Agency (EPA), I am pleased to hear of your interest in joining the Natural Gas STAR Methane Challenge Program as a founding partner. We will be officially launching this new program at the Global Methane Forum (GMF) at 10:00am on March 30, 2016 in Washington, D.C.

The launch event will be hosted by Janet McCabe, EPA's Acting Assistant Administrator for Air and Radiation. If you confirm your participation as a founding partner, we encourage you to attend this exciting event. We will recognize your company even if you are not able to participate in person. Please be aware of the following next steps:

•□□□□□□□□ By March 23, please contact us (see contact information below) to confirm that you will be joining as a founding partner, and provide your signed Partnership Agreement

o Provide us a short bio (approximately 75 words) describing your company, your commitments, and highlighting reasons for becoming a Methane Challenge partner

o If your company plans to attend the Launch Event, provide the name, title, and contact information of the person who will be representing your company at the event and, if different, the contact information for the individual coordinating your company's participation at the event

•□□□□□□□□ Also, by March 23, please provide a link to your company's website as well as the specific way your company should be listed on the Methane Challenge Program website

•□□□□□□□□ Be sure to register for the GMF as soon as possible (http://globalmethane.org/forum/)

Please send the above information to myself and Elina Bouloubasis (elina.bouloubasis@erg.com). Once we receive confirmation of your participation, we will provide more specific details about the launch event agenda, which will include recognition of each partner and individual and group photos. Please note that due to time constraints, we do not anticipate that partner companies will be able to give individual remarks at the event.

As a new Methane Challenge Program partner, there are a few next steps to be aware of. Within six months after joining the Program, each partner must develop an Implementation Plan to provide details on their planned participation, such as anticipated rate of progress, key milestones, and other relevant context. See the following Guidelines document for more information about how to develop an Implementation Plan: http://www3.epa.gov/gasstar/documents/MC_IP_Guidelines_Final.pdf.

We will also be working with partners as we develop the Program's reporting system, and will be seeking input and feedback in the coming months. Finally, in an effort to further highlight our partners' accomplishments, we aim to work with partners to develop "Fact Sheets" that cover notable historical actions taken in advance of the Methane Challenge Program in efforts to mitigate methane emissions.

We encourage you to attend the full GMF event that will offer high-level plenary sessions on cross-cutting issues such as project financing, joint Global Methane Initiative (GMI)-Climate & Clean Air Coalition (CCAC) discussions on projects and

policy, and ample opportunities for networking with methane experts in the public and private sectors from around the world. A draft agenda is available at http://globalmethane.org/forum/. We hope you are able to attend and participate in the sessions.

Please feel free to contact me or Justin Pryor (202-343-9258 or pryor.justin@epa.gov) with any questions you may have about the Methane Challenge Partnership. Please contact Elina Bouloubasis (703-373-0149 or elina.bouloubasis@erg.com) with any questions about the launch event. Thank you again for your support of the Methane Challenge Program and we hope to see you at the launch event in Washington, D.C.

Sincerely,

Ms. Carey Bylin

U.S. Environmental Protection Agency

202-343-9669

bylin.carey@epa.gov

Ms. Carey Bylin

International Programs Leader, Oil and Gas

Natural Gas STAR Program

Global Methane Initiative

U.S. Environmental Protection Agency

Phone: +1-202-343-9669

Visiting Address & Private Deliveries (courier, FedEx etc.)

1201 Constitution Ave NW, Room Number 4353 UU, Washington DC 20004

U.S. Mail Address:

Mail Code 6207M, 1200 Pennsylvania Ave NW, Washington DC 20460

From: McDonald, Andy [mailto:Andy.McDonald@mdu.com]
Sent: Tuesday, March 22, 2016 11:09 AM
To: Bylin, Carey <Bylin.Carey@epa.gov>
Subject: RE: Methane Challenge Founding Partner

Carey,

I will confirm but I believe a few of our states are interested in becoming founding partners. Thank you. I will be in touch soon.

Andy McDonald

-----Original Message-----
From: Bylin, Carey [Bylin.Carey@epa.gov]
Sent: Tuesday, March 22, 2016 10:04 AM Central Standard Time
To: McDonald, Andy
Subject: RE: Methane Challenge Founding Partner

*** This is an EXTERNAL email. Exercise caution. ***

Hi Andy,

I am so sorry for the delay! Yes, there is no problem with you signing on as a founding partner by March 23rd. It sounds like it is still a possibility for you?

Ms. Carey Bylin

International Programs Leader, Oil and Gas

Natural Gas STAR Program

Global Methane Initiative

U.S. Environmental Protection Agency

Phone: +1-202-343-9669

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1201 Constitution Ave NW, Room Number 4353 UU, Washington DC 20004

U.S. Mail Address:

Mail Code 6207M, 1200 Pennsylvania Ave NW, Washington DC 20460

From: McDonald, Andy [mailto:Andy.McDonald@mdu.com]
Sent: Tuesday, March 22, 2016 11:00 AM

To: Bylin, Carey <Bylin.Carey@epa.gov>
Subject: RE: Methane Challenge Founding Partner

Carey,

Did you hear anything back on our availability to still get in as founding partners if we can get our agreement signed by tomorrow? We appreciate you checking into the matter.

Andy McDonald

-----Original Message-----
From: McDonald, Andy
Sent: Wednesday, March 16, 2016 12:27 PM Central Standard Time
To: bylin.carey@epa.gov
Subject: Methane Challenge Founding Partner

Carey,

Is it too late in the process to get signed up as a founding partner? We also had a question as to how the membership will be viewed on your webpage. MDU has four different LDCs operating in eight states, so if we choose to sign up, it is my understanding that we can choose to sign up as an entire corporation, or individually on a state by state basis, correct? Another aspect of that would be if we choose to achieve our commitment goals as one corporation, do we have the option of listing each one of our four LDCs as a partner or founding partner?

If you have a few minutes to discuss, I can be reached at the telephone number listed below and would appreciate your guidance on these issues.

Andy McDonald

Environmental Scientist

Montana-Dakota Utilities Co.

400 N. 4th Street

Bismarck, ND 58501

Phone: 701-222-7941

Fax: 701-222-7845

To: Bylin, Carey[Bylin.Carey@epa.gov]
From: McDonald, Andy
Sent: Wed 3/16/2016 5:27:07 PM
Subject: Methane Challenge Founding Partner

Carey,

Is it too late in the process to get signed up as a founding partner? We also had a question as to how the membership will be viewed on your webpage. MDU has four different LDCs operating in eight states, so if we choose to sign up, it is my understanding that we can choose to sign up as an entire corporation, or individually on a state by state basis, correct? Another aspect of that would be if we choose to achieve our commitment goals as one corporation, do we have the option of listing each one of our four LDCs as a partner or founding partner?

If you have a few minutes to discuss, I can be reached at the telephone number listed below and would appreciate your guidance on these issues.

Andy McDonald

Environmental Scientist

Montana-Dakota Utilities Co.

400 N. 4th Street

Bismarck, ND 58501

Phone: 701-222-7941

Fax: 701-222-7845

To: Bylin, Carey[Bylin.Carey@epa.gov]
From: John St.Hilaire
Sent: Sun 3/13/2016 3:52:44 PM
Subject: Re: natural gas star methan challenge program

That is correct,we felt we could not materially improve on the measures we have already implemented that significantly reduce methane emissions.

From: Bylin, Carey <Bylin.Carey@epa.gov>
Sent: Tuesday, March 8, 2016 9:41 PM
To: John St.Hilaire
Subject: RE: natural gas star methan challenge program

Hi john,

Thank you for that background, your efforts are very impressive. We have heard from companies that they would like to be able to highlight their historical methane emission reduction actions, so we are planning to develop a mechanism for sharing that information. I will mention it sounds like you already take action on blowdowns as well, is that source of interest to you? Or did you not select it because you think you are already doing all you can there?

Ms. Carey Bylin

International Programs Leader, Oil and Gas

Natural Gas STAR Program

Global Methane Initiative

U.S. Environmental Protection Agency

Phone: +1-202-343-9669

Visiting Address & Private Deliveries (courier, FedEx etc.)

1201 Constitution Ave NW, Room Number 4353 UU, Washington DC 20004

U.S. Mail Address:

Mail Code 6207M, 1200 Pennsylvania Ave NW, Washington DC 20460

From: John St.Hilaire [mailto:jsthilaire@vermontgas.com]
Sent: Friday, February 26, 2016 7:09 AM
To: Bylin, Carey <Bylin.Carey@epa.gov>
Subject: RE: natural gas star methan challenge program

Hi Casey

I forgot to mention yesterday that our limited involvement in the other STAR sections is because of our prior success. We have evaluated the STAR program many times and were unable to participate as we could not show material improvements from our advanced starting point. Vermont Gas has already removed all of the cast iron and bare steel pipelines in our system. We are currently managing a coated steel replace program and are well on our way to a PE system. For methane capture, we already hot tap and utilize nitrogen plugs when purging large diameter pipes to limit the amount of methane released into the atmosphere. We are proud to have had the Environmental Defense Fund bring the Google car with the picaro methane detection unit to survey the Vermont Gas System in which they found very few leaks.

We look forward to participating in the exciting program.

John

From: Bylin, Carey [mailto:Bylin.Carey@epa.gov]
Sent: Thursday, February 25, 2016 4:08 PM
To: John St.Hilaire
Cc: Pryor, Justin; Franklin, Pamela
Subject: RE: natural gas star methan challenge program

Hello John,

This is great! You are the first partner to send an MOU and we welcome you to the Methane Challenge Program. We will circulate this internally to secure a signature from our end, and will share with you the final document.

Will you or someone from your company be able to join us for the launch ceremony in Washington, DC on March 30? It is great to see that your commitment start date will be in April and that in this first year you will also be able to meet your commitment. As outlined in our supplemental technical information, a significant part of the excavation damages commitment is related to reporting key data on damages, and we would very much like to work with you and other founding partners as we develop the process for reporting supplemental data. We will be in touch as that process proceeds.

We very much look forward to working with you on this program.

Best,

Carey

Ms. Carey Bylin

International Programs Leader, Oil and Gas

Natural Gas STAR Program

Global Methane Initiative

U.S. Environmental Protection Agency

Phone: +1-202-343-9669

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1201 Constitution Ave NW, Room Number 4353 UU, Washington DC 20004

U.S. Mail Address:

Mail Code 6207M, 1200 Pennsylvania Ave NW, Washington DC 20460

From: John St.Hilaire [mailto:jsthilaire@vermontgas.com]
Sent: Wednesday, February 24, 2016 3:17 PM
To: Bylin, Carey <Bylin.Carey@epa.gov>
Subject: RE: natural gas star methan challenge program

Hi Carey

Attached is Vermont Gas' application, I will send it in the mail tomorrow.

John

From: John St.Hilaire
Sent: Wednesday, February 24, 2016 11:23 AM
To: 'bylin.carey@epa.gov'
Subject: natural gas star methan challenge program

Hi Carey

Vermont Gas Systems, Inc would like to participate in the STAR methane challenge program. I will fill out the commitment form and mail it in. We will be committing to do Excavation Damages under NG Distribution.

Is there anything else that I need to do right away?

We will also start to create our implementation plan and will have that shortly. Do I submit the plan to you?

Thank you.

John St.Hilaire

VP Operations

Vermont Gas Systems, Inc.

To: Bylin, Carey[Bylin.Carey@epa.gov]; Pryor, Justin[Pryor.Justin@epa.gov]
From: Lacey, Pam
Sent: Fri 3/11/2016 9:13:37 PM
Subject: Methane Challenge question: vintage coupled pipe leaks more than unprotected steel - can it be included?

Carey and Justin –

I have a question from a member company. You may recall that there have been problems with old couplings that have been drying out due to very dry gas (either from LNG or from dry gas coming from some shale plays). The dried out couplings then leak – far more than unprotected steel pipe. State utility commissions have required companies to replace many miles of pipe with these vintage couplings. With that background, here is the question (with company-identifying information removed because I can't reach them to find out if they mind me telling you who it is) --

We are on the bubble for Tier 2 and Tier 3 designation – by about one mile. This makes a huge difference for us – essentially it determines whether we can make a [corporate] system wide commitment or just commit to [one state].

However, if we are allowed to count our vintage coupled pipe as unprotected steel – as we are permitted to do by our [state A] and [state B] Commissions – we use the same GHG emissions factor as unprotected steel – then we are deep into tier 3 reporting because we have added hundreds of miles of planned pipe replacement.

Essentially our Commissions allow us to make this designation because our vintage coupled pipe has the same or higher leak count as our unprotected steel pipe. In fact, I believe our vintage coupled pipe actually has a higher leak count than unprotected steel.

Do you know if EPA has considered these situations? You may recall that about 10 years ago this vintage coupled pipe started to have higher leak counts and we began an aggressive replacement program that is still continuing. Studies attributed this situation to dryer gas, or lower hydrocarbon counts in the LNG gas that we were receiving and taking straight off the system from nearby [LNG facility]. At the time we were relatively unique. I have now heard that some other utilities are having similar problems but for different reasons. In these cases, LDCs are seeing "dryer" gas overall as richer hydrocarbons are being stripped off of fracked gas.

So … are we alone with this issue? Any chance that EPA might count vintage coupled pipe, especially when our commissions are applying the same emissions factor to this pipe as that applied to unprotected steel?

Thank you for considering this. I know the company is eager to sign up at the corporate level for all its states.

Best regards, Pam

Pamela A. Lacey | Chief Regulatory Counsel

Office of General Counsel

American Gas Association

400 N. Capitol St., NW | Washington, DC | 20001

P: 202-824-7340 | M: 202-809-6565 | F: 202-824-9190 | placey@aga.org

The American Gas Association represents more than 200 local energy companies committed to the safe and reliable delivery of clean natural gas to over 69 million customers throughout the nation.

To: Pryor, Justin[Pryor.Justin@epa.gov]; John St.Hilaire[jsthilaire@vermontgas.com]
Cc: Bylin, Carey[Bylin.Carey@epa.gov]
From: Ned Farquhar
Sent: Wed 3/9/2016 9:12:09 PM
Subject: Re: STAR announcement
1512 EPA methane rule ltr FINAL.docx

See you then. I am all signed up for the event. Hope to get time with Kate and others at GU to see if there are other gas LDCs who are interested in starting to send comments together, etc. Our customers clearly want us to support reasonable regs to control meythane emissions in field and in transmission, not just in our system, per attached letter. Ned

Ned Farquhar
Vermont Gas
VP, Communications and Government
cell: 222-1038

From: "Pryor, Justin" <Pryor.Justin@epa.gov>
Date: Wednesday, March 9, 2016 at 3:55 PM
To: Ned Farquhar <nfarquhar@vermontgas.com>, "John St.Hilaire" <jsthilaire@vermontgas.com>
Cc: "Bylin, Carey" <Bylin.Carey@epa.gov>
Subject: RE: STAR announcement

Hi Ned,

We are so glad you are able to attend the launch event, thank you for letting us know. EPA will be coordinating the event and initiating all announcements. We plan to send out welcome letters to all new members very shortly, which will provide some next steps for partners. In the interim, attached is information on the launch event itself.

Thank you for reaching out, and you will hear from us again very soon with additional information.

Respectfully,

Justin Pryor

Climate Change Division

U.S. Environmental Protection Agency

202-343-9258

From: Ned Farquhar [mailto:NFarquhar@vermontgas.com]
Sent: Tuesday, March 08, 2016 4:36 PM
To: Bylin, Carey <Bylin.Carey@epa.gov>
Cc: Franklin, Pamela <Franklin.Pamela@epa.gov>; Pryor, Justin <Pryor.Justin@epa.gov>; John St.Hilaire <jsthilaire@vermontgas.com>
Subject: STAR announcement

Hi Carey – Responding to your Feb 25 confirmation that Vermont Gas is a natural gas star methane challenge program participant (perhaps the first to respond, sounds like). We'd like to be involved in the announcement. Either I or our CEO will attend. We have heard AGA is pulling together some info. Do you know who I would contact there? Or are you running the announcement from there?

Thanks,

Ned

Ned Farquhar

Vermont Gas

VP, Communications and Government

cell: 222-1038

To: Bylin, Carey[Bylin.Carey@epa.gov]
From: Lacey, Pam
Sent: Wed 3/9/2016 2:35:26 AM
Subject: RE: Invitation to speak at AGA Environmental Committee Meeting at AGA in DC - May 17 or 18, 2016 - re Methane Challenge

Great! I'm glad this will work out. - Pam

Sent from my Verizon Wireless 4G LTE smartphone

-------- Original message --------
From: "Bylin, Carey"
Date:03/08/2016 8:12 PM (GMT-05:00)
To: "Lacey, Pam"
Subject: RE: Invitation to speak at AGA Environmental Committee Meeting at AGA in DC - May 17 or 18, 2016 - re Methane Challenge

Hi Pam,

Thank you for your support on Methane Challenge, we have seen very positive response so far. Thank you also for the invitation to speak to the AGA Environmental Committee. Yes, this will work, and I'll propose May 18 at 2:30p or 3p. Having said that, I am somewhat flexible to feel free to propose alternate times.

Ms. Carey Bylin

International Programs Leader, Oil and Gas

Natural Gas STAR Program

Global Methane Initiative

U.S. Environmental Protection Agency

Phone: +1-202-343-9669

Visiting Address & Private Deliveries (courier, FedEx etc.)

1201 Constitution Ave NW, Room Number 4353 UU, Washington DC 20004

U.S. Mail Address:

Mail Code 6207M, 1200 Pennsylvania Ave NW, Washington DC 20460

From: Lacey, Pam [mailto:PLacey@aga.org]
Sent: Monday, March 07, 2016 1:00 PM
To: Bylin, Carey <Bylin.Carey@epa.gov>
Subject: Invitation to speak at AGA Environmental Committee Meeting at AGA in DC - May 17 or 18, 2016 - re Methane Challenge

Carey – I know you are swamped right now getting Methane Challenge ramped up. You should be hearing from at least 13 AGA member companies that they are seriously considering joining as Founding Partners. I sent everyone a reminder last week and again this morning.

If you can find a moment, would you please check your calendar and let me know if you can come over to AGA's office on North Capitol Street either May 17 or May 18, 2016 to talk to AGA members about Methane Challenge. Many if not all of the companies who are signing up as Founding Partners will be there, so it will be a good opportunity to discuss implementation and next steps. If you have a time preference, please let me know as I am drafting the agenda now. Thank you!

Best, Pam

Pamela A. Lacey | Chief Regulatory Counsel

Office of General Counsel

American Gas Association

400 N. Capitol St., NW | Washington, DC | 20001

P: 202-824-7340 | M: 202-809-6565 | F: 202-824-9190 | placey@aga.org

The American Gas Association represents more than 200 local energy companies committed to the safe and reliable delivery of clean natural gas to over 69 million customers throughout the nation.

To: Bylin, Carey[Bylin.Carey@epa.gov]
From: Brian Jones
Sent: Wed 3/9/2016 2:12:21 AM
Subject: Re: DSI Meeting April 7-8

Great thanks. Tomorrow at 2 works for me to connect- shall I call you at your office?

Brian Jones
(b)(6) personal privacy [redacted]

On Mar 8, 2016, at 9:08 PM, Bylin, Carey <Bylin.Carey@epa.gov> wrote:

Hi Brian,

Okay, technical and high-level discussions sound good. These days both work for me and at this point I don't have a preference. Yes if you don't mind reaching out to Paul that would be great. He and I can coordinate and his availability will likely drive which day we do.

Ms. Carey Bylin

International Programs Leader, Oil and Gas

Natural Gas STAR Program

Global Methane Initiative

U.S. Environmental Protection Agency

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1201 Constitution Ave NW, Room Number 4353 UU, Washington DC 20004

U.S. Mail Address:

Mail Code 6207M, 1200 Pennsylvania Ave NW, Washington DC 20460

<image001.gif>

From: Brian Jones [mailto:bjones@mjbradley.com]
Sent: Wednesday, March 02, 2016 5:23 PM
To: Bylin, Carey <Bylin.Carey@epa.gov>
Subject: RE: DSI Meeting April 7-8

Hi Carey,

Great, thanks. Yes, I think it makes sense to have both a high level discussion and a more technical one as well. I think a two hour time slot should be good.

Let me know which day is best – again the format this time around is a half day 11-4 on April 7th and 9-12 on April 8.

Please let me know if it would be easier if I reached out to Paul directly.

Thanks

Brian

From: Bylin, Carey [mailto:Bylin.Carey@epa.gov]
Sent: Tuesday, March 01, 2016 3:39 PM
To: Brian Jones <bjones@mjbradley.com>
Subject: RE: DSI Meeting April 7-8

Hi Brian,

Yes, of course we appreciate the invitation and would be interested in participating. Would you want to hear something more high-level from Paul? Or would you want to take the opportunity to have a more technical discussion? Or both? We would be open to either.

Ms. Carey Bylin

International Programs Leader, Oil and Gas

Natural Gas STAR Program

Global Methane Initiative

U.S. Environmental Protection Agency

Phone: +1-202-343-9669

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1201 Constitution Ave NW, Room Number 4353 UU, Washington DC 20004

U.S. Mail Address:

Mail Code 6207M, 1200 Pennsylvania Ave NW, Washington DC 20460

<image001.gif>

From: Brian Jones [mailto:bjones@mjbradley.com]
Sent: Monday, February 29, 2016 5:13 PM
To: Bylin, Carey <Bylin.Carey@epa.gov>
Subject: DSI Meeting April 7-8

Hi Carey

I am doing some planning for our upcoming DSI meeting April 7-8. The format this time around is a half day 11-4 on April 7th and 9-12 on April 8. We would love to have you and the team attend once again – Methane Challenge, methane strategy etc. Please let me know what you think and if one of those days works better.

Thanks

Brian

Brian M. Jones

Senior Vice President

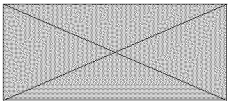
M.J. Bradley & Associates, LLC

47 Junction Square Drive

Concord, MA 01742

Main: 978-369-5533 | Direct: 978-405-1269

www.mjbradley.com



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To: Bylin, Carey[Bylin.Carey@epa.gov]
From: Brian Jones
Sent: Wed 3/2/2016 10:23:00 PM
Subject: RE: DSI Meeting April 7-8

Hi Carey,

Great, thanks. Yes, I think it makes sense to have both a high level discussion and a more technical one as well. I think a two hour time slot should be good.

Let me know which day is best – again the format this time around is a half day 11-4 on April 7th and 9-12 on April 8.

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From: Bylin, Carey [mailto:Bylin.Carey@epa.gov]
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1201 Constitution Ave NW, Room Number 4353 UU, Washington DC 20004

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Mail Code 6207M, 1200 Pennsylvania Ave NW, Washington DC 20460

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Brian M. Jones

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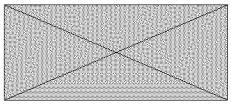

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To: Bylin, Carey[Bylin.Carey@epa.gov]
Cc: Christine Wyman[cwyman@aga.org]
From: Lacey, Pam
Sent: Mon 2/22/2016 3:21:34 PM
Subject: FW:AGA RELEASE: Natural Gas Utilities Focused on Storage Safety

Carey – I thought you might be interested in AGA's updated "Commitment to Enhancing Safety" and its implications for reducing incidents with associated emissions. Looking forward to seeing you today for the Methane Challenge meeting and call. - Pam

Pamela A. Lacey | Chief Regulatory Counsel

Office of General Counsel

American Gas Association

400 N. Capitol St., NW | Washington, DC | 20001

P: 202-824-7340 | M: 202-809-6565 | F: 202-824-9190 | placey@aga.org

The American Gas Association represents more than 200 local energy companies committed to the safe and reliable delivery of clean natural gas to over 69 million customers throughout the nation.

From: Rubin, Jake
Sent: Monday, February 22, 2016 10:15 AM
To: AGA Contacts <AGAContacts@aga.org>
Subject: RELEASE: Natural Gas Utilities Focused on Storage Safety

For Immediate Release:

February 22, 2016

AGA Media Contact:

Jake Rubin

jrubin@aga.org

(202) 824-7027

Natural Gas Utilities Focused on Storage Safety

AGA Board of Directors Updates Commitment to Enhancing Safety

Washington, D.C. –In an American Gas Association (AGA) Board of Directors meeting last week, the Board approved an update to its "Commitment to Enhancing Safety," which outlines the industry's continued commitment to improving pipeline safety through voluntary actions above and beyond federal regulations, to include promotion of the use of API Recommended Practices (RPs) 1170 and 1171. These RPs provide guidance to operators on how to design, operate, and ensure the integrity of underground storage for natural gas.

"Safety is a core value for AGA and its members, and the industry works continuously to ensure the safety and reliability of this domestic fuel," said AGA president and CEO, Dave McCurdy. "AGA and its members were active participants in the development of recommended practices 1170 and 1171, a process which brought together regulators, academia, industry and the public - an approach accredited by the American National Standards Institute. We have updated our 'Commitment to Enhancing Safety' to reflect the work we have done on this issue and to make it clear that we support federal regulations that address natural gas storage facilities."

The SAFE PIPES Act (S. 2276), which recently passed out of the U.S. Senate Commerce Committee, directs the Pipeline and Hazardous Materials Safety Administration (PHMSA) to promulgate safety standards for the oversight of underground natural gas storage facilities, a measure supported by the natural gas industry.

AGA's "Commitment to Enhancing Safety" also contains a recognition that the concerted effort by natural gas utilities to upgrade our nation's pipeline network in order to enhance safety has contributed significantly to a declining trend in emissions from the natural gas distribution system. A report published in Environmental Science & Technology in March led by a team from Washington State University found that as little as 0.1 percent of the natural gas delivered nationwide is emitted from local distribution systems.

In 2011, then U.S. Secretary of Transportation Ray LaHood brought together federal, state and industry stakeholders to discuss steps for making continued improvements to the safety and efficiency of the nation's pipeline infrastructure, and, in particular, accelerating the replacement of pipelines no longer fit for service to help ensure a safe and reliable system for the next 100 years. Secretary LaHood's Call to Action directed operators of local gas distribution pipelines to evaluate the risks on their pipeline systems to determine their fitness for service and take action to address those risks. America's natural gas utilities heeded the call and released the first "Commitment to Enhancing Safety" that year, which detailed actions taken by AGA or individual operators that went above and beyond current regulation to help ensure the safe and reliable operation of the nation's network of natural gas pipelines.

Review AGA's Commitment to Enhancing Safety here.

# # #

About the American Gas Association

The American Gas Association, founded in 1918, represents more than 200 local energy companies that deliver clean natural gas throughout the United States. There are more than 72 million residential, commercial and industrial natural gas customers in the U.S., of which 95 percent — just under 69 million customers — receive their gas from AGA members. Today, natural gas meets more than one-fourth of the United States' energy needs.

Jennifer O'Shea | Vice President, Communications

American Gas Association

400 N. Capitol St., NW | Washington, DC | 20001

P: 202-824-7023 | F: 202-824-9133 | joshea@aga.org

The American Gas Association represents more than 200 local energy companies committed to the safe and reliable delivery of clean natural gas to nearly 69 million customers throughout the nation.

To: Bylin, Carey[Bylin.Carey@epa.gov]
From: Magee, Charles H.
Sent: Wed 1/27/2016 12:21:56 AM
Subject: CPUC Best Practices Report
RA Doc 3 SEDSB1371LenoNaturalGasLeakageAbatementBestPracticesFinal.pdf
Copy of RA Doc 4 AppendixANaturalGasLeakageAbatementBestPracticesRev3.xlsx

Hi Carey,

I believe we talked on the phone a couple of weeks ago about the Methane Challenge Program. I said that I would send you a report on best practices that we did last year. That report is attached. We are also completing a series of best practices working group meetings with the gas utilities and interested parties.

This is all due to California bill SB 1371. The proceeding is R.15-01-008. You can follow it on our Risk Assessment website, or from the CPUC Homepage by typing r1501008 in the search box in the upper right hand corner of the Homepage.

http://www.cpuc.ca.gov/riskassessment/

Chuck Magee

Senior Utilities Engineer

Risk Assessment Unit

California Public Utilities Commission

415-806-2394

charles.magee@cpuc.ca.gov<mailto:charles.magee@cpuc.ca.gov>

Natural Gas STAR
Methane Challenge Program:
Supplementary Technical Information for ONE Future Commitment Option

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Introduction

This document provides additional details to augment the Natural Gas STAR Methane Challenge Program ("Methane Challenge") ONE Future Emissions Intensity Commitment Framework and Partnership Agreement documents released May XX, 2016. This document provides additional information for emission sources for the onshore production, gathering and boosting, processing, transmission and storage, and distribution segments, including source descriptions, detail on mitigation options, and Greenhouse Gas Reporting Program (GHGRP) and voluntary reporting data elements that would be reported to EPA to track partner progress. Where multiple mitigation options are listed, Partners may choose to implement any combination of these throughout their operations to meet their commitments. Because companies selecting the ONE Future Emissions Intensity Option (ONE Future Option) would need to quantify all of their methane emission sources, this document is intended to be comprehensive and cover all applicable methane emission sources covered in the GHGRP and the Greenhouse Gas Inventory (GHGI). In addition, ONE Future Inc., has developed the Methane Emissions Intensity Protocol that enables diverse companies involved in different segments of the natural gas supply chain to report CH_4 emissions intensity in a manner that is both transparent, and consistent with ONE Future's goal of achieving methane emissions intensity that are less than or equal to one percent of gross production by the year 2025.[1]

Methane Challenge Program Reporting

The EPA will collect the following information from partner companies as part of annual reporting to provide context for participation in the Program and facilitate annual tracking of progress.

- List of included facilities that report to Subpart W (facility ID)
- List of included facilities not reporting to Subpart W (a process will be developed for generating a facility ID for facilities that do not report to Subpart W). The facility ID for Transmission and Storage companies reporting through the Methane Challenge Program will be at the Company Pipeline level.
- List of facilities acquired/divested during the reporting year

In the following sections of this document, for each emission source, the "Reporting" table summarizes the Data Elements the Methane Challenge Program will utilize to track partner company progress towards their commitments, including the following information:

- Emission Source: For each Emission Source that a company has committed to address, the company will provide information on all occurrences of that source across company/unit operations. Data collection will include both unmitigated sources and sources that have implemented mitigation options (including supplementary information for those sources that have eliminated emissions completely).
- Quantification Method: For each Emission Source, there is a corresponding method or methods to quantify methane emissions.

[1] The scope of this protocol is limited to CH_4 emissions intensity computation and progress tracking. Specific program elements for company engagement in the EPA Methane Challenge Program, such as memorandums of understanding (MOU) between participating companies and the EPA, implementation plans, and supplemental technical information, specific data submission and management software to support emissions reporting will be defined by EPA or are outside the scope of this document.

- Data Elements Collected via Facility-Level Reporting: The table lists data elements to be reported by Partners, and indicates those already collected through GHGRP Subpart W reporting. Facilities not already reporting to Subpart W would report Data Elements through a supplemental reporting mechanism. Facilities already reporting to Subpart W would provide only supplemental data elements through the supplemental reporting mechanism.

In addition, annual reports will provide an opportunity for reporting optional, qualitative information to provide context for their progress each year.

This document includes the following information for each emission source: the segments in which the source's methane emissions would be quantified, the methods for quantifying such emissions, and the corresponding data elements to be reported by Partners. Each data element includes a specification of whether it is already being reported to GHGRP. For the supplemental data, in the cases where multiple emission quantification methods are suggested and there is no specification as to their use, partner companies can select any quantification method. As part of the ONE Future Methane Intensity Option, the EPA will allow for other quantification methods that are supplemental to GHGRP Subpart W for certain emission sources (e.g. measurement for certain sources), for which facilities could potentially select either the GHGRP or Methane Challenge Quantification Method for purposes of tracking Methane Challenge commitments.

Methane Challenge ONE Future Option Reporting Approach

For each ONE Future participant company, the participants' gross emission rates will be developed using the emission sources for each segment and emission factors at an appropriate facility level and will include the following:

a. **E1:** emissions from Subpart W sources within facilities that emit greater than 25,000 tons per year of CO2e;
b. **E2:** emissions from Subpart W sources from facilities that emit less than 25,000 tons per year of CO2e [2];
c. **E3:** emission from non-subpart W sources at either E1 or E2 facilities but listed in the GHGI.

While Subpart W methodologies incorporate direct measurements for some emission sources, for many sources, default emission factors are employed. Under the ONE Future Methane Intensity Option, companies have the flexibility to generate emission for sources listed in Table 2. These may include the following:

- Use of "actual counts" instead of population counts;
- Use of company-specific emission measurements for emission sources generated by direct measurements. Companies can use such company-specific leaker factors to achieve the following:
  + Substitute "default" Subpart W and GHGI emission factors with measurement data specific to the company's operations for Methane Challenge. For example, company specific data to replace default Subpart W pneumatic controller emission rates;
  + Substitute "default" Subpart W and GHGI emission factors due to specific action (i.e. reduction technology, work practice standard) for Methane Challenge. Example, a company that conducts a corporate-wide Leak Detection and Repair (LDAR) program has the option to also conduct emissions measurements (e.g. Hi Flow) as part of their leak detection program and to use these measurements to generate leaker emissions factors specific to the company's operations

[2] Emissions for transmission and storage sectors will be reported at a pipeline company level

The term "R" refers to revisions in methane emissions that may be the result of improved company practices, equipment changes, and developing company-specific emission measurements (which may be an increase or reduction in emission rates)

For those participating companies which choses to employ the above options, the "net emissions" for each participant company are calculated based on the following equation (all terms are expressed as tonnes CH_4 emissions):

(Equation 1)

(Equation 2)

For companies that chose not to compute R, the gross emissions (Equation 1) = net participant emissions (Equation 2).

