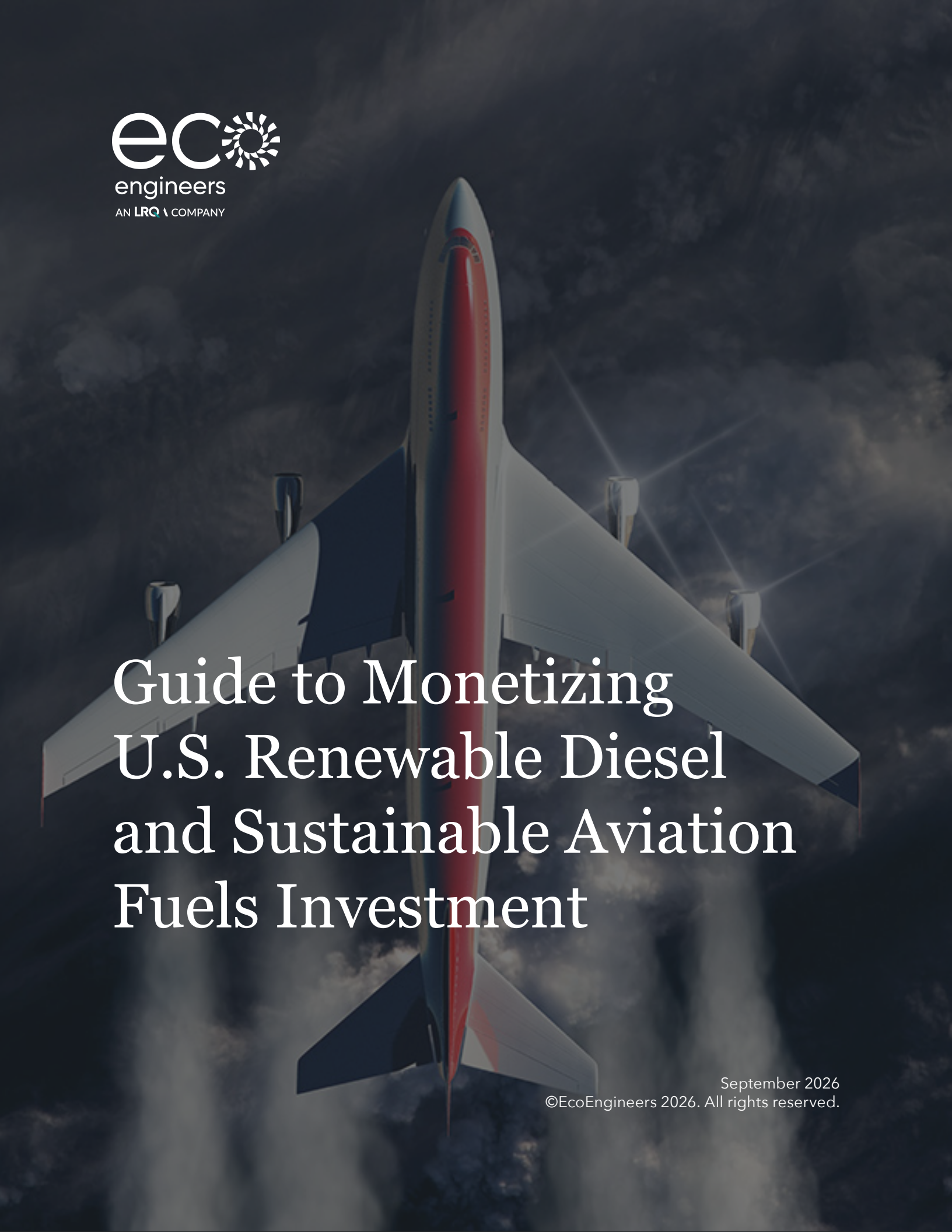


A high-angle, rear-view photograph of a large commercial airplane flying through a dark, cloudy sky. The plane is white with a prominent red stripe running down the center of its fuselage. The wings are spread wide, and the tail is visible at the bottom. The overall tone is dramatic and professional.

Guide to Monetizing U.S. Renewable Diesel and Sustainable Aviation Fuels Investment

