**Date Submitted**: May 12, 2020

# Koole Terminals

**Location of Headquarters**:
Sluispolderweg 67
1505 HJ Zaandam
The Netherlands

**Location of Biofuel Production Facility**:
Koole Tankstorage Botlek B.V.
Oude Maasweg 6
3197 KJ Botlek-Rotterdam

## Fuel Pathway Requested

| Fuel | Feedstock | Production Process Technology | RIN D-Code Requested |
|---|---|---|---|
| **Renewable Jet Fuel** | **Renewable diesel (derived from waste fats oils and greases, including animal fat and used cooking oil)** | **Fractionation** | **4** |

## Primary Point of Contact:

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## B. Technical Justification

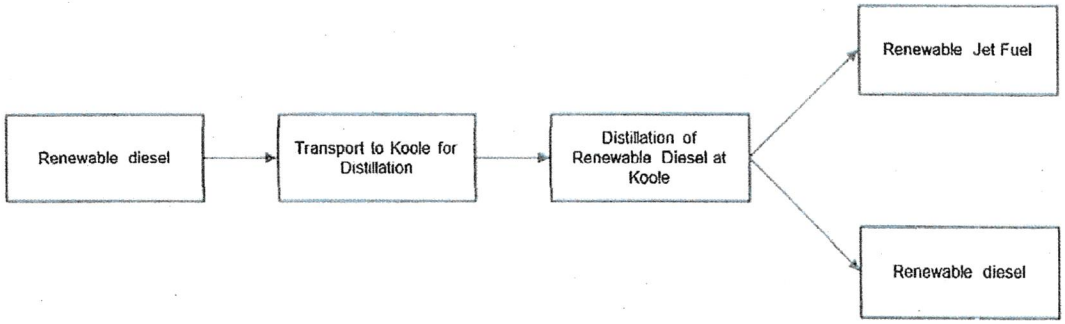
### 1. Fuel Pathway Description

Pursuant to 40 CFR 80.1426(c)(6), which directs parties seeking to produce a renewable fuel using another renewable fuel as a feedstock to pursue the petition process, Koole and Neste petition EPA to approve a pathway for the production of renewable jet fuel from a renewable diesel feedstock using the fractionation process. The fractionation process, also known as distillation, involves boiling renewable diesel feedstock to the jet fuel range and recovering the distillate, which includes both renewable jet fuel and renewable diesel. The proposed pathway is identical to the pathway approved in Neste and Texmark's joint petition approved on September 23, 2019. Like the Neste-Texmark pathway, the proposed pathway is very similar to existing pathways for the production of renewable jet fuel via the hydrotreating process, and the chief difference is that Koole and Neste propose to conduct the fractionation step of the hydrotreating process at a separate facility from where the renewable diesel feedstock was produced. Koole and Neste intend to enter into a tolling agreement in order to conduct the fractionation step, with Neste acting as the exclusive renewable diesel feedstock supplier and Koole serving as the renewable jet fuel producer.

The proposed pathway does not involve analysis of any new feedstocks for the production of the renewable diesel feedstock. Koole and Neste seek approval to only use renewable feedstock that was produced via the existing Table 1 Pathway F at Neste's facility in Porvoo, Finland. Koole and Neste seek approval of a pathway to generate biomass-based diesel (D-code 4) Renewable Identification Numbers ("RINs") for renewable jet fuel derived from renewable diesel that was produced from the following feedstocks currently approved for renewable diesel from the hydrotreating process under Pathway F of Table 1 of 40 CFR 80.1426: biogenic waste oils, fats, and greases ("biogenic waste FOGs"). The specific biogenic waste FOGs that Koole and Neste intend to use are animal fat and used cooking oil, although Koole and Neste would like the pathway to include the broader category of any D4-eligible biogenic waste FOG that is not subject to further modeling or other examination.

The proposed fractionation process has been previously evaluated by EPA in the Neste-Texmark petition, and has also been previously evaluated as a component of the hydrotreating process in existing Table 1 pathways. Fractionation of renewable diesel feedstock would be conducted using grid electricity and a thermal oil furnace powered by natural gas. The process will result in the production of both renewable jet (primary product) and renewable diesel bottom fraction (coproduct). The renewable jet product is an approved blending component with conventional petroleum-derived jet fuels certified to the ASTM 7566 Annex A2 specification. The renewable diesel coproduct is a complete drop-in replacement for fossil diesel and meets both EN 15940:2016 and ASTM D975 for paraffinic diesel fuels.