It should be noted that ONE Future companies are not mandated to develop company or site-specific emission factors, rather the ONE Future option provides companies the ***option*** to generate company specific data rather than relying on default emission rates. It should be noted that the term "R" focuses on change in emissions (i.e. reductions or increase) relative to emissions computed employing GHGRP or GHGI factors for sources E1, E2 and E3.

For reporting purposes, the Methane Challenge Program will utilize the same source, segment and facility definitions and data will be reported at the facility level consistent with Subpart W, except where specified below.

Table 1: Reporting Facility Definition

Industry Segment	Reporting Facility
Production & Gathering	Consistent with proposed Subpart W
Processing	Consistent with Subpart W
Transmission & Storage	Reported at each Pipeline level[3]
Distribution	Consistent with Subpart W

For the Transmission and Storage sector, data for non-subpart W facilities (E2) and specific emission sources that exist at a facility that are not required to be reported under Subpart W but are included in the Greenhouse Gas inventory (E3) may be aggregated and reported at a transmission pipeline company level. Annually, the EPA will compile the data collected and publicly release (on the Program website) all non-confidential data submitted either to the

[3] *Transmission Pipeline* means a Federal Energy Regulatory Commission rate-regulated Interstate pipeline, a state rate-regulated Intrastate pipeline, or a pipeline that falls under the "Hinshaw Exemption" as referenced in section 1(c) of the Natural Gas Act, 15 U.S.C. 717-717 (w)(1994). The transmission pipeline company would be the owner or operator of the respective transmission pipeline as defined above and all associated onshore transmission compressor stations and underground natural gas storage facilities.

Methane Challenge Program or through the GHGRP. See Appendix A for schematic descriptions of facility reporting.

Table 2 provides the classification of various emission sources within each segment of the industry.

Table 2: Methane Emission Source Classification (E1, E2, E3)

Emission Source	Production*	Gathering & Boosting	Processing	Transmission & Storage	Transmission Pipeline	Distribution	LNG S LNG Ir Export
Acid Gas Removal	E3	E3	E3				
Associated Gas Venting and Flaring	E1						
Blowdowns - Pipelines	E3	E3			E1	E3	
Blowdown Vent Stacks – non-pipeline	E3	E1/E2	E1/E2	E1/E2, or E3			E1/E2 Import E3 (LN Storag
Combustion Units – Internal(Engine Exhaust)	E1	E1/E2	E1/E2	E1/E2		E1/E2	E1/E2
Combustion Units – External (Engine Exhaust)	E1	E1/E2	E1/E2	E1/E2		E1/E2	E1/E2
Centrifugal Compressors	E1	E1/E2	E1/E2	E1/E2			E1/E2
Reciprocating Compressors	E1	E1/E2	E1/E2	E1/E2			E1/E2
Compressor Starts	E3	E3					
Dehydrator Vents	E1	E1/E2	E1/E2	E3			
Equipment Leaks	E1	E1/E2	E1/E2	E1/E2		E1/E2	E1/E2
Excavation Damage (Dig-Ins / Mishaps)	E3	E3				E3	
Distribution Mains – Leaks						E1/E2	
Distribution Services – Leaks						E1/E2	
Flare Stacks	E1	E1/E2	E1/E2	E1/E2			E1/E2
Liquids Unloading	E1						
Meters – Residential – Leaks						E3	
Meters – Commercial/ Industrial - Leaks						E3	
Pneumatic Controllers	E1	E1/E2	E3	E1/E2			
Pneumatic Pumps	E1	E1/E2					
Pressure Relief Valves	E3					E3	
Tank Vents	E1	E1/E2					
Storage Tank Vents – Transmission Stations				E1/E2			
Well Drilling	E3						
Well Venting during							

completions / workovers with HF							
Gas Well Venting during completions / workovers without HF	E1						
Well Testing Venting and Flaring	E1						

A partner may use alternative quantification methods (i.e. other than Subpart W methods for the source category) for certain source categories. The intent of this flexibility is to reduce the reporting burden for partners in the ONE Future option. These are outlined in Appendix B and reflected in the quantification methods for specific sources below.

Emission Sources

Acid Gas Removal Vents (E3)

Applicable Segments:

- Production (E3)[7], Gathering and Boosting (E3)[8], and Processing[9]

Quantification Methods:

- GHGI segment specific EFs[10]

- Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Acid Gas Removal (AGR) vents	Actual count of AGR units	X
	Annual CH_4 Emissions (mt CH_4)	
Voluntary action to reduce methane emissions during the reporting year[11]	Mitigation actions implemented to reduce methane emissions (list)	
	Emission reductions from voluntary action (mt CH_4)	

Associated Gas Venting & Flaring (E1)

Applicable Segments:

- Production (E1)[12]

Quantification Methods:

- Subpart W Calculation Methodology[13]

[7] 40 CFR 98.232(c)(17)
[8] 40 CFR 98.232(j)(3)
[9] 40 CFR 98.232(d)(5)
[10] Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013, Table A-136: 2013 Data and CH_4 Emissions [Mg] for the Natural Gas Processing Stage

[12]
40 CFR 98.232(c)(13)
[13] 40 CFR 98.233(m) and 40 CFR 98.233(n)

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Associated Gas Venting & Flaring	Volume of oil produced during venting/flaring	X
	Volume of associated gas sent to sales (scf)	X
	Actual count of wells venting associated gas	X
	Actual count of wells flaring associated gas	X
	Annual CH_4 Emissions from Venting (mt CH_4)	X
	Annual CH_4 Emissions from Flaring (mt CH_4)	X
Voluntary action to reduce methane emissions during the reporting year[14]	Mitigation actions implemented to reduce methane emissions (list)	
	Emission reductions from voluntary action (mt CH_4)	

Blowdown – Production Vessels (E3), Gathering and Boosting Pipelines (E3), and Distribution Pipelines (E3)

Applicable Segments:

- Production (E3),
- Gathering and Boosting (E3), and
- Distribution (E3)

Quantification Methods:

- GHGI segment specific EFs[15]
- Subpart W Calculation Methodology (98.233(i)

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Routine maintenance:	Miles of pipeline	
	Annual CH_4 Emissions (mt CH_4)	
Pipeline Blowdowns Voluntary action to reduce methane emissions during the reporting year[16]	Number of blowdowns that routed gas to a compressor or capture system for beneficial use, flare, or low-pressure system	
	For pipelines, number of hot taps utilized that avoided the need to blowdown gas to the atmosphere	
	Emission reductions from voluntary action (mt CH_4)	

Blowdown Vent Stacks (E1/E2)

Applicable Segments:

- Gathering and Boosting (E1/E2)[25], Processing (E1/E2)[26], Transmission Compression (E1/E2)[27], Transmission Pipelines (E1/E2), and LNG Import/Export (E1/E2)[28]

Quantification Methods:

- Subpart W Calculation method using engineering calculation method by equipment or event type[29]
- Subpart W Calculation method using direct measurement of emissions using a flow meter[30]
- Alternative quantification method: Average reporter unique physical volume calculated at a pipeline company level for each blowdown event type based on an average of the actual blowdown events collected at other company facilities that report under the GHGRP (using 98.233(i)). This average reporter unique physical volume would then be multiplied by the actual number of blowdown events that occur at the E2 site.

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Blowdown Vent Stacks	Actual count of blowdowns by equipment or event type	X
	Annual CH_4 emissions by equipment or event type (mt CH_4) (emissions calculated by equipment or event type)	X
	Annual total CH_4 emissions calculated by flow meter (mt CH_4) (emissions calculated using flow meters)	X
Voluntary action to reduce methane emissions during the reporting year[31]	Total number of blowdowns	
	Number of blowdowns that routed gas to a compressor or capture system for beneficial use	
		N
	Number of blowdowns that routed gas to a low-pressure system	
	Number of hot taps that avoided the need to blowdown gas to the atmosphere	
		N
	Emission reductions from voluntary action (mt CH_4)	

[25] 40 CFR 98.232(j)(5)
[26] 40 CFR 98.232(d)(3)
[27] 40 CFR 98.232(e)(4)
[28] 40 CFR 98.232(h)(3)
[29] 98.233(i)(2)
[30] 98.233(i)(3)
[31] As calculated per the specified emission quantification methodologies for each source.
[32] Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013, Table A-126: 2013 CH_4 Emissions from Petroleum Production Field Operations

Combustion Units – Internal (Engine Exhaust) (E1/E2)

Applicable Segments:

- Production (E1)[34], Gathering and Boosting(E1/E2)[35], Processing (E1/E2)[36], Transmission Compression (E1/E2)[37], Storage (E1/E2)[38], LNG Storage (E1/E2)[39], LNG Import/Export (E1/E2)[40], and Distribution (E1/E2)[41]

Quantification Methods:

- Apply emission estimation methods as specified in 98.233(z) or Subpart C.
- Direct measurement (Specify measurement protocol)

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP	
Internal combustion units	Actual count of internal fuel combustion units that are not compressor-drivers, with a rated heat capacity less than or equal to 1 mmBtu/hr	X	
	Actual count of internal fuel combustion units that are not compressor-drivers, with a rated heat capacity greater than 1 million Btu per hour	X	
	Annual CH_4 Emissions (mt CH_4) for internal fuel combustion units that are not compressor-drivers, with a rated heat capacity greater than 1 million Btu per hour	X	
		Actual	X

[33] As calculated per the specified emission quantification methodologies for each source.
[34] 40 CFR 98.232(c)(22)
[35] 40 CFR 98.232(j)(12)
[36] 40 CFR 98.33
[37] *ibid*
[38] *ibid*
[39] *ibid*
[40] *ibid*
[41] 40 CFR 98.232(i)(7)
[42] 40 CFR 98.233(z)(1); 40 CFR 98.233(z)(2)
[43] 40 CFR 98.236(z)(1); 40 CFR 98.236(z)(2)

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
	capacity that are compressor-drivers	
	Annual CH_4 Emissions (mt CH_4) for internal fuel combustion units of any heat capacity that are compressor-drivers	X
Voluntary action to reduce methane emissions during the reporting year[44]	Mitigation actions implemented to reduce methane emissions (list)	
	Emission reductions from voluntary action (mt CH_4)	

Combustion Units – External (Engine Exhaust) (E1/E2)

Applicable Segments:

- Production (E1)[45], Gathering and Boosting (E1/E2)[46], Processing (E1/E2)[47], Transmission Compression (E1/E2)[48], Storage (E1/E2)[49], LNG Storage (E1/E2)[50], LNG Import/Export (E1/E2)[51], and Distribution (E1/E2)[52]

Quantification Methods:

- Apply emission estimation methods as specified in 98.233(z) or Subpart C.
- Direct measurement (Specify measurement protocol)

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
External combustion units	Actual count of external fuel combustion units with a rated heat capacity less than or equal to 5 million Btu per hour	X
	Actual count of external fuel combustion units with a rated heat capacity greater than 5 million Btu per hour	X
	Annual CH_4 Emissions (mt CH_4) for external fuel combustion units with a rated heat capacity greater than 5 million Btu per hour	X
Voluntary action to reduce methane emissions during the reporting year[53]	Mitigation actions implemented to reduce methane emissions (list)	
	Emission reductions from voluntary action (mt CH_4)	

44 As calculated per the specified emission quantification methodologies for each source.
45 40 CFR 98.232(c)(22)
46 40 CFR 98.232(j)(12)
47 40 CFR 98.33
48 *ibid*
49 *ibid*
50 *ibid*
51 *ibid*
52 40 CFR 98.232(i)(7)
53 As calculated per the specified emission quantification methodologies for each source.

Centrifugal Compressors – Fugitive Emissions from Wet Seal Oil Degassing– Production and Gathering & Boosting (E1)

Applicable Segments:

- Production (E1)[54], and Gathering & Boosting (E1/E2)[55]

Quantification Methods:

- Subpart W Calculation Methodologies: Default population EF for compressors with wet seal oil degassing vents[56]

- Subpart W Calculation Methodologies: 98.233(o)(1)-(9) and (11)-(12)

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Centrifugal compressors	Number of centrifugal compressors with wet seal oil degassing vents	X
	Annual CH_4 emissions (mt CH_4)	X
Voluntary action to reduce methane emissions during the reporting year[57]	Number of compressors routed to vapor recovery units	
	Number of compressors routed to flare	
	Number of compressors where source emissions are captured for fuel use or routed to a thermal oxidizer	
	Number of compressors utilizing other emissions control technique (specify emissions control methodology)	
	Emission reductions from voluntary action (mt CH_4)	

Centrifugal Compressors – Other Segments (E1/E2)

Applicable Segments:

- Processing (E1/E2)[58], Transmission Compression (E1/E2)[59], Storage (E1/E2)[60], LNG Storage (E1/E2)[61], and LNG Import/Export (E1/E2)[62]

Quantification Methods:

- Subpart W - Individual compressor source "as found" measurements[63]
  - Operating mode: blowdown valve leakage and wet seal oil degassing vents (if applicable)
  - Not-operating-depressurized mode: isolation valve leakage
  - Site-specific EF[64]

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[54] 40 CFR 98.232(c)(19)
[55] 40 CFR 98.232(j)(8)
[56] 40 CFR 98.233(o)(10)
[57] As calculated per the specified emission quantification methodologies for each source.
[58] 40 CFR 98.232(d)(2)
[59] 40 CFR 98.232(e)(2)
[60] 40 CFR 98.232(f)(2)
[61] 40 CFR 98.232(g)(2)
[62] 40 CFR 98.232(h)(2)
[63] 40 CFR 98.233(o)(1)(i)
[64] 40 CFR 98.233(o)(6)

- Subpart W - Continuous monitoring[65]
- Subpart W - Manifolded "as found" measurements[66]
- Apply average company reporter emission factor Equations W-22 and W-23 to the centrifugal compressors at the E2 facilities.
-

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP	
Centrifugal compressors	Actual count of centrifugal compressors with wet seals	X	
	Actual count of centrifugal compressors with dry seals	X	
	Actual count of manifolded groups of compressors with wet seals, isolation valves, or blowdown valves	X	
	Actual count of compressors with wet seals, isolation valves, or blowdown valves that are routed to a flare	X	
	Actual count of compressors with wet seals, isolation valves, and or blowdown valves that have vapor recovery	X	
	Actual count of compressors with wet seals, isolation valves, or blowdown valves that are routed to a thermal oxidizer or emissions are captured for beneficial use	X	
		Annual	X
	Annual CH_4 Emissions (mt CH_4)	X	
Voluntary action to reduce methane emissions during the reporting year[67]	Number of compressors routed to vapor recovery units		
	Number of compressors routed to flare		
	Number of compressors where source emissions are captured for fuel use or routed to a thermal oxidizer		
	Number of compressors utilizing other emissions control technique (specify emissions control methodology)		
	Emission reductions from voluntary action (mt CH_4)		

Note: Onshore petroleum and natural gas production facilities only report total annual centrifugal compressor CH_4 Emissions

Reciprocating Compressors – Fugitive Emissions from Rod Packing, Blowdown Valves, and Isolation Valves - Production and Gathering and Boosting (E1/E2)

Applicable Segments:

- Production (E1)[68] and Gathering & Boosting (E1/E2)[69]

Quantification Methods:

- Subpart W Calculation Methodologies: Default population EF for reciprocating compressors[70]
- Subpart W Calculation Methodologies: 98.233(p)(1)-(9) and (11)-(12)

[65] 40 CFR 98.233(o)(1)(ii)
[66] 40 CFR 98.233(o)(1)(iii)
[67] As calculated per the specified emission quantification methodologies for each source.
[68] 40 CFR 98.232(c)(11)
[69] 40 CFR 98.232(j)(9)
[70] 40 CFR 98.233(p)(10)

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Reciprocating compressors	Number of reciprocating compressors	X
	Annual CH4 emissions (mt CH_4)	X
Voluntary action to reduce methane emissions during the reporting year[71]	Number of replaced reciprocating compressor rod packing	
	Number of compressors routed to vapor recovery units	
	Number of compressors routed to flare	
	Number of compressors where source emissions are captured for fuel use or routed to a thermal oxidizer	
	Number of compressors utilizing other emissions control technique (specify emissions control methodology)	
	Emission reductions from voluntary action (mt CH_4)	

Reciprocating Compressors – Other Segments (E1/E2)

Applicable Segments:

- Processing (E1/E2)[72], Transmission Compression (E1/E2)[73], Storage (E1/E2)[74], LNG storage (E1/E2)[75], and LNG Import/Export (E1/E2)[76]

Quantification Methods:

- Subpart W – Individual compressor source "as found" measurements[77]
  - Operating mode: blowdown valve leakage and rod packing emissions
  - Standby-pressurized mode: blowdown valve leakage
  - Not-operating-depressurized mode: isolation valve leakage
  - Site-specific EF[78]
- Subpart W - Continuous monitoring[79]
- Subpart W - Manifolded "as found" measurements[80]
- Apply average company reporter emission factor Equations W-27 and W-28 to the reciprocating compressors at the E2 facilities.

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Reciprocating compressors	Number of compressors with rod packing emissions vented to the atmosphere	X
	Number of manifolded groups of compressor sources:	X

[71] As calculated per the specified emission quantification methodologies for each source.
[72] 40 CFR 98.232(d)(1)
[73] 40 CFR 98.232(e)(1)
[74] 40 CFR 98.232(f)(1)
[75] 40 CFR 98.232(g)(1)
[76] 40 CFR 98.232(h)(1)
[77] 40 CFR 98.233(p)(1)(i)
[78] 40 CFR 98.233(p)(6)
[79] 40 CFR 98.233(p)(1)(ii)
[80] 40 CFR 98.233(p)(1)(iii)

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
	isolation valves, blowdown valves, and rod packing	
	Number of compressors routing isolation valve leakage to flares, combustion units, or capture systems for beneficial use	X
	Number of compressors routing blowdown valve leakage to flares, combustion units, or capture systems for beneficial use	X
	Number of compressors routing rod packing vents to flares, combustion units, or capture systems for beneficial use	X
	Annual CH_4 emissions from flares and combustion units due to combustion of emissions from isolation valves, blowdown valves, and rod packing vents (mt CH_4)	X
	Annual CH_4 emissions vented to the atmosphere from isolation valves, blowdown valves, and rod packing (including estimated fraction of CH_4 from manifolded compressor sources) (mt CH_4)	X
	Annual CH4 emissions (mt CH_4)	X
Voluntary action to reduce methane emissions during the reporting year[81]	Number of replaced reciprocating compressor rod packing	
	Number of compressors routed to vapor recovery units	
	Number of compressors routed to flare	
	Number of compressors where source emissions are captured for fuel use or routed to a thermal oxidizer	
	Number of compressors utilizing other emissions control technique (specify emissions control methodology)	
	Emission reductions from voluntary action (mt CH_4)	

Compressor Starts (E3)

Applicable Segments:

- Production (E3)

Quantification Methods:

- GHGI segment specific EFs[42]
- Subpart W flare stack emission calculation methods where mitigation activities route gas to flare

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Compressor starts	Actual count of starts	
	Actual count of compressors	
	Annual CH_4 Emissions (mt CH_4)	
Voluntary action to reduce methane emissions during the reporting year[84]	Mitigation actions implemented to reduce methane emissions (list)	

	Emission reductions from voluntary action (mt CH_4)	

Dehydrator Vents (E1/E2 or E3)

Applicable Segments:

- Production (E1)[85], Gathering and Boosting (E1/E2)[86], Processing (E1/E2)[87] and Transmission & Storage (E3)

Quantification Methods:

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- Subpart W Calculation Methodologies under 98.233(e)
- GHGI segment specific EF for Transmission and Storage
- Subpart W flare stack emission calculation methods where mitigation activities route gas to flare
- Subpart W combustion emission calculation methods where mitigation activities route gas to burner or other combustion device
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[83] As calculated per the specified emission quantification methodologies for each source. [84] As calculated per the specified emission quantification methodologies for each source. [85] 40 CFR 98.232(c)(14)
[86] 40 CFR 98.232(j)(4)
[87] 40 CFR 98.232(d)(4)
[88] 40 CFR Part 98.233(e)(1); 40 CFR Part 98.233(e)(5)
[89] 40 CFR Part 98.233(e)(2); 40 CFR Part 98.233(e)(5)
[90] 40 CFR Part 98.233(e)(3); 40 CFR Part 98.233(e)(5)

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Dehydrators	For Calculation Method 1 and Calculation Method 2, actual count of glycol dehydrators	X
	For Calculation Method 3, actual count of desiccant dehydrators	X
	Count of dehydrators venting to a flare or regenerator firebox/fire tubes	X
	Count of dehydrators at the facility that vented to a vapor recovery device	X
	Annual CH_4 emissions from dehydrators venting to a flare or regenerator firebox/fire tubes (mt CH_4)	X
	Annual CH_4 Emissions from all dehydrators that were not vented to a flare or regenerator firebox/fire tubes (mt CH_4)	X
Voluntary action to reduce methane emissions during the reporting year[91]	Number of Dehydrators routed to Vapor Recovery Units	
	Number of Dehydrators routed to Flare or Regenerator Firebox/Fire Tubes	
	Number of Dehydrators utilizing other emissions control technique (specify emissions control methodology)	
	Emission reductions from voluntary action (mt CH_4)	

Dig-Ins/Mishaps (Excavation Damage) (E3)

Applicable Segments:

- Production (E3), Gathering & Boosting (E1/E2), Distribution (E3)

Quantification Methods:

- GHGI segment specific EFs[92]
- Subpart W Calculation method for Blowdowns using engineering calculation method by equipment or event type[29]

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Excavation Damage	Miles of pipeline	
	Annual CH_4 Emissions (mt CH_4)	
Voluntary action to reduce methane emissions during the reporting year[93]	Actions taken to minimize excavation damages/reduce methane emissions from excavation damages	
	Emission reductions from voluntary action (mt CH_4)	

91 As calculated per the specified emission quantification methodologies for each source.
92 Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013, Table A-138: 2013 Data and CH_4 Emissions (Mg) for the Natural Gas Distribution Stage
93 As calculated per the specified emission quantification methodologies for each source.

Distribution Mains (E1/E2)

Applicable Segments:

- Distribution (E1/E2)[94]

Quantification Methods:

- Subpart W - Equipment leaks calculated using population counts and factors[95]
  - Cast Iron Mains EF
  - Plastic Mains EF (for plastic mains and for cast iron or unprotected steel distribution mains with plastic liners or inserts)
  - Protected Steel Mains EF
  - Unprotected Steel Mains

EF Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Distribution Mains	Total miles of cast iron distribution mains	X
	Annual CH_4 emissions from cast iron mains (mt CH_4)	X
	Total miles of plastic distribution mains	X
	Annual CH_4 emissions from plastic mains (mt CH_4)	X
	Total miles of protected steel distribution mains	X
	Annual CH_4 emissions from protected steel mains (mt CH_4)	X
	Total miles of unprotected steel distribution mains	X
	Annual CH_4 emissions from unprotected steel mains (mt CH_4)	X
	Total miles of cast iron or unprotected steel distribution mains with Plastic Liners or Inserts	
	Annual CH_4 emissions from cast iron or unprotected steel distribution mains with Plastic Liners or Inserts (mt CH_4)	

Voluntary action to reduce methane emissions during the reporting year[96]	Miles of cast iron mains replaced with plastic, protected steel, or rehabilitated with plastic pipe inserts or cured-in-place liners	
	Miles of unprotected steel mains cathodically protected, replaced with protected steel, or rehabilitated with pipe inserts or cured-in-place liners	
	Emission reductions from voluntary action (mt CH_4)	

Distribution Services (E1/E2)

Applicable Segments:

- Distribution (E1/E2)[97]

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[94] 40 CFR 98.232(i)(5)
[95] 40 CFR 98.233(r)
[96] As calculated per the specified emission quantification methodologies for each source.
[97] 40 CFR 98.232(i)(6)

Quantification Methods:

- Subpart W - Equipment leaks calculated using population counts and factors[98]
  - Cast Iron Services EF
  - Plastic Services EF (for plastic mains and for cast iron or unprotected steel distribution mains with plastic liners or inserts)
  - Protected Steel Services EF
  - Unprotected Steel Services

EF Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Distribution Services	Total number of cast iron services	
	Annual CH_4 emissions from cast iron services (mt CH_4)	
	Total number of copper services	X
	Annual CH_4 emissions from copper services (mt CH_4)	X
	Total number of plastic services	X
	Annual CH_4 emissions from plastic services (mt CH_4)	X
	Total number of protected steel services	X
	Annual CH_4 emissions from protected steel services (mt CH_4)	X
	Total number of unprotected steel services	X
	Annual CH_4 emissions from unprotected steel services (mt CH_4)	X
	Total number of cast iron or unprotected steel services with plastic liners or inserts	
	Annual CH_4 emissions from cast iron or unprotected steel services with plastic liners or inserts (mt CH_4)	
Voluntary action to reduce methane emissions during the reporting year[99]	Actual count of cast iron services replaced with plastic, protected steel, copper, or rehabilitated with plastic pipe inserts	
	Actual count of unprotected steel services replaced with cathodically protected or replaced with protected steel, plastic, copper, or rehabilitated with plastic pipe inserts	
	Emission reductions from voluntary action (mt CH_4)	

Equipment Leaks (E1/E2)

Applicable Segments:

Production (E1)[100], Gathering and Boosting (E1/E2)[101], Processing (E1/E2)[102], Transmission Compression (E1/E2)[103], Storage (E1/E2)[104], LNG Storage (E1/E2)[105], and LNG Import/Export (E1/E2)[106]

Quantification Methods:

- Subpart W Calculation Methodology[107]
- Use of company-specific emission measurements for emission sources generated by direct measurements (Specify protocols.)

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Flare Stacks	Actual count of flare stacks	X
	Annual CH_4 Emissions (mt CH_4)	X
Voluntary action to reduce methane emissions during the reporting year[108]	Number of flares with all or part of gas flow routed to VRU, fuel, or other beneficial use	
	Combined volume of gas routed to VRU, fuel, or other beneficial use	
	Emission reductions from voluntary action (mt CH_4)	

Flare Stacks (E1/E2)

Applicable Segments:

Production (E1)[100], Gathering and Boosting (E1/E2)[101], Processing (E1/E2)[102], Transmission Compression (E1/E2)[103], Storage (E1/E2)[104],

[98] 40 CFR 98.233(r)
[99] As calculated per the specified emission quantification methodologies for each source.
[100] 40 CFR 98.232(c)(9)
[101] 40 CFR 98.232(j)(7)
[102] 40 CFR 98.232(d)(6)
[103] 40 CFR 98.232(e)(6)
[104] 40 CFR 98.232(f)(4)

LNG Storage (E1/E2)[105], and LNG Import/Export (E1/E2)[106].

Quantification Methods:

- Subpart W Calculation

Methodology[107] Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Flare Stacks	Actual count of flare stacks	X
	Annual CH_4 Emissions (mt CH_4)	X
Voluntary action to reduce methane emissions during the reporting year[108]	Number of flares with all or part of gas flow routed to VRU, fuel, or other beneficial use	
	Combined volume of gas routed to VRU, fuel, or other beneficial use	
	Emission reductions from voluntary action (mt CH_4)	

Liquids Unloading (E1)

Applicable Segments:

- Production (E1)[109]

Quantification Methods:

- Subpart W Calculation Method 1 using direct measurement for each tubing diameter and pressure group with and without plunger lifts[110]
- Subpart W Calculation Method 2 using engineering calculations for wells without plunger lifts[111]
- Subpart W Calculation Method 3 using engineering calculations for wells with plunger lifts[112]
- Use of company-specific emission measurements for emission sources generated by direct measurements (Specify protocols.)

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Liquids unloading for wells	Actual count of wells conducting liquids unloading without plunger lifts that are vented to the atmosphere	X
	Count of unloadings for all wells without plunger lifts	X
	Annual CH_4 emissions from wells conducting liquids unloading without plunger lifts that are vented to the atmosphere (mt CH_4)	X

[105] 40 CFR 98.232(g)(4)
[106] 40 CFR 98.232(h)(4)
[107] 40 CFR Part 98.233(n)(5); 40 CFR Part 98.233(n)(6)
[108] As calculated per the specified emission quantification methodologies for each source.
[109] 40 CFR 98.232(c)(4)
[110] 40 CFR 98.233(f)(1), data elements will be reported separately for wells with plunger lifts and wells without plunger lifts
[111] 40 CFR 98.233(f)(2)
[112] 40 CFR 98.233(f)(3)

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
	Actual count of wells conducting liquids unloading with plunger lifts that are vented to the atmosphere	X
	Count of unloadings for all wells with plunger lifts	X
	Annual CH_4 emissions from wells conducting liquids unloading with plunger lifts that are vented to the atmosphere (mt CH_4)	X
	Annual CH_4 Emissions from liquids unloading (mt CH_4)	X
Voluntary action to reduce methane emissions during the reporting year[113]	Number of wells reducing emissions voluntarily	
	Emissions control methodology being implemented (list)	
	Emission reductions from voluntary action (mt CH_4)	

Meters – Residential (E1)

Applicable Segments:

- Distribution (E1)

Quantification Methods:

- GHGI segment specific EFs[114]
- Direct measurement (Specify measurement protocol; e.g. Method 21, RMLD, Calibrated Bag, HiFlow)

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Residential meters	Count of outdoor residential meters	
	Annual CH_4 Emissions (mt CH_4)	
Voluntary action to reduce methane emissions during the reporting year[115]	Mitigation actions implemented to reduce methane emissions (list)	
	Emission reductions from voluntary action (mt CH_4)	

Meters - Commercial/Industrial (E3)

Applicable Segments:

- Distribution (E3)

Quantification Methods:

- GHGI segment specific EFs[4]
- Direct measurement (Specify measurement protocol; e.g. Method 21, RMLD, Calibrated Bag, HiFlow)

[113] As calculated per the specified emission quantification methodologies for each source.
[114] Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013, Table A-138: 2013 Data and CH_4 Emissions (Mg) for the Natural Gas Distribution Stage
[115] As calculated per the specified emission quantification methodologies for each source.

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Commercial/Industrial Meters	Count of commercial/industrial meters	
	Annual CH_4 Emissions (mt CH_4)	
Voluntary action to reduce methane emissions during the reporting year[116]	Mitigation actions implemented to reduce methane emissions (list)	
	Emission reductions from voluntary action (mt CH_4)	

Natural Gas Pneumatic Device (Controller) Vents (E1/E2 or E3)

Applicable Segments:

- Production (E1)[119], Gathering & Boosting (E1/E2)[120], Processing (E3)[121], Transmission Compression (E1/E2)[122], and Storage (E1/E2)[123]

116 As calculated per the specified emission quantification methodologies for each source.
117 Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013, Table A-133: 2013 Data and Calculated CH_4 Potential Emissions [Mg] for the Natural Gas Production Stage, by NEMS Region
118 As calculated per the specified emission quantification methodologies for each source.
119 40 CFR 98.232(c)(1)
120 40 CFR 98.232(j)(1)
121 Not required in GHGRP
122 40 CFR 98.232(e)(5)
123 40 CFR 98.232(f)(3)

Quantification Methods:

- Subpart W Calculation Methodology using actual count of devices and default emission factors[124]
- For Production, Gathering & Boosting, and Processing: Use of company-specific emission measurements for emission sources generated by direct measurements (Specify protocols.)