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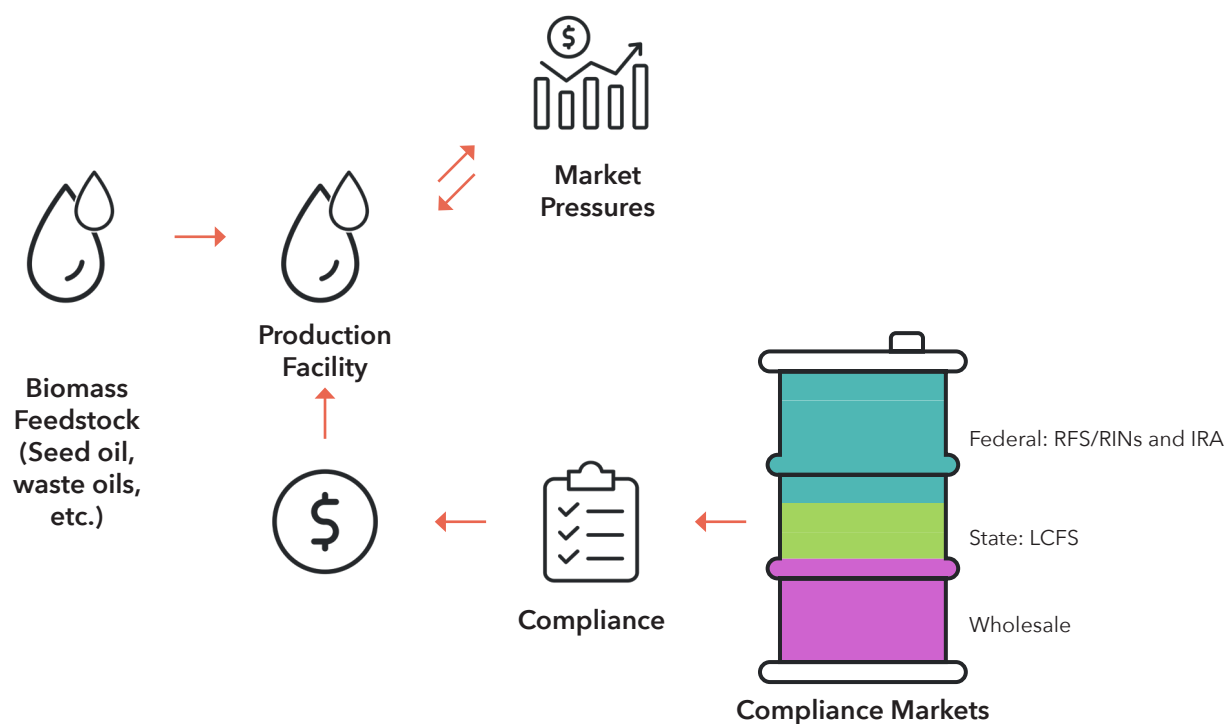
Unlocking the Potential Commercial Value for RD and SAF

Compliance-based programs operate within strict regulatory frameworks, playing a crucial role in financing and ensuring the long-term viability of low-carbon fuel projects. Success in these projects depends on integrating compliance requirements at every stage of development.

For renewable diesel (RD) and sustainable aviation fuel (SAF) projects, compliance spans the entire value chain – from feedstock sourcing and fuel production technology to transportation and end-use. Market dynamics such as feedstock availability, regulatory mandates, incentives, and corporate net-zero goals further influence project outcomes.

Project value under federal, state, or voluntary carbon market (VCM) programs is maximized through high greenhouse gas (GHG) savings and unlocked by meeting compliance requirements. Each program offers unique compliance hurdles and ultimately creates opportunities for revenue through program credits and incentives.

Shifts in supply and demand – such as increasing fuel consumption or a tighter supply of low-carbon fuels – can drive credit prices higher, boosting profitability. Additionally, evolving regulations, such as stricter emission standards, can increase demand for compliant fuels, further enhancing commercial viability and market opportunities.



Source: EcoEngineers

	Fuel Type	Feedstock	Production Process Requirements	D-code
H	Biodiesel, renewable diesel, jet fuel, and heating oil	Soy bean oil; Oil from annual covercrops; Oil from algae grown photosynthetically; Biogenic waste oils/fats/greases; Camelina sativa oil ; Distillers corn oil; Distillers sorghum oil; Commingled distillers corn oil and sorghum oil; Canola/Rapeseed oil	One of the following: Transesterification with or without esterification pre-treatment, Esterification, or Hydrotreating; includes only processes that co-process renewable biomass and petroleum	5 advanced

Source: Excerpt from USEPA Table 1 §80.1426

U.S. Regulatory Compliance Guide

Renewable Fuel Standard (RFS)

The RFS is a federal regulation established under 40 CFR 80 Subpart M of the Energy Policy Act of 2005 and expanded by the Energy Independence and Security Act of 2007. The program's goals are to replace a portion of fossil fuels used in U.S. transportation with biofuels, reduce U.S. dependence on foreign oil, and incentivize the development of advanced biofuels with a GHG reduction of 50% or more.

A low-carbon fuel producer can unlock the value of Renewable Identification Numbers (RINs) through the program if the facility falls under one of the U.S. Environmental Protection Agency's (USEPA) existing approved pathways for fuels based on prescribed combinations of fuel type, feedstock, and process technology.

Producers may prepare and submit a pathway petition if any of these characteristics do not align with the approved pathways. An example of an approved pathway can be found above. The final step for participation requires producers to complete an engineering review, then the USEPA must approve their registration.