## 2. Process Flow Charts




## 3. Comparison to Previously Evaluated Pathways

As noted above, EPA previously evaluated the similar Neste-Texmark pathway and determined the pathway had a 77% lifecycle GHG reduction, well in excess of the 50% threshold required for biomass-based diesel.

As noted in that petition, EPA has previously evaluated the production of renewable diesel and renewable jet from hydrotreating. Pathways F, H, L, and P of Table 1 to 40 CFR §80.1426 currently allow for the production of either renewable diesel or renewable jet via the hydrotreating process using a variety of feedstocks.

As with the previously approved Texmark-Neste pathway, the proposed pathway is nearly identical to these existing hydrotreating pathways, except that Koole and Neste seek approval to use renewable diesel produced pursuant to Pathway F as a feedstock to produce renewable jet fuel via fractionation at a separate facility. Fractionation, which is also known as distillation, is the separation of renewable diesel feedstock into renewable jet and diesel coproducts.

Fractionation is a commonly recognized step in the larger hydrotreating process, and EPA has extensively evaluated the hydrotreating process as part of numerous pathway approvals, including in the March 2010 RFS Rule, the March 2013 RFS Rule, and several recent petition determinations. In the March 2010 RFS rule, EPA analyzed and approved pathways for renewable diesel produced from biogenic waste FOGs and other feedstocks through the hydrotreating process.[1] In the March 2013 RFS rule, EPA specifically evaluated the hydrotreating process for the production of jet fuel. There, EPA conducted detailed process modeling using data representing an industry average hydrotreating production process maximized for diesel fuel output and the same process maximized for jet fuel output.[2] Based on this analysis, EPA approved the use of camelina oil to produce renewable diesel,

[1] *See* Regulation of Fuels and Fuel Additives: Changes to the Renewable Fuel Standard Program, Final Rule. 75 Fed. Reg. 14670 (March 28, 2010)

[2] *See* Regulation of Fuels and Fuel Additive: Identification of Additional Qualifying Renewable Fuel Pathways Under the Renewable Fuel Standard Program, Final Rule. 78 Fed. Reg. 14190 (March 5, 2013)

jet fuel, naphtha, and LPG from the hydrotreating process, under either a maximum diesel or maximum jet fuel hydrotreating configuration. In that rulemaking, EPA also clarified that previously approved hydrotreating pathways for renewable diesel (including renewable diesel from soybean oil, oil from annual cover crops, algal oil, biogenic waste FOGs, and non-food grade corn oil) were also applicable to jet fuel. EPA has also evaluated hydrotreating as part of pathway petition determinations for Renewable Energy Group's Geismar facility and for Diamond Green Diesel.[3]

EPA's March 2013 RFS rulemaking and subsequent analyses of hydrotreating have extensively relied on peer-reviewed journal articles and publicly available literature, and EPA's analysis of the mass and energy balance of hydrotreating has relied upon the data in Pearlson (2011).[4] That analysis specifically notes that fractionation/distillation is part of the hydrotreating process.[5] Thus, the proposed fractionation process has already been analyzed by EPA as part of its assessment of hydrotreating.

Accordingly, the key difference between the proposed pathway and existing Table 1 pathways for renewable jet is that the fractionation step of the hydrotreating process would occur at a separate facility from the facility producing the renewable diesel feedstock.

## 4. Commercial Viability

Neste My Renewable Jet Fuel™ is a commercially available product for the global aviation market. Approved by ASTM as a 50% blend, Neste commenced commercial production last year and has publicly announced sales agreements with several major airline customers, including Jet Blue, Finnair, Lufthansa, and KLM. In the United States, Neste is currently partnering with Texmark Chemicals to produce renewable jet fuel.

Commercial production of Neste My Renewable Jet Fuel™ does not require significant additional capital expenditures or construction of additional facilities. Rather, scaling of production volume requires access to adequate fractionation capacity in order to upgrade Neste's existing renewable diesel supply. While Neste has announced plans to invest in internal fractionation capacity, which will require moderate capital investment, Neste is pursuing an additional agreement with Koole as its fractionation partner to facilitate greater near-term production of Neste My Renewable Jet Fuel™ in response to customer demand for additional volume or renewable jet fuel in the United States.

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[3] *See* February 2018 REG Geismar determination, available at https://www.epa.gov/sites/production/files/2018-02/documents/reg-geismar-deter-ltr-2018-02-23.pdf; April 2017 REG Geismar Determination, available at https://www.epa.gov/sites/production/files/2017-05/documents/reg-geismar-deter-ltr-2017-04-13.pdf; and October 2013 Diamond Green Diesel determination, available at https://www.epa.gov/sites/production/files/2015-08/documents/diamond-green-diesel-determination-ltr-10-13.pdf

[4] Pearlson, M., N. 2011. A Techno-Economic and Environmental Assessment of Hydroprocessed Renewable Distillate Fuels.