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Natural Gas Pneumatic Device (Controller) Vents (all sectors except processing)	Actual count of high-bleed pneumatic controllers[125]	X
	Annual CH_4 emissions from high-bleed pneumatic controllers (mt CH_4)	X
	Actual count of intermittent-bleed pneumatic controllers	X
	Annual CH_4 emissions from intermittent-bleed pneumatic controllers (mt CH_4)	X
	Actual count of low-bleed pneumatic controllers[126]	X
	Annual CH_4 emissions from low-bleed pneumatic controllers (mt CH_4)	X
Natural Gas Pneumatic Device (Controller) Vents (processing sector only)[127]	Actual count of high-bleed pneumatic controllers[128]	
	Annual CH_4 emissions from high-bleed pneumatic controllers (mt CH_4)	
	Actual count of intermittent-bleed pneumatic controllers	
	Annual CH_4 emissions from intermittent-bleed pneumatic controllers (mt CH_4)	
	Actual count of low-bleed pneumatic controllers[129]	
	Annual CH_4 emissions from low-bleed pneumatic controllers (mt CH_4)	
Voluntary action to reduce methane emissions during the reporting year[130]	Number of high-bleed controllers converted to low-bleed	
	Number of high-bleed controllers converted to zero emitting or removed from service	
	Number of intermittent-bleed pneumatic controllers converted to zero emitting or removed from service	
	Number of low bleed pneumatic controllers converted to zero emitting or removed from service	
	Number of pneumatic controllers with measured emissions	
	Emission reductions from voluntary action (mt CH_4)	

Applicable Segments:

- Production (E1)[119], Gathering & Boosting (E1/E2)[120],

Quantification Methods:

- Subpart W Calculation Methodology
- Subpart W flare stack emission calculation methods where mitigation activities route gas to flare
- Subpart W combustion emission calculation methods where mitigation activities route gas to burner or other combustion device
-

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Pneumatic Pumps	Actual count pumps	X
	Annual CH_4 emissions (mt CH_4)	X
Voluntary action to reduce methane emissions during the reporting year[130]	Number of pumps with mitigation actions implemented to	
	Mitigation actions implemented to reduce emissions (list)	
	Emission reductions from voluntary action (mt CH_4)	

[124] *ibid*
[125] Natural gas-actuated controllers with a bleed rate greater than 6 scf per hour
[126] Natural gas-actuated controllers with a bleed rate less than or equal to 6 scf per hour
[127] Processing sector reporters providing voluntary supplementary information should use the Transmission Compression segment EFs to quantify methane emissions (40 CFR 98.232(e)(5)).
[128] Natural gas-actuated controllers with a bleed rate greater than 6 scf per hour
[129] Natural gas-actuated controllers with a bleed rate less than or equal to 6 scf per hour
[130] As calculated per the specified emission quantification methodologies for each source.

PRV Releases (E3)

Applicable Segments:

- Production (E3), Distribution (E3)

Quantification Methods:

- GHGI segment specific EFs[133] [134]

Subpart W Calculation Methodology (98.233(i)

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Routine maintenance: Pressure relief valve releases	Actual count of PRVs (production)	
	Miles of main (distribution)	
	Annual CH_4 Emissions (mt CH_4)	

Voluntary action to reduce methane emissions during the reporting year[135]	Mitigation actions implemented to reduce methane emissions (list)	
	Emission reductions from voluntary action (mt CH_4)	

131 Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013, Table A-133: 2013 Data and Calculated CH_4 Potential Emissions [Mg] for the Natural Gas Production Stage, by NEMS Region
132 As calculated per the specified emission quantification methodologies for each source.
133 Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013, Table A-126: 2013 CH_4 Emissions from Petroleum Production Field Operations
134 Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013, Table A-138: 2013 Data and CH_4 Emissions (Mg) for the Natural Gas Distribution Stage
135 As calculated per the specified emission quantification methodologies for each source.

Storage Tank Vents – Production and Gathering & Boosting (E1/E2)

Applicable Segments:

- Production (E1)[136], and Gathering & Boosting (E1/E2)[137]

Quantification Methods:

-
- Subpart W Calculation Methodologies under 98.233(j)
- Use of company-specific emission measurements for emission sources generated by direct measurements (Specify protocols.)

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Storage Tank Vents Using Calculation Methods 1 and 2	Total volume of oil sent to tanks from all gas-liquid separators or gathering and boosting non-separator equipment or wells flowing directly to atmospheric tanks with oil throughput ≥10 barrels/day (bbl/day)	X
	Number of wells sending oil to gas-liquid separators or gathering and boosting non-separator equipment or wells flowing directly to atmospheric tanks with oil throughput ≥10 bbl/day	X
	Count of tanks that control emissions with vapor recovery systems	X
	Annual CH_4 emissions from tanks with vapor recovery systems (mt CH_4)	X
	Count of tanks that vented directly to the atmosphere	X
	Annual CH_4 emissions from venting (mt CH_4)	X
	Actual count of atmospheric tanks	X
	Count of tanks with flaring emission control measures	X
	Annual CH_4 Emissions (mt CH_4)	X
	Annual CH_4 emissions from flaring (mt CH_4)	X
	Count of gas-liquid separators whose liquid dump valves did	X

136 40 CFR 98.232(c)(10)
137 40 CFR 98.232(j)(6)
138 40 CFR 98.233(j)(1)

[139] 40 CFR 98.233(j)(2)
[140] 40 CFR 98.233(j)(3)

	not close properly	
	Annual CH_4 emissions from improperly functioning dump valves (mt CH_4)	X
Storage Tank Vents Using Calculation Method 3	Total volume of oil sent to tanks from all wellhead separators and direct from wells with oil throughput <10 barrels/day (bbl/day)	X
	Count of tanks that did not control emissions with flares	X
	Annual CH_4 emissions from tanks without flares (mt CH_4 emissions)	X
	Count of wells with gas-liquid separators	X
	Count of wells without gas-liquid separators	X
	Count of tanks that vented directly to the atmosphere	X
	Annual CH_4 emissions from venting (mt CH_4)	X
	Actual count of atmospheric tanks	X
	Count of tanks with flaring emission control measures	X
	Annual CH_4 Emissions (mt CH_4)	X
	Annual CH_4 emissions from flaring (mt CH_4)	X
Voluntary action to reduce methane emissions during the reporting year[141]	Number of tanks routed to VRU or beneficial use	
	Number of tanks routed to flare	
	Emission reductions from voluntary action (mt CH_4)	

Storage Tank Vents – Transmission (E1/E2)

Applicable Segments:

- Transmission Compression (E1/E2)[142]

Quantification Methods:

- Subpart W Calculation Methodology[143]
- For compressor scrubber dump valve leakage: Average pipeline company reporter emission factor calculated based on actual measurements of transmission storage tanks taken at pipeline company transmission compressor stations that report under the GHGRP (using 98.233(k)), times the number of tanks at the E2 site.
  EFTank × Count = ERTank

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Transmission storage tank vents	Count of storage tank vent stacks with flares attached	X
	Count of storage tank vent stacks without flares attached	X
	Count of storage tank vent stacks with dump valve leakage direct to atmosphere	X
	Annual CH_4 emissions from storage tank vent stacks with dump valve leakage venting gas directly to the atmosphere (mt CH_4)	X
	Count of storage tank vent stacks with flared dump valve leakage	X

[141] As calculated per the specified emission quantification methodologies for each source.

[142] 40 CFR 98.232(e)(3)
[143] 40 CFR 98.233(k)

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
	Annual CH_4 emissions from storage tank vent stacks with flared dump valve leakage (mt CH_4)	X
Voluntary action to reduce methane emissions during the reporting year[144]	Number of tanks with compressor scrubber dump valve leakage routed to flare or control device	
	Emission reductions from voluntary action (mt CH_4)	

Well Drilling (E3)

Applicable Segments:

- Production (E3)

Quantification Methods:

- GHGI segment specific

EFs[148] Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Well drilling	Actual count of wells drilled	
	Annual CH_4 Emissions (mt CH_4)	
Voluntary action to reduce methane emissions during the reporting year[149]	Mitigation actions implemented to reduce methane emissions (list)	
	Emission reductions from voluntary action (mt CH_4)	

Well Venting During Well Completions/Workovers With Hydraulic Fracturing (E1)

Applicable Segments:

- Production (e1)[150] [151]

Quantification Methods:

- Subpart W Calculation Methodology using combined production rate measurement and engineering calculations using Equation W-10A[152]
- Subpart W Calculation Methodology using measured vented or flared volume from each well using Equation W-10B[153]

[147] As calculated per the specified emission quantification methodologies for each source.
[148] Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013, Table A-126: 2013 CH_4 Emissions from Petroleum Production Field Operations
[149] As calculated per the specified emission quantification methodologies for each source.
[150] 40 CFR 98.232(c)(6)
[151] 40 CFR 98.232(c)(8)
[152] 40 CFR 98.233(g)(1)(i)
[153] 40 CFR 98.233(g)(1)(ii)

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Well venting during well completions with hydraulic fracturing[154]	Actual count of completions in the calendar year	X
	Actual count of wells that conduct flaring	X
	Actual count of wells that have reduced emission completions	X
	Annual CH_4 Emissions (mt CH_4)	X
Well venting during well workovers with hydraulic fracturing[155]	Total count of workovers	X
	Actual count of wells that conduct flaring	X
	Actual count of wells that have reduced emission workovers	X
	Annual CH_4 Emissions (mt CH_4)	X
Voluntary action to reduce methane emissions during the reporting year[156]	Number of well completions/workovers utilizing flaring	
	Number of well completions/workovers utilizing reduced emission completions	
	Number of well completions/workovers utilizing other emissions control technique (specify emissions control methodology)	
	Emission reductions from voluntary action (mt CH_4)	

Gas Well Venting During Well Completions/Workovers Without Hydraulic Fracturing (E1)

Applicable Segments:

- Production (E1)[157]

Quantification Methods:

- For workovers, calculate emissions according to Subpart W using a count of workovers and an emission factor[158], or calculate emissions according to Subpart W using measured production rate after workover
- For completions, calculate emissions according to Subpart W using measured production rate[159]
- Subpart W flare stack emission calculation methods where mitigation activities route gas to flare
- Subpart W combustion emission calculation methods where mitigation activities route gas to burner or other combustion device

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP	
Gas well venting during well completions without hydraulic fracturing	Total count of completions that vented directly to atmosphere without flaring	X	
	Total count of completions with flaring	X	
		An nu	X
	Annual CH_4 Emissions that resulted from flares for completions	X	

[154] For oil wells, this section is limited to oil wells that have a gas-oil ratio (GOR) of 300 scf/STB or greater. [155] For oil wells, this section is limited to oil wells that have a gas-oil ratio (GOR) of 300 scf/STB or greater. [156] As calculated per the specified emission quantification methodologies for each source.

[157] 40 CFR 98.232(c)(5) and 40 CFR 98.232(c)(7)

[158] 40 CFR 98.233(h)

[159] *ibid*

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Gas well venting during well workovers without hydraulic fracturing	Total count of workovers that vented directly to atmosphere without flaring	X
	Total count of workovers with flaring	X
	Annual CH_4 Emissions that resulted from venting gas directly to the atmosphere for workovers (mt CH_4)	X
	Annual CH_4 Emissions that resulted from flares for workovers	X
Voluntary action to reduce methane emissions during the reporting year[160]	Number of workovers utilizing flaring	
	Number of workovers utilizing other emissions control technique (specify emissions control methodology)	
	Emission reductions from voluntary action (mt CH_4)	

Well Testing Venting & Flaring (E1)

Applicable Segments:

- Production (E1)[161]

Quantification Methods:

- Subpart W Calculation Methodology for oil wells using Equation W-17A[162]
- Subpart W Calculation Methodology for gas wells using Equation W-17B[163]
- Subpart W flare stack emission calculation methods where mitigation activities route gas to flare
- Subpart W combustion emission calculation methods where mitigation activities route gas to burner or other combustion device

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Well Testing Venting & Flaring	Actual count of wells tested in a calendar year that vented emissions to the atmosphere	X
	Average number of days wells were tested that vented emissions to the atmosphere	X
	Actual count of wells tested in a calendar year that flared emissions	X
	Average number of days wells were tested that flared emissions	X
	Annual CH_4 Emissions from venting (mt CH_4)	X
	Annual CH_4 Emissions from flaring (mt CH_4)	X
Voluntary action to reduce methane emissions during the reporting year[164]	Mitigation actions implemented to reduce methane emissions (list)	
	Emission reductions from voluntary action (mt CH_4)	

[160] As calculated per the specified emission quantification methodologies for each source.
[161] 40 CFR 98.232(c)(12)
[162] 40 CFR 98.233(l)
[163] *ibid*
[164] As calculated per the specified emission quantification methodologies for each source.

Appendix A: Reporting Structures

Figure 1: Reporting Structure for Transmission & Storage associated with a pipeline

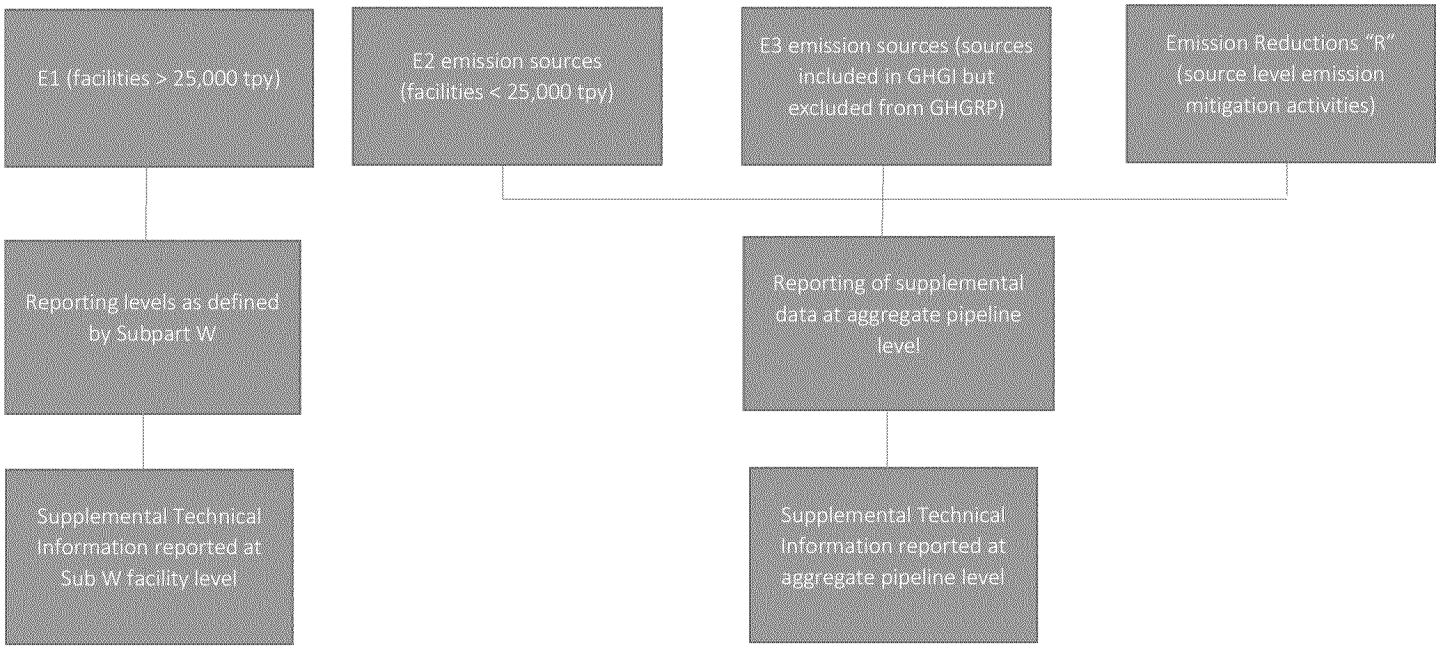

Figure 2: Reporting Structure for Production, Processing and Distribution

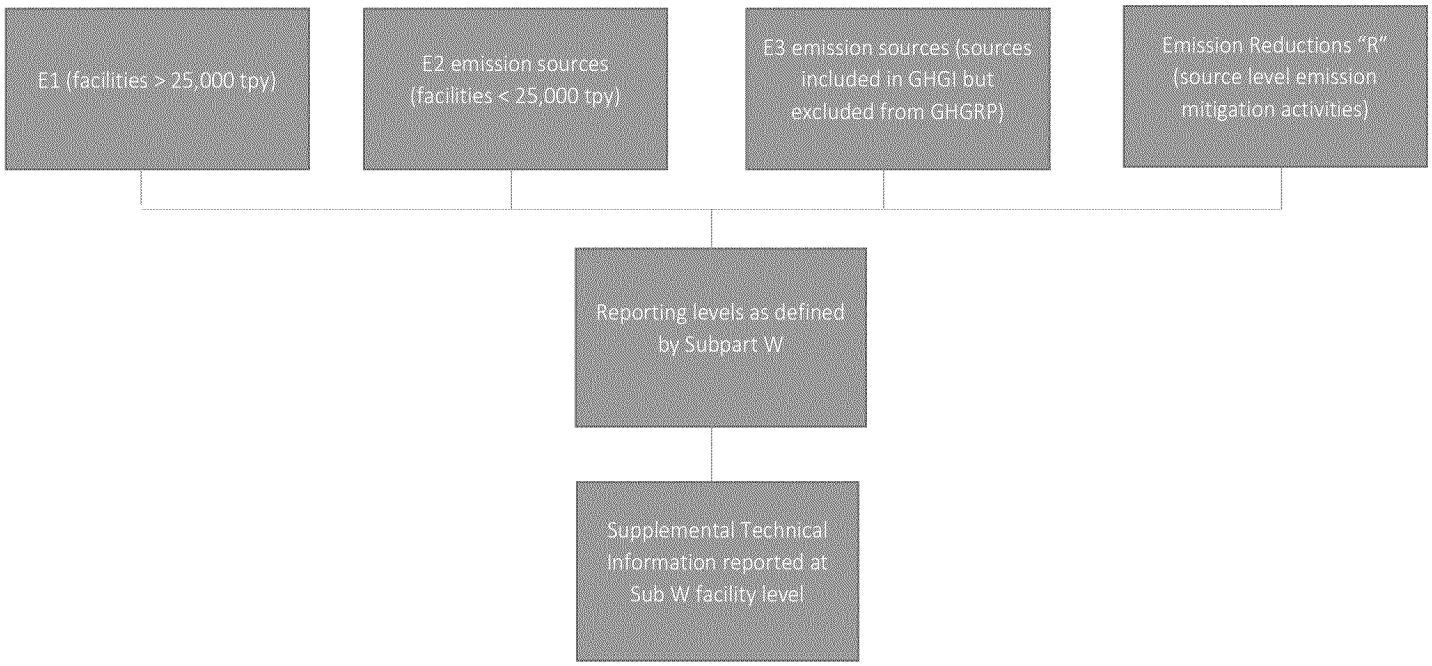
E1 (facilities > 25,000 tpy)
E2 emission sources (facilities < 25,000 tpy)
E3 emission sources (sources included in GHGI but excluded from GHGRP)
Emission Reductions "R" (source level emission mitigation activities)
Reporting levels as defined by Subpart W
Supplemental Technical Information reported at Sub W facility level

Table B.1 E2 CH_4 Emission Estimation Methods for Transmission & Storage Facilities

CH_4 Emission Sources		**CH_4** Emission estimation Methods
Fugitive Emission Sources	**Operating Mode**	
Reciprocating Compressors – Fugitives from Rod Packing	Operating	GHGRP Methodology under 98.233(p) OR Apply average company reporter emission factor Equations W-27 and W-28 to the reciprocating compressors at the E2 facilities.
Reciprocating Compressors – Fugitives from Blowdown Valves	Operating	GHGRP Methodology under 98.233(p) OR Apply average company reporter emission factor Equations W-27 and W-28 to the reciprocating compressors at the E2 facilities.
	Not Operating, Pressurized	GHGRP Methodology under 98.233(p) OR Apply average company reporter emission factor Equations W-27 and W-28 to the reciprocating compressors at the E2 facilities.
Reciprocating Compressors – Fugitives from Isolation Valves	Not Operating, De-pressurized	GHGRP Methodology under 98.233(p) OR Apply average company reporter emission factor Equations W-27and W-28 to the reciprocating compressors at the E2 facilities.
Centrifugal Compressors– Fugitives from Blowdown Valve Leakage	Operating	GHGRP Methodology under 98.233(o) OR Apply average company reporter emission factor Equations W-22 and W-23 to the centrifugal compressors at the E2 facilities.

Centrifugal Compressors– Fugitives from Unit Isolation Valve Leakage	Not Operating, De-pressurized	GHGRP Methodology under 98.233(o) OR Apply average company reporter emission factor Equations W-22 and W-23 to the centrifugal compressors at the E2 facilities.
Centrifugal Compressors– Fugitives from Wet Seal Oil Degassing	Operating	GHGRP Methodology under 98.233(o) OR Apply average company reporter emission factor Equations W-22 and W-23 to the centrifugal compressors at the E2 facilities.
Pneumatic Controllers	GHGRP Methodology under 98.233(a)	
Stations – Fugitives from Equipment Component Leaks	GHGRP Methodology under 98.233(q) OR Average company reporter equipment leak count factor calculated at a transmission pipeline company level based on actual Subpart W equipment leak surveys taken at E1 facilities for the reporting year (using 98.233(q)), $EF_{Fugitive} \times$ Sites = $ER_{Fugitive}$	
Storage Facility- Fugitives	GHGRP Methodology under	

CH_4 Emission Source	**CH_4 Emission Estimation Methods**	**Comments On Metho Selection**
Vented Emission Sources		
Transmission Storage Tanks - compressor scrubber dump valve leakage	GHGRP Methodology under 98.233(k) OR Average pipeline company reporter emission factor calculated based on actual measurements of transmission storage tanks taken at pipeline company transmission compressor stations that report under the GHGRP (using 98.233(k)), times the number of tanks at the E2 site. $EF_{Tank} \times$ Count = ER_{Tank}	The preferred method will be the exact GHGRP approach for those transmission tanks that have been measured. If an E2 source has not been measured under the GHGRP approach in the reporting year, the alternative approach will be used. This methodology is similar to average reporter emission

		factor methodology prescribed under the GHGRP.
Blowdown Vent Stacks	GHGRP Methodology under 98.233(i) OR Average reporter unique physical volume calculated at a pipeline company level for each blowdown event type based on an average of the actual blowdown events collected at other company transmission compressor stations that report under the GHGRP (using 98.233(i)). This average reporter unique physical volume would then be multiplied by the actual number of blowdown events that occur at the E2 site.	The preferred method will be the exact GHGRP approach for blowdown vent stacks. If an E2 source is unable to utilize the exact GHGRP approach for blowdown vent stacks, the alternative approach will be used. This methodology is similar to average reporter emission factor methodology prescribed under the GHGRP.
Combustion Emission Sources		
Gas Compressor Engines, Gas Turbines, and Other Combustion Sources	GHGRP Methodology under 98.33	
Flare Stacks	GHGRP Methodology under 98.233(n)	

Table B.2. E2 CH_4 Emission Estimation Methods for Gas Processing Facilities

CH_4 Emission Source	**CH_4** Emission Estimation Methods	**Comments On Method Selection**
Vented Emission Sources		
Blowdown Vent Stacks	GHGRP Methodology under 98.233(i) OR Average reporter unique physical volume calculated for each blowdown event type based on an average of the actual blowdown events collected at other company gas processing facilities that report under the GHGRP (using 98.233(i)). This average reporter unique physical volume would then be multiplied by the actual number of blowdown events that occur at the E2 site.	The preferred method will be the exact GHGRP approach for blowdown vent stacks. If an E2 source is unable to utilize the exact GHGRP approach for blowdown vent stacks, the alternative average reporter emission factor approach will be used. This methodology is similar to average reporter emission factor methodology prescribed under the GHGRP for reciprocating and centrifugal compressors. The alternative approach will still require that the number & type of actual blowdown events be collected at the E2 site.
Dehydrator Vents and Kimray Vents	GHGRP Methodology under 98.233(e)	
AGR Vents	GHGRP Methodology under 98.233(d)	

CH_4 Emission Sources		**CH_4** Emission estimation Methods
Fugitive Emission Sources	**Operating Mode**	
Reciprocating Compressors – Fugitives from Rod Packing	Operating	GHGRP Methodology under 98.233(p) OR Apply average company reporter emission factor Equations W-27 and W-28 to the reciprocating compressors at the E2 facilities.
Reciprocating Compressors – Fugitives from Blowdown Valves	Operating	GHGRP Methodology under 98.233(p) OR Apply average company reporter emission factor Equations W-27 and W-28 to the reciprocating compressors at the E2 facilities.
	Not Operating, Pressurized	GHGRP Methodology under 98.233(p) OR Apply average company reporter emission factor Equations W-27 and W-28 to the reciprocating compressors at the E2 facilities.
Reciprocating Compressors – Fugitives from Isolation Valves	Not Operating, De-pressurized	GHGRP Methodology under 98.233(p) OR

		Apply average company reporter emission factor Equations W-27and W-28 to the reciprocating compressors at the E2 facilities.
Centrifugal Compressors– Fugitives from Blowdown Valve Leakage	Operating	GHGRP Methodology under 98.233(o) OR Apply average company reporter emission factor Equations W-22 and W-23 to the centrifugal compressors at the E2 facilities.
Centrifugal Compressors– Fugitives from Unit Isolation Valve Leakage	Not Operating, De-pressurized	GHGRP Methodology under 98.233(o) OR Apply average company reporter emission factor Equations W-22 and W-23 to the centrifugal compressors at the E2 facilities.
Centrifugal Compressors– Fugitives from Wet Seal Oil Degassing	Operating	GHGRP Methodology under 98.233(o) OR Apply average company reporter emission factor Equations W-22 and W-23 to the centrifugal compressors at the E2 facilities.
Plants – Fugitives from Equipment Component Leaks		**GHGRP Methodology under 98.233(q)** **OR** **Average company reporter equipment leak factor calculated per natural gas processing facility based on an average of actual Subpart W equipment leak counts taken at other company gas processing facilities for the reporting year (using 98.233(q)), EFFugitive × Sites = ERFugitive**
Combustion Emission Sources		
Gas Compressor Engines, Gas Turbines, and Other Combustion Sources		GHGRP Methodology under 98.33
Flare Stacks		GHGRP Methodology under 98.233(n)

Table B.3 E2 CH_4 Emission Estimation Methods for LNG Import/Export Terminals

CH_4 Emission Source	**CH_4** Emission Estimation Methods	**Comments On Method** Selection
Vented Emission Sources		
Blowdown Vent Stacks	GHGRP Methodology under 98.233(i)	

CH_4 Emission Sources		**CH_4** Emission estimation Methods
Fugitive Emission Sources	**Operating Mode**	
Reciprocating Compressors – Fugitives from Rod	Operating	GHGRP Methodology under 98.233(p)

Packing		OR Apply average company reporter emission factor Equations W-27 and W-28 to the reciprocating compressors at the E2 facilities.
Reciprocating Compressors – Fugitives from Blowdown Valves	Operating	GHGRP Methodology under 98.233(p) OR Apply average company reporter emission factor Equations W-27 and W-28 to the reciprocating compressors at the E2 facilities.
	Not Operating, Pressurized	GHGRP Methodology under 98.233(p) OR Apply average company reporter emission factor Equations W-27 and W-28 to the reciprocating compressors at the E2 facilities.
Reciprocating Compressors – Fugitives from Isolation Valves	Not Operating, De-pressurized	GHGRP Methodology under 98.233(p) OR Apply average company reporter emission factor Equations W-27and W-28 to the reciprocating compressors at the E2 facilities.
Centrifugal Compressors– Fugitives from Blowdown Valve Leakage	Operating	GHGRP Methodology under 98.233(o) OR Apply average company reporter emission factor Equations W-22 and W-23 to the centrifugal compressors at the E2 facilities.
Centrifugal Compressors– Fugitives from Unit Isolation Valve Leakage	Not Operating, De-pressurized	GHGRP Methodology under 98.233(o) OR Apply average company reporter emission factor Equations W-22 and W-23 to the centrifugal compressors at the E2 facilities.
Centrifugal Compressors– Fugitives from Wet Seal Oil Degassing	Operating	GHGRP Methodology under 98.233(o) OR Apply average company reporter emission factor Equations W-22 and W-23 to the centrifugal compressors at the E2 facilities.
Terminals – Fugitives from Equipment Component Leaks		**GHGRP Methodology under 98.233(q) and (r)**
Combustion Emission Sources		
Gas Compressor Engines, Gas Turbines, and Other Combustion Sources		GHGRP Methodology under 98.33

Flare Stacks	GHGRP Methodology under 98.233(n)

Natural Gas STAR Methane Challenge Program: Partnership Agreement for Best Management Practice (BMP) Commitment

The Natural Gas STAR Methane Challenge Program is a flexible, voluntary partnership between the U.S. Environmental Protection Agency (EPA) and oil and natural gas companies. This voluntary Program allows the EPA to collaborate with Partners to promote and track ambitious, transparent commitments to voluntarily reduce methane emissions beyond regulatory requirements and to recognize Partners for their progress. By signing this agreement, UGI Utilities, Inc. (*company name*) agrees to join the U.S. EPA to reduce methane emissions through a Best Management Practice (BMP) Commitment. The BMP Commitment entails a Partner commitment to company-wide implementation of BMPs to reduce methane emissions from key sources by a future target date. Partners commit to at least one emission source and specify a target year of completion (maximum of five [5] years from commitment start date).

Partner's Best Management Practice Commitment: Please specify participating sources, start date, and target achievement year in the table below; check all that apply. For companies joining at the corporate level that wish to make separate commitments for each of their subsidiaries/LDCs, please use "Appendix A: Commitment Table" found on the Methane Challenge Program website and submit in conjunction with this Partnership Agreement.

	Source	Start Date	Achievement Year
	Onshore Production		
☐	Pneumatic Controllers		
☐	Equipment Leaks/Fugitive Emissions		
☐	Liquids Unloading		
☐	Pneumatic Pumps		
☐	Fixed Roof, Atmospheric Pressure Hydrocarbon Liquid Storage Tanks		
	Gathering and Boosting		
☐	Pneumatic Controllers		
☐	Equipment Leaks/Fugitive Emissions		
☐	Pneumatic Pumps		
☐	Fixed Roof, Atmospheric Pressure Hydrocarbon Liquid Storage Tanks		
☐	Reciprocating Compressors - Rod Packing Vent		
☐	Centrifugal Compressors - Venting		
	Natural Gas (NG) Processing		
☐	Reciprocating Compressors - Rod Packing Vent		
☐	Centrifugal Compressors - Venting		
	NG Transmission & Underground Storage		
☐	Reciprocating Compressors - Rod Packing Vent		
☐	Centrifugal Compressors - Venting		
☐	Equipment Leaks/Fugitive Emissions		
☐	Transmission Pipeline Blowdowns between Compressor Stations		
☐	Pneumatic Controllers		
	NG Distribution		
☐	M&R Stations/City Gates		
☑	Mains – Cast Iron and Unprotected Steel *(Commitment Rate: 2%)*	3-31-2016	3-31-2017
☑	Services – Cast Iron and Unprotected Steel	3-31-2016	3-31-2017
☐	Distribution Pipeline Blowdowns *(Commitment Rate:_____)*		
☐	Excavation Damages		

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NOT FOR CIRCULATION

Washington Gas Joins the EPA's Natural Gas STAR Methane Challenge Program as Founding Partner

WASHINGTON (March 30, 2016) – Washington Gas, a WGL company (NYSE: WGL), announced today that it has joined the U.S. Environmental Protection Agency's (EPA) Natural Gas STAR Methane Challenge Program as a founding partner. This voluntary program provides participating companies with a platform to showcase their efforts to reduce methane emissions and improve air quality.

By joining the EPA's Methane Challenge Program, Washington Gas demonstrates its ongoing commitment to greenhouse gas (GHG) emission reduction. This commitment includes a goal to achieve by 2020 an 18 percent reduction in GHG emissions for every unit of natural gas delivered. Established in 2011 against a 2008 GHG emission baseline, the company is on track to meet this objective.

"WGL has a strong commitment to sustainability as a core company value," said Terry McCallister, chairman and CEO of WGL Holdings, Inc and Washington Gas. "We demonstrate this commitment by establishing aggressive emission reduction objectives for our own operations and by offering our customers energy answers from a well-balanced portfolio that includes renewable solutions, energy efficiency services and green power."

Washington Gas has also established a goal to reduce GHG emissions from its fleet and facilities operations by 70 percent by 2020. The company expects to announce achievement of this goal well ahead of schedule based on a number of initiatives. At its Washington Gas LEED Gold-certified facility in Springfield, Virginia, for example, up to 35 percent of the building's base load power comes from an on-site solid oxide fuel cell that generates electricity through a process with far less emissions than grid-generated electricity. The Washington Gas fleet reduced its carbon footprint by 25 percent, primarily by deploying nearly 200 clean-burning natural gas vehicles.

The EPA Methane Challenge provides a mechanism for natural gas and other energy companies to make and track commitments established in collaboration with the EPA to lower methane emissions that improve air quality. It is a voluntary program designed for participants that submit meaningful and ambitious methane reduction goals and are prepared to transparently account for progress and demonstrate ongoing improvements.

The Methane Challenge Program and its founding partners will be introduced today at the Global Methane Forum at an event hosted by Janet McCabe, EPA's acting assistant administrator for Air and Radiation, at the Georgetown University Hotel and Conference Center in Washington, DC.

About Washington Gas

Washington Gas Light Company is a regulated natural gas utility providing safe, reliable natural gas service to more than 1.1 million customers in the District of Columbia, Maryland and Virginia. A subsidiary of WGL Holdings, Inc., the company has been providing energy to residential, commercial and industrial customers for more than 167 years.

About WGL

WGL (NYSE: WGL), headquartered in Washington, D.C., is a leading source for clean, efficient and diverse energy solutions. With activities and assets across the U.S., WGL consists of Washington Gas, WGL Energy, WGL Midstream and Hampshire Gas. WGL provides options for natural gas, electricity, green power and energy services, including generation, storage, transportation, distribution, supply and efficiency. Our calling as a company is to make energy surprisingly easy for our employees, our community and all our customers. Whether you are a homeowner or renter, small business or multinational corporation, state and local or federal agency, WGL is here to provide Energy Answers. Ask Us. For more information, visit us at www.wgl.com.

