Scoping Document

For Programmatic Environmental Impact Statement on Sustainable Aviation Fuel Production Pathways, Including Blending and Distribution Infrastructure, in Washington State

Shorelands and Environmental Assistance Program

Washington State Department of Ecology

Olympia, Washington

October 2025

The Programmatic Environmental Impact Statement on Sustainable Aviation Production Pathways, Including Blending and Distribution Infrastructure, in Washington State is supported with funding from Washington's Climate Commitment Act (CCA). The CCA supports Washington's climate action efforts by putting cap-and-invest dollars to work reducing climate pollution, creating jobs, and improving public health. Information about the CCA is available on the Washington Climate Action website.[1]

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[1] https://climate.wa.gov/
[2] https://ecology.wa.gov/about-us/contact-us

Department of Ecology's Regional Offices

Map of Counties Served

Southwest Region 360-407-6300

Northwest Region 206-594-0000

Central Region 509-575-2490

Eastern Region 509-329-3400

Region	Counties served	Mailing Address	Phone
Southwest	Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Mason, Lewis, Pacific, Pierce, Skamania, Thurston, Wahkiakum	PO Box 47775 Olympia, WA 98504	360-407-6300
Northwest	Island, King, Kitsap, San Juan, Skagit, Snohomish, Whatcom	PO Box 330316 Shoreline, WA 98133	206-594-0000
Central	Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, Yakima	1250 W Alder St Union Gap, WA 98903	509-575-2490
Eastern	Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman	4601 N Monroe Spokane, WA 99205	509-329-3400
Headquarters	Across Washington	PO Box 46700 Olympia, WA 98504	360-407-6000

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DEPARTMENT OF
ECOLOGY
State of Washington

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Acronyms and Abbreviations List

AtJ	alcohol to jet
B&O	business and occupation
CFS	Clean Fuel Standard
Ecology	Washington State Department of Ecology
EIS	environmental impact statement
EPA	Environmental Protection Agency
FT	Fischer-Tropsch
GHG	greenhouse gas
HEFA	hydroprocessed esters and fatty acids
PEIS	programmatic environmental impact statement
PtJ	pyrolysis to jet
PtL	power to liquid
RCW	Revised Code of Washington
RFS	Renewable Fuel Standard
RIN	Renewable Identification Number
RVO	Renewable Volume Obligation
SAF	sustainable aviation fuel
SEPA	State Environmental Policy Act
WAC	Washington Administrative Code

Summary

The Legislature directed the Washington State Department of Ecology (Ecology) to prepare a nonproject environmental review for developing sustainable aviation fuel (SAF) (also called alternative jet fuel) including the production pathway and blending and distribution infrastructure in Washington. The types of SAF production pathways or infrastructure to be analyzed will be decided through the scoping process.

A programmatic environmental impact statement (PEIS) is a type of nonproject environmental review used for planning under the State Environmental Policy Act (SEPA). A PEIS identifies potential significant adverse environmental impacts and possible ways to avoid, minimize, or mitigate those impacts. A PEIS analyzes general types of facilities—not individual projects—to identify probable significant adverse environmental impacts and potential mitigation measures.

A PEIS:

- Provides information for project applicants, SEPA lead agencies, permitting agencies, Tribes, interested parties, and the public.

- Helps developers understand potential impacts and make siting and design choices that could avoid or minimize impacts from the start.

- Identifies how impacts could be mitigated.

Scoping

Scoping is the first step in developing a PEIS. The purpose is to seek public comment on the environmental issues that should be studied. Scoping will be important for this study as there are multiple production methods using various types of feedstocks (raw materials), as well as many types of blending and distribution infrastructure. This document provides a high-level description of those for review and comment.

Ecology is asking for feedback and input

This scoping document includes initial information for feedback and input on:

- SAF production pathways, including types of feedstocks, to be evaluated
- Types of blending and distribution infrastructure to be evaluated
- Assumptions to identify the geographic scope of study used for the PEIS analysis
- Potential impacts to environmental resources to analyze
- Potential mitigation measures to consider

Resources being considered for analysis

The PEIS will analyze probable significant adverse environmental impacts to the following resources:

- Tribal rights, interests, and resources
- Environmental justice
- Earth resources
- Air quality and greenhouse gases
- Water resources
- Biological resources (species and habitats)
- Energy and natural resources
- Environmental health and safety
- Noise and vibration
- Land use
- Aesthetics and visual quality
- Recreation
- Historic and cultural resources
- Transportation
- Public services and utilities
- Cumulative impacts

Geographic scope of study

The scoping phase looks statewide. The scope of the PEIS will be limited to the potential significant adverse environmental impacts in geographic areas that are suitable for SAF production pathways, including blending and distribution infrastructure. After considering scoping input, Ecology will determine the geographic area of study and use it for the analysis in the Draft PEIS.

Scoping comment period: October 6 – November 5, 2025

Scoping comments will be accepted from noon on October 6, 2025, through 11:59 p.m. on November 5, 2025. There are multiple ways to comment and provide feedback. All comments are valued equally.

Online comment form: https://sea.ecology.commentinput.com/?id=8pM3Hf7QK

Virtual meetings: information and links to register at https://ecology.wa.gov/regulations-permits/sepa/clean-energy/programmatic-eis/SAF-PEIS

October 21, 2025, starting at 1:00 pm

October 22, 2025, starting at 9:00 am

U.S. Postal Service:

Clean Energy Coordination
Department of Ecology
PO Box 47709
Olympia, WA 98504-7709

Documents and information on how to comment and virtual meetings are available on our website.[3]

Next steps

Ecology will consider comments received during scoping and use them to develop the Draft PEIS. We will also release a scoping report with information on what will be studied in the Draft PEIS.