[5] *Id.*at 36.

Under the proposed agreement, Neste will provide raw materials (i.e. the renewable fuel raw material) while Koole will conduct the fractionation process to produce renewable jet and renewable diesel.

## 5. Renewable Fuel Production Volumes

Neste is currently the world's largest producer of renewable diesel and jet fuel, with roughly 1 billion gallons of global distillate capacity at three production facilities in Finland, the Netherlands, and Singapore. Further, Neste is currently increasing capacity at its Singapore facility and will expand total worldwide capacity to over 1.3 billion gallons by 2022.[6] Neste's renewable diesel production capacity for the last five years is detailed below.

| Year | Neste RD Production (million gallons) |
|---|---|
| 2015 | 790 |
| 2016 | 750 |
| 2017 | 854 |
| 2018 | 918 |
| 2019 | 1,020 |

Neste has ambitious targets for production of renewable jet fuel in order to meet global airline demand and assist in reducing GHG emissions in the hard to decarbonize aviation sector. Neste, in coordination with its fractionation partners, has a current worldwide capacity of 34 million gallons of renewable jet fuel.

Koole and Neste's fractionation partnership is a key component of Neste's strategy to expand availability of renewable jet fuel in North America in response to strong interest from U.S. airlines. Koole and Neste currently plan to provide the below estimated North American volumes through at least 2022.

| Year | Koole Renewable Jet Fuel and Renewable Diesel Projected Production (million gallons/year)[7] |
|---|---|
| 2020 | Ex. 4 |
| 2021 | |
| 2022 | |
| 2023 | |

[6] *See* Neste Annual Report 2019 at Appendix 1.

[7] [Post-2022 volumes are contingent upon continued contractual agreement between Neste and Koole]

| | |
|---|---|
| 2024 | Confidential Business Information Exemption 4 |
| 2025 | |
| 2026 | |
| 2027 | |
| 2028 | |
| 2029 | |
| 2030 | |

While the above production projections are based upon Koole's available fractionation capacity, Neste projects aggregate SAF capacity of at least 340 million gallons by 2022, with a feasibility study underway that would enable another 150 million gallons by 2023. These projections reflect the use of several global fractionation partners over the next several years, as well as planned internal Neste resources in 2022 and beyond. Although not directly relevant to this pathway petition, Neste's global projections demonstrate that this pathway could be replicated relatively quickly for additional facilities if demand for renewable jet fuel increases significantly. Further, approval of this pathway would facilitate Neste's longer term global volume projections by allowing for earlier market entry and uptake of renewable jet fuel. Accordingly, there is significant volume potential for this pathway.

Although the above illustrative scenarios are based on Koole and Neste's current projections for renewable jet fuel production, actual future renewable jet production volumes will depend on a number of market and regulatory factors. Koole and Neste expect the regulatory treatment of renewable jet fuel as compared to renewable diesel fuel to be a key factor in ultimate production numbers. Key regulatory programs that may impact production of renewable jet fuel include the California Low Carbon Fuel Standard, the European Renewable Energy Directive, and the International Civil Aviation Organization's Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). Other market factors, including the price of conventional jet fuel, the status of tax incentives, and the ability to monetize other benefits of renewable jet fuel, including conventional air quality benefits, may also impact renewable jet fuel production volumes.

Given that renewable jet fuel and renewable diesel are closely related middle distillate fuels and production can be maximized for the production of either fuel, high and low-end renewable jet fuel scenarios will necessarily depend on the market attractiveness of producing renewable jet fuel vs. renewable diesel. Under a high-end scenario with favorable regulatory and market conditions, Koole could produce up to the maximum contemplated capacity of Exemption 4 total product. Globally, Neste could produce up to 340 million gallons (1 MT) of renewable jet by 2022. In a low-end scenario where the combination of market and regulatory factors favors production of renewable diesel over renewable jet, Koole and Neste may produce a relatively smaller amount of renewable jet fuel than reflected in the above tables, although Koole and Neste will continue to produce significant volumes as Neste views development of the renewable jet fuel market as a long-term strategic priority.

## C. Organization Information

### 1. Organization Description

Koole is an international storage company providing logistics solutions. Handling the entire logistics chain for its customers, the company has major storage facilities sited strategically at six locations in the Netherlands, two in the UK and one in Poland. With a total capacity over 3,500,000 cubic metres, its facilities allow the handling of a highly diversified base of products, including edible and vegetable oils, base oils, oleochemicals, non-hazardous chemicals, biodiesel, liquid agricultural products, fuel oil, middle distillates and gasoline.