###

DRAFT

Cheryl Vetter
Office of Air Quality Planning and Standards
Environmental Protection Agency (C504-03)
Research Triangle Park, North Carolina
27711

December 4, 2015

SUBJECT: "Oil and Natural Gas Sector: Emission Standards for New and Modified Sources," Docket ID No. EPA-HQ-OAR-2010-0505

Dear Ms. Vetter:

Vermont Gas Systems, Inc. submits the following comment with respect to the Agency's proposed rules for reducing methane emissions in the upstream sector of the oil and gas industry.

Vermont Gas is a distribution company now serving almost 50,000 customers in northwestern Vermont. Although much of our customers' gas supply has historically been from western Canada, via a connection to the TransCanada Pipeline, the company increasingly purchases natural gas at market hubs where US-produced gas is offered.

Our customers are deeply 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.

We support the Federal government's proposal to strengthen management of methane. Further we recommend that the rules should be broadened to expand

beyond new and modified equipment and that, at the least, the rules should be applied to existing equipment when producing wells undergo a workover.

We also believe that EPA's approach to leak detection and repair could be strengthened to achieve the meaningful identification and correction of methane leaks that is being demonstrated by well designed state programs such as those now in effect, according to rules developed with industry participation, in the State of Colorado.

States and leading oil and gas businesses are pioneering cost-effective and meaningful methane reductions from existing infrastructure. Comprehensive leak detection and repair should be the centerpiece of a well designed existing source methane abatement program under the Clean Air Act.

National regulation and enforcement is a critical ingredient of public trust and acceptance of our energy products and infrastructure. As with air and water pollution in the 1960-70's, the time has come to act the national level.

We appreciate the effort of the Agency, stakeholder groups, and supportive industry members to move forward with strong, effective rules to increase oversight of, and sharply reduce leakage of, methane in the industry.

Sincerely,

Don Rendall
President and CEO

Appendix A - Natural Gas Leakage Abatement Best Pr

Revised 4/27/15 - Revised the information on Gas Leak Detection tab, Row 31, Odyssian Technologies and added R

Economic Analysis of Methane Emission Reduction Oppo

in the U.S. Onshore Oil and Natural Gas Industries

3/1/2014
Prepared for
Environmental Defense Fund
257 Park Avenue South
New York, NY 10010
Prepared by
ICF International
9300 Lee Highway
Fairfax, VA 22031
Environmental Protection Agency (EPA)
Recommended Technologies and Practices

The following report is a valuable source of information to help determine where the opportunities are for Methane reduction in the Gas Industry.

http://www.edf.org/sites/default/files/methane_cost_curve_report.pdf

actices

ow 17 to Gas Leak Prevention tab

Appendix A - Natural Gas Leakage Abatement Best Pr

Revised 4/27/15 - Revised the information on Gas Leak Detection tab, Row 31, Odyssian Technologies and added R

Environmental Protection Agency (EPA) Recommended Technologies and Practices

Natural Gas STAR partners share information on cost-effective methane emission reduction technologies and practices via sub reports detailing their emissions reduction activities. To promote technology transfer and share industry best practices, the Na information on cost-effective methane emission reduction opportunities through a variety of documents including *Lessons Le Opportunities (PRO) Fact Sheets*, Technical Presentations, and *Partner Update* articles (to learn more, see descriptions of Natu below). *Lessons Learned Studies* and *PRO Fact Sheets* are also available in Arabic, Chinese, Russian, and Spanish translations.

The following webpages are extremely valuable sources of information for the practical, cost-effective reduction of methane e industry:

Recommended Technologies and Practices

Technical Document Translations
Program Forms
Technology Transfer Workshops
Service Provider Directory
Natural Gas STAR Contacts

actices

ow 17 to Gas Leak Prevention tab

Appendix A - Natural Gas Leakage Abatement Best Pr

Revised 4/27/15 - Revised the information on Gas Leak Detection tab, Row 31, Odyssian Technologies and added R

Gas Leak Detection Technology

Name	Technology
Picarro	Cavity Ring-Down Spectroscopy (CRDS) - Nearly every small gas-phase molecule (e.g., CO2, H2O, H2S, NH3) has a unique near-infrared absorption spectrum. At sub-atmospheric pressure, this consists of a series of narrow, well-resolved, sharp lines, each at a characteristic wavelength. Because these lines are well-spaced and their wavelength is well-known, the concentration of any species can be determined by measuring the strength of this absorption, i.e. the height of a specific absorption peak. But, in conventional infrared spectrometers, trace gases provide far too little absorption to measure, typically limiting sensitivity to the parts per million at best. CRDS - Cavity Ring-Down Spectroscopy - avoids this sensitivity limitation by using an effective pathlength of many kilometers. It enables gases to be monitored in seconds or less at the parts per billion level, and some gases at the parts per trillion level. (Source: Picarro website)

CHARM® – CH4 Air Remote Monitoring, i.e. helicopter- borne infrared laser-based (LIDAR) remote gas detection system	How does CHARM® work? Natural gas traces made visible; Detection of very low methane concentrations Natural gas detection systems used for monitoring the tightness of buried pipelines must be capable of identifying even the smallest traces of methane. The measurement method of CHARM® is based on the absorption of specific infrared light wavelengths by methane, the main constituent of natural gas. CHARM® generates two short infrared laser pulses, whose wavelength is adjusted such that the first pulse is absorbed by methane while the second pulse is not absorbed. A small amount of the light of both pulses is scattered back to the measurement system where it is focussed by as telescope onto a sensitive detector. Evaluating the ratio of the measured signal of both pulses directly gives the concentration of the methane layer. For more technology information refer to this link: http://www.open-grid-europe.com/cps/rde/xchg/open-grid-europe-internet/hs.xsl/1222.htm

Gas Camera	The Gas Camera was mainly developed at Hamburg University of Technology on behalf of industry with support by E.ON Ruhrgas, Gasunie, Fluxys and Snam Rete Gas. The Gas Camera is a remote detection system that provides video images of gas clouds displayed of the target (leak). It analyses infrared radiation that propagates from the background of the field of view through the gas cloud to the optical receiver and the sensing element. There are IR Gas Cameras sold by other vendors.
EyeCGas by Opgal	Gases have their own characteristic absorption lines in the IR spectrum. The use of a gas camera, with an appropriate sensitivity, allows gases to be visualized. Thermal imagers are sensitive to the absorption lines spectrum and are designed to have an optical path sensitivity in correspondence with the gases, in the spectrum area of interest. When the operating gas camera is pointed at leaking components, the emissions will absorb the IR energy, appearing as what looks like smoke on either a black or white background. (Source: Opgal Corp)

GasFindIR by FLIR	Specifically the FLIR GF 320 can be used to detect Methane and Volitile Organic Compounds (VOCs) by visually displaying the temperature of the escaping gas and surroundings on a video screen. It can make small differences in temperature visible. See the links to the right.
Optical Methane Detector	The vehicle mounted Optical Methane Detector *TM uses infra-red technology to specifically detect methane gas leaks down to levels of 1ppm without cross interference to other hydrocarbons. (Gas Measurement Instruments LTD.) The Optical Methane Detector's infrared light source is mounted on a crossbar at one side of a vehicle's front bumper and then aimed at an optical detector mounted at the other end of the bumper. When methane molecules pass between the source and the detector, they absorb energy from the light beam, resulting in an attenuation of the beam that is proportional to the amount of gas present. This attenuation affects the detector's reading and the driver is alerted to a leak. The concentration may then be observed, mapped and logged. The Optical Methane Detector is effective at detecting trace levels as low as 1 ppm of methane. Because only part of the infrared light beam is affected by partial obstruction of the light path (such as from deposits of dirt on the exterior or water) the unit can function in light rain and other non-ideal survey conditions. (Source: Lechtzer Inc.)

Heath Detecto Pak Infrared (DP-IR)	Infrared Controlled Interference Polarization Spectrometer. The HEATH Detecto Pak-Infrared (DP-IR™) is a highly advanced technology capable of detecting methane without false alarming on other gases. The DP-IR is the latest of a new generation of leak survey instruments from HEATH that will greatly improve the productivity and safety of a walking/mobile survey. The DP-IR functions by using an infrared optical gas detection system. **This instrument is intended to replace the current surveying equipment using the traditional Flame Ionization with next generation technology utilizing a simple light beam, eliminating the need for expensive gas cylinders and refill systems.** It is designed to be selective to detecting methane only, and will not false alarm on other hydrocarbon gases. (Source: Heath Corp.)
Remote Methane Leak Detector	The RMLD-IS does not have to be within the gas plume because it uses laser technology known as Tunable Diode Laser Absorption Spectroscopy. As the laser passes through a gas plume, the methane absorbs a portion of the light, which the RMLD-IS then detects. This technology makes it possible to detect leaks along the sight line without always having to walk the full length of the service line. (Source: Heath Consultants website)

Laser Methane Detector by Gazomat	The INSPECTRA® Laser is a natural gas leak portable analyser with laser spectroscopy.The measuring chamber of the INSPECTRA® Laser analyzer is fitted with a laser diode adjusted to the absorption wavelength specifi c to methane. In the presence of methane molecules, the laser beam is partially absorbed. Thus, only methane is detected. The device is insensitive to other hydrocarbon gases, chemicals,water vapours and pollution that may be present in the atmosphere. (Source: Gazomat Corp.)
GT Instrument by GMI	Uses a semiconductor sensor for methane detection (PPM)) and a catalytic bead sensor for the Lower Explosive Limit (LEL) (Source: GMI Website)

Combustible Gas Indicator - Gascope Model 60 by MSA	The Gascope Combustible Gas Indicator is prepared for operation by turning the switch to the ON position, and setting the selector switch for high or low scale. A sample is drawn in by squeezing the aspirator bulb. The instrument uses two different types of filaments: a catalytic combustion filament for the low range, and a thermal-conductivity filament for the high range. Concentrations on the low ranges are measured by the hot-wire, Wheatstone bridge method. The filament is one arm of the bridge. When a gas sample is passed across this filament, combustibles are burned, raising the temperature of the filament. As a result, resistance is increased and the bridge becomes unbalanced. The imbalance is proportional to the concentration of the combustibles, and is indicated on the low range of the meter. For measuring in or above the explosive range, a thermal-conductivity filament is used. Combustibles in the sample cool this filament, causing the Wheatstone bridge to go out of balance. The imbalance, proportional to the gas concentration, is measured by the meter and read as percent-by-volume. The filament is field replaceable. (Source: MSA)
Leakator 10 by Bacharach	This easy-to-use instrument detects acetone, acetylene, ammonia, benzene, butane, ethanol, ethylene-oxide, gasoline, hexane, hydrogen, industrial solvents, methane, naphtha, natural gas, paint thinners and propane. (Source: Bacharach Corp.)

Portable Flame Ionization Detector	The operation of the FID is based on the detection of ions formed during combustion of organic compounds in a hydrogen flame. The generation of these ions is proportional to the concentration of organic species in the sample gas stream. Hydrocarbons generally have molar response factors that are equal to number of carbon atoms in their molecule, while oxygenates and other species that contain heteroatoms tend to have a lower response factor. Carbon monoxide and carbon dioxide are not detectable by FID. **There is now a replacement for FIDs. It is called DP-IR see line 10 of this spreadsheet.**(Source: Consumer's Energy Presentation to AGA - 2011 and Wikipedia)
Combustion Gas Indicator (CGI)	Semi-conductor Sensor Probe connected to instrument with electrical harness or Standard Probe and Handle assembly using instrument integral pump with flow fail sensor. The sample path is protected by hydrophobic filter and automatic pump switch off. (Source: Heath)

Gas Rover by Bascom-Turner	The Gas-Rover™ uses a catalytic combustion sensor to provide sensitivity, speed of response, and accuracy needed for leak surveys on foot or by vehicle. The Rover can be used to replace a conventional FID with a significant reduction in cost and a substantial increase in convenience. (Source: Bascom-Turner Website)
Smart Ball	Free-swimming acoustic monitoring device. It can identify the sound of leaks. (Source: Technical Toolboxes Inc.)

Robots	Design News - Robot Can Detect Gas Pipe Leaks By Ann R. Thryft, July 18, 2014 In more than one US location gas pipes under city streets have exploded, causing damage and even death. Aging, failing underground pipes carrying natural gas can be notoriously difficult to troubleshoot. Now, a self-propelled robot developed by MIT researchers promises to detect leaks quickly and accurately. Researchers at MIT and King Fahd University of Petroleum and Minerals in Saudi Arabia say their prototype robotic system can detect very small leaks of 1 mm to 2 mm and at lower pressures. Existing leak detection methods tend to be slow and incapable of finding small leaks. They usually involve either leak detectors located inside pipes that use cameras for visual inspection, or acoustic sensors above ground that detect characteristic sound and vibration patterns. Other methods include hydrostatic or liquid natural gas testing and aerial patrols equipped with lasers. This system detects leaks by sensing a pressure gradient near a leak in the pipe using force-resistive sensors. The small robot has wheels to propel it through a gas pipe. A drum-shaped projection from the robot's body houses a membrane that forms a seal across the pipe's diameter. Liquid flows in the direction of a leak and pulls the membrane slightly toward it. This creates a distortion detected by the sensors, and their data is sent back using wireless communications. The system can detect leaks quickly and pinpoint their location. The robot can potentially go faster than 3 mph, a limit set by motor speed, not sensor speed.

Tunable Laser Spectrometer	By measuring the absorption of light at specific wavelengths, the tool can measure concentrations of methane, carbon dioxide and water vapor and different isotopes of those gases.
Portable Spectrometer	By measuring the absorption of light at specific wavelengths, the tool can measure concentrations of methane, carbon dioxide and water vapor and different isotopes of those gases.

Canines (Dogs)	Trained Dogs. A gas detection team consists of a handler and 2 gas detection dogs. The following is from the Maribo company website: "The teams are trained according to specifications established by Swedish authorities and Maribo. According to impartial experts, Swedish requirement specifications are among the most stringent in the world. The fact that Swedish authorities place significant demands on handlers and service dogs is primarily due to a low political acceptability for failure. High demands from authorities and the market drive development. Maribo develops detection functions in cooperation with customers who have cutting-edge skills in their fields. Examples of customers who have cutting-edge skills include Vattenfall, Orica Sweden, Eon Sverige, Eurenco Bofors and Fortum Corporation. The training of teams from Maribo comprises expert technical content. " (Source: Maribo website)

Canines (Dogs)	Trained Dogs

Canines (Dogs)	Trained Dogs - Locating leaks in oil and gas pipelines using highly trained leak detection dogs. Our dogs sniff out the specialized odorant that is injected into the oil or gas pipeline. The odorant then rises to the surface allowing the scent to be recognized and located by the man and dog teams. This method saves the oil and gas company time, manpower, equipment usage and money. We offer maintenance inspection packages on all existing pipeline. Our customers don't have to wait for a leak to occur but employ a standard inspection schedule of their pipeline, saving even more time and money. Our dog teams locate potential problems before they become a major risk. Monthly, Bi- Monthly, quarterly and six months maintenance inspection scheduling packages available. (Source: K9 Pipeline Leak Detectoin LLC website)

Aerial Leak Surveys Using Drones	Small remote control helicopters that can be fitted with cameras and a variety of sensors.

Patrols Using Helicopters, Fixed Wing Aircraft, Cars, Boats, On Foot or any combination of these.	All of the methods on the left, with or without cameras or gas detection devices.

Hyperspectral Imaging Cameras (Rebellion Photonics)	Hyperspectral imaging collects and processes information from across the electromagnetic spectrum. The goal of hyperspectral imaging is to obtain the spectrum for each pixel in the image of a scene, with the purpose of finding objects, identifying materials, or detecting processes. Much as the human eye sees visible light in three bands (red, green, and blue), spectral imaging divides the spectrum into many more bands. This technique of dividing images into bands can be extended beyond the visible. In hyperspectral imaging, the recorded spectra have fine wavelength resolution and cover a wide range of wavelengths. (Source: Wikipedia and the references mentioned therein)
Smart Pipeline Network - Pipe & Repair Sensor System	Odyssian Technology believes that the correct approach to eradicating or significantly reducing pipeline leaks is a smart pipeline system that has a collection of diverse (and evolving) technologies all integrated within a distributed, yet common communication and control platform. The technology developed in these PHMSA SBIR programs take advantage of recent technology advances and shifts in affordability of technology to develop and demonstrate what Odyssian believes will be our future national Smart Pipeline Network. Such technology advances include the advent of nano-scale and thin and thick film materials in conjunction with micro machining techniques that allow for the development of very small sensors and multifunctional systems having intrinsically embedded sensing functionality. These small devices and materials are being used to develop highly engineered smart systems that are capable of sensing their environment and often responding to such stimulus. Odyssian Technology has developed smart pipe and smart seal technology, originally targeted for use on airborne high-energy chemical laser systems. This DOT PHMSA SBIR program further developed and adapted this technology for use on pipelines to allow for the pinpoint location of leaks and in some cases emerging leaks (detecting an imminent leak before leakage occurs). The shift in affordability and proliferation of wireless and wired communication networks makes more feasible a Smart Pipeline Network that provides real-time operational status of pipeline transmission, distribution, and remote facility systems. Communication and signal conditioning circuitry was developed that is integrated within the system to provide a sensor network capable of pinpointing the location of progressing leaks through fittings, joints, valves, pipe, pipe repairs, etc. For more information see the Final Report found via the link to the right. (Source: Odyssian Technology)

Gas Insertion Sensor System	In 2013 JD7 commercially launched its live gas insertion sensor system. This technology incorporates not only high resolution CCTV camera sensors but also a highly sensitive hydrophone and high powered sonde system. The hydrohpone is used for precise leak detection and pinpointing purposes. The hydrophone and software is sensitive enough to detect the smallest of leaks within low pressure gas distribution systems. Full leakage acoustic signatures can be displayed graphically or using the conventional audio output as headphones and HD CCTV live images allow the operator to validate the full survey. The system includes a pressurised launch and feed system which allows safe and consistent feeding of the system during live insertion work. (Source: JD7 Inc.)

Uses	Detection Sensitivity
The unit Is mounted on a vehicle and driven through neighborhoods to identify areas where methan is detected. (Source: Picarro website) _	It enables gases to be monitored in seconds or less at the parts per billion level, and some gases at the parts per trillion level. It can 1 PPB detect up to 600' from the source. (Source: Picarro website)

CHARMS hardware is mounted on a helicopter to survey the gas piping system. The use of CHARM requires not only the hardware (helicopter, system), but also a detailed data analysis depending on the customer requirements. This is a service offered by Adlares GmbH of Teltow, Germany. It is able to inspect up to 350 km/day.Their service will be possibly available in North America in 2016. Since this is a contractual service, the pipeline operator does not need to employ CHARM-specialists.	Gas concentrations can be determined over a width of at least 7 metres up to 12 metres * Even the slightest traces of natural gas can be identified during routine air patrols at a speed between 50 – 90 km/h at altitudes between 80 m and 140 m. It can detect a leak of 100 liter/hour (0.06 scfm) at wind speeds of 3 m/s (6,7 mph). Even at 6 m/s (13 mph)it can detect leakages of 500 l/h (0,3 scfm). * The operational detection limit is less then 25 ppm·m at a high detection resolution. (Source: E-ON/RuhrGas and Open Grid Europe)

Can be a portable camera used to scan facilities or a stationary camera aimed at a gas facility or other target which can alarm if a methane leak is detected.	It is capable of safely detecting gas clouds with column densities as low as 150 ppm·m. (Source:Eon Ruhrgas)
Portable camera about the size of a normal video camera allow the operator to see and record gas leaks. (Source: Opgal Corp)	Only says that it can detect small leaks.

Portable camera about the size of a normal video camera allow the operator to see and record gas leaks. (Source: FLIR)	.8g/hr http://www.flir.com/thermography/americas/us/view/?id=30866
Mobile Leak Survey - Attaches to front of truck - Speeds up to 35 miles per hour. (Source: Consumer's Energy Presentation to AGA - 2011)	Range of 16' and detects down to 1ppm and < 1 second (Source: Consumer's Energy Presentation to AGA - 2011, Gas Measurement Instruments LTD and Lechtzer Inc. and Heath Corp.)

Walking leak survey. According to Heath, the manufacturer, you use it the same way as the Flame Ionization Detector. (Source: Heath Corp.)	0-1000 PPM: 1 PPM 1000-10,000 PPM: 5 PPM 1-100%Gas: 0.5%. For more information see the brochure: http://heathus.com/wp-content/uploads/dpir.pdf
Walking Leak Survey. Can be used from 15' to 100' away. Must have appropriate background target to reflect the IR beam (i.e. ground or building) Scan slowly over longer distances Avoid dark zones (Source: Consumer's Energy Presentation to AGA - 2011)	According to NYSearch it can detect 5 ppm from a distance of 200 feet. http://www.nysearch.org/commercial_products.php Can be used from 15' to 100' away. Must have appropriate background target to reflect the IR beam (i.e. ground or building) (Source: Consumer's Energy Presentation to AGA - 2011)

Walking Leak Surveys• ATEX Version: for use in explosive atmospheres (both inside and outside of buildings), suitable for any application requiring the measurement of natural gas concentrations (methane only) such as : • Survey of natural gas network (methane only) • Detection and localization of gas leaks (methane only) • Monitoring of natural gas compression plants • Monitoring of methanation plants • Monitoring of landfills • Measurements in laboratories, etc. • Non ATEX version : for use outside of buildings only and exclusively limited to NON ATEX areas presenting no risk of permanent presence of explosive gases. • Applications requiring natural gas concentration measurements (methane only). (Source: Gazomat Corp.)	Sensitivity of 1 ppm (Source: Gazomat Corp.)
Overview - Designed for the gas industry, the GT Series are multi-application instruments, satisfying all the needs of service technicians within a single unit. With 7 modes of operation, the GT Series is the most versatile instrument available for working with gas.The GT Series is suitable for the following operations: Leak test, Confined space entry, Barhole testing, Carbon monoxide, Purge, Sniffer, Pressure leak tightness. (Source: GMI Website)	0-10,000 ppm in increments of 1 ppm 0-100% LEL in increments of 1% (Source: GMI Website)

The Model 60 is designed for use by gas utility companies in routine testing for methane-in-air concentrations in manholes, sewers, curb boxes and other street openings. The unit reads 0 to 5% by volume methane-in-air, and 0-100% by volume methane-in-air. (Source: MSA)	The unit reads 0 to 5% by volume methane in air and 1-100% by volume methane in air. (Source: MSA)
Hand held light weight gas detector. This easy-to-use instrument detects acetone, acetylene, ammonia, benzene, butane, ethanol, ethylene-oxide, gasoline, hexane, hydrogen, industrial solvents, methane, naphtha, natural gas, paint thinners and propane. (Source: Bacharach Corp.)	20 ppm for Methane (Source: Bacharach Corp.)

Sensitive, economical, single purpose gas leak Flame Ionization Search Instrument. One instrument for walking, ATV and mobile surveys. Provides eight hours of continuous operation and can be refueled in one minute or less. Ideal for checking mains, services, congested areas, meter sets and risers. Weighs 4¾ lbs. Meter, audible alarm and LED flame out indicator provide the readouts. (Source: Southern Cross Inc.) Walking Leak Survey or Mobile Surveys. See the brochure for all of the uses of this instrument: http://heathus.com/wp-content/uploads/detecto-pak-4.pdf (Source: Consumer's Energy Presentation to AGA - 2011 and Heath)	In the search range, (50 ppm @ full scale), it is capable of detecting as low as one part per million (ppm) of hydrocarbons in air. A centering range, (5000 ppm @ full scale), is provided to assist in centering leaks. The meter indicates the presence of hydrocarbons. An alarm sounds at a preset point on the search range. (Source: Southern Cross Inc.)
The First Responder gas detector provides gas detection for first call and emergency response technicians in the gas utilities. It can be used as a Combustible Gas Indicator with LEL and % Volume ranges for leak detection and general safety monitoring. Additionally, the First Responder has a Carbon Monoxide range for internal atmosphere monitoring where odor call response is required. There are currently three CGIs utilized at SCE Catalina: GMI Acclaim, Impact Pro, and the Sensit□ HXG-2D. The GMI Acclaim is a portable combustible gas indicator that can detect the presence and concentration of combustible gases. The Impact Pro is a portable gas monitor designed to monitor the atmosphere continuously for hazardous levels of oxygen, combustible gas, carbon monoxide, and hydrogen sulfide. The Sensit□ HXG-2D is designed to detect combustible gases in both the PPM and %LEL range.	1 PPM (Source: Heath)

Use it to conduct gas leak surveys by foot or vehicle (Source: Bascom-Turner Website)	Measurements over the full range of gas from 1ppm to 100% gas, Survey mode provides a calibrated scale from 1ppm to 10,000 ppm, Barhole mode yields peak and sustained readings after a fixed time (Source: Bascom-Turner Website)
Rolls through pipes 4" and above, propelled by the flow of the gas. Used for routine leak surveys, including pin-hole sized leaks, emergency leak location, minimizing product loss and cleanup costs, validation of alarms generated by CPM systems (with leak location), acceptance testing of new pipelines, product theft detection, leak location during hydrotests.(Source: Technical Toolboxes Inc.)	0.1 liter/min.(Source: Technical Toolboxes Inc.)

Detects very small gas leaks	Detects very small leaks of 1mm to 2mm at low pressures. (Source: Design News - Robot Can Detect Gas Pipe Leaks By Ann R. Thryft, July 18, 2014)

It is used to find and pinpoint methane leaks	PG&E says it's 1,000 times more sensitive than the hand-held equipment it’s been using to track down leaks. NASA says 1.3 parts per billion.
UC Davis is also using it to perform surveys of methane emissions from the air: The project is funded by PG&E and the Pipeline Research Council (PRCI):	Very sensitive but needs refinement to differentiate the signiture of pipeline methane from naturally occurring methane.

Find transmission and distribution line leaks	Performance is continuously monitored and results show that reliability is around 96%-97%. Chromatographs show that a gas detection dog detects values far below the PPB level. " (Source: Maribo website)

Find transmission line leaks	See the line above. Tests have shown that they can detect gas in the parts per billion (ppb) range

Find transmission and distribution line leaks	See the line above. Tests have shown that they can detect gas in the parts per billion (ppb) range

Drones are being tested now by SDG&E to inspect power lines and towers. In the future they may also be used to inspect gas lines and other infrastructure. One possibility is to fit the drones with miniature tunable laser spectrometers to detect gas (see the Leak Survey and Repair Methods tab on this spreadsheet).	N/A

Landslides or threatened slides. Erosion by streams, wave action, rain, etc.. Land subsidence that could affect the pipeline, Construction or maintenance work being done by others along the pipeline. Encroachments into the right-of-way by buildings, structures or the construction of levees, roads, wells, etc, for which no prior permission has been granted by the company. Evidence of gas leakage, by checking vents at RR crossings or as indicated by vegetation (See Procedure 5.02, Leakage Surveys), bubbles in surface water, odor, etc.. Needed repairs to company owned facilities, including fences, pipeline markers, exposed crossings, etc. Needed repairs to highway structures and other non-company owned facilities where public safety is a factor. Presence of survey parties or other indications of possible future work that might jeopardize the pipeline or effect a change in its class location. Any other factors affecting the operation or safety of the pipeline or other company facilities such as slope erosion, blocked culverts, casing vents, and access road washouts. Evidence of atmospheric corrosion that would indicate the need for repair and/or re-coating. Access roads used by others occasionally, or in areas viewed by the general public that may not be in a passable condition as established in accordance with existing agreements. Changes in population deensity. Any activity that could create an unsightly condition in aesthetically sensitive areas.	Usually patrols are visual however, they are becoming more sophisticated using gas detection technology.

Detecting Methane Leaks	1% methane leaks at 160 ft. (Source: Rebellion Photonics)
Detect leaks in gas transmission lines. In this program, smart pipes and smart composite repair having integrated leak detection micro-sensors will be further developed and adapted for pipeline use. Concepts and designs will be developed for a networked sensing system capable of sensing the pinpoint location of a leak or impending leak, as well as monitoring structural health. In Phase I, the scope will include the development of a Pipe and Repair Sensor System for use with petroleum-based liquids, with Phase II expanding the scope to include development of a system for use with natural gas. For more information see the Final Report found via the link to the right. (Source: Odyssian Technology)	Depends on the sensors used. Still in R&D Phase

Determine the condition of low pressure distribution piping and locate leaks in low pressure gas distribution systems.(Source: JD7 Inc.)	The JD7 website just says " The hydrophone and software is sensitive enough to detect the smallest of leaks within low pressure gas distribution systems."

Link to Manufacturer or Research	Cost
http://www.picarro.com/	Must contact the vendor

http://www.open-grid-europe.com/cps/rde/xchg/open-grid-europe-internet/hs.xsl/charm.htm?rdeLocaleAttr=en	This is a service offered by Adlares GmbH, in partnership with Open Grid Europe. Currenly, it is not available in the US but the company anticipates that it will begin to offer the service to North America in 2016. The pricing for the CHARM survey depends on many parameters, including Topology (structure) of the pipeline (straight ahead, many branches, …), Assigned mileage, Preparation costs (e.g. transfer from base to area of operation), Assigned additional services (e.g. photographic mapping) (Source: Matthias Ulbricht of Adlares GmbH)

http://www.tuhh.de/mt/ftir/project09.htm	N/A
OPGAL	Must contact the vendor

http://www.flir.com/cs/emea/en/view/?id=41663	Must contact the vendor
http://heathus.com/products/omd/	Must contact the vendor

http://heathus.com/product_category/gas/infrared-ir-optical-based/	Must contact the vendor
http://heathus.com/product_category/gas/laser-based/	Must contact the vendor

http://www.gazomat.com/Pages/INSPECTRA-Laser-Portable.aspx?language=English	Must contact the vendor
http://www.gmiuk.com/product/gt-series/	Must contact the vendor

There is no direct link to this device. It does not appear on the website of MSA, the manufacturer. Instead you must type "gascope model 60' into a search browser. One of the selections will be "media.msanet.com" Click on it.	Per Internet search - Approx $3000 http://www.superiorvalueproducts.com/MSA-Gascope-Combustible-Gas-Indicator-Model-60-465475_p_1944.html
http://www.bacharach-inc.com/leak-detection.htm	Must contact the vendor

Several manufacturers easily found on the interntet. One of them is Heath: http://heathus.com/product_category/gas/flame-ionization-fid/ Another manufacturer is Southern Cross: http://southerncrossinc.com/products/flame-pack-400	Must contact the vendor
http://heathus.com/products/first-responder-gas-detector/	Must contact the vendor

http://www.bascomturner.com/rover.php	Must contact the vendor. Supposedly cheaper than a Flame Ionization Detector (Source: Bascom-Turner Website)
http://www.ttoolboxes.com/Products/Smartball/	Must contact the vendor

http://www.designnews.com/author.asp?section_id=1392&doc_id=274104	N/A - Not commercially available yet.

http://trs-new.jpl.nasa.gov/dspace/handle/2014/42732	Possibly as low as $5000 per unit
http://www.sfgate.com/business/article/Methane-detector-tracks-pipeline-leaks-4071523.php	Fixed Wing Aircraft are much cheaper than helicopters using lasers. This equipment can be bought off-the-shelf for about $50,000 and easily mounted on an airplane.

http://www.maribo.se/gas-detection.html	Must contact the vendor

http://detectordogservices.com/oil%20and%20gas%20services.html	Must contact the vendor

http://www.canineoilpipelineservices.com/index.html	Must contact the vendor

http://3drobotics.com/	Each Drone costs $750-$11000, depending on the type of drone and options chosen

	Varies by vendor providing the service.

http://rebellionphotonics.com/	$2-3 Million for a mid-sized refinery
http://primis.phmsa.dot.gov/matrix/PrjHome.rdm?prj=444&c=1&s=D92E98698A8F48E794162A2DE1106BD2	Must contact the vendor

http://jd7.co.uk/products/gas-insertion-system.php	Contact JD7. All products are available as a service, lease or sale.

Advantages
The Picarro Surveyor enables operators to survey gas secured mains and services at traffic speeds and automatically map and display results in real-time on a secure web browser. The user also has the option to perform a real-time analysis to distinguish between natural gas and other biogenic sources. The data is transferred stored, processed and mapped in the Picarro Processing Platform (P-Cubed). Picarro is able to locate and pinpoint leaks under varying environmental conditions, provide more efficient surveys to streamline operations and repairs, remove human error in reporting and provide a data-driven audit trail. Generates verifiable, traceable and complete records. (Source: Picarro website)

What can CHARM® perform? Efficient and reliable pipeline inspections from the air.

The CHARM® system, developed by Open Grid Europe, is a highly efficient innovative procedure of monitoring natural gas grids. Because of the high sensitivity of the system as well as the automatically and extremely precisely beam control (autotracking), CHARM® can be reliably used even for complex pipeline topologies.