Under the RFS, the USEPA requires obligated parties – refiners or importers – to blend specific volumes of renewable fuels into the transportation fuel supply. These Renewable Volume Obligation (RVO) requirements are based on a percentage of each obligated party's petroleum product sales and are categorized into four types: conventional biofuel, advanced biofuel, cellulosic biofuel, and biomass-based diesel.

Volume Targets (Billions RINs)		
	2026	2027
Cellulosic Biofuel	1.36	1.43
Biomass-Based Diesel	8.86	8.95
Advanced Biofuel	10.98	10.98
Total Renewable Fuel	25.82	25.98

Source: USEPA

Obligated parties can meet their RVOs by producing renewable fuels or by purchasing tradeable RINs. The USEPA sets RVO targets through a regulatory process, which is historically on an annual basis, though recent rulemakings have adopted a multi-year approach. In 2025, the USEPA proposed and approved revisions to the RFS, including RVOs for 2026 and 2027, as well as updated feedstock requirements.

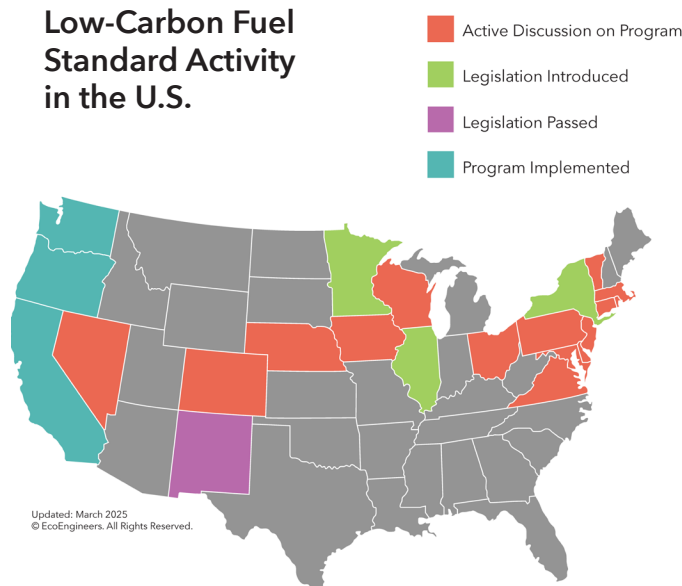
Lastly, it is strongly encouraged that renewable fuel producers, especially foreign entities and entities with complex feedstock supply chains or foreign feedstock, enroll in a Quality Assurance Program (QAP). This helps ensure their low-carbon fuel complies with the RFS regulation and prevents fraudulent activities.

State: LCFS/Tax Incentives

Several U.S. states have implemented low-carbon fuel standard (LCFS) programs to reduce their GHG emissions, but California remains by far the largest market with its program, the California Low Carbon Fuel Standard (CA-LCFS).

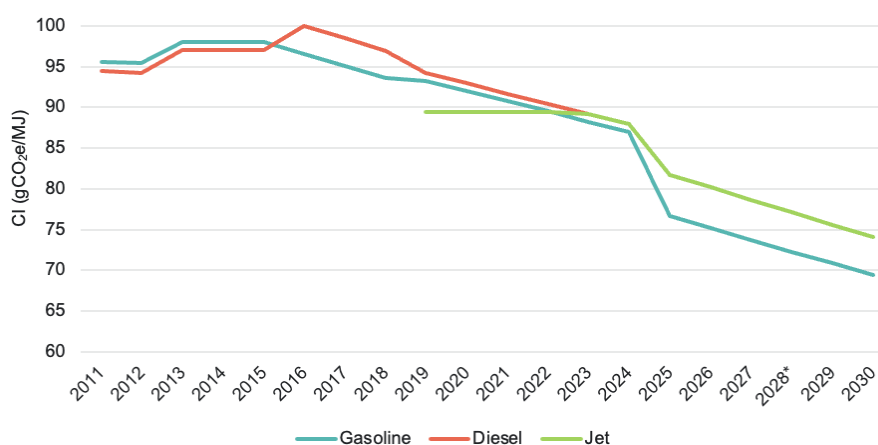
California initiated its landmark program in 2009 under the Assembly Bill 32 Scoping Plan. The CA-LCFS was designed to decrease the transportation fuel pool's carbon intensity (CI) by 20% by 2030, reduce petroleum dependency, and achieve air quality benefits. In 2025, the reduction goals were increased due to the program's success. The updates included a 9% CI reduction step-down in 2025 and an increase in the reduction target for transportation fuel from 20% to 30% by 2030, aiming for a 90% reduction by 2045, with a 20% cap on biomass-based diesel credits from soy, canola, and sunflower feedstocks.

Low-Carbon Fuel Standard Activity in the U.S.



Source: EcoEngineers