Koole provides a wide range of ancillary services, including blending, mixing, heating, temperature control and quality control. Its automation system for coordinating the flow of goods is custom-built to precisely meet the needs of the business.

The PID facility in Rotterdam provides independent distillation services to the petrochemical industry. With nearly 50 years of experience in toll distilling, Koole Tankstorage Botlek provides services including: R&D facilities, receipt and storage of feedstock and distillates, quality assurance, analysis and ancillary treatments such as caustic washing, blending of additives and decolorization.

Koole is headquartered in the Netherlands at the following address:
Sluispolderweg 67
1505 HJ Zaandam
The Netherlands

Neste is a refining and marketing company specializing in premium-quality, lower-emission traffic fuels. The company is the world's leading producer of renewable diesel made from renewable raw materials. Sustainability is deeply embedded in Neste's everyday business. Neste has been listed on the Dow Jones Sustainability Index eleven times and was ranked the third most sustainable company in the world on the January 2020 Global 100 List. In 2019, Neste's renewable products reduced GHG emissions by 9.6 million tons, and 80% of Neste's renewable fuel volume was produced from wastes and residues.

Neste has operations in 15 countries worldwide and employs some 5,000 people. In 2019, the company's net sales stood at EUR 15.8 billion. More information, including Neste's Annual Report and Sustainability Report can be found at Neste.com

Under the contemplated agreement, Koole would conduct the fractionation process at its Botlek, Rotterdam, facility to produce renewable jet and renewable diesel using Neste's renewable diesel as feedstock. Neste will produce the renewable diesel feedstock at its facility in Porvoo, Finland, and will remain in control of the feedstock until delivery of ownership to Koole for processing. After processing of the feedstock, Neste will retake ownership of the end-product and market the renewable jet fuel to U.S. customers.

Neste's renewable diesel production facilities are registered pursuant to 40 CFR Part 80 and have the following facility ID numbers:

Neste Oil Netherlands B.V.: 81333
Neste Oil Singapore PTe Ltd: 80327
Neste Renewable Fuels Oy: 80272

Neste's North American operations are headquartered in Houston, Texas at the following address:

Neste U.S. Inc
3040 Post Oak Blvd, Suite 1700
Houston, Texas 77056

### 2. Responsible Corporate Officer

**Koole**
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Title: General Counsel
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Mailing Address: Koole Terminals B.V.
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The Netherlands

## D. Fuel Type

### 1. Technical Description

The fuel type is renewable jet fuel which is synthesized paraffinic kerosene made from hydroprocessed fatty acids esters and free fatty acids (HEFA) technology using biogenic waste oils/fats/greases and other feedstocks. It is an approved blending component with conventional petroleum-derived jet fuels certified to ASTM 7566 Annex A2 specification. The maximum concentration allowed to be blended in petroleum jet fuel is 50%. Chemically, this fuel consist of normal and isoparaffins with relatively small amount of cycloparaffins and virtually no aromatics.

### 2. Information for New Fuel Types

N/A (renewable jet fuel previously evaluated by EPA)

### 3. Other Relevant Information

N/A

# E. Production Process

## 1. Type of Production Process

The production process for the renewable diesel feedstock involves the previously EPA approved hydrotreatment process as listed in Table 1 to 40 CFR 80.1416, in which the feed is catalytically treated with hydrogen gas under pressure. It involves the combination of the following chemical processes: feedstock pretreatment, hydrotreating which includes hydrodeoxygenation and isomerization.

Koole will conduct fractionation of Neste's renewable diesel feedstocks at its Botlek facility in Rotterdam, Netherlands. Fractionation is the last step in the hydrotreating process and was evaluated as part of the approval for the hydrotreating process to produce both renewable diesel and jet fuel.[8] Fractionation involves boiling renewable diesel to jet fuel range and recovering the distillate. The two co-product streams consist of jet fuel range hydrocarbons ($C_8$ to $C_{16}$) and remaining renewable diesel range hydrocarbons ($C_{15}$ to $C_{18}$). Fractionation is also needed to meet specification properties of density and flashpoint as well as to improve final fuel quality.

## 2. Mass and Energy Balances

Koole and Neste provide mass and energy balance data specific to the fractionation step below and in Appendix 2. Koole and Neste also provide mass and energy balance data for the renewable diesel produced at Porvoo in Attachment 3.