Key facts and benefits at a glance
Helicopter-borne infrared-based laser remote gas detection system
Detection of slightest traces of natural gas (at altitudes between 80 m and 140 m)
Recognized under DVGW codes of practice (Technical Rule G 501: Airborne Remote Gas Detection Methods)
Operational detection limit < 25 ppm•m
Automated documentation of pipeline inspection and real-time reporting of incidents
High efficiency in monitoring pipelines in built-up areas
Area-wide inspection of pipeline route (7 m up to 12 m)
Accurate geographic positioning with CHARM®-Autotracking (CAT)
100 double pulse measurements per second
Patrol speed 50 km/h (up to 90 km/h) (Source: Open Grid Europe).
No capital investment.
This is a contracted service provided by Adlares GmbH of Teltow, Germany, which is in partnership with Open Grid Europe..
(Source: Matthias Ulbricht of Adlares GmbH)
See also Presentations and Useful Files to the right.

Detect gas at a safe distance. Can scan large areas quickly. Can provide video images of gas clouds
Detect gas at a safe distance. Can scan large areas quickly. Specially designed for the natural gas, oil and petrochemical industries, taking into consideration the requirements of the users. Very sensitive and detects smaller leaks than the existing optical imagers' portable solutions. Certified for use in hazardous environments (Class 1, Div.2 and ATEX II), allowing inspection at hazardous places in plants. Implements an internal video and audio recording device. Features a large color LCD display for image and text display. Rugged and durable by design to be used as a tool in the field. It's a portable camera about the size of a normal video camera allow the operator to see gas leaks. The camera also can record videos and audios of the leak and allow you to add commentary.. Only requires 1 hour of training. (Source: Opgal Corp)

Detect gas at a safe distance. Can scan large areas quickly. The FLIR GF320 is an IR camera for optical gas imaging (OGI) that visualizes and pinpoints leaks of VOCs, without the need to shut down the operation. The portable camera also greatly improves operator safety, by detecting emissions at a safe distance, and helps to protect the environment by tracing leaks of environmentally harmful gases. The GF320 is used in industrial settings such as oil refineries, natural gas processing plants, offshore platforms, chemical/petrochemical industries, and biogas and power generation plants. Can also be used to detect leaks in residential gas distribution piping. It's a video camera with IR capability. It can record videos or still pictures. Has GIS capability so you know the exact location of the leak. Optical gas imaging is an accepted leak detection technique in the Method 21 Leak Detection and Repair Alternative Work Practice (Method21 AWP) as well as the Green House Gas Reporting Rule.
Infrared technology, methane specific, instant response, very high survey speeds (to 50 kph), largely unaffected by rain or surface water, no pumps or calibration gases, GPS option (Gas Measurement Instruments LTD.)

The DP-IR operates under a variety of environmental conditions including cold or hot weather. Its rugged design will stand up to normal field use and operating conditions. The DP-IR has built-in Self-test and Zero functions that will assure that the instrument is operating properly. Using the internal calibration cell, the operator can perform the self-test as part of a daily start up routine. While in operation, the DP-IR continuously monitors several parameters to ensure that the instrument is functioning properly. Should any of these parameters go outside of the operational limits, an audible alarm will sound and a Fault/Warning error message will be displayed. (Source: Heath Corp.)
Works well in outdoor situations. (Source: Wikipedia) Using laser technology, remote detection allows you to safely survey areas that may be difficult to reach such as busy roadways, yards with large dogs, fenced-off areas and other hard-to-access places. Will only detect Methane, not other hydrocarbon gases (Heath Consultants website)

Small, portable, weighs 6 lbs. 2 measurement scales: • PPM scale from 0 ppm to 10,000 ppm • GAS scale: from 0 % to 100 % volume gas • Simultaneous display of double measurement range • Very short response time • Two sampling speeds: 35 l/hour and 70 l/hour. GPS Tablet system for total traceability of on-foot inspections. This device enables the operator to keep a computerized record of his/her detection operations: • Geographical positioning on a map of detected leak indications • Recording of concentration measurements • The operator may insert comments during the on-foot inspection • Inspection reports are generated (location, date and time, leak numbers, concentrations, weather conditions and operator comments).See the Gazomat website link for more information. (Source: Gazomat Corp.)
The GT range of instruments combine quality, ruggedness and advanced GMI Technology in a user friendly, hand held gas detector. • PPM, LEL and Volume Methane flammable gas ranges for leak detection • Manual and automatic datalogging • Loud audible and high visual 'ticker' (Geiger) on ppm range • Integral flashlight • Alkaline or rechargeable battery options • Charging via simple power cable or docking station • Rugged polycarbonate case, sealed to IP54 Bump Test & Calibration Station • Simple user interface • Full bump test and calibration options • Bump test and calibration results storage • Robust construction. It is also light weight at 1.7 lbs. (Source: GMI Website)

- Effective measurement of combustible gases and vapors
- Excellent for pinpointing leaks
- 3 Models to meet differing detection needs
- Impact-resistant, waterproof case
- Equipped with neck and waist straps for hands-free operation

(Source: MSA)

10 bright red LED's and a speaker that provide visual and audible indications to the presence of gas •Three operation-status LED's that show power on, sensor operation and low battery • Simple thumb wheel on/off allowing for one-handed operation • Solid state plug-in sensor with typical five year life • 20 inch flexible probe for hard to reach areas • Operational status LED's in English and International systems • UL 913 Classified. Small and Light - Only 18 ounces Detects many combustible gases, not just methane. Low Maintenance and relatively inexpensive. (Source: Bacharach Corp.)

Flame ionization detectors are used very widely in gas chromatography because of a number of advantages.Cost: Flame ionization detectors are relatively inexpensive to acquire and operate. Low maintenance requirements: Apart from cleaning or replacing the FID jet, these detectors require no maintenance. Rugged construction: FIDs are relatively resistant to misuse. Linearity and detection ranges: FIDs can measure organic substance concentration at very low and very high levels, having a linear response of 10^6. Life is eight hours with fully- charged battery and two fuel cylinders filled to 1,750 psig. (Source: Wikipedia) They are rugged and light and can be hand carried, mounted on an ATV or other vehicle. (Source: Southern Cross Inc.)
Portable, easy to use, easy to set up, fast, provides permanent repeatable measurements and records. Relatively inexpensive.(Source: Heath)

• Measurements over the full range of gas from 1ppm to 100% gas • Survey mode provides a calibrated scale from 1ppm to 10,000 ppm • Barhole mode yields peak and sustained readings after a fixed time • Optional sensors for CO and O2 • Intrinsically safe design for indoor and outdoor use • Visual and audible alarms for all monitored gases • Optional GPS capabilities & Bluetooth functionality • Optional 1 Gas Calibration • Retrieve field and calibration data with DataLink4Access • Use the Rover to become Method 21 Subpart W compliant • Automatic calibration, stand-alone and/or in-network docking stations • Automatic storage of mode and time-stamped data • USB interface for data transfer and area network • Two-speed pump automatically set for the job on hand • Large, bright, backlit LCD display with short manual on-board • Sturdy construction in an ergonomic 24 oz package Supposedly, the Rover can be used to replace a conventional FID with a substantial increase in convenience. (Source: Bascom-Turner Website)
Easy to deploy and tack throughout inspection, long battery life allows for long distances to be inspected in one deployment, can detect 'pinhole' leaks as small as 0.016 GPM (0.06 LPM), which is typically several orders of magnitude more sensitive than some leak detection systems, maneuvers quickly and easily through a pipeline (the ball is smaller than the inside diameter of the pipe), light weight for easy shipping and tool preparation.(Source: Technical Toolboxes Inc.)

Fairly fast. It travels at least 3 MPH with the potential to go faster. Almost entirely automated.

Small, handheld and extremely sensitive. The laser and detector themselves are very small. The laser, the size of a quarter and the detector, the size of a penney. See the file in the Presentations and Useful Files column
You can survey large areas from the air. More accurate than looking for dead vegitation, especially in the summer when weeds and grass are brwon anyway.

Maribo GDD-Teams have cutting-edge skills and experience; reliability for detection performance is 96%-97%. Search tags (i.e. all substances GDD identifies) are made up of exclusive substances (not freely occurring substances) and Maribo teams can detect gas leaks in gas pipelines located above or below ground. A gas detection dog from Maribo can identify gas leaks in environments contaminated by gas. GDD-Teams have technical expertise in gas pipelines and expertise in drawings and maps. Maribo gas detection dogs can serve in any environment where people and animals live, and they demonstrate great insensitivity to normally occurring heights, tunnels, traffic, people, animals and sounds. GDD-Teams can operate in the temperature range of -8°C to +32°C. At daytime temperatures above +32°C detection is performed during the cool part of the day. GDD-Teams can operate in hilly terrain and urban areas in wind with a force up to 25m/s; in open flat terrain in a constant wind with a force up to 17m/s*; and in open flat terrain in a gusty wind with a force up to 12m/s*. Maribo gas detection dogs can work in moderate rain or snowfall (they do not perform detection where there is ice formation in soil) and can work for ten consecutive hours while maintaining reliability in detection performance. The average control distance per day is 5,000m (when working with detection only) and for maintenance inspections Maribo gas detection dogs average 32 valves per working day (when working with valves only). Gas detection services provided by Maribo GDD-Teams can fix discrepancies in the distribution system. All reports are provided according to instructions from clients. * In open flat terrain there is some limitation when the wind is strong and/or gusty. (Source: Maribo company website)

This information is from the Detector Dogs International (DDI) webpage: "When you use dogs for leak detection, you only have to dig once. Dogs can be used during leak audits and can also be used in pipeline maintenance, especially on lines that are 30 or more years old. This part can be critical to any company because the dogs are fast and in a situation where you do not want to shut down a line, the dog can be used to locate a leak on an active line. Dogs are wonderful detection tools, suited for use in even the most environmentally sensitive areas. The weight of the dog does not destroy sensitive flora or grasslands, as a huge mechanical shovel would. The dogs do not have to be brought in by huge trucks to a location – they are themselves self-propelling. And to date, no hi-tech machine can match the sensitivity of a dog's nose – it's that powerful! Dogs can serve as a powerful general maintenance tool to locate leaks on active lines before the leak can spread into small rivers and creeks or on to farmers' fields. DDSI employs specially trained dogs that are able to detect actual leaks to an accuracy of less than half a metre. Unlike mechanical devices, the leak detection success rate of healthy, properly trained DDSI dogs is 100%." No need to drag leak detection equipment into mountainous or rugged terrain. More cost effective than leak detection equipment. (Source: Detector Dogs International (DDI))

The company is K9 Pipeline Leak Detectoin LLC. According to their website, "Within the U.S. our handler and dog teams can be mobilized and on your job site within 72 hours after initial activation. Please call for Canadian mobilization time frame and other locations worldwide. Our Pipeline Leak Detector Dogs and handlers go through an extensive six week training course. Only dogs with extreme desire and stamina are selected as Pipeline Leak Detector Dogs. Our dogs can work in temp ranging from 32 degrees up to 95 degrees. A minimum of two Pipeline Leak Detector Dogs are used for each assignment up to four depending on circumstances." one dog can cover up to 5 miles per day in an open field and many miles of Neighborhood blocks if needed. Most jobs we use multiple dogs and trade them out as needed along with multiple handlers.

(Source: K9 Pipeline Leak Detectoin LLC website)

Inexpensive. In some cases, drones can get closer to infrastructure than humans or helicopters, especially in rugged areas.

Covers a lot of mileage in a relatively short amount of time.

You can see leaks on live video. Color coding identifies the severity of the leak. Rebellion Photonics offers a Gas Cloud Imaging video camera that monitors, quantifies, and displays, using a false-colored image, explosive/harmful gas leaks with real-time (~30 fps) video and hardware-based zoom. The camera can be used as an alarm, with 0.5 second response time, to notify of potentially dangerous leaks and aid in safety management. With breakthrough optics technology invented at Rice University, Rebellion Photonics can offer Gas Cloud Imaging video cameras which provide several new possibilities in refinery/rig safety: Detect more explosive, harmful leaks earlier, monitor large sections of a facility in real-time, night and day, visualize gas clouds with powerful false-colored video, zoom in on leaks to better understand size and dispersal, repair leaks more accurately due to portability, save video for future analysis and safety management. Automated calibration with annual maintenance. Unaffected by the wind or temperature, fully automatic 24/7. (Source: Rebellion Photonics webpage)
Using a system of sensors along the pipe to create a "smart pipe", the hope is that leaks will be detected sooner. It is very difficult to detect a leak from the control room.

The distribution system can be inspected while in service. The hydrophone is used for precise leak detection and pinpointing purposes. Full leakage acoustic signatures can be displayed graphically or using the conventional audio output as headphones and HD CCTV live images allow the operator to validate the full survey. The system includes a pressurised launch and feed system which allows safe and consistent feeding of the system during live insertion work. (Source: JD7 Inc.)

Disadvantages
Results can be affected by weather, especially wind.

It cannot detect gas unless it is able to leak to the surface. It is currently unavailable in the US. It is scheduled to be available in North America in 2016.

Obstacles in the line of sight.
Obstacles in the line of sight.

Obstacles in the line of sight.
Open path detectors suffer downtime from anything that blocks the path of the beam, such as people, vehicles or thick fog. (Source: Wikipedia)

Cannot be used at a distance. Gas has to be sucked into the machine to be analyzed.
Open path detectors suffer downtime from anything that blocks the path of the beam, such as people, vehicles or thick fog. (Source: Wikipedia)

The probe must come in contact with the gas to sniff it. Not for locating gas leaks from a distance.
Must come in contact with the gas to sniff it.

Silanes, silicones, silicates and other compounds containing silicon in the tested atmosphere may seriously impair the response of this instrument. Some of these materials rapidly poison the catalytic combustion filament so that it will not function properly. When there is even a suspicion that such materials are in the atmosphere being tested, the instrument must be checked frequently (at least once every five uses). Calibration kits are available to conduct this test. Leaded gasoline vapors can also poison the catalytic combustion filament. To prevent this, an inhibitor filter (Part No. 47740) should be used to nullify their effect.

(Source: MSA)

Cannot distinguish between Methane and other combustible gases. (Source: Bacharach Corp.)

1. Requires the use of High Pressure (1750 psi) Hydrogen / Nitrogen gas to fuel the flame. It can be dangerous if not used properly. 2. Must be able to come in contact with the gas to sniff it. 3. Requires maintenance and frequent calibration checks. 4. **Heath states that the Heath Detecto Pak Infrared (DP-IR) is the next generation of methane detection equipment and is the replacement for FIDs. DP-IR is next generation technology utilizing a simple light beam, eliminating the need for expensive gas cylinders and refill systems. See Line 10 of this spreadsheet.** (Source: Heath website)
It cannot detect gas unless it is able to sniff it so it has to be close to the leak.

Cannot be used in pipes below 4" in diameter.
(Source: Technical Toolboxes Inc.)

It looks like the robot cannot adapt to different pipe sizes. In other words you would need a separate robot for each pipe size. Not commercially available yet.

It cannot survey widespread areas. - Not commercially available yet.
Currently in the research stage. Currently working to differentiate natural gas from pipelines from natural sources of methane,

The company is in Sweden

Optimal pipeline pressure of 1000psi or more. Less pressure takes longer for the dog to find the leak.
The company is in Alberta, Canada

K9 :Pipeline Leak Detection is in Florida

The FAA has not yet approved the use of drones. SDG&E is the only utility approved to test them at the current time. Helicopter drone has 15-20 minute battery life. However, the fixed wing drones can stay in the air for 40 minutes. They cannot stay in the air as long as a standard helicopter or cover as much territory. It's best if drones stay within sight of someone.

Imprecise way to search for gas leaks. Basically the spotter is looking for dead vegetation

Not sure how portable it is. Wikipedia says it may require a lot of data storage capability. This is a highly pixelated digital video at 30 fps. Will require more investigation to determine if these disadvantages are accurate
In the R&D Phase - Not clear from the report

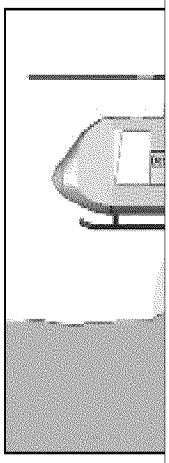
The company is in the UK.

Presentations and Useful Files
http://www.picarrosurveyor.com/

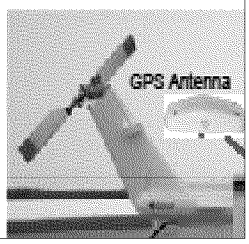
e·on | Ruhrgas

CHARM®

<u>Main technical features:</u>



- Based on the differential absorption measurement principle (LIDAR)
- Gas clouds arte detected by tuning the laser wavelength to the spectral signature and absorption characteristics of the gas
- Gas concentrations can be determined over a width of at least 7 metres up to 12 metres
- Even the slightest traces of natural gas can be identified during routine air patrols at a



e·on | Ruhrgas

Gas Camera – small traces of methane at p
be detected quickly and reliably

- The Gas Camera was mainly developed at Hamburg Univers
  Technology on behalf of industry with support by E.ON Ruh
  Gasunie, Fluxys and Snam Rete Gas.
- The Gas Camera is a remote detection system that provides video images of gas clouds displayed of the target (leak).
- It analyses infrared radiation that propagates from the background of the field of view through the gas cloud to the optical receiver and the sensing element.
- It is capable of safely detecting gas clouds with column densities as low as 150 ppm·m.

http://www.youtube.com/watch?v=tD6p9cAwxQo

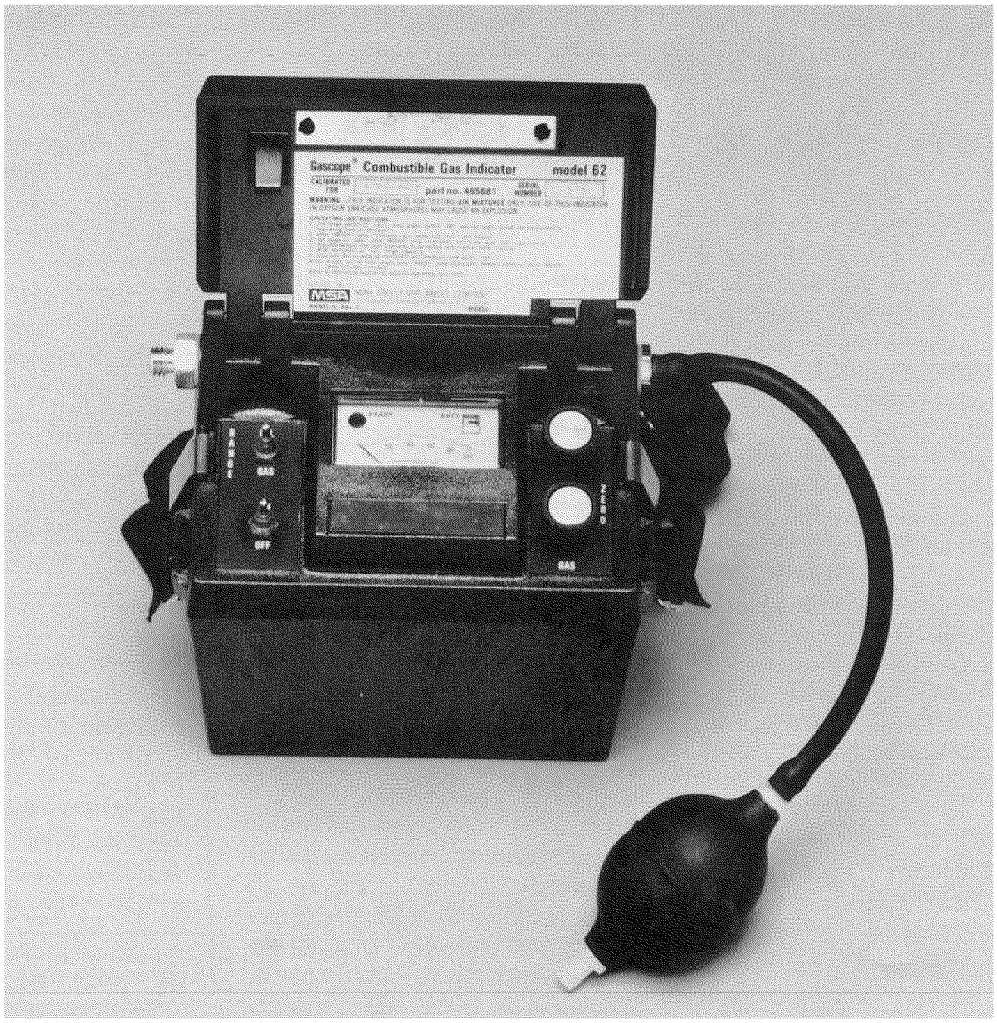
http://www.flir.com/cs/emea/en/view/?id=41384

http://heathus.com/wp-content/uploads/omd.pdf

http://gasandoil.com.au/2013/01/17/heath-detecto-pak-infrared-dp-ir/
http://www.nysearch.org/commercial_products.php

http://www.gazomat.com/?language=English

See the link at the left for the manufacturer's website and brochure



http://www.bacharach-inc.com/leakator-10.htm

http://southerncrossinc.com/technology-products#

http://spectrum.mit.edu/continuum/robot-patrols-gas-pipes-for-dangerous-leaks/

Excerpts from KQED-FM - PG&E Tests Tech Adapted From NASA's Mars Rover - By Molly Samuel, October 2 Pacific Gas and Electric is testing a new device for detecting methane leaks. The sensor is based on a tool that's mounted on NASA's Mars Curiosity rover. NASA designed PG&E's new gadget, too, which the utility says is 1,000 times more sensitive than the hand-held equipment it's been using to track down leaks. The sensor is a small, ultra-sensitive device, mounted on the end of a pole, so that it looks a little like a golf club, explains Hailey Wilson, a PG&E spokeswoman. Inspectors can walk around with it, and it will notify them of leaks in real-time. Methane is the main ingredient in natural gas. "It helps us localize the leaks quicker," Wilson says. "So it's not like it's picking up leaks that we wouldn't find eventually, but it enables us to find it much more quickly and fix it much more quickly." PG&E currently monitors for natural gas leaks by helicopter, boat, car and foot along its nearly 48,000 miles of pipelines. The utility has begun using another ultra-sensitive methane detector, which is mounted on cars. While the Picarro car can sweep neighborhoods for leaks, Wilson says, hand-held devices are vital for pinpointing the sources. "There's a safety component, it makes sure that our system is even safer," Wilson says. "But there's actually that green component as well, with making sure that we eliminate as much methane emissions — which is a greenhouse gas — as possible." On Mars, the Curiosity rover is using the tool, called the tunable laser spectrometer, to search for traces of methane in the atmosphere. There, though, the methane wouldn't signal a leak, but would instead, perhaps, be a sign of life. "Anytime we can go out and find an application that addresses real world problems — in this case one that relates very closely to global climate change and greenhouse gas concentrations — NASA is very supportive," says Andrew Aubrey of NASA's Jet Propulsion Lab in Pasadena. "So in this particular instance, it's a Mars technology that we are translating to the needs of the oil and gas industry." Right now, PG&E is testing a prototype of the sensor. The company is planning to deploy more of them in the field in 2015.

http://www.power-technology.com/contractors/safety/maribo/

http://www.cepa.com/detector-dogs-sniffing-out-pipeline-leaks

We offer the sale of pipeline leak detection dogs to agencies and individuals and teach the process to include the chemical to students. You can visit our training academy website at www.k9pta.com

If you should have any further questions feel free to contact me at pnichol@atlantic.net or you can call me at 352 552-4855.

Thanks,

Paris Nicholson
President
K9 Pipeline Leak Detection
K9 pipeline Training Academy

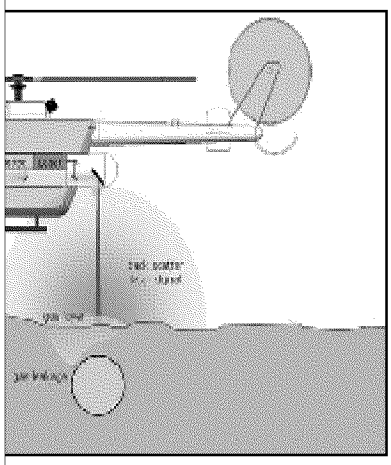
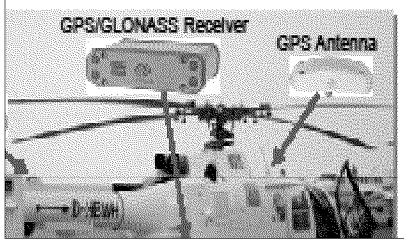
Their website is:
http://www.canineoilpipelineservices.com/services.html

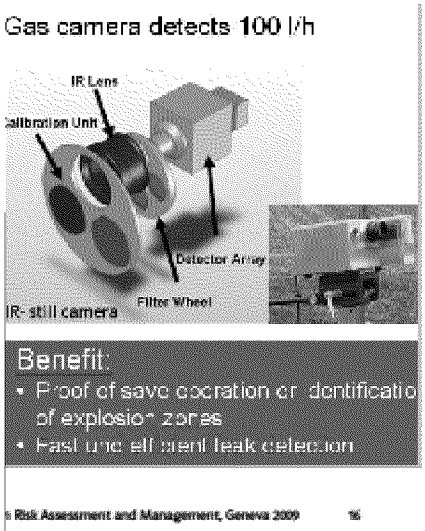
aircraft, he will keep an eye on it while it's airborne. "Coming on," Deering says, and the propellers start spinning. The machine buzzes like a swarm of insects. Soon it is flying at an altitude of 103 feet, beaming down images of a utility pole. "I'm going to go to the tower," Deering said, and the little aircraft darted south to a spindly metal structure. The unit is able to zip quickly from one spot to another in the 100-foot-diameter flying zone approved by the FAA. The utility flies the whirlybirds as if they were manned helicopters, following every rule and regulation, Cormier said. It has to file flight plans. Before showing off the capabilities of their quad-copter, Deering and Ortiz go through a pre-flight checklist. When it comes time to work on the aircraft, all maintenance tasks are recorded in a logbook. SDG&E plans to test its flying machines in four sparsely populated, 2½-mile-long corridors near Campo and Boulevard, in eastern San Diego County. The SDG&E aircraft uses a tiny lenses, to take still pictures or video of its assets — such as wooden power poles that woodpeckers tend to drill on. The camera's image quality is "one step up from a GoPro," utility officials said, with 30-40 megapixel resolution. Cormier said the utility has its choice of sensors, including infrared, multispectral and Lidar (short for light detection and ranging). To get to this point in the testing, SDG&E has had to formally ask the FAA for exemptions to certain rules, including the rule that the aircraft display its N-number (the aviation version of a license plate number) in 6-inch high letters. There is barely room on the flying machine for 1-inch high letters. Now the utility is working to get permission to fly its UASes in comercial airspace in all of San Diego County, a portion of Orange County and half of Imperial County. The San Diego region not only has a major company gearing up to use UASes. It has a company that produces them. While home base is in Berkeley, 3D Robotics Inc. has the bulk of its employees — roughly 150 of them — in Otay Mesa and Tijuana. The firm makes small fixed-wing and helicopterstyle UAS platforms and software, and is investigating work in the farming, insurance and railway vertical markets, according to Tim McConnell, the company's vice president of engineering. SDG&E's Cormier and 3D Robotics' McConnell both said they get lots of questions from people considering UASes for their businesses.

https://www.youtube.com/watch?v=yCtZs8_zb5A

http://digital.turn-page.com/i/406321?_cldee=Y2hhcmxlcy5tYWdlZUBjcHVjLmNhLmdvdg%3d%3d&urlid=100

entations and Useful Files	Utility Company
	PG&E

marcogaz		
		
	ɔ integration and demonstration of GIS imagery, ɛrential Absorption Lidar and resulted in near real- nproving from 3-4 weeks to one day. At the neration can now be accomplished in the field generate 100 miles of pipeline routes. This is a Government & Industry Pipeline Research and mmary Report, Westin Arlington Gateway, the entire presentation here: _071812.htm	Open Grid Europe and E-ON/Ruhrgas(Europe)

marcogaz rocess plants to ity of rgas,  	l/Remote_IR.pdf	Open Grid Europe and E-ON/Ruhrgas(Europe)
http://www.opgal.com/ABOUTUS/Overview.aspx		Not Known

http://www.flir.com/cs/emea/en/view/?id=41529	Unknown
	Consumers Energy, PG&E

http://undergroundconstructionmagazine.com/heath-consultants-detecto-pak-infrared	PG&E, Alpine, Sempra, West Coast Gas
	Consumers Energy - Michigan, PG&E, Sempra, Dominion East - Ohio

	Dominion East - Ohio, Sempra
	Sempra

	Sempra
	Sempra

http://heathus.com/wp-content/uploads/detecto-pak-4.pdf	Consumers Energy-Michigan, PG&E, Central Valley Storage, Gill Ranch Storage, Lodi Gas Storage, Dominion East-Ohio, Southern California Edison (SCE), Southwest Gas
	PG&E, Alpine, Central Valley Storage, Lodi Gas Storage, Southern California Edison (SCE)

	Southwest Gas
	N/A

http://www.youtube.com/watch?v=eNg003mmmiU#t=12	N/A

	PG&E
	PG&E

Penspen Ltd, UK, and Newcastle University have been investigating the feasibility of implementing dogs as an additional leak detection tool to be used on onshore pipelines. Leak detection dogs were walked along a pipeline right of way, and also took part in extensive field trials on farm land. The right of way and farm land contained both buried and surface simulated leaks of jet fuel. The results of this research have shown that dogs can detect leaks as small as 5 ml, up to depths of 800 mm below ground, with an 86% success rate. Larger volume leaks would be easily and consistently detected by dogs. The research showed there is a 95% confidence that the dog would: 1. Find between 52% and 78% of extremely small leaks (~5 ml) on a pipeline, 2. Miss between 22% and 48% of these sizes of leaks on a pipeline and, 3. Incorrectly identify the presence of these small leaks between 5% and 15% of his total indications. The dogs would be particularly useful for 1. Inspecting areas where deep corrosion has been identified by in-line inspection. 2. Where coating problems have been identified by above ground surveys. 3. Un-piggable' pipelines. 4. Locations with poor cathodic protection (CP) coverage. 5. Where there are suspected 'illegal taps'; and 6. Detecting leaks during a hydrotest (using scented water). Using sniffer dogs, to survey areas like those mentioned above, can greatly increase the probability of finding any leaks. Also, it provides the operator with additional assurance if no leaks are found. Finally, the dogs are not only reliable; they are also cost-effective, and environmentally friendly. (Source: 'Using canines to inspect for leaks in buried pipelines' by Phil Hopkins, Presented at the 1st Australasian International Welding, Inspection and NDT Conference, iWIN2013. WTIA, Perth, Australia. 10-14th March 2013. Contact Info: E-Mail: p.hopkins@penspen.com, Penspen Limited Unit 7-8, Terrace Level, St Peter's Wharf, St Peter's Basin, Newcastle upon Tyne NE6 1TZ. UK.)	Numerous European Companies use their services

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Penspen Ltd, UK, and Newcastle University have been investigating the feasibility of implementing dogs as an additional leak detection tool to be used on onshore pipelines. Leak detection dogs were walked along a pipeline right of way, and also took part in extensive field trials on farm land. The right of way and farm land contained both buried and surface simulated leaks of jet fuel. The results of this research have shown that dogs can detect leaks as small as 5 ml, up to depths of 800 mm below ground, with an 86% success rate. Larger volume leaks would be easily and consistently detected by dogs. The research showed there is a 95% confidence that the dog would: 1. Find between 52% and 78% of extremely small leaks (~5 ml) on a pipeline, 2. Miss between 22% and 48% of these sizes of leaks on a pipeline and, 3. Incorrectly identify the presence of these small leaks between 5% and 15% of his total indications. The dogs would be particularly useful for 1. Inspecting areas where deep corrosion has been identified by in-line inspection. 2. Where coating problems have been identified by above ground surveys. 3. Un-piggable' pipelines. 4. Locations with poor cathodic protection (CP) coverage. 5. Where there are suspected 'illegal taps'; and 6. Detecting leaks during a hydrotest (using scented water). Using sniffer dogs, to survey areas like those mentioned above, can greatly increase the probability of finding any leaks. Also, it provides the operator with additional assurance if no leaks are found. Finally, the dogs are not only reliable; they are also cost-effective, and environmentally friendly. (Source: 'Using canines to inspect for leaks in buried pipelines' by Phil Hopkins, Presented at the 1st Australasian International Welding, Inspection and NDT Conference, iWIN2013. WTIA, Perth, Australia. 10-14th March 2013. Contact Info: E-Mail: p.hopkins@penspen.com, Penspen Limited Unit 7-8, Terrace Level, St Peter's Wharf, St Peter's Basin, Newcastle upon Tyne NE6 1TZ. UK.)	Numerous

	SDG&E - SDG&E is the first utility in th country to get permission to test the use of drones and train the crews to operate them.