There will be a public comment period for the Draft PEIS, which is planned for release early in 2027. After we receive public comments on the Draft PEIS, we will consider them and determine if additional work is needed. The Final PEIS is planned for release by June 30, 2027.

It is important to note that future SAF facilities will need individual environmental review under SEPA using project- and site-specific information.

[3] https://ecology.wa.gov/regulations-permits/sepa/clean-energy/programmatic-eis/SAF-PEIS

1 Introduction

1.1 Purpose of this scoping document

The Legislature directed the Washington State Department of Ecology (Ecology)[4] to prepare a nonproject environmental review for developing sustainable aviation fuel (SAF) (also called alternative jet fuel) including the production pathway and blending and distribution infrastructure in Washington.

A programmatic environmental impact statement (PEIS) is a type of nonproject environmental review used for planning under the State Environmental Policy Act (SEPA). A PEIS identifies potential significant adverse environmental impacts and possible ways to avoid, minimize, or mitigate those impacts. A PEIS analyzes general types of facilities—not individual projects—to identify probable significant adverse environmental impacts and potential mitigation measures.

Scoping is the first step in developing a PEIS. The purpose is to seek public comment on the environmental issues that should be studied. This scoping document is an early step in developing a PEIS for sustainable aviation fuel (SAF) production pathways. The types of SAF production pathways or infrastructure to be analyzed will be decided through the scoping process. Scoping will be important for this study as there are multiple production methods using various types of feedstocks (raw materials), as well as many types of blending and distribution infrastructure. This document provides a high-level description of those for review and comment.

Ecology is asking for feedback and input on:

- SAF production pathways, including types of feedstocks, to be evaluated
- Types of blending and distribution infrastructure to be evaluated
- Assumptions to identify the geographic scope of study used for the PEIS analysis
- Potential impacts to environmental resources to analyze
- Potential mitigation measures to consider

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[4] https://lawfilesext.leg.wa.gov/biennium/2025-26/Pdf/Bills/Session%20Laws/Senate/5161-S.SL.pdf?q=20250718131855

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It is important to note that a PEIS is not a review of a specific project. The PEIS will evaluate potential significant environmental impacts for general types of SAF facilities. It provides information for project applicants, SEPA lead agencies, permitting agencies, Tribes, interested parties, and the public. A PEIS helps developers understand potential impacts and make siting and design choices that could avoid or minimize impacts from the start. It also identifies how impacts could be mitigated. Proposed SAF facilities will need individual environmental review under SEPA using project- and site-specific information.

The PEIS development process will include early and meaningful Tribal engagement and consultation on Tribal rights, interests, and resources. The PEIS will consider impacts to overburdened communities and vulnerable populations and provide opportunities for local communities to voice concerns early in the process so they can be considered in the impact analysis.

1.2 SEPA process

SEPA[6] is intended to provide information to state and local agencies, project applicants, and the public to encourage the development of proposals that avoid, minimize, and mitigate potential impacts. The SEPA environmental review process provides a way to identify and assess alternatives, probable environmental impacts, and mitigation and to provide information to the public, Tribes, and agencies. The process helps decision makers and the public understand how a proposed action would affect the natural and human environments. This environmental information, along with other documents, is

[5] https://ecology.wa.gov/regulations-permits/sepa/clean-energy/programmatic-eis/SAF-PEIS
[6] https://app.leg.wa.gov/WAC/default.aspx?cite=197-11

used by decision makers to decide whether to approve a proposal, approve the proposal with conditions, or deny the proposal.

Ecology is the lead agency for this PEIS process, as directed by the Legislature in Senate Bill 5161, Section 112 (2)[7]. Ecology will prepare a PEIS under SEPA requirements described in Chapter 43.21C[8] Revised Code of Washington (RCW) and Chapter 197-11 Washington Administrative Code (WAC)[9].

1.3 PEIS process

The PEIS will consider potential significant impacts from general types of SAF production pathways and infrastructure; it is not site-specific or for a specific project. It will evaluate environmental impacts over a broad geographic and time horizon, and the depth and detail of the impact analysis will be fairly general, focusing on major impacts in a qualitative manner. Mitigation will also be identified at a high level.

The PEIS will not assess site-specific issues associated with any individual SAF development project. Location-specific factors (e.g., soil type, groundwater availability and presence of jurisdictional waters, habitat, vegetation, the presence of threatened and endangered species, and the presence of cultural resources) vary considerably from site to site. The effects of location- and project-specific factors cannot be fully anticipated or addressed in a programmatic analysis; such effects must be evaluated at the project level.

The PEIS will identify probable significant adverse environmental impacts and relevant mitigation applicable to SAF production pathways and infrastructure in general. Site-specific issues would be addressed during individual project reviews as part of the SEPA process. The impact assessment and mitigation in a PEIS is more qualitative than a project-specific environmental impact statement (EIS).

SEPA analyses for proposed specific SAF projects would tier to the SAF PEIS. “Tiering” means when a broad nonproject evaluation is later used for a project. Tiering can result in a more effective environmental analysis process for subsequent SAF projects.

A PEIS does not approve or deny a proposed project. State and local agencies will use the information in this PEIS, along with other publicly available information and site-specific details, to inform project-level environmental reviews and permitting.