**Mass:**

| Inputs | Type | Product | Mass (kg/hr) | Volume (m3/hr) | LHV (J/kg) |
|---|---|---|---|---|---|
| | Feedstock | Renewable Diesel | Exemption 4 | | 4.39E+07 |
| | Chemicals | Antioxidant | | | Unknown |
| | | | | | |
| **Outputs** | **Type** | **Product** | **Mass (kg/hr)** | **Volume (m3/hr)** | **LHV (J/kg)** |
| | Fuel produced | Renewable Jet Fuel | Exemption 4 | | 4.40E+07 |
| | Co-products | Renewable Diesel | | | 4.39E+07 |
| | | Light Hydrocarbons | | | 4.53E+07 |

**Energy:**

| Input | Type | Input Value (kW) | Output Value (kW) |
|---|---|---|---|
| | Electricity | Exemption 4 | 0 |
| | Natural gas[1] | | 0 |
| | | | |
| **Outputs** | **Type** | **Input Value (kW)** | **Output Value (kW)** |
| | N/A | N/A | N/A |

[1]Heating in the process unit is done with thermal oil, which is in its turn heated by a natural gas fired furnace.

## 3. Historical Process Data

No historical process data is available for fractionation of renewable diesel as Neste and Koole have not previously conducted this process at the Koole facility with renewable diesel feedstock. The basis for the mass and energy balance values provided were simulated with Hysys. The mass and energy balance data for hydrotreating previously relied upon by EPA was based on predecessor Aspen Plus refinery simulation software.

## 4. Information for New Production Processes

N/A

### i. Energy Saving Technologies or Other Process Improvements

N/A

### Ii. Request for Special Provisions

N/A

### Iii. Processes that Use Renewable Fuel Inputs

Although this section of the guidance is listed under "new production processes" and EPA has previously evaluated hydrotreating as discussed above, Koole and Neste below provide specific information on the types of renewable fuel used, the suppliers of such fuel, and the fate of the renewable fuel after it undergoes the conversion process.

As noted previously, the renewable diesel will be produced from the hydrotreating process at Neste's Porvoo facility and then fractionated into two streams: renewable jet fuel as the main product and renewable diesel as coproduct. Neste will retain control of the renewable fuel feedstocks until delivery to Koole's facility.

Fractionation under the proposed pathway of renewable diesel to renewable jet fuel will result in jet and the vast majority of the rest as renewable diesel fuel, with a small amount of light hydrocarbons generated. More detailed information on the fate of the renewable fuel feedstocks can be found in the mass balance table in Section E.2 and in Attachment 2.

Exemption 4

### 5. Other Relevant Information

N/A

## F. Feedstock

### 1. Type of Feedstock

The proposed feedstock for production of renewable jet fuel is renewable diesel produced pursuant to pathway "F" for biogenic waste FOG under Table 1 of to 40 CFR 80.1426. The hydrotreating process for the renewable diesel feedstock converts lipids into fuel. The lipids such as mono, di, triglycerides are converted to a hydrocarbon chain in the range of diesel and jet fuel.

Specifically, Neste seeks approval of a pathway to generate biomass-based diesel (D-code 4) Renewable Identification Numbers ("RINs") for renewable jet fuel derived from renewable diesel that was produced from the following feedstocks currently approved for renewable diesel from the hydrotreating process under Pathway F of Table 1 of 40 CFR 80.1426: biogenic waste oils, fats, and greases ("biogenic waste FOGs").

### 2. Information for New Feedstocks

N/A (including section F.2.i-xi)

## F. Coproducts

### 1. Technical Description

Renewable Diesel "bottoms" are the only significant coproduct from the fractionation process. Renewable diesel is a mixture of straight and branched paraffinic hydrocarbons with typical carbon numbers between $C_{15}$ and $C_{18}$. The fuel is practically free of aromatics and combusts cleanly, thus reducing emissions. The fuel is considered a complete drop-in for fossil diesel and meets both EN 15940:2016 and ASTM D975 specifications for paraffinic diesel fuels.

Insignificant co-products include a small amount of light hydrocarbons.

### 2. Market Value

Renewable diesel is often valued at a premium to fossil diesel, as renewable diesel is established as a premium fuel with superior qualities than that of fossil diesel as a result of the feedstocks and

advanced production technology. Federal and state incentives (RINs, LCFS, Blender's Tax Credit) impact the market value of renewable diesel, often encouraging the fuel to be at price parity with fossil diesel.

### 3. Coproducts Used as Livestock Feed

N/A

## H. List of Attachments

1. **Neste 2019 Annual Report**
2. **Koole Mass and Energy Balance Information [attachment data CBI]**
3. **Porvoo Production Data [Attachment data CBI]**

**Signatures:**

**Mr. John Kraakman**
**CEO**
**Koole Terminals B.V.**
**Date:**