	PG&E

	N/A
https://www.youtube.com/watch?v=YfFvhOHsCm0	N/A

http://napipelines.com/aging-gas-lines-hidden-threat/?_cldee=Y2hhcmxlcy5tYWdlZUBjcHVjLmNhLmdvdg%3d%3d&urlid=7	Several utilities in the UK

Location
California

E-On Ruhrgas and numerous others / Europe

E-On Ruhrgas and numerous others / Europe
Location of the company appears to be Israel

FLIR is a worldwide company. Headquarters appear to be in Europe.
Michigan, California

California
Ohio, Michigan, California

Ohio, California
California

California
California

Ohio, Michigan, California, Nevada, Arizona
California

California, Arizona and Nevada
N/A

N/A

California
California

Europe

Canada

U.S. and
Canada

California

California

N/A
N/A

United
Kingdom

Appendix A - Natural Gas Leakage Abatement Best Pr

Revised 4/27/15 - Revised the information on Gas Leak Detection tab, Row 31, Odyssian Technologies and added R

Gas Leak Prevention Technology

Name	Technology
Starline 2000 Cured In-Place Pipe Liner	Fabric Liner blown into a line, then glued to the pipe wall with epoxy coating. In the US, Nysearch and Con Ed (NY) have been testing it. Recently, a line that was coated 10 years ago was examined. http://www.starlinett.com/products/star_2000_2.html http://www.nysearch.org/news-info_110514-1.php (Source: Starline Website and NYsearch website)
Starline 200 Cured In-Place Pipe (CIPP) Liner	Fabric Liner blown into a line, then glued to the pipe wall with epoxy coating. In the US, Nysearch and Con Ed (NY) have been testing it. Recently, a line that was coated 10 years ago was examined. http://www.starlinett.com/products/star_200_2.html http://www.nysearch.org/news-info_110514-1.php (Source: Starline Website and NYsearch website)

Nu Line by Nu Flow	The Nu Flow epoxy lining solution includes removing existing corrosion in the pipes and applying an epoxy coating without the need to dig or cut access points to underground, under-foundation or in-wall pipes. Unlike alternative epoxy barrier solutions, Nu Flow's epoxy and application process is effective in pipes from 1/2" up to 10" in diameter. The unique characteristics of the Nu Flow epoxy make it feasible to line longer lengths of pipe through elbows, tees and unique system constructs. The epoxy coating process restores flow and prevents corrosion which would otherwise lead to pinhole leaks. Prevents future leaks in hard to access areas such as under foundations or within walls and ceilings. Once completed, the Nu Flow solution ensures continued performance and long-term durability of the pipe system. Nu Flow restores gas systems using patented epoxy coatings. (Source: Nu Flow Corp)
No Dig Anode Installation	Anode installation on steel mains and services typically required utility companies to acquire a street opening permit and proceed to close off and excavate a large section of the street or sidewalk with heavy construction equipment. ULC Robotics was approached by a large gas utility in the Northeast US to see if it would be possible to install anodes by drilling through existing valve boxes or test stations. It was determined to be possible and is in commercial use. (Source: ULC Robotics)

PipeGuard Proactive Damage Prevention System --- Senstar calls the product FiberPatrol-PR	A research partnership between PHMSA/DOT, NGA/NYSEARCH and Magal/Senstar to develop and test an acoustic warning system to proactively report third party activity near pipelines. NYSEARCH completed several successful tests with alpha prototypes and is now completing with PHMSA further advances to the product through development and testing the of beta prototypes.
Guided Wave Ultrasonics	Four separate research projects addressing GWUT with NYSEARCH and Southwest Research Institute led to commercial improvements with multiple service providers. As a result software and hardware support longer inspection distances and better characterization of defects. This technology is widely applied to inspect cased crossings nationwide. Use of magnetostrictive sensor guided-wave technology was also benchmarked.

Micro-Magnetic Cased Pipeline Inspection Robot	New federal pipeline integrity rules require utility companies to evaluate thousands of gas mains buried beneath highways, railroad tracks and airport runways – each and every one cased inside a larger pipe. ULC Robotics imagined, designed and built a solution. The Micro-Magnetic Cased Pipe Inspection Robots defy gravity by magnetically attaching to the metallic casing pipe enabling them to crawl hundreds of feet into tight annular spaces. Front and rear mounted video cameras provide real-time, full motion video of the outer surface of the gas main. Pitch and roll sensors allow for remote navigation and provide the precise location of defects and anomalies. Includes laser measurement of defects. Temperature and humidity sensors continually monitor the environment inside the casing. An ultrasonic thickness sensor can be deployed to take spot wall thickness measurements. Using two forward projecting lasers, a video based measurement system may be used to take measurements of defects or objects within the casing annulus. (Source: ULC Robotics Website)

Variable Geometry Crawler – ULC Robotics, Inc.	Closed Circuit Television (CCTV) inspection of live gas mains
3-D Toolbox	Digital camera capable of photographing and providing detailed measurements of dents, corrosion or other damage on the outside of pipes. It was originally developed for the dental industry. (Source - 3-D Toolbox)

Explorer (Robot)	According to Pipetel's website - The Explorer's magnetic flux leakage (MFL) capabilities inspect for metal loss while caliper sensors provide data on dent and mechanical damage. It also uses laser deformation sensor to detect and measure out of round defects and dents. The robot was developed by NYSearch, a subsidiary of the NorthEast Gas Association. A company called Pipetel provides inspection services which use the device. They actually perform the inspections and provide reports to the utilities describing their findings. (Source: Pipetel website) Also see: http://www.pipetelone.com/demo.html
PHMSA R&D Projects	Various

Smart Pipeline Network - Pipe & Repair Sensor System	Odyssian Technology believes that the correct approach to eradicating or significantly reducing pipeline leaks is a smart pipeline system that has a collection of diverse (and evolving) technologies all integrated within a distributed, yet common communication and control platform. The technology developed in these PHMSA SBIR programs take advantage of recent technology advances and shifts in affordability of technology to develop and demonstrate what Odyssian believes will be our future national Smart Pipeline Network. Such technology advances include the advent of nano-scale and thin and thick film materials in conjunction with micro machining techniques that allow for the development of very small sensors and multifunctional systems having intrinsically embedded sensing functionality. These small devices and materials are being used to develop highly engineered smart systems that are capable of sensing their environment and often responding to such stimulus. Odyssian Technology has developed smart pipe and smart seal technology, originally targeted for use on airborne high-energy chemical laser systems. This DOT PHMSA SBIR program further developed and adapted this technology for use on pipelines to allow for the pinpoint location of leaks and in some cases emerging leaks (detecting an imminent leak before leakage occurs). The shift in affordability and proliferation of wireless and wired communication networks makes more feasible a Smart Pipeline Network that provides real-time operational status of pipeline transmission, distribution, and remote facility systems. Communication and signal conditioning circuitry was developed that is integrated within the system to provide a sensor network capable of pinpointing the location of progressing leaks through fittings, joints, valves, pipe, pipe repairs, etc. For more information see the Final Report found via the link to the right. (Source: Odyssian Technology)

Uses	Link to Manufacturer or Research	Cost
In Europe it has been used to rehabilitate 250 miles of natural gas distribution mains ranging from 4" to 24". It is good for gas pressures up to 90 psi. Can be used in cast iron, steel, asbestos and PVC lines. http://www.starlinett.com/products/star_2000_2.html (Source: Starline Website and NYsearch website)	http://www.starlinett.com/products/star2000.html	Contact the Vendor
Used to line natural gas service lines ranging from 1" to 2-1/2". It is good for gas pressures up to 60 psi. Can be used in cast iron, steel and PVC lines. http://www.starlinett.com/products/star_200_2.html (Source: Starline Website and NYsearch website)	http://www.starlinett.com/products/star200.html	Contact the Vendor

Applicable for use in host pipes consisting of metal, iron, steel, plastic, concrete and fiberglass in pipe diameters ranging from 1/2" to 10", with larger custom sizes available. (Source: Nu Flow Corp)	http://www.nuflowtech.com/Products/EPOXYLINING.aspx	Contact the Vendor
Installing anodes on steel gas piping	http://www.ulcrobotics.com/portfolio/no-dig-anode-installation/	Contact the Vendor

Proactively report third party activity near pipelines. Also used as a security system to protect utility piping and infrastructure from instrusion.	http://senstar.com/products/fiberpatrol-pr-formerly-fiberlr-for-pipelines/	Contact the Vendor
Inspect and assess pipe walls and coating on buried pipes.	http://primis.phmsa.dot.gov/matrix/PrjQuery.rdm?text1=guided+wave&btn=Modern+Search	Open each research project and refer to the commercial partners listed.

Provides video and sensor data for critical analysis of gas mains buried within cased pipe in high consequence areas. Determine the integrity of pipeline coating including delamination, holes and other defects. Determine the Integrity, composition and spacing of pipeline insulators. Measure the pipeline wall thickness. Measure atmospheric conditions (temperature, humidity) in the annular space. Determine the quantity and location of debris and water in the annular space. Determine the location of electrical shorts. (Source: ULC Robotics Website)	These tiny robots are manufactured by ULC Robotics and Honeybee Robotics. Their websites are; http://www.ulcrobotics.com/portfolio/micro-magnetic-cased-pipeline-inspection-robot/ and http://www.honeybeerobotics.com/portfolio/pipe-inspection-robot/	Contact the Vendors

Assessment and Evaluation of Pressurized PE, Steel and Cast Iron Gas Pipelines, Inspection of Pipelines to Locate Water Infiltration, Location of Pipeline Damage and Features; Joints, Taps, Branches, Service Lines, Stub Services, Valve Inspection for Proper Orientation, Setting and Type, Pre- and Post-Pipeline Rehabilitation Surveys, Locate Water Blockages in Live Gas Mains. Can inspect pipes ranging from 2" to 48" (Source: ULC Robotics Website)	http://www.ulcrobotics.com/energy-services/cctv-camera-inspections-of-live-gas-mains/	Contact Vendor
Photographic analysis of exterior pipeline anomolies	http://www.ttoolboxes.com/products/3dtoolbox/whats_new.cfm	Contact the Vendor

This is a robot that can inspect previously unpiggable pipes due to its flexible design. It can adapt to a range of pipe sizes. For example the same robot can inspect pipes ranging from 20 to 26 inches in diameter. In all there are robots which can inspect pipes from 6" to 36" in diameter. (Source: Pipetel website)	http://www.pipetelone.com/index.html	Contact the Vendor
Various	http://primis.phmsa.dot.gov/matrix/	Contact the Commercial Partners listed with each R&D Project.

Detect leaks in gas transmission lines. In this program, smart pipes and smart composite repair having integrated leak detection micro-sensors will be further developed and adapted for pipeline use. Concepts and designs will be developed for a networked sensing system capable of sensing the pinpoint location of a leak or impending leak, as well as monitoring structural health. In Phase I, the scope will include the development of a Pipe and Repair Sensor System for use with petroleum-based liquids, with Phase II expanding the scope to include development of a system for use with natural gas. For more information see the Final Report found via the link to the right. (Source: Odyssian Technology)	Depends on the sensors used. Still in R&D Phase	http://primis.phmsa.dot.gov/matrix/PrjHome.rdm?prj=444&c=1&s=D92E98698A8F48E794162A2DE1106BD2

Advantages	Disadvantages
Maintains gas-tightness even if the pipe breaks, misalignment of 7°, uniform bonding, i. e. no gas migration, new service tees can be installed using the utility's standard procedure, no significant reduction in pipe capacity. Cold-hardening system: The lines are cured overnight so that the pipeline can be put into operation again within 1½ working days. Warm-hardening system: Only a few hours are required for warm-hardening so that the customer can be resupplied with gas within 12 - 16 hours. Can be used to rehabilitate lines with partially deteriorated gas pipes, e. g. holes or gaps up to 4". (Source: Starline Website and NYsearch website)	Gas line is out of service for 12-16 hours
The pipe doesn't have to be replaced. Depending on the size of the rehabilitation crew, three to four services can be lined per day if the warm-curing method is used. Thus, customers are promptly reconnected to their gas supply. The starline®200 technology is a cost-effective, fast, and safe rehabilitation process for gas services. starline®200 lines the pipeline uniformly and wrinkle-free, even in 90° bends, with the rehabilitated line having at least the same life as a new HD PE service. A special-purpose self-contained installation truck has been developed in the United States to facilitate the cost-effective performance of the technology. Can be used to rehabilitate lines with heavy corrosion possible, e. g. holes or gaps up to 1". (Source: Starline Website and NYsearch website)	Unknown

The pipe doesn't have to be replaced. Existing interior corrosion is removed and new corrosion is prevented by the epoxy barrier. Can be used in pipes from 1/2" to 10" in diameter. The manufacturer says the epoxy withstands whatever pressure the host pipe can withstand(Source: Nu Flow Corp)	Takes time to cure. Unknown how long that is.
The commercialized process has been performed several thousand times and has successfully reduced the cost of protecting steel mains and services by eliminating the need for permit acquisition and heavy construction equipment. In addition, the improved process reduces the time it takes to install anodes. (Source: ULC Robotics)	

FiberPatrol-PR is ideal for protecting pipelines and other in-ground infrastructure from Third-Party Interference (TPI). A single sensor can provide protection for up to 50 km (30 mi.) of sensor cable buried along the pipeline. FiberLR detects manual or machine digging, whether from intruders intent on damaging or tapping the pipeline or those accidentally digging near the pipeline's location. By providing an early warning and the precise location of an incident, the sensors helps responders prevent costly damage.FiberPatrol-PR accurately locates intrusions even when there are multiple simultaneous intrusions or in the presence of non-localized environmental noise that would overwhelm the location capability of other long-range fiber-optic sensors. FiberPatrol-PR's resilient design allows detection to continue right up to the point of a cut in the sensor cable. When installed in a redundant configuration, FiberPatrol□PR protects the full perimeter even after a cable cut. (Source: Senstar)	
Inspect piping and coating in place without excavating. Inspect non-piggable pipes.	

The tiny robots can inspect pipes, casings and areas that were formerly inaccessible. They are magnetic and can therefore inspect the entire circumference of the pipe.	

Live Gas Main Inspection Service Overview - Our live gas pipeline inspection services provides utility companies and pipeline operators with the comprehensive visual data need to assess pipelines for damage, signs of corrosion and take note of pipeline features that may not be recorded on utility maps. Information collected from our live gas main inspection services helps gas utilities prioritize maintenance activities by identifying the sections of main that may require more immediate attention. Reduced Excavation, Permit and Street Restoration Costs: Our camera inspection equipment enters your live gas mains through compact pits or low-cost keyholes and can inspect hundreds of feet of pipeline from just one access point. No Need to Shut Down Service: We remove the need to shut off service to customers, saving you the hassle and the cost of turn-ons and relights. Our service is also trenchless, which translates into less engineering and permit costs. Advanced Inspection Equipment: Our crews utilize our patented PRX250 live gas main inspection camera system and our live gas main crawler systems to deliver a thorough visual inspection of your live mains. Minimal excavation, the line can be inspected live gas mains up to 100 psi. Long tether - can inspect up to 500 feet of pipe through one opening. Can be used for Cast Iron, Steel, or PE piping. (Source: ULC Robotics Website)	
Portable, easy to use, easy to set up, fast, provides permanent repeatable measurements and records.(Source - 3-D Toolbox)	

Can inspect pipes which were previously un-piggable due to diameter changes, tight turns and geometry. Self propelled. Battery can be charged while the robot is inside the pipe. No need to remove it. One robot can inspect a range of pipes. Can detect metal loss, dents, mechanical damage, out of round. Also takes videos from the front and rear. Operates while the pipeline is in service. Wireless communication therefore no tethers necessary. According to Piptel's website - Pipetel's inspection service is the ideal inspection tool for natural gas pipelines with: limited or no flow, short radius or mitered bends, valves, back-to-back bends, vertical segments, and pipelines without pre-built launch capabilities. Pipetel also inspects cased pipelines, and pipelines located at difficult to access locations such as underneath urban infrastructure. (Source: Pipetel website)	Cannot be used in pipes below 6" in diameter

Must contact the vendor	Using a system of sensors along the pipe to create a "smart pipe", the hope is that leaks will be detected sooner. It is very difficult to detect a leak from the control room.

Presentations and Useful Files		Utility Company	State
http://www.starlinett.com/products/star_2000_2.html	http://www.nysearch.org/news-info_080514-2.php	Con Ed, Public Service Electric and Gas and an unamed European Utility	New Jersey, New York, Europe
http://www.starlinett.com/products/star_200_2.html	http://www.nysearch.org/news-info_080514-2.php	Con Ed, Public Service Electric and Gas and an unamed European Utility	New Jersey, New York, Europe

http://www.nuflowtech.com/Products/EPOXYLINING/ForcedAirLining/Applications/Gas.aspx	http:/americanleakdetec4.reachlocal.net/epoxy-pipe-lining.php	N/A	N/A
		N/A	Somewhere in the Northeast U.S.

http://primis.phmsa.dot.gov/rd/mtg_071812.htm	http://primis.phmsa.dot.gov/matrix/PrjHome.rdm?prj=364	N/A Contact the Vendor	N/A Contact the Vendor
		N/A Contact the vendors.	N/A Contact the vendors.

http://www.ulcrobotics.com/products/cased-pipeline-inspection-crawler/	http://www.nysearch.org/news-info_111914.php	PG&E and National Grid	California and New England

http://www.nysearch.org/commercial_products.php		N/A Contact Vendor	N/A Contact Vendor
http://www.pgecurrents.com/2014/05/20/video-pge-using-new-tool-to-check-outside-of-pipeline-for-dents-corrosion/?utm_source=newsletter&utm_medium=email&utm_content=052214&utm_campaign=pgecurrents		PG&E	California

http://www.nysearch.org/news-info.php		PG&E, Con Edison, Questar Gas,	New York, California, Utah, idaho, Wyoming
		Various	

https://www.youtube.com/watch?v=YfFvhOHsCm0	https://www.youtube.com/watch?v=yCtZs8_zb5A	N/A	N/A

Appendix A - Natural Gas Leakage Abatement Best Pr

Revised 4/27/15 - Revised the information on Gas Leak Detection tab, Row 31, Odyssian Technologies and added R

Record Management Technology

Name	**Technology**	**Uses**	**Cost**	**Link to Manufacturer**
Leak Survey Handheld Device	Programmable pocket PC of which there are many brands. Internal software can be custom written for the specific utility. (Source: Internet Search)	Used by gas leak surveyors to find gas services, record gas leak survey data and material condition, to conduct accurate, thorough and timely gas surveys, record appointments, plan gas leak survey path, track statistics, and be aware of on-the-job dangers.	Approx $100-$400 (Source: Internet Search)	Many types and manufacturers
Intermec CN3 - Discontinued - Replaced by Intermec (Honeywell) CN 70 or CN70e	Programmable pocket PC of which there are many brands. Internal software can be custom written for the specific utility. (Source: Internet Search)	Used by gas leak surveyors to find gas services, customer info, service info, record gas leak survey data and material condition, to conduct accurate, thorough and timely gas surveys, record appointments, plan gas leak survey path, track statistics, critical maintenance, hazardous conditions and on-the-job dangers. If a leak is found, the grade of the leak is entered and also the location of the crayon mark where the leak is. Takes 5-10 minutes to upload or download data. Leaks and identified conditions are tracked to completion. (Source WE Energy presentation to AGA in 2011).	Approx. $1500-$3500 depending on model chosen (Source: Internet Search)	http://www.intermec.com/products/cmptrcn70a/index.aspx

Gas Survey and Maintenance Website	Web-based	Create, modify, view, and print survey route information for service surveys and valve inspections. View and print Street Opening / Main Leak Survey maps. All details of leak inspection shown. Maintenance repair order is linked to work management system to monitor repair order status. Select services and file is sent to billing system which prints and mails letters. Provides a summary of compliance dates. List is sorted by the closest compliance date for each office.For maintenance items that do not have a work order created. Use the drop-down menus to search for maintenance to process. Quick data extracts for specific needs. (Source WE Energy presentation to AGA in 2011).		
Maximo	IBM Maximo Asset Management is an enterprise asset management (EAM) software solution product produced by IBM. It is a solution which is used to operate, maintain and dispose of enterprise assets. (Source: Wikipedia)	Maximo has a work management module that can be used to generate and track work orders. It is also useful as a repository for equipment work history. Regarding gas leaks it is used to generate work orders for field personnel to evaluate and/or fix gas leaks and track the repairs. The software can also automatically generate new work orders where work is on scheduled intervals.	$1000 - $5000 per year depending on options chosen. See the link to the website in the column to the right.	http://www-03.ibm.com/software/products/en/maximoassetmanagement/

SAP	SAP stands for Systems, Applications and Products. SAP applications, built around their latest R/3 system, provide the capability to manage financial, asset, and cost accounting, production operations and materials, personnel, plants, and archived documents. (Source: Whatis.com)	SAP Enterprise Asset Management allows you to analyze equipment performance, schedule work, generate work orders, order parts and track costs. Regarding gas leaks it is used to schedule, dispatch and generate work orders for field personnel to evaluate and/or fix gas leaks and track the repairs. The software can also automatically generate new work orders where work is on scheduled intervals.	SAP would not discuss pricing in general. Prices are only available from the Sales Team.	http://www.sap.com/pc/bp/eam/software/maintenance-operations/index.html

actices

ow 17 to Gas Leak Prevention tab

Advantages	Disadvantages	Company	State
Creates an accurate record of a leak survey. Eliminates illegible hand written records. Can be uploaded to database and used to create work orders. Helps to prevent mistakes and missed surveys	Records can accidently be erased or the pocket PC may crash, wiping out records.	Consumers Energy	Michigan
Speeds the leak survey process by automating some of the human preparation and recordkeeping, improves the safety of the leak surveyors by warning them of dangers and reduces errors by downloading or uploading data rather than using human transcription. Also see the link on the left	Possible to lose large amounts of data if the hand-held pc is damaged.	WE Energy	Wisconsin

Eliminates the use of paper forms. Automated routing and sequencing of surveys. Provides relevant attribute and survey information to field technician. Eliminates manual data entry for inspections. Provides real-time inspection status to area managers and supervisors. Tracks leaks and maintenance to completion. Shares leak survey attempts and contacts with Customer Call Centers Automated processing with links to attribute systems. If service is retired, outstanding surveys and maintenance are completed. Automatically completes ABI and inside GSS if scheduled in same year to minimize customer disturbances. (Source WE Energy presentation to AGA in 2011).	Hacking and server crashing. Must have a backup server and files.	WE Energy	Wisconsin
The data in Maximo can be used to perform analysis of crew work performance, create a work history for gas system components and track asset performance. Maximo can be programmed to automatically generate work orders on scheduled intervals. It can also be used to track assets and inventory	Hacking and server crashing. Must have a backup server and files.	Duke Energy	North Carolina, South Carolina, Ohio, Indiana, Kentucky

The data in SAP Enterprise Managment can be used to perform analysis of equipment performance, crew work performance, create a work history for gas system components and track asset performance. It can be programmed to automatically generate work orders on scheduled intervals. It can also be used to track assets and inventory and order parts and services from outside vendors. It can do much more than can be described here. You would have to go to the SAP website to learn more.	Hacking and server crashing. Must have a backup server and files.	Sempra	California

California Public Utilities Commission
Safety and Enforcement Division
Staff Report

Survey of Natural Gas Leakage Abatement Best Practices

In partial fulfillment of

Senate Bill 1371 (Leno, 2014) &
Order Instituting Rulemaking (OIR) 15-01-008

Charles Magee, P.E.

March 17, 2015

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Introduction

Methane is a greenhouse gas (GHG) at least 20 times more potent than carbon dioxide. Researchers have identified the oil and natural gas industry as a significant source of methane emissions. In California, Senate Bill Senate Bill (SB) 1371 (Leno, 2014) was signed by Governor Brown on September 21, 2014. This bill seeks to reduce methane emissions from leaks in the gas transmission, distribution and storage utilities in California. While the benefits to the environment are apparent, some may question if the economic cost of the legislative mandate will be too high. In actuality, reducing methane emissions may be a win-win resulting in an improved environment as well as a reduction in costs to the consumer.

The California Public Utilities Commission (CPUC) Safety and Enforcement Division (SED) staff prepared this report to comply with the requirements of SB 1371. The bill adds Article 3 (commencing with Section 975) to Chapter 4.5 of Part 1 of Division 1 of the Public Utilities Code which states, in part:

> Not later than January 15, 2015, the commission, in consultation with the Air Resources Board, shall commence a proceeding to adopt rules and procedures for those commission-regulated facilities that are intrastate transmission and distribution lines...[1]
> Establish and require the use of best practices for leak surveys, patrols, leak survey technology, leak prevention, and leak reduction. The commission shall consider in the development of best practices the quality of materials and equipment.[2]

In January 2015, the CPUC launched Rulemaking (R.) 15-01-008 in response to SB 1371 to investigate new technologies in gas leak detection in the transmission,

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[1] Section 975 (d) at 222. Unless otherwise stated, all statutory references are to the Public Utilities Code.

[2] Section 975 (e)(4) at 223.

distribution and storage process, specifically optimizing for methane reductions.[3] This staff report is written in response to the above statutory requirement and to facilitate record development in R.15-01-008. The purpose of this paper is to identify technologies and practices presently in use around the globe, technologies and practices which are new and/or currently not in use in California, and those which are in various stages of research and development (R&D). We note that this report has identified many different types of leak management technologies and proposes some "best practices"; however, we do not claim to identify ALL technologies or best practices. Leak detection and abatement is an evolving field and there are many technologies currently under development. Consequently, identifying leak management technologies and "best practices" is an ongoing process not ending with the publication of this report and not confined to the work of the Commission. We prepare this report recognizing that all stakeholders, including the utilities and facility operators, have a responsibility to engage in the identification of best practices and an investment in the R&D of new technologies.

In preparing this report, it is not Staff's intent to suggest that any particular gas leak management technology or practices should necessarily be a requirement subject to further review and evaluation via this instant proceeding. We recognize that there are many variables between the gas transmission, distribution and storage companies including size, location, population density, materials, soil conditions, etc. Thus, the best leak management practice for one company may not be the best for another. We offer this report for consideration by the Commission and parties to R.15-01-008 to inform them of the many gas leak management technologies and practices which may

[3] *See* R.15-01-008 "Order Instituting Rulemaking to Adopt Rules and Procedures Governing Commission-Regulated Natural Gas Pipelines and Facilities to Reduce Natural Gas Leakage Consistent with Senate Bill 1371" issued January 22, 2015.

be used to comply with the impending Commission rules and procedures required by SB 1371.

Background

Methane is a potent greenhouse gas that contributes to global warming. As stated in the report "Economic Analysis of Methane Emission Reduction Opportunities in the U.S. Onshore Oil and Natural Gas Industries," by ICF International (ICF Report):

> Methane emissions have an enhanced effect on climate change because methane has a climate forcing effect 25 times greater on a 100 year basis than that of carbon dioxide, the primary greenhouse gas (GHG). Methane's impact is almost three times greater on a 20 year basis and there is research that may cause both factors to be increased. Recent research also suggests that mitigation of short-term climate forcers such as methane is a critical component of a comprehensive response to climate change.[4]

In an effort to reduce methane emissions from gas utilities in California, Senator Mark Leno introduced and Governor Brown signed into law, SB 1371 Natural Gas: Leakage Abatement. As stated in SB 1371:

> The California Global Warming Solutions Act of 2006 requires the State Air Resources Board to adopt regulations to require the reporting and verification of emissions of greenhouse gases and to monitor and enforce compliance with the reporting and verification program, and requires the state board to adopt a statewide greenhouse gas emissions limit equivalent to the statewide greenhouse gas emissions level in 1990, to be achieved by 2020.
>
> This bill would require the commission, giving priority to safety, reliability, and affordability of service, to adopt rules and procedures governing the operation,

[4] "Economic Analysis of Methane Emission Reduction Opportunities in the U.S. Onshore Oil and Natural Gas Industries, page 2-1, prepared for the Environmental Defense Fund" by ICF International, March 2014.

> maintenance, repair, and replacement of those commission-regulated gas pipeline facilities that are intrastate transmission and distribution lines to minimize leaks as a hazard to be mitigated pursuant to the Natural Gas Pipeline Safety Act of 2011, consistent with specified federal regulations, and a specified order of the commission, and to reduce emissions of natural gas from those facilities to the maximum extent feasible in order to advance the state's goals in reducing emissions of greenhouse gases pursuant to the California Global Warming Solutions Act of 2006.[5]

Among other requirements, SB 1371 requires the commission to "establish and require the use of best practices for leak surveys, patrols, leak survey technology, leak prevention, and leak reduction." This report attempts to identify as many of these current best practices as possible.

The Air Resources Board (ARB) is currently developing a regulation to set greenhouse gas emissions limits for the oil and gas industry in California. The goal of the regulation is to obtain the maximum methane emissions reductions possible from new and existing oil and gas operations in a technically feasible and cost effective manner. By adopting a statewide regulation, ARB seeks to limit the administrative burden to local air districts. ARB staff expects to present the proposed regulation to the Board in September 2015.

The draft regulation, *Greenhouse Gas Emission Controls from Crude Oil and Natural Gas Operations*, applies to onshore and offshore crude oil and natural gas production, processing and storage; natural gas underground storage; and natural gas transmission compressor stations. The draft regulation sets emissions limits and control technology requirements for separator and tank systems, circulation tanks for well stimulation treatment, natural gas compressors, pneumatic pumps, and liquids unloading of

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[5] AB 32, Nunez. Air pollution: greenhouse gases: California Global Warming Solutions Act of 2006.

natural gas well operations. Reporting and record keeping requirements are also specified. Local air districts will implement the regulation by incorporating the requirements into their rules.

With the adoption of the rule, fugitives from storage and transmission compressor stations will be covered, thereby limiting mitigation options. However, annual reporting of activity data is still required to ensure the compliance and effectiveness of the rule.

Defining Leaks in the Context of Senate Bill 1371

SB 1371 changes a paradigm that has existed since the beginning of the gas industry: previously, only leaks considered hazardous to persons or property needed to be repaired immediately. Before the passage of SB 1371, intentional, non-hazardous emissions, during the course of normal operations and maintenance were considered harmless. With SB 1371 now in effect, there is a need to create a new category of hazard in addition to "gas leaks hazardous to persons and property". That new category is "gas leaks hazardous to the environment".

In effect, all gas leaks are now considered hazardous.

Although not defined in statute, in considering the new paradigm established by SB 1371, we define a leak as any release of methane from the gas system into the atmosphere, whether intentional or unintentional, whether hazardous or non-hazardous.

We note that this definition of leak is NOT in agreement with the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) definition of leak, which states:

> A "leak" is defined as an unintentional escape of gas from the pipeline. A non-hazardous release that can be eliminated by lubrication, adjustment, or tightening, is not a leak.[6]

The reason for the difference is that PHMSA regulations are concerned with physical safety, while SB 1371 is concerned with reducing methane emissions. SB 1371 uses the words "leaks and leaking components". Some examples of leaking components are defective gaskets, seals, valve packing, relief valves, pumps, compressors, etc. We also include gas blow-downs during the course of operations, maintenance and testing (including hydro-testing). Therefore, methane emitted during the course of purging, normal operations, maintenance and testing, whether intentional or unintentional, are also considered leaks.

With this definition in place, we now turn to best practices, methods and technologies to reduce methane emissions. Specific topics and major references include the economic analysis of methane leak reduction, leak grading and repair timelines, leak surveys, leak detection, and leak prevention. In this paper we also introduce "administrative" best practices including information management and training. Major references include recent industry technical reports from ICF International, the U.S. Environmental Protection Agency (EPA), and current utility rules, procedures and "best practices."

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[6] PHMSA Gas Distribution Integrity Management Program Definition

Economic Analysis of Methane Leak Reduction

Under the current ratemaking practice employed in California, gas distribution utilities do not pay for lost gas due to intentional and unintentional leaks; the gas customers do. Lost and unaccounted-for gas is considered a "cost of doing business" and therefore is passed through to customers via rates. Gas distribution utilities have no financial incentive to eliminate traditionally non-hazardous leaks. While we assume that new investments in capital or costs associated with change in operations to reduce methane from gas leaks should be paid for by customers, we do not take any position on what the appropriate cost sharing or level of reasonableness is appropriate between customers and shareholders. Nor do we take a position on the appropriate CPUC procedural venue to resolve. We do compare customer-oriented costs with the current regime, which is mainly a pass-through model to gas customers for gas used or vented by the utility during normal operations and maintenance, and gas that is lost and unaccounted for. With that in mind, the investment in equipment and infrastructure to reduce methane leaks can be very cost effective for the customers. This economic benefit is noted in the following excerpt from the ICF Report:

> Methane is an important climate change forcing greenhouse gas (GHG) with a short-term impact many times greater than carbon dioxide. Methane comprised 9% of U.S. greenhouse gas (GHG) emissions in 2011 according to the U.S. EPA Inventory of U.S. Greenhouse Gas Emission and Sinks: 1990-2011[7], and would comprise a substantially higher portion based on a shorter timescale measurement. Recent research also suggests that mitigation of short-term climate forcers such as methane is a critical component of a comprehensive response to climate change.[8] Emissions from the oil and gas industry are among the largest anthropogenic sources of U.S. methane emissions. At the same time, there are many ways to reduce emissions of fugitive and vented methane from

[7] Calculated at a 100 year GWP of 21 – see Section 2.3. of the ICF Report

[8] Shoemaker, J. et. al., "What Role for Short-Lived Climate Pollutants in Mitigation Policy?", Science Vol. 342 13 December 2013.