[7] https://lawfilesext.leg.wa.gov/biennium/2025-26/Pdf/Bills/Session%20Laws/Senate/5161-S.SL.pdf?q=20251003111806

[8] https://app.leg.wa.gov/rcw/default.aspx?cite=43.21c

[9] https://app.leg.wa.gov/WAC/default.aspx?cite=197-11

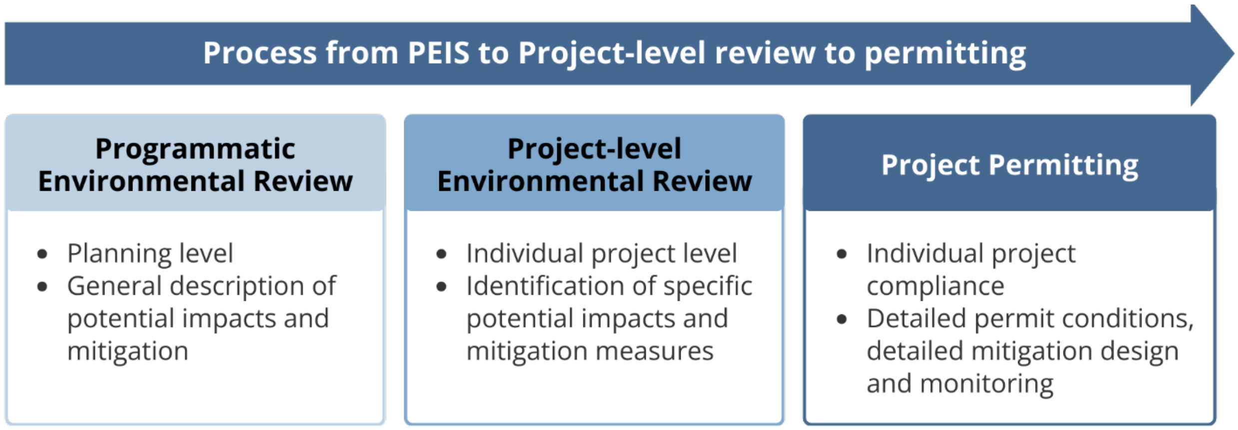

Figure 1: Process from PEIS to project-level review to permitting

1.4 How PEISs are used

A PEIS:

- Provides information for project applicants, SEPA lead agencies, permitting agencies, Tribes, interested parties, and the public.
- Helps developers understand potential impacts and make siting and design choices that could avoid or minimize impacts from the start.
- Identifies how impacts could be mitigated.

Local, state, and federal agencies may use PEISs that have previously been prepared in order to help evaluate proposed actions, alternatives, environmental impacts, or mitigation for a proposed project. Each agency will ensure that the PEIS analysis is valid when applied to the project proposal. If it is not valid, the analysis must be re-evaluated in the project-level environmental review or permit.

1.4.1 PEIS informs project-level SEPA reviews

When an applicant submits a project proposal, a project-level SEPA environmental review is done by the appropriate lead agency as required by the SEPA Rules (Chapter 197-11 WAC). Lead agencies conducting environmental review of SAF projects may consider the PEIS in order to identify and mitigate project-level probable significant environmental impacts. A project-level review must address any probable significant adverse environmental impacts associated with the proposal that were not analyzed in the PEIS. The review must identify any mitigation measures specific to the project for probable significant adverse environmental impacts.

1.4.2 PEIS informs permitting decisions

No final permit decisions can be made until a project-level SEPA environmental review is finished. The PEIS, project-level environmental review, and other documents and studies are used by decision makers to decide whether to approve a proposal, approve the proposal with conditions, or deny the proposal.

Permits ensure that projects comply with all applicable state environmental standards to protect land, air, water, wildlife, and people. The required permits for a project depend on its location and the construction and operations involved. A project may need local, state, and federal permits, and each permit has its own regulatory authority and regulatory agency. Information about specific permits can be found in the Washington State Regulatory Handbook.[10]

2 Sustainable Aviation Fuel (SAF)

2.1 SAF overview

Aviation contributes approximately 9% of the total U.S. transportation sector's greenhouse gas (GHG) emissions (EPA 2024). Unlike the ground transportation sector, which can be decarbonized using batteries, hydrogen fuel cell technologies, biodiesel, or other synthetic drop-in fuels, the aviation sector faces greater technical and economic challenges (NREL 2023). To achieve net zero GHG emissions, aircraft must be powered with low- or no-carbon emission options such as batteries and clean fuels. SAF is currently the only feasible solution to decarbonize the long-haul aviation sector (DOE et al. 2025).

2.1.1 What is SAF?

SAF is a drop-in jet fuel replacement that is produced through a variety of pathways and results in a reduction in lifecycle emissions compared to conventional jet fuel. It must meet certain standards to be used as jet fuel. Compared with conventional jet fuel, 100% SAF has the potential to reduce GHG emissions by up to 94% on a lifecycle basis, depending on feedstock and technology pathway (DOE 2025). As a drop-in fuel, SAF can be used in existing aircraft engines and other fuel-related infrastructure. Currently, SAF must be blended, up to 50%, with conventional jet fuel before it is certified for use in commercial aircraft. Ongoing efforts are assessing the utilization of 100% SAF in newer-generation aircraft and engines.

SAF has already been used in hundreds of thousands of commercial flights (IATA 2025). Currently, 174 airports distribute SAF, including 58 in the U.S. (ICAO 2025).

2.1.2 SAF current and future use

Currently, SAF accounts for less than 1% of all aviation fuels consumed globally (IATA 2025). However, there is growing domestic and international demand for SAF.

Aviation industry and organizations are key drivers of demand for SAF. Members of the International Civil Aviation Organization, which includes the U.S., have adopted a goal to reach

[10] https://www.oria.wa.gov/site/alias__oria/403/regulatory-handbook.aspx

net zero emissions by 2050. The world's largest airline industry association, the International Air Transport Association, has similarly set targets for net zero emissions from aviation by 2050.

Additionally, some governments are mandating the use of SAF. In Europe, for example, the ReFuelEU Aviation initiative sets requirements for aviation fuel suppliers to gradually increase the share of SAF blended into the conventional aviation fuel supplied at EU airports. Aviation fuel suppliers will have to blend increasing amounts of SAF with conventional aviation fuel, starting with a 2% minimum blend in 2025, and rising to 70% in 2050 (European Commission 2025).

While demand for SAF is growing, production is in the early stages. Currently, there are only a limited number of production facilities, though many more are in development. According to the International Energy Agency, planned production capacity for SAF will provide just a small fraction of jet fuel demand by 2030 (IEA 2025). Therefore, increasing the use of these fuels to achieve net-zero emissions by 2050 will require a significant ramp-up of investments in production capacity.

2.1.3 Federal and state SAF policies

Federal

Federal agencies are considering actions to reduce the cost, enhance energy security, and expand the production and use of SAF.[11] The goals are to cut GHGs by at least 50% and produce 3 billion gallons in the U.S. by 2030. A longer-term goal is to produce 35 billion gallons by 2050.

Businesses often consider federal tax credits as well as policies in making decisions about projects. A federal tax credit, known as the Clean Fuel Production Credit (45Z), incentivizes the production of a broad range of clean fuels, including SAF. Public Law 119-21,[12] signed into law on July 4, 2025, contained major changes to this tax credit. It extended the tax credit through December 2029 and reduced the maximum value from $1.75 per gallon to $1.00 per gallon. There are multiple restrictions for this tax credit, including that fuel must be produced from feedstocks from the U.S., Canada, or Mexico.

The Renewable Fuel Standard (RFS) is a national policy, implemented by the Environmental Protection Agency (EPA), that requires a certain volume of renewable fuel be used to replace or reduce the quantity of fossil fuel in jet fuel and other fuels. Companies that refine, import, or blend fossil fuels—referred to as obligated parties—need to meet individual renewable fuel quotas based on the amount of fuel they introduce into the market. The EPA assigns obligated parties a Renewable Volume Obligation (RVO), which represents the amount of renewable fuel they are required to introduce into the fuel supply each year. Obligated parties can either blend their fuel with the required amount of renewable fuel or purchase credits from others that blend more than the required amount (EPA 2025 [1]).

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[11] https://www.energy.gov/eere/bioenergy/sustainable-aviation-fuel-grand-challenge

[12] https://www.congress.gov/119/plaws/publ21/PLAW-119publ21.pdf

The EPA tracks the production, use, and trading of renewable fuels with serial numbers called Renewable Identification Numbers (RINs). Each batch of renewable fuel is assigned a RIN. RINs are credits used for compliance and are the "currency" of the RFS program (EPA 2025 [2]). Market participants may trade RINs. Obligated parties may obtain and retire RINs for compliance.

The EPA is proposing changes to the value of a RIN based on whether the renewable fuel is derived from domestic or foreign sources. Under this proposed change, foreign renewable fuels and feedstocks would generate 50% less RINs than domestically produced renewable fuels using domestic feedstocks (EPA 2025 [3]).

Washington state

Washington enacted legislation in 2008 that set a series of limits on the emission of greenhouse gases within the state. Those limits were modified by legislation[13] enacted in 2020. Washington must limit emissions of GHGs from human activities to achieve the following reductions for the state:

- By 2020, reduce overall emissions of GHGs to 1990 levels, or 90.5 million metric tons
- By 2030, reduce overall emissions of GHGs to 45 percent below 1990 levels, or 50 million metric tons
- By 2040, reduce overall emissions of GHGs to 70 percent below 1990 levels, or 27 million metric tons
- By 2050, reduce overall emissions of GHGs to 95 percent below 1990 levels, or 5 million metric tons, and achieve net-zero GHG emissions

The 2021 State Energy Strategy[14] provides a roadmap for meeting the state's GHG emission limits and identifies a path to a clean energy economy. The strategy recommends continuing Washington's leadership in sustainable aviation. A specific action recommended in the strategy is to continue to support efforts to coordinate the research, development, and deployment of lower-carbon intensity aviation fuels.

RCW 28B.30.646[15] requires Washington State University to convene an alternative jet fuels work group and provide three reports to the Legislature, publishing one every two years, through 2028. The first report, Sustainable Aviation Fuel Updates and Recommendations: Opportunities for Washington,[16] was published in December 2024 and contained the work group's information and updates, identified opportunities, and consensus recommendations (WSU 2024).

[13] https://app.leg.wa.gov/rcw/default.aspx?cite=70A.45.020
[14] https://www.commerce.wa.gov/energy-policy/state-energy-strategy/
[15] https://app.leg.wa.gov/RCW/default.aspx?cite=28B.30.646
[16] https://app.leg.wa.gov/ReportsToTheLegislature/Home/GetPDF?fileName=WA%20AJF%20Work%20Group%20Report%202024%2011%2027%2024_249d6525-6c9b-4cd3-a76f-1454cacd262c.pdf

In July 2023, the Legislature passed Senate Bill 5447[17] to promote the SAF industry in Washington. This legislation added SAF to the portfolio of fuels overseen by Washington State Department of Commerce's Office of Renewable Fuels.

The legislation also required that one or more carbon intensity pathways for SAF be included in the state's Clean Fuel Standard (CFS).[18] The CFS aims to curb carbon pollution from transportation, the largest source of greenhouse gas emissions in Washington, by reducing these emissions from the production and supply of transportation fuels. The CFS will provide an increasing range of low-carbon and renewable alternatives that reduce dependency on petroleum and improve air quality. The law requires fuel suppliers to gradually reduce the carbon intensity of transportation fuels to 45% below 2017 levels by 2038.