> the oil and gas industry and, because of the value of the gas that is conserved, some of these measures actually save money or have limited net cost.[9]

In Appendix A of this report is an Excel spreadsheet. The first tab of the spreadsheet is titled "Econ. Anal. of CH4 Reduction". The spreadsheet refers to the ICF Report and contains the cost/benefit of reducing methane leaks from specific components of the entire gas system. For purposes of this report, we focus on the parts of the gas system which are operated by the gas utilities under the jurisdiction of the CPUC, namely gas transmission, storage, distribution and regulated gathering lines as described in 49 CFR 192.8. We do not focus on leaks from the gas system during production, which is under the jurisdiction of the California Air Resources Board (ARB.)

The ICF Report contains data on the total amount of methane leaking from the entire gas system and expresses methane leaks from specific components and equipment as percentages of the total methane leaking from the system. The following table derived from the ICF Report lists some of the most common leaks for gas transmission, storage and distribution systems by component responsible for leakage and percentage of total methane leaked from the gas system. The majority of methane leaked from the gas system does not emanate from "leaks" as they are usually defined, but from gas system equipment and infrastructure. These types of leaks are usually defined by the gas industry as "fugitive emissions". For the purposes of SB 1371, fugitive emissions are now also considered leaks.

[9] ICF Report, page 1-1

Component Responsible for Leakage	Percentage of Total Methane Leaked from the Gas System[10]
Reciprocating Compressors	13%
High Bleed Pneumatic Devices	7%
Local Distribution Company Meters and Regulators	7%
Centrifugal Compressors with wet seals	6%
Gas Engine Exhaust	5%
Intermittent Bleed Pneumatic Devices	5%
Reciprocating Compressor Rod Packing	4%
Pipeline Leaks	2%
Centrifugal Compressors with dry seals	2%
Mains – Plastic	2%
Mains - Cast Iron	2%
Transmission Station Venting	2%
Chemical Injection Pumps	2%
Residential	1%

In April 2009, the California Air Resources Board (ARB) staff conducted a survey of the natural gas transmission and distribution (NG T&D) industry. The information collected was a snapshot of the 2007 activity data, including pipeline length and material, number of compressors stations, types of compressors, number of pneumatic valves, and number of metering and regulating (M&R) stations. In comparing the

[10] The total percentage does not equal 100% because this a list of the most common (not all) sources of methane leaks in gas transmission, distribution and storage areas of the gas system. This list also does not include the most common sources of methane leaked during the production of gas which, as stated in this report, is under the jurisdiction of ARB.

survey data to national data, ARB staff determined that California has different activity data than other states and therefore has a different breakdown of GHG emissions.

California also has fewer compressor stations compared to oil and gas producing states. However, it has approximately 200,000 miles of distribution pipelines, which is a relatively larger number in comparison. Consequently, pipelines are estimated at approximately 74% of the 2007 GHG emissions. Based on the survey, M&R stations result in about 16% of the emissions and compressor stations and other sources are the remaining 10%. Additional data will improve this estimate.

In addition to information on the sources of methane leaks, the ICF Report also contains the capital cost of purchasing new equipment to reduce methane leaks, the cost of enhanced inspections and other methods to detect and mitigate leaks, and the avoided cost of lost gas from the leaks.

The report also refers to the EPA Natural Gas STAR reference materials for information on how to locate and quantify leaks:

> There are a variety of techniques and types of equipment that can be used to locate and quantify these fugitive emissions. Extensive work has been done by EPA and others to document and describe these techniques, both in the Gas STAR reference materials and in several regulatory analyses.[11]

EPA Natural Gas STAR references, techniques and equipment are discussed below in a section entitled "Leak Prevention."

Using the economic analysis in the ICF Report can help the parties in this proceeding to determine the cost/benefit of reducing each type of leak and prioritize how funds should be spent.

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[11] ICF Report at 3-9.

Leak Grading, and Repair Timelines

It is appropriate to summarize current practices of leak grading and repair timelines since any changes made to optimize methane will need to fit into this existing structure. California gas utilities currently use the following leak grading and repair timelines (with slight deviations between companies):

Grade 1 Gas Leaks:
A Grade 1 gas leak, also referred to as a "hazardous leak," represents an existing or probable hazard to persons or property and requires immediate repair or continuous action until conditions are no longer hazardous.

Grade 2 Gas Leaks:
A Grade 2 leak is non-hazardous to persons or property at the time of detection but still requires a scheduled repair because it presents a probable future hazard. Grade 2 leaks must be repaired within 15 months. These leaks are usually monitored at set intervals to ensure that they do not get worse or become hazardous before they are scheduled for repair. If they become hazardous, they are upgraded to Grade 1 and should be immediately repaired.

Grade 3 Gas Leaks:
A Grade 3 leak is non-hazardous at the time of detection and can reasonably be expected to remain non-hazardous. These leaks are monitored to ensure that they do not get worse or become hazardous. If they get worse or become hazardous, they are upgraded to Grade 2 or Grade 1.

Note: Some smaller California utilities fix all leaks as they are discovered and/or have no open Grade 2 or Grade 3 leaks being monitored.

SB 1371 necessitates changes to the leak grading, and repair timelines because all leaks are now considered hazardous to either people, property or the environment. For example, in the current system a fairly large leak in a remote area may be considered a Grade 3 leak because it is non-hazardous to people or property. Theoretically, it could be allowed to leak indefinitely. With SB 1371 being optimized for methane reduction,

this practice may no longer be appropriate. We offer a suggested update to each grade of leak, below. SB 1371 requires leaks and leak rates to be recorded geographically. We also have highlighted with "XX" variables in which we seek party input. Under this new proposal, we augment the definitions for Grades 1 and 2 leaks and eliminate the Grade 3 category. There may be alternative approaches to this proposal which can be discussed as a topic of conversation at an upcoming workshop.

SB 1371 also suggests that any rules and procedures that may be adopted must not only be guided by SB 1371 "principles" such as "best practices" but also be "technologically feasible" and "cost-effective" and "provide for the repair of leaks as soon as reasonably possible after discovery" – so these factors must be weighed when we consider any options such as the following: [12]

Grade 1 Gas Leaks
A Grade 1 gas leak, also referred to as a "hazardous leak," represents an existing or probable hazard to persons or property, or leaks in excess of XXX thousand cubic feet (Mcf)/week, and requires immediate repair or continuous temporary leak prevention methods until the leak is permanently repaired. Permanent repairs must be completed within XX days. All leaks, including leak rates, shall be recorded and located geographically on GIS or maps. Leak rates shall be monitored XXX thereafter and recorded geographically on a GIS system or maps until the leak is permanently repaired.

Grade 2 Gas Leaks
A Grade 2 leak is non-hazardous to persons or property at the time of detection, or leaks less than or equal to XXX Mcf/week. Permanent repairs must be completed within XX days. All leaks, including leak rates, shall be recorded and located geographically on GIS or maps. Leak rates shall be monitored XXX thereafter and recorded geographically on a GIS system or maps until the leak is permanently repaired.

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[12] Section 975 (e)(1) at 222.

The allowable leak rates and times to permanent repairs, represented by XX's above may be considered by the CPUC through the rulemaking process (workshops, and formal stakeholder comments, etc.).

The best practice would be to repair all leaks immediately as they are detected however, for utilities with large service areas that may not be practical or cost effective for small leaks. There may be a positive cost/benefit to allow a brief time limit before Grade 2 leaks have to be permanently repaired. Again, these cost/benefit "tradeoffs" will be further evaluated during the CPUC's rulemaking process.

Leak Surveys

We recommend as part of the updated leak grading and repair that the scope of leak surveys be enlarged. In order to optimize the reduction of methane, the gas utilities should now perform leak surveys of all gas infrastructure and equipment. That means the entire gas system will now have to be leak surveyed and all fugitive emissions / leaks recorded, graded, tracked and repaired. The ICF Report contains an analysis of the cost and effectiveness of the increased inspections of equipment:

> The key factors in the analysis are how much time it takes an inspector to survey each facility, how many inspections are required each year, how much reduction can be achieved, and how much time is required for repairs. Research cited by both Colorado and EPA indicates that more frequent inspections result in greater reductions, summarized as approximately:
>
> - Annual inspection = 40% reduction
> - Quarterly inspection = 60% reduction
> - Monthly inspection = 80% reduction[13]

[13] ICF Report at pages 3-10.

Where leaks result from intentional venting, leaking seals, packing, etc. new methods and equipment may be needed to reduce or eliminate the leaks. New methods and equipment are discussed in the "Leak Prevention" section, below.

We expect an increase in leak surveys in the near term, to record, re-grade and repair as many leaks as possible to comply with the rules and procedures resulting from SB 1371. Finding and repairing many gas leaks in a short amount of time may require new methods to perform this task efficiently. One promising method is the use of extremely sensitive mobile leak survey technology combined with using multiple leak repair crews simultaneously to fix all of the leaks in an area in a short amount of time. One such mobile technology in use today by Pacific Gas & Electric (PG&E) is from the Picarro Corporation. The technical name for the Picarro technology is "Cavity Ring-Down Spectroscopy" (see Appendix A "Leak Detection" tab for details). It can detect methane concentrations as low as 1 part per billion (ppb), which is 1000 times more sensitive than many traditional gas detection instruments. The technology allows PG&E to detect gas leaks from 600 feet away; the technology in practice has enabled PG&E to find more leaks in a shorter amount of time.

PG&E has conducted three pilot projects using Picarro technology and sensitive hand held gas detection devices to pinpoint all of the gas leaks within an area. PG&E schedules a date when leak repair crews can be brought to a defined geographic area to fix all of the leaks at once. PG&E calls this the "Super Crew" method. Due to the amount of equipment concentrated in a small area, this method usually requires advanced notifications sent to residents and building occupants. While employing a Super Crew creates a short-term inconvenience, it eliminates the need for individual service calls to repair individual leaks. PG&E estimates that surveying and bundling leak repair work in this way results in a cost savings of approximately 50% compared to

using the traditional leak survey and leak repair methods. In addition, using Picarro technology has allowed the company to complete many more leak surveys than before. Using this technology, PG&E has been able to survey 500 services/ hour vs. 10-11 services/ hour and locate 32 leaks per hour vs. 0.4 leaks/ hour using prior methods.[14] In addition to the benefit of a more rapid reduction in methane escaping to the environment, the leak survey labor cost savings and the methane cost savings can be used to offset new costs, lessening the need for new recovery from customers.

Leak Detection

Gas leak detection is an area where rapid technological advances are being made. We include in this report a list of technologies currently in use, or in R&D, in the U.S. and several different foreign countries. These technologies are listed on the third tab of Appendix A titled "Gas Leak Detection". This is a rapidly evolving field, and any new rules or practices which the CPUC may adopt should be nimble enough to account for technological advancements and refined best practices.

There is no one single "best practice" standard for leak detection – the context of the operator, business situation, geographic location, cost,[15] are all variables. We do list a variety of best available options with the hope that the operator can explore options to

[14] PG&E presentation to the American Gas Association (AGA), October 5, 2014.

[15] Many of the cost fields on the attached Excel spreadsheet are blank. There are two main reasons for this. The first is that some of the technologies mentioned are still in the R&D phase and are not commercially available yet. The second reason is that many vendors prefer to be contacted by prospective customers to discuss the customer's specific needs before quoting a price. Where the author was able to determine an approximate cost for a device or technology, it was entered on the spreadsheet. The reader should keep in mind however, that the exact cost can change and can only be accurately determined by discussing customer needs with a vendor.

best fit their business situations and to meet the impending rules that the CPUC will be adopting to comply with SB 1371.

SED found leak detection devices, both already in use and in the R&D phase, which we highlight for further consideration by California gas companies. One such "device" isn't a device at all; it is a dog. Traditionally, dogs have been trained to find and detect explosive materials, drugs and even people. With proper training, as has been done for at least the past 30 years, dogs can be used to find gas leaks. Canines' sense of smell is sensitive enough to detect gas in the parts per billion (ppb) range, which is on par with the most sensitive gas detection devices in use, or in R&D, today. According to the vendors and research,[16] employing dogs to detect gas leaks can be very cost effective, have a very high accuracy rate and work relatively fast, capable of covering up to five miles per day. Dogs are currently being used to find gas leaks in Texas, Canada and in parts of Europe. At least three companies located in Florida, Canada and Sweden supply these services. We single out detector dogs in this report because we feel that they are a resource which may have been overlooked in California in favor of "high-tech" solutions. However, due to their extremely sensitive sense of smell and relatively rapid speed, we feel that they too deserve consideration by the gas companies.

[16] "Using canines to inspect for leaks in buried pipelines" by Phil Hopkins, Presented at the 1st Australasian International Welding, Inspection and NDT Conference, iWIN2013. WTIA, Perth, Australia. 10-14th March 2013. Contact Info: E-Mail: p.hopkins@penspen.com, Penspen Limited Unit 7-8, Terrace Level, St Peter's Wharf, St Peter's Basin, Newcastle upon Tyne NE6 1TZ. UK.)

Leak Prevention

The first step toward the goal of eliminating methane leaks is to determine how most of the methane is currently escaping from the gas system. This understanding should help gas operators re-prioritize new preventative maintenance and inform the scope of modifications needed for their gas system.

To see where the largest methane leaks in the gas system are, we again refer to the ICF Report:

> Table 3-2 summarizes the largest emitting source categories in the projected 2018 emissions for the oil and gas sectors by major source category. Due to the lack of specific data on the emission sources for offshore oil and gas production, the study focused on onshore production and offshore emissions are excluded from this list. The top 22 source categories account for 80% of the total 2018 onshore methane emissions of 404 Bcf and the remaining 100+ categories account for 1% or less of the total emissions each. Although these source categories were not included in this analysis due to their small size, there are demonstrated methane reduction technologies that can provide cost-effective reductions for many of them.[17]

[17] ICF Report at page, 3-6.

Table 3-2 - Highest Emitting Onshore Methane Source Categories in 2018

Source	2018 Emissions (BCF)	Percent of Total	Cumulative Bcf	Cumulative %
Reciprocating Compressor Fugitives	53.8	13%	53.8	13%
High Bleed Pneumatic Devices	28.7	7%	82.5	20%
LDC Meters and Regulators	28.7	7%	111.2	28%
Centrifugal Compressors (wet seals)	24.0	6%	135.3	33%
Gas Engine Exhaust	22.2	5%	157.5	39%
Well Fugitives	20.8	5%	178.3	44%
Reciprocating Compressor Rod Packing	17.6	4%	195.9	48%
Liquids Unloading -Wells w/ Plunger Lifts	13.2	3%	209.1	52%
Intermittent Bleed Pneumatic Devices	13.0	3%	222.1	55%
Kimray Pumps	11.5	3%	233.6	58%
Oil Tanks	11.5	3%	245.1	61%
Flares	9.0	2%	254.1	63%
Stranded Gas Venting from Oil Wells	8.4	2%	262.5	65%
Intermittent Bleed Pneumatic Devices -Dump Valves	7.7	2%	270.2	67%
Oil Well Completions -with Fracturing	6.9	2%	277.1	69%
Pipeline Leaks (All)	6.7	2%	283.8	70%
Pipeline Venting (Transmission)	6.6	2%	290.4	72%
Centrifugal Compressors (dry seals)	6.4	2%	296.8	73%
Mains – Plastic	6.3	2%	303.2	75%
Mains -Cast Iron	6.3	2%	309.4	77%
Transmission Station Venting	6.2	2%	315.7	78%
Chemical Injection Pumps	5.9	1%	321.6	80%
Residential	5.6	1%	327.2	81%
Gathering and Boosting Stations	5.6	1%	332.8	82%

According to the above table, equipment leaks are by far the greatest source of methane emissions from the gas system, with compressor related leaks accounting for 25% of all methane leaked into the atmosphere. More than 22% of total methane leaks are related to oil and gas production, which is beyond the scope of SB 1371.

The ICF Report and the EPA Report complement one another. The economic analysis report by ICF approaches the methane leaks from the gas system on a macro scale, analyzing the environmental impact of the leaks, identifying the sources and analyzing the cost of eliminating the leaks. It also identifies the equipment that leak the largest amount of methane and describes in detail the corrective actions to eliminate or

reduce the leaks. For example, as mentioned earlier, compressor related leaks are the largest source of leaks. The economic analysis report by ICF describes the problematic issues with compressors and the corrective actions needed to reduce the leaks. Using information found in the EPA Report such as labor rates and equipment cost, ICF calculates the time required to recover the investment to replace or repair equipment to reduce or eliminate the largest gas leaks. The report's analysis also recalculates this payback time using various prices of natural gas. The economic analysis report by ICF addresses the corrective actions needed to mitigate, cost-effectively, approximately 80% of the methane leaks from the gas system.

The EPA Natural Gas STAR Program

The second tab of Appendix A contains a link to the EPA Natural Gas STAR program (EPA Report). The EPA Report identifies additional specific corrective actions to reduce methane leaks from almost 100% of the sources of gas leaks. The EPA Report examines practices such as replacing methane-driven pumps with electric motor-driven pumps, replacing pneumatic controls with mechanical controls, changing compressor seals from wet seals to dry seals, better inspection and maintenance practices for various types of equipment, ways to reduce equipment start-ups to reduce methane emissions, flexible liners for gas mains, ways to reduce gas venting and much more. The EPA Report describes a method used by Open Grid Europe which uses a mobile compressor truck to pump down and transfer methane from gas lines instead of venting them to the atmosphere. The EPA Report also includes the investment capital required for repairs or new equipment, along with an analysis of the time needed to recover the investment at various prices of natural gas.

The EPA also hosts regional workshops to help gas companies learn how to reduce methane emissions. As the EPA Report states:

> The Natural Gas STAR Program hosts regional Technology Transfer Workshops for each sector of the natural gas industry. These workshops provide a forum for oil and natural gas companies to receive and share detailed information about current cost-effective technologies and practices to reduce methane emissions in their specific sector. Technical presentations provide current information about the emission reducing technologies and practices covered at the Technology Transfer Workshops.[18]

Almost all of the corrective actions described in both the ICF and the EPA reports require only one to three years, sometimes less, to save enough gas to recover the investment in new equipment or modifications necessary to eliminate or mitigate gas leaks.[19] The savings from the corrective actions only account for the dollar value of the natural gas lost and do not monetize the benefit to the environment.

Gas Leak Prevention

The fourth tab of Appendix A lists the technologies and practices mainly used to prevent transmission and distribution piping leaks as opposed to leaks due to equipment, operation and maintenance. The information in this tab includes new pipe lining techniques, advanced pipe inspection devices and an acoustic warning system to alert pipeline owners when there is third-party activity near their pipeline.

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[18] EPA Report at: http://www.epa.gov/gasstar/workshops/index.html

[19] This is for $3/Mcf natural gas which, in recent history, is inexpensive gas. If gas prices rise higher, the payback time is even less.

Information Management

The fifth tab of Appendix A is titled, "Information Management". It contains information on some of the latest hand-held devices used by leak surveyors to record leak information by GPS coordinates and to aid them on their surveying route. The devices can be programmed to contain information such as on-the-job dangers at particular residences (e.g. dogs), the location of gas services, statistics, templates for recording the material condition of the gas services, reporting and grading leaks and more. The information can then be uploaded to the utility's main leak tracking program and used to generate work orders to repair leaks. Using devices such as this reduce transcription errors and incomplete or illegible records.

This tab also contains information on two of the main information management systems in use today, Maximo by IBM and SAP Enterprise Asset Management. These systems are used to track leak information, schedule work and generate work orders. In order to effectively manage the new definitions of gas leaks proposed above, robust information management systems are critical. to enable information to flow accurately and efficiently between the field and work planners, engineering, management and other affected departments.

Training

Training is extremely important for operator safety and the proper use of any of the technologies and devices described in this report. Accurate gas leak detection and measurement can only be obtained if the operator understands the limitations of the technology and devices that he/she is using. There are variables which can affect the accuracy of measurements such as wind speed, distance from the leak, obstructions,

fog, rain, reflective backgrounds, etc. In addition, some of the instruments require more frequent calibration than others and some use highly pressurized flammable gas, which can be dangerous. For these reasons, gas companies should formalize and document training programs for the operators of these devices. The training programs should include the following elements:

- Scheduled training for all operators;
- Qualification testing to ensure that operators are able to
    - operate the equipment properly and safely,
    - calibrate equipment, if necessary,
    - demonstrate that they can detect measure and record gas leaks accurately;
- Requalification training should occur at least annually;
- Requalification training should also occur before an operator can use any equipment that he/she has not used within the past 60 days;
- All training records should be retained for a period of time in accordance with GO 112 and any applicable CFRs.

Records

An appropriate record retention policy will be determined in consultation with the California Air Resources Board and stakeholders during the course of this proceeding.

Recommendations

Based on the preliminary staff observations made throughout this report, SED staff offers the following recommendations to meet the requirements of SB 1371 and preliminary scoping memo objectives:[20]

1. The Commission should ensure that financial incentives are properly aligned for both customers and shareholders in the gas transmission, distribution and storage (GTD&S) corporations to eliminate **both** intentional and unintentional methane leaks from the gas system. After assessing ratemaking implications of potential performance based incentives, the Commission should consider the appropriate procedural venue to implement them (e.g., General Rate Case, Gas Cost Incentive Mechanism).
2. The Commission, in cooperation with the parties to R.15-01-008, should develop a new methane leak grading system which meets the intent of SB 1371. Staff proposes updated definitions for Grades 1 and 2 leaks, and eliminating Grade 3. Staff suggests hosting a workshop to determine if there are alternatives to this approach and to build consensus regarding any preferred alternative.
3. The Commission should evaluate the operations, maintenance, and repair practices to determine whether existing (and newly proposed) practices are effective at reducing methane leaks.[21]

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[20] R.15-01-008 at 12. Final scoping memo objectives will be determined following a Prehearing Conference for this proceeding at a later date.
[21] Section 975 (e)(3).

4. The Commission should consider how to best have the GTD&S corporations to enlarge the scope of their leak surveys and procedures to include their entire gas system including all equipment and facilities.
5. The Commission should consider how to best encourage the GTD&S corporations to invest in the leak detection equipment for their business and to continually search for best practices in leak detection and prevention.
6. The Commission should consider how the GTD&S corporations should implement training programs as described in this report to ensure that personnel are proficient in the use of leak survey equipment and are periodically re-tested and re-qualified to use it.
7. The Commission should consider how the GTD&S corporations should develop capital improvement plans to upgrade their systems with equipment and modifications which have been identified as best practices for the prevention of methane leaks. These expenditures should be considered in the GTD&S General Rate Case or separate application.
8. The Commission should establish the specific requirements for the annual reports required by SB 1371.

Conclusion

In this report, staff provides references to an economic analysis of methane emission reductions conducted by ICF International. The report also includes references to best leak prevention equipment and methods researched by the EPA and references to some of the newest equipment in the field of gas leak detection. The report also describes a framework for a new leak grading system which would comply

with SB 1371. The reports claim that methane leak reduction is both beneficial to the environment and cost effective to the ratepayer. If an effective methane reduction program is implemented, the ratepayer may no longer be required to pay for methane which leaks from the gas system and the gas system should be safer due to the identification and elimination of more gas leaks. The short one-to-three-year payback time to the ratepayer for most of the new equipment and modifications needed by the utilities appears promising.

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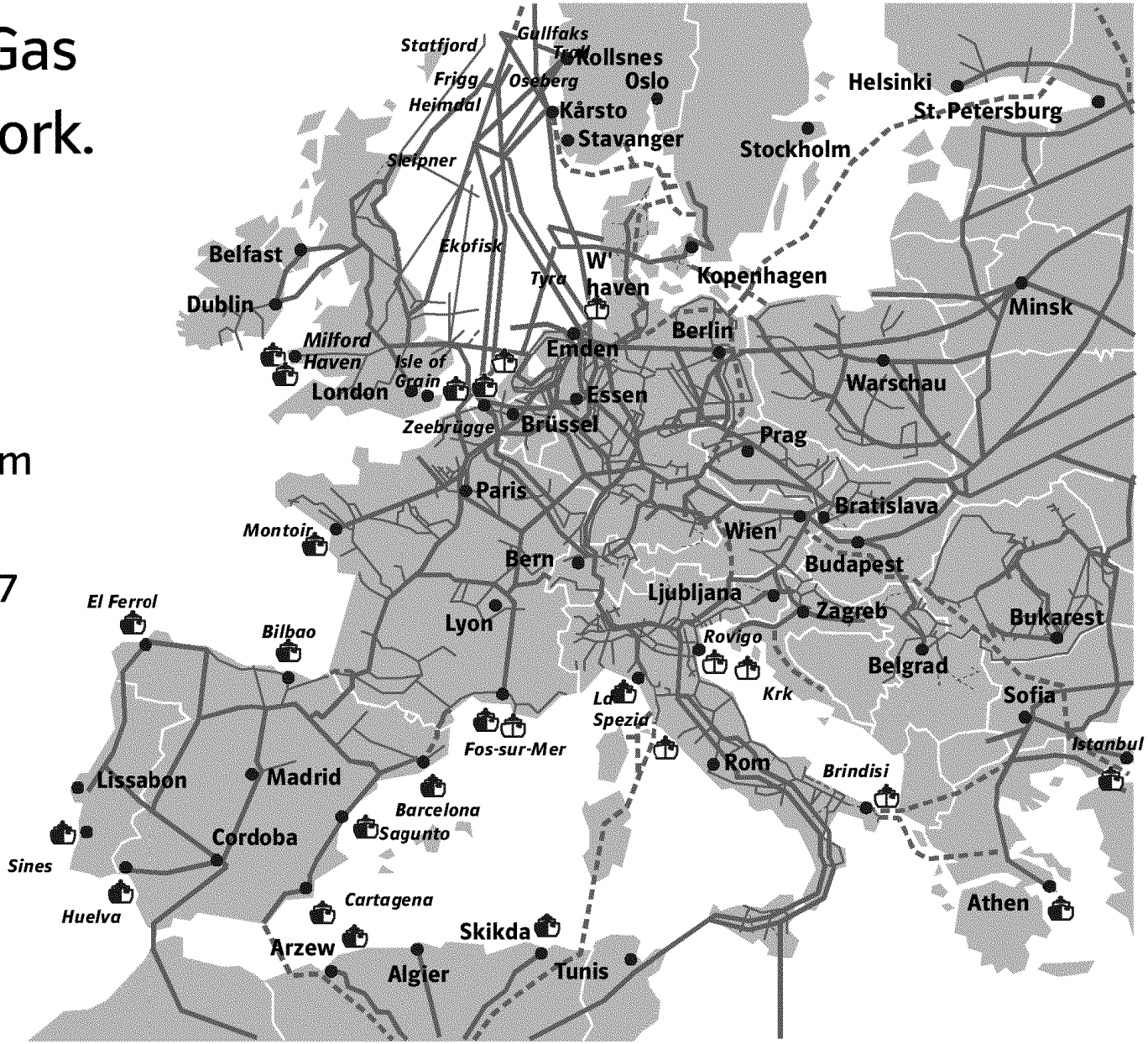

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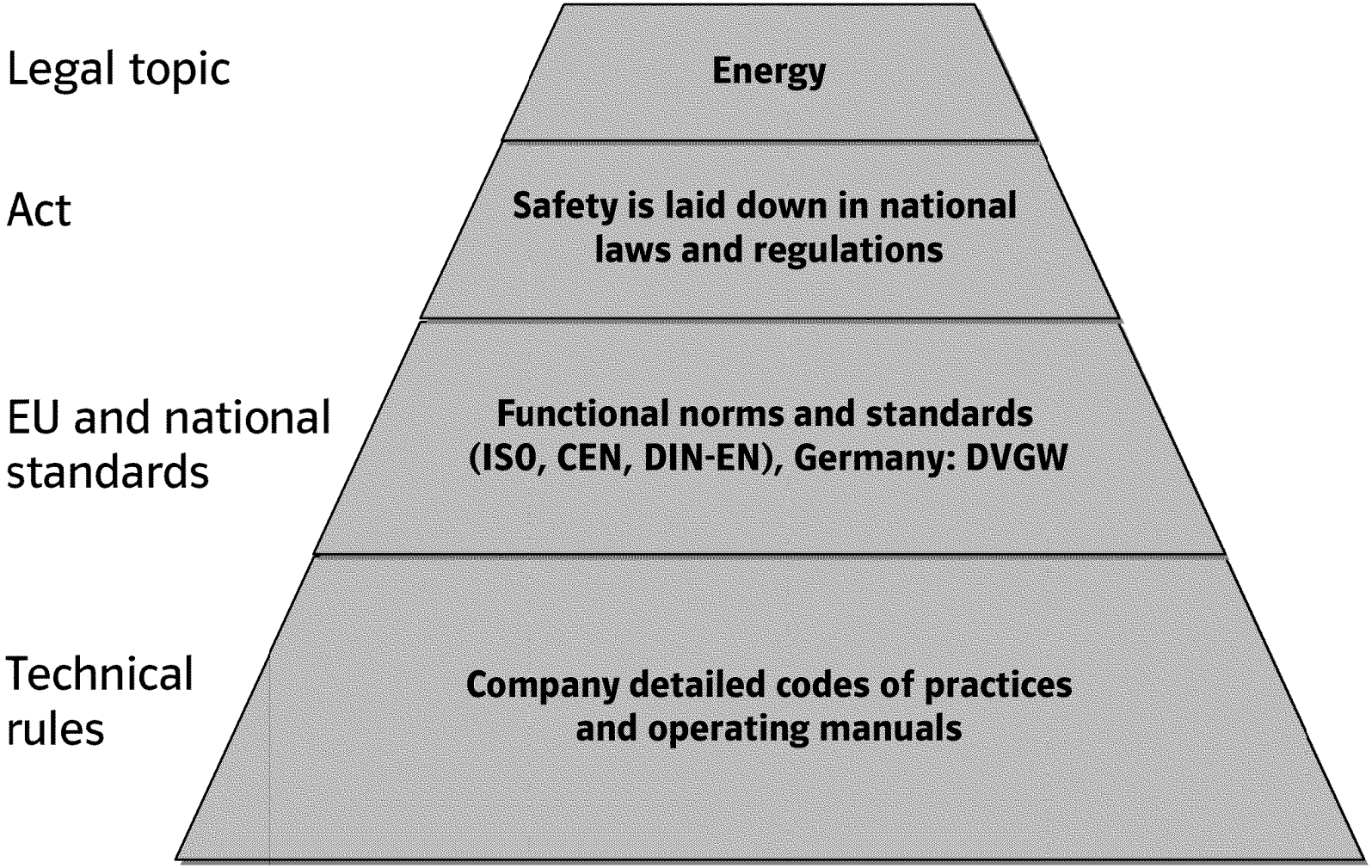

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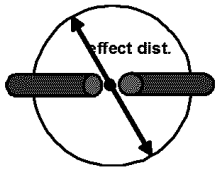

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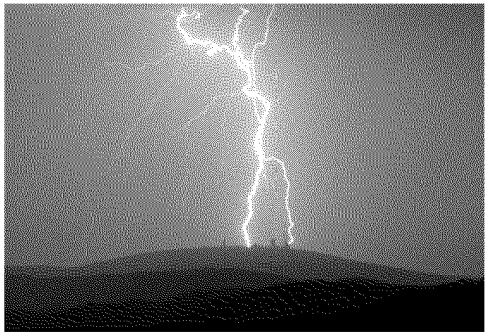

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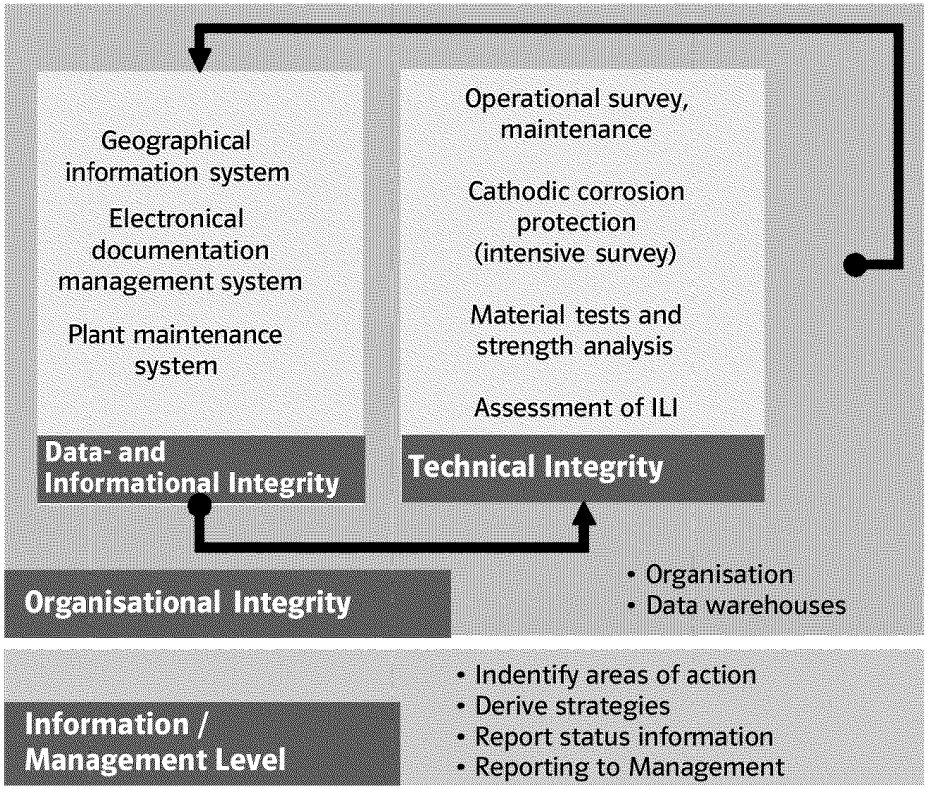