Instead of sustainable aviation fuel, the CFS uses the term "alternative jet fuel." This term is defined in the CFS as:

> A fuel that can be blended and used with conventional petroleum jet fuels without the need to modify aircraft engines and existing fuel distribution infrastructure, and that have a lower carbon intensity than the applicable annual carbon intensity standard in Table 2 of WAC 173-424-900, as it existed on July 1, 2023. Alternative jet fuel includes jet fuels derived from coprocessed feedstocks at a conventional petroleum refinery.[19]

Washington uses the business and occupation (B&O) tax as a primary source of revenue. The B&O tax is applied to the gross income of businesses operating within the state (DOR 2025 [1]). In 2023, with passage of Senate Bill 5441,[20] the Legislature established a preferential B&O tax rate of 0.275% for the production and wholesale of SAF. The legislation also included the creation of a tax credit set at $1 per gallon of SAF that has at least 50% less carbon dioxide equivalent emissions than conventional jet fuel. This credit increases by $0.02 for each additional 1% reduction in emission, capping at $2 a gallon (DOR 2025 [2]).

2.2 Development of SAF

This section presents a high-level overview of the development of SAF. It provides information about the common elements for most feedstocks and production pathways and an overview of blending and distribution infrastructure (see Figure 2).

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[17] https://lawfilesext.leg.wa.gov/biennium/2023-24/Pdf/Bills/Session%20Laws/Senate/5447-S.SL.pdf?q=20250915103121

[18] https://ecology.wa.gov/air-climate/reducing-greenhouse-gas-emissions/clean-fuel-standard#:~:text=In%20Washington%2C%20the%20Clean%20Fuel,below%202017%20levels%20by%202034.

[19] https://app.leg.wa.gov/RCW/default.aspx?cite=70A.535.010

[20] https://lawfilesext.leg.wa.gov/biennium/2023-24/Pdf/Bills/Senate%20Passed%20Legislature/5447-S.PL.pdf?q=20230502125608

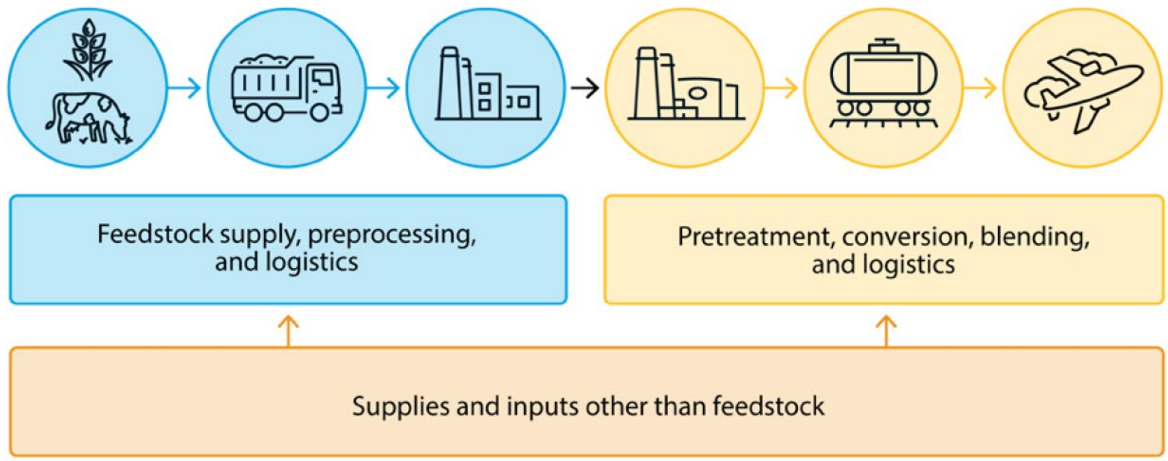

Figure 2: Development of SAF (adapted from NREL 2024)

2.2.1 Feedstocks

Feedstocks are the raw materials used to create SAF. Examples of potential feedstocks include lipids, like vegetable oils, used cooking oils, and animal fats; biomass; municipal solid waste and other waste streams. The blue part of Figure 2 involves the supply, preprocessing, and logistics of feedstock, which includes generating, collecting, and transporting raw feedstock to a preprocessing facility. The type of feedstock depends on the SAF production pathway. Feedstocks are collected from the location where they are generated, which may be widely distributed, then transported to a preprocessing facility. Feedstocks need to be processed before production of SAF begins. For example, seed oil crops are transported from farms to a preprocessing facility that crushes the crops to extract vegetable oil.

Feedstock logistics are an important consideration when evaluating environmental impacts, particularly for less dense feedstocks, such as woody biomass and agricultural waste. Some materials could come from multiple locations or need to be transported over large distances. This can vary widely for each production pathway. Transportation impacts will be considered in the PEIS analysis. Only SAF produced from feedstocks coming from U.S., Canada, or Mexico are eligible for the federal Clean Fuel Production Credit. This will be considered in determining the scope of the PEIS.

The yellow part of Figure 2 involves transporting the preprocessed feedstock to a fuel facility for upgrading into fuels and distributing the fuel. This includes storage, blending, and transporting it to aircraft. Blending may be done near the production facility or closer to where the SAF is used. Distribution includes transporting the fuel and this could be done by rail, vessel, truck, or pipeline.

The bottom part of Figure 2 indicates that production of SAF requires additional supplies and inputs other than feedstock. These may include fertilizers, catalysts, consumable chemicals (hydrogen, nitrogen, acids, and bases), utilities (electricity and natural gas), and adsorbents. These supplies and inputs would be specific to the production pathway and the associated supply chain.

2.2.2 SAF production pathways

SAF may be produced at biorefineries, existing petroleum refineries, or industrial facilities. Refineries typically have available infrastructure used for producing and transporting petroleum-based jet fuel and this could also be used for SAF, though some modifications will likely be needed.

ASTM International sets the international standard for jet fuel quality called ASTM Specification D7566, *Standard Specification for Aviation Turbine Fuel Containing Synthesized Hydrocarbons* (ASTM International 2025 [1]). This is for non-petroleum-based jet fuel. Meeting this standard means that the fuel is safe to blend with petroleum jet fuel to meet ASTM D1655 specifications and use in aircraft (ASTM International 2025 [2]).

There are 11 ASTM International approved processes that convert a feedstock into pure SAF (see Table 1). These processes are known as SAF production technologies. These technologies, combined with a specific feedstock, are termed production pathways. Additional technologies, including pyrolysis to jet (PtJ), are being considered and are under review (CRS 2025).

Table 1: ASTM International approved SAF technologies for production

SAF Technologies	Feedstocks	Chemical Process
Hydroprocessed Esters and Fatty Acids – Synthetic paraffinic kerosene	Oil-based feedstocks, including plant or animal oils, grease, waste fats	Treats feedstocks with hydrogen under high pressure and temperature to remove oxygen and impurities.
Hydrocarbon-Hydroprocessed Esters and Fatty Acids - Synthetic paraffinic kerosene	Oil from algae	Treats feedstocks with hydrogen under high pressure and temperature to remove oxygen and impurities.
Fats, Oils, and Greases Co-Processing	Fats, oils, and greases (new or used)	Refines feedstocks using high temperature and pressure.
Hydroprocessed fermented sugars to synthetic isoparaffins	Sugars from plants, pretreated waste fat, oil, and grease	Uses microbes to convert sugars to hydrocarbons.
Hydroprocessed biomass	Hydroprocessed fats, oils, and greases	Coprocesses hydroprocessed mono-, di-, and triglycerides, free fatty acids, and fatty acids (biomass) via fractionation.
Alcohol-to-Jet synthetic paraffinic kerosene	Sugar/starch biomass, cellulosic biomass	Converts alcohol through a series of chemical reactions.
Alcohol-to-Jet synthetic paraffinic kerosene with aromatics	Alcohols (ethanol, isobutanol)	Modified Alcohol-to-Jet process that produces both paraffins and aromatics.
Fischer-Tropsch Synthetic Paraffinic Kerosene	Municipal solid waste, agricultural and forest waste, wood, energy crops	Converts feedstock to syngas using gasification, then a Fischer-Tropsch synthesis reaction converts the syngas to jet fuel.

SAF Technologies	Feedstocks	Chemical Process
Fischer-Tropsch - Synthetic paraffinic kerosene with Aromatics	Municipal solid waste, agricultural and forest wastes, wood, energy crops	Converts feedstock to syngas using gasification, then a Fischer-Tropsch synthesis reaction converts the syngas to jet fuel. This process is similar to the process above.
Fischer-Tropsch Co-Processing	Biocrude	Converts biocrude through pyrolysis (heating without oxygen) and high-temperature, high-pressure processing in water.
Catalytic hydrothermolysis synthesized kerosene	Waste oils or energy oils	Converts feedstocks using a high-temperature, high-pressure process in the presence of water and a catalyst.

This scoping document focuses on the four production pathways identified by the U.S. Department of Energy as the most cited SAF production pathways (DOE 2024). These production pathways include:

- Hydroprocessed esters and fatty acids (HEFA)
- Alcohol to jet (AtJ)
- Fischer-Tropsch (FT)
- Power to liquid (PtL)

All four production pathways utilize different feedstocks and processes and have varying degrees of commercial readiness (see Figure 3). HEFA is the only production pathway that has been deployed at a commercial scale. The other SAF production pathways require additional research and development and need to complete successful demonstrations (DOE 2024).