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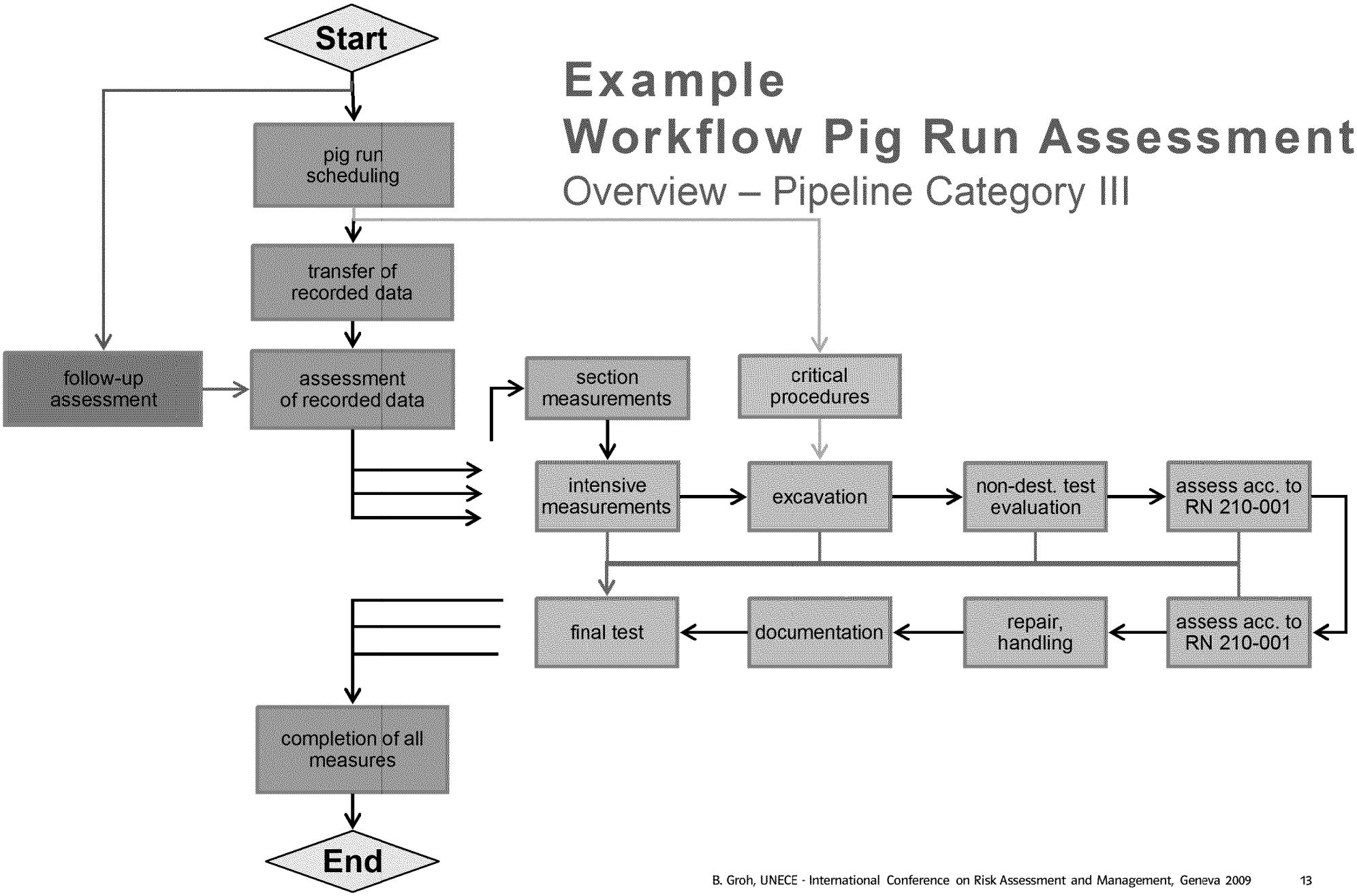

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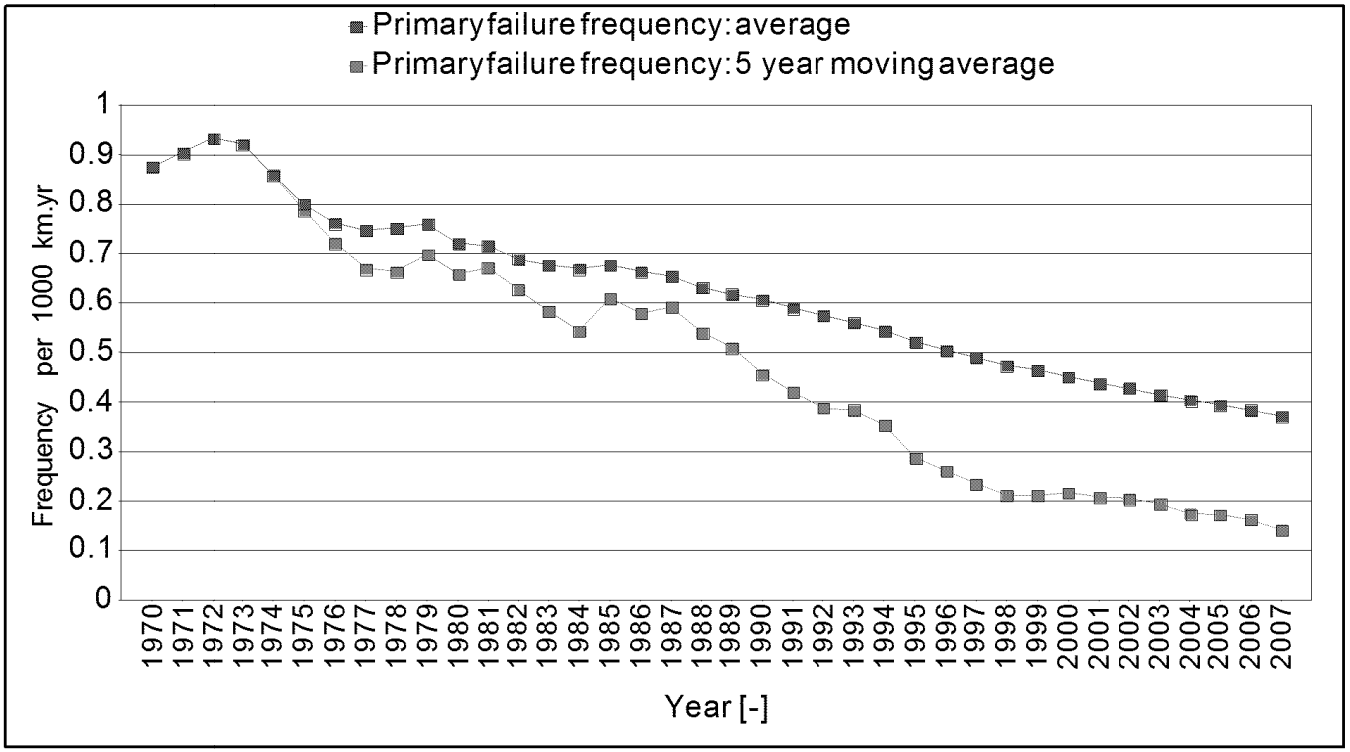

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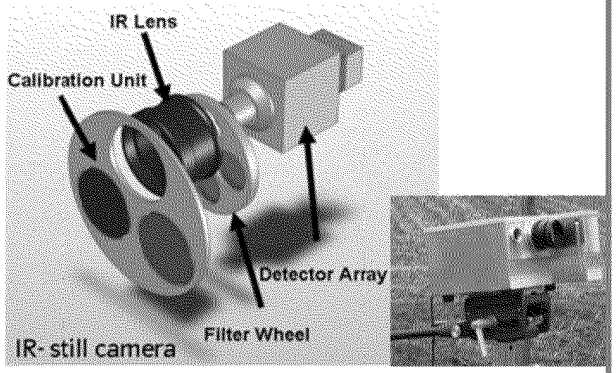

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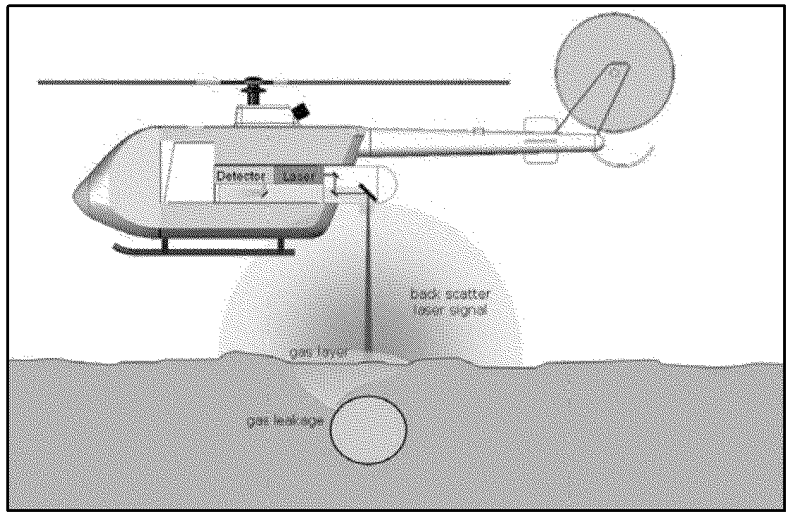

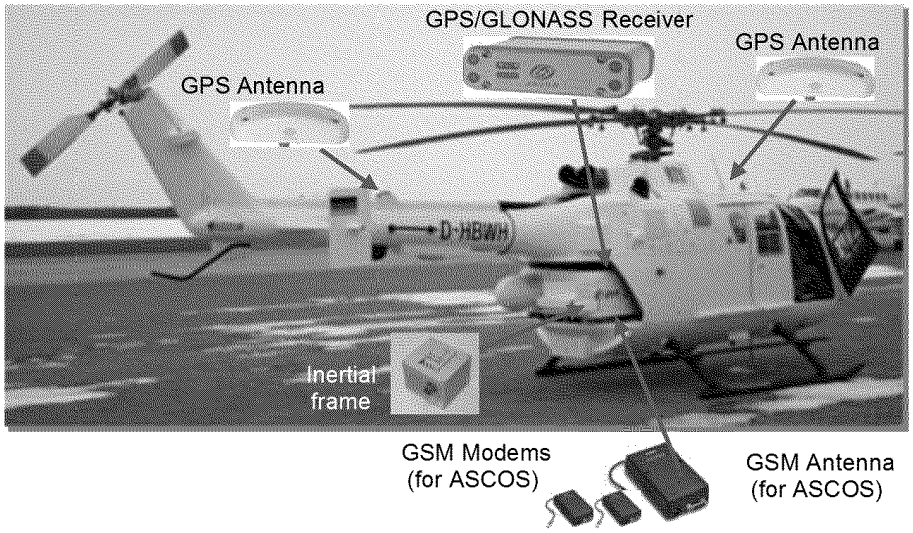

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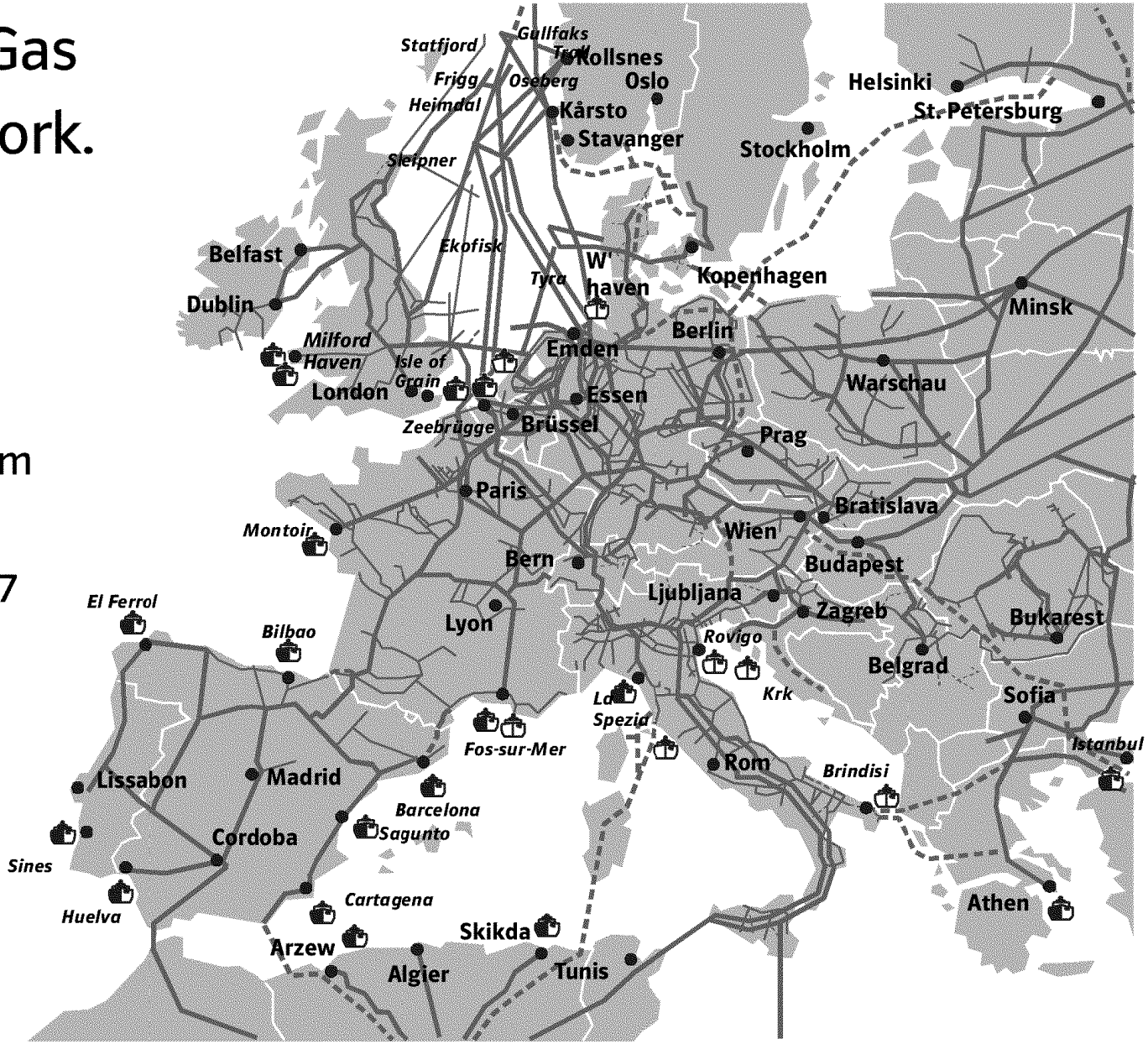

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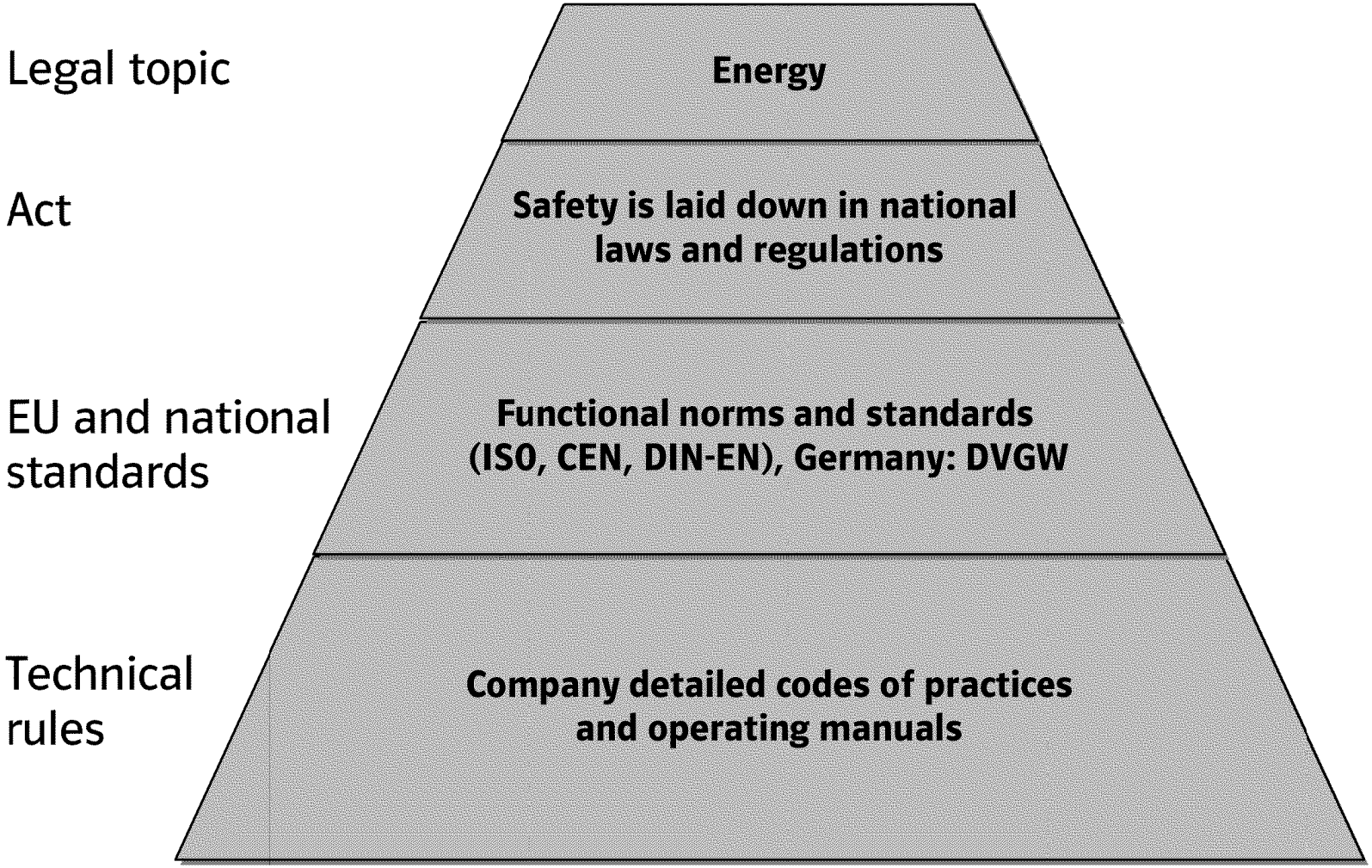

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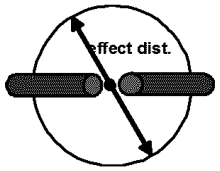

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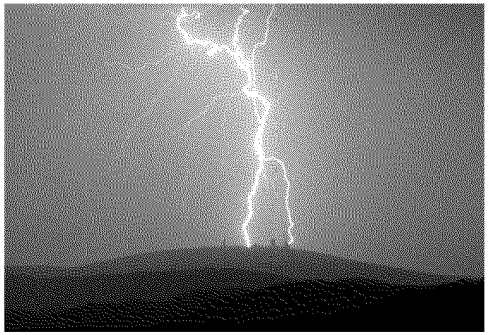

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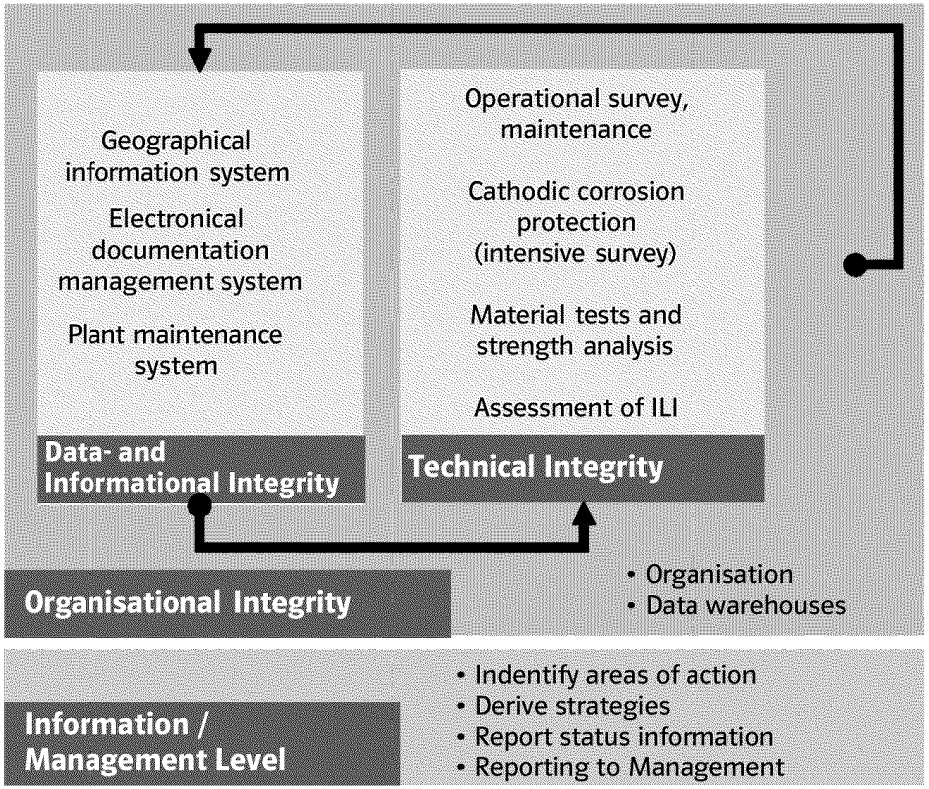

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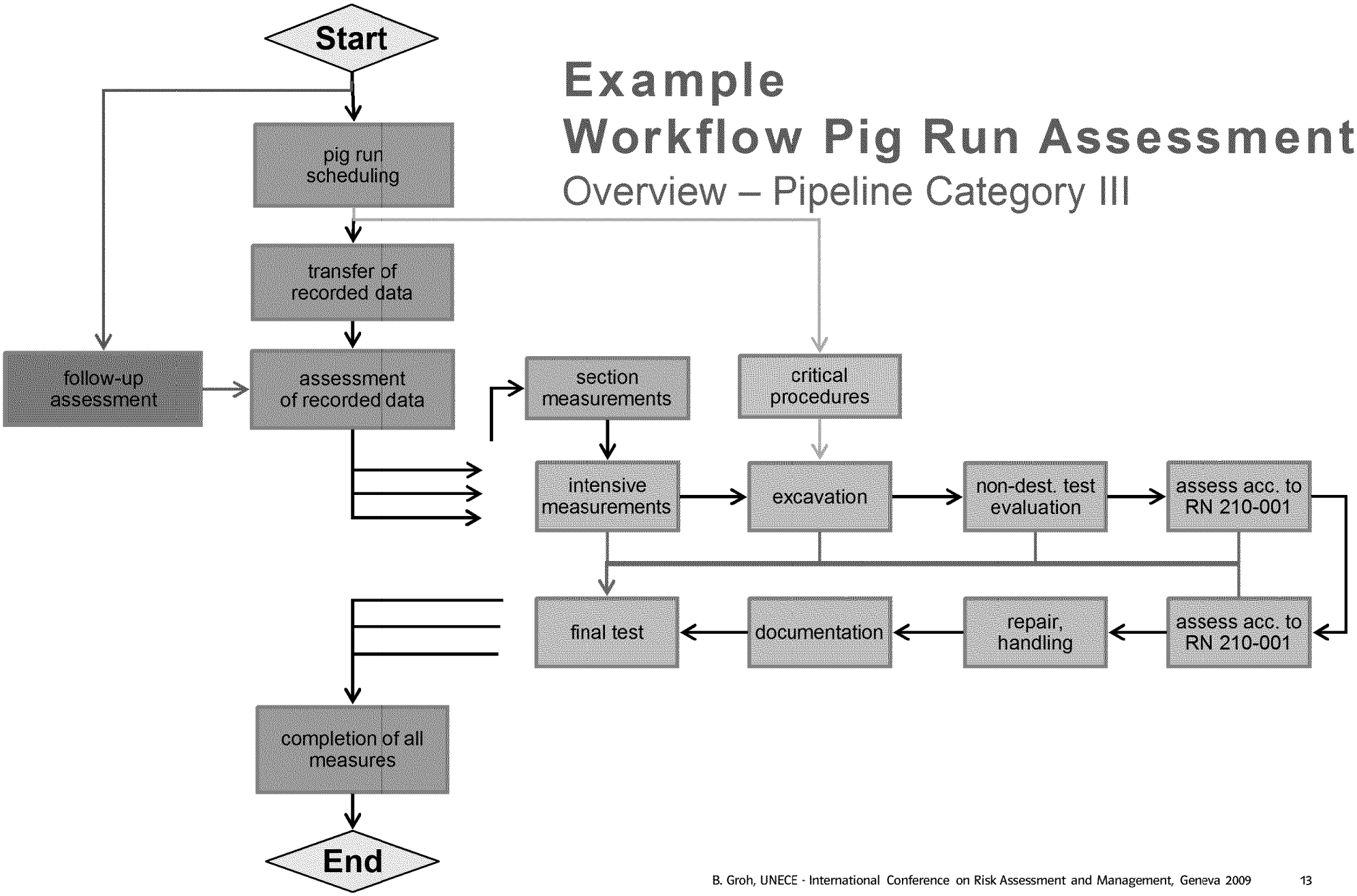

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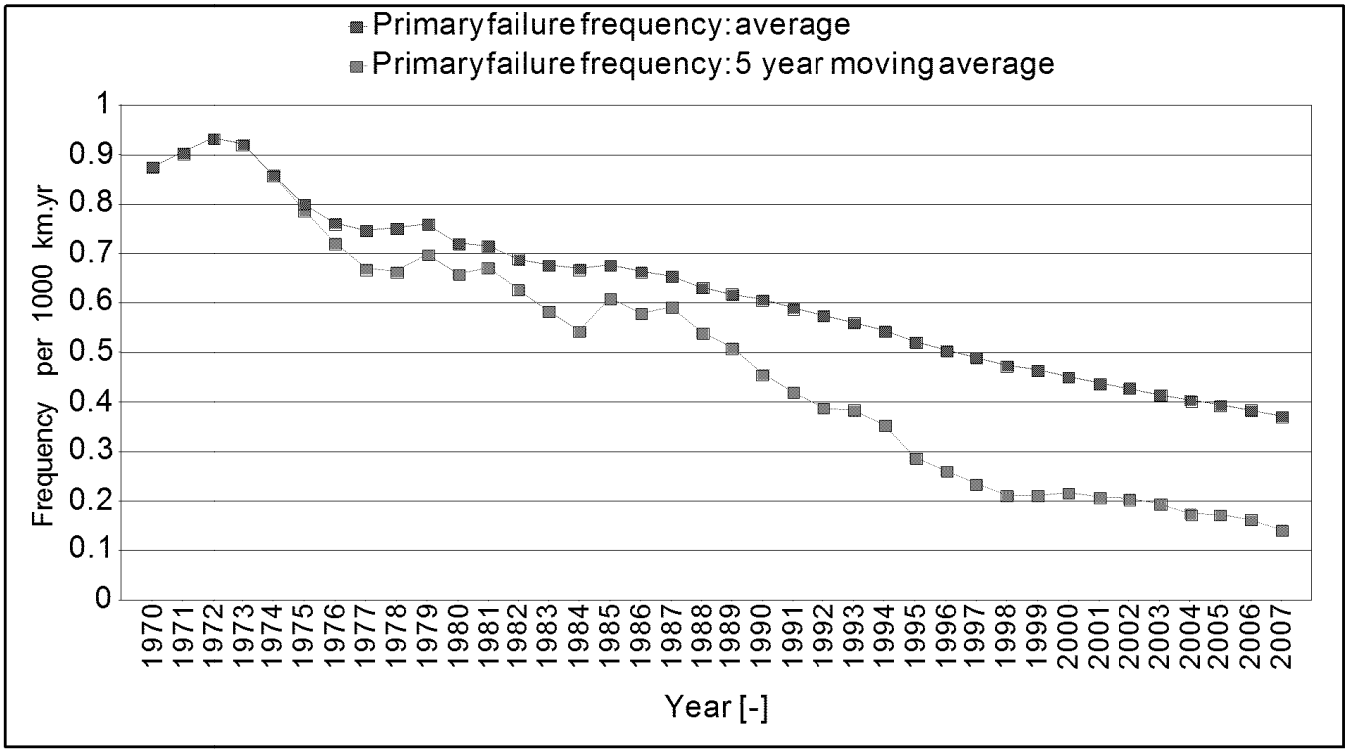

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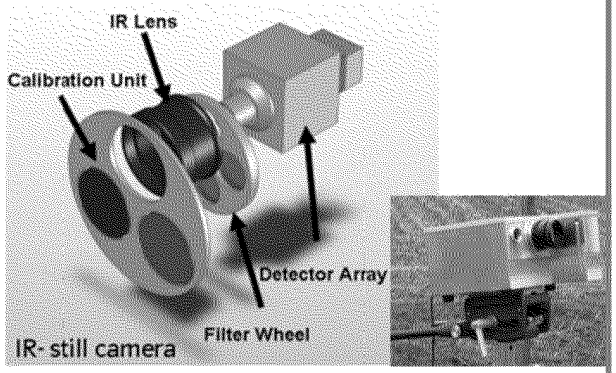

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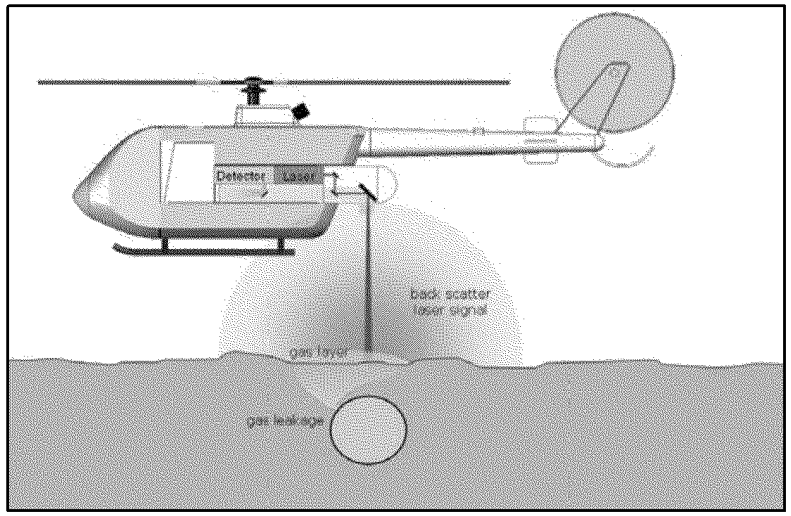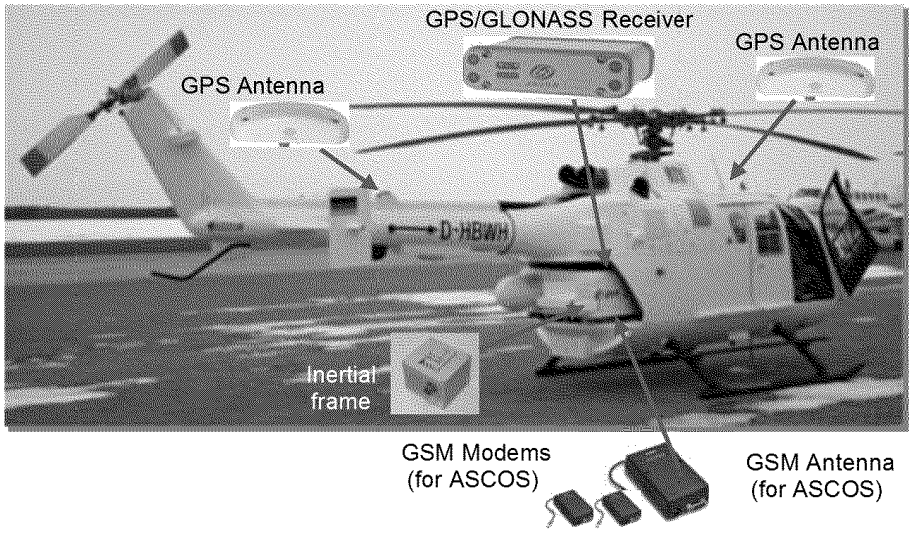
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