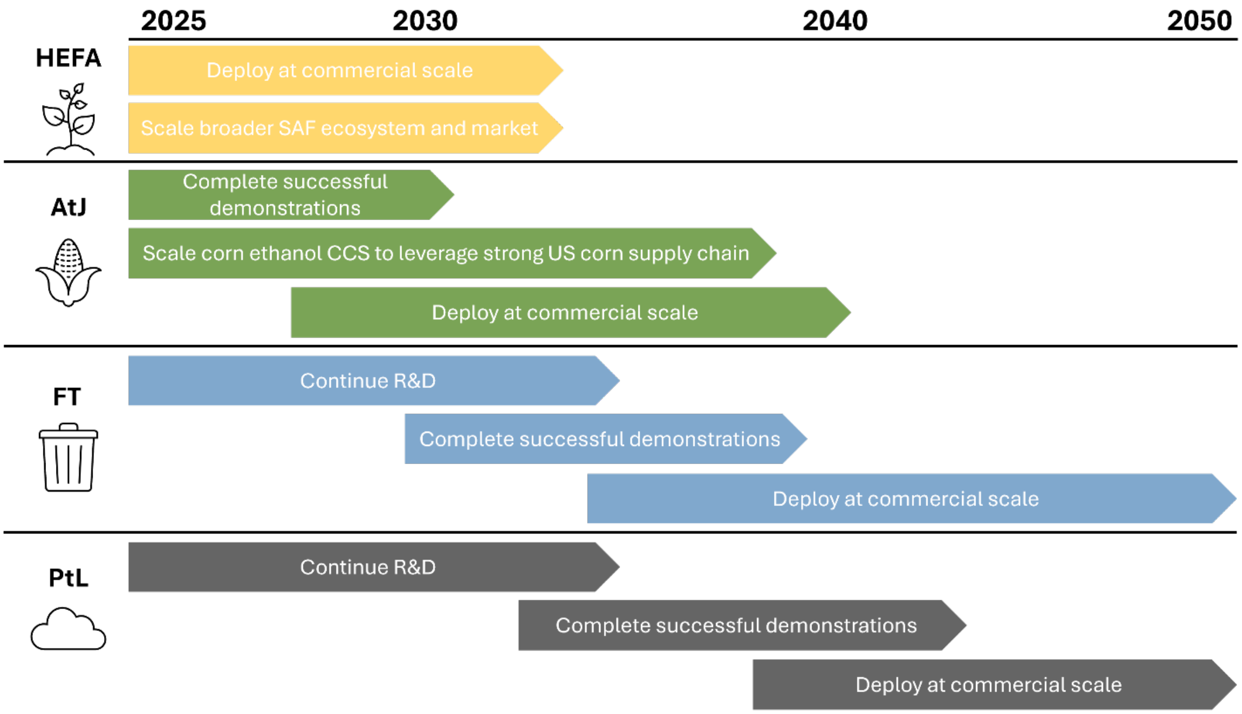

Figure 3: Timeline for potential commercialization of different SAF production pathways (adapted from DOE 2024); AtJ: alcohol to jet, CCS: carbon capture and storage, FT: Fischer-Tropsch, HEFA: hydroprocessed esters and fatty acids, PtL: power to liquid, R&D: research and development

Hydroprocessed esters and fatty acids (HEFA)

Waste fats, oils, and greases are feedstocks used in the HEFA process. These are treated with hydrogen under high pressure and temperature to remove oxygen and impurities. These are further treated to create SAF.

HEFA is the most mature SAF production pathway and is so far the only pathway deployed at commercial scale. Companies operating facilities using this production method in the U.S. include Chevron, Montana Renewables, and World Energy (DOE 2024).

A Washington State University and Port of Seattle study found that the amount of waste fats, oils, and greases available in the northwest U.S. is estimated to be at or near zero because they are already under long-term contracts. Without a steady feedstock supply in this region, this pathway would only be viable in the near term by sourcing feedstocks from other regions of the U.S. or overseas (WSU & PoS 2020). To be able to claim the Clean Fuel Production Credit for SAF, feedstocks would need to be sourced from the U.S., Canada, or Mexico.

Alcohol to jet (AtJ)

Plants can be converted to alcohols called ethanol and isobutanol through fermentation or using heat and chemicals. Commonly used feedstocks include corn and sugarcane. Agricultural and forestry waste can be feedstocks but are more complex and expensive to convert into alcohols, however they offer greater GHG emissions reductions. Water is removed from the alcohols before they are converted into a chemical known as an olefin. This is then treated further to create SAF.

Fischer-Tropsch (FT)

The Fischer-Tropsch process starts with the gasification of any carbon-containing material, using heat and chemicals to produce syngas. Syngas, or synthesis gas, is a fuel mixture consisting of hydrogen, carbon monoxide, and other gases. Then a synthesis reaction converts the syngas into SAF. Feedstocks include agricultural and forestry residues (woody biomass), municipal solid waste, as well as any carbon-containing material. This process has the greatest variety of suitable feedstocks.

In Washington, a proposal by SkyNRG is currently in the permitting process for a SAF production facility using Fischer-Tropsch with renewable natural gas as the feedstock at the Port of Walla Walla's Wallula Gap Industrial Business Park. Construction of the facility is expected to begin in 2026 with production in 2029. The facility will have the capacity to produce 50 million gallons of SAF and renewable diesel annually (SkyNRG 2025).

Power to liquid (PtL)

The power to liquid process combines captured carbon dioxide with hydrogen to produce syngas. The syngas is then further converted to make SAF, often using a Fischer-Tropsch process. The carbon dioxide is primarily obtained by capturing carbon at the source or from biomass. Direct air capture may become a viable alternative as soon as 2030 (DOE 2024). Using renewable energy and green hydrogen results in fewer greenhouse gas emissions. This process is not yet ASTM International approved, but is undergoing assessment.

In Washington, the company Twelve is currently finishing the construction of a power to liquid production facility named AirPlant One in Moses Lake, which is expected to begin production this year (2025). AirPlant One is expected to produce 50,000 gallons of SAF annually (Twelve 2025).

2.2.3 Blending

Currently, SAF must be blended with petroleum-based aviation fuel to be used by aircraft. It may be blended between 5% up to its maximum allowed blend ratio of 50%, depending on the conversion pathway (NREL 2024). The blending occurs at facilities with large storage tanks.

The National Renewable Energy Laboratory found that airports are unlikely to own or operate their own blending facilities. Therefore, blending facilities are likely to be located upstream of airports either at the production facility, a standalone blending facility, or at an existing refinery (NREL 2021).

2.2.4 Distribution

As a drop-in fuel replacement for conventional aviation fuel, blended SAF can be distributed in the same ways as conventional aviation fuel using pipelines, trucks, rail, and vessels. If the SAF replaces petroleum jet fuel, the need for infrastructure build-out may be minimal.

However, the capacity of petroleum fuel transportation infrastructure is already constrained at major airports across the United States and there is an increasing demand for aviation fuel (NREL 2024). If SAF is added to the existing capacity or if production and blending facilities are sited in locations away from the existing infrastructure, then new distribution pathways would be needed. This could include new pipelines, additional truck, rail, and vessel traffic, or new routes.

3 Scoping the SAF PEIS

3.1 Purpose and objectives

The PEIS will evaluate potential impacts and mitigation for SAF production pathways and blending and distribution infrastructure in Washington state. The PEIS could be used by the public, project applicants, Tribes, landowners and managers, and decision-makers as a source of information, along with other studies such as comprehensive plans, cost-benefit analyses, and health impact assessments. A PEIS does not approve or deny projects or evaluate specific sites.

The intent of the PEIS is to:

- Support the state's clean energy transition while protecting the environment, Tribal rights, interests, and resources, and local communities.
- Identify probable significant adverse environmental impacts at a broad level.
- Identify general potential mitigation measures for impacts.
- Provide information for SAF facility applicants to propose projects that avoid or minimize adverse environmental impacts.
- Provide information for lead agencies to consider when conducting environmental reviews for SAF facilities.

3.2 What will be studied (alternatives)

The Legislature directed Ecology to "provide one or more nonproject environmental impact statements for alternative jet fuel production pathways, including blending and distribution infrastructure." There is a broad range of production and blending facilities and distribution infrastructure that could be used in creating and moving SAF. The PEIS will focus on facilities and infrastructure that will be needed for SAF development in the next several years.

The types of SAF production pathways or infrastructure to be analyzed will be decided through the scoping process. We are seeking input on SAF production pathways, including types of feedstocks, to be evaluated and types of blending and distribution infrastructure to be evaluated. Production pathways studied could include new facilities or the modification of existing refineries. Distribution infrastructure studied could include rail, road, vessel, or pipelines.

As required by SEPA, the PEIS will include a No Action Alternative. The PEIS is a planning document, so under the No Action Alternative, city, county, and state agencies would continue to conduct environmental review and permitting for SAF facilities under existing state and local laws on a project-by-project basis without the use of a PEIS.

3.3 Geographic scope of study

The scoping phase looks statewide. The scope of the PEIS will be limited to the potential significant adverse environmental impacts in geographic areas that are suitable for SAF production pathways, including blending and distribution infrastructure. We may consider factors such as standard attributes for likely development and proximity to complementary facilities or existing infrastructure.

We are seeking input on assumptions to identify the geographic scope of study used for the PEIS analysis. After considering scoping input, Ecology will determine the geographic area of study and use it for the analysis in the Draft PEIS.

The PEIS will not approve, authorize, limit, or exclude projects on a site-specific basis. SAF projects could potentially occur on private, city, county, state, federal, or Tribal lands. In all cases, project developers would need to work directly with the landowner, land manager, or Tribes for individual projects.

Ecology will coordinate with state land managers to determine the state lands that could be included in the geographic scope. State parks will be excluded from the geographic scope. Federal lands determined to be suitable for SAF facilities will be included in the geographic scope of study.

For projects on Tribal reservation lands, each federally recognized Tribe would determine use of their lands. Ecology will not include Tribal reservation lands in the geographic scope of study unless requested to do so by a Tribe.

3.4 Evaluating impacts and mitigation in the PEIS

The PEIS will analyze probable significant adverse environmental impacts to the following resources:

- Tribal rights, interests, and resources
- Environmental justice
- Earth resources
- Air quality and greenhouse gases
- Water resources
- Biological resources (species and habitats)
- Energy and natural resources

- Environmental health and safety
- Noise and vibration
- Land use
- Aesthetics and visual quality
- Recreation
- Historic and cultural resources
- Transportation
- Public services and utilities
- Cumulative impacts

We are seeking input on potential impacts to environmental resources to analyze. “Impacts” are the effects or consequences of actions. The following three types of impacts will be evaluated in the PEIS:

- Direct effects, which are caused by the action and occur at the same time and place.

- Indirect effects, which are caused by the action and occur later in time or are farther removed in distance but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems including ecosystems.

- Cumulative effects, which are impacts on the environment that result from the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions.

We are seeking input on potential mitigation measures to consider. Under SEPA (Chapter 197-11-768 WAC), “mitigation” means:

- Avoiding the impact altogether by not taking a certain action or parts of an action.

- Minimizing impacts by limiting the degree or magnitude of the action and its implementation, by using appropriate technology, or by taking affirmative steps to avoid or reduce impacts.

- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.

- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.

- Compensating for the impact by replacing, enhancing, or providing substitute resources or environments.

- Monitoring the impact and taking appropriate corrective measures.

The PEIS will describe the analysis and methods used for evaluating impacts to each resource, impact findings, whether adverse environmental impacts would be expected to be significant or not, and mitigation measures. If an impact is not expected to be mitigable below a level of significance, it will be identified in the PEIS as a likely unavoidable significant adverse environmental impact.

Ecology will offer early and meaningful consultation with any affected federally recognized Tribes with lands and territories in Washington state on the PEIS for the purpose of understanding potential impacts to Tribal rights and resources, including Tribal cultural resources, archaeological sites, sacred sites, fisheries, or other rights and interests in Tribal lands and lands within which a Tribe or Tribes possess rights reserved or protected by federal treaty, statute, or executive order. Certain information obtained by Ecology under this section is exempt from disclosure, consistent with Chapter 42.56.300 RCW. Through formal consultation and informal engagement with Tribes, the PEIS will seek to reflect and incorporate the Tribes' perspectives of, values about, and relationships with aspects of the environment potentially impacted by SAF production pathways.

3.4.1 Cumulative impacts

SEPA requires consideration of how a project or projects could contribute to cumulative impacts from other developments over time. This analysis combines the potential effects of a project or projects with the effects of past, present, and reasonably foreseeable future actions.

The cumulative impacts analysis will be prepared in accordance with SEPA requirements (Chapter 197-11-060 WAC). It will also consider the federal Council on Environmental Quality approach for analyzing cumulative impacts. The following steps will be used:

- Identify the resources that could be adversely affected by SAF projects (see list at beginning of this section).
- Assess the current condition and historical context for each resource, including trends affecting the resource.
- Consider other actions in the same geographic study area for each resource.
- Consider other actions with effects during the same time period as effects from SAF projects, during both construction and operation.
- Analyze cumulative impacts using the best available data.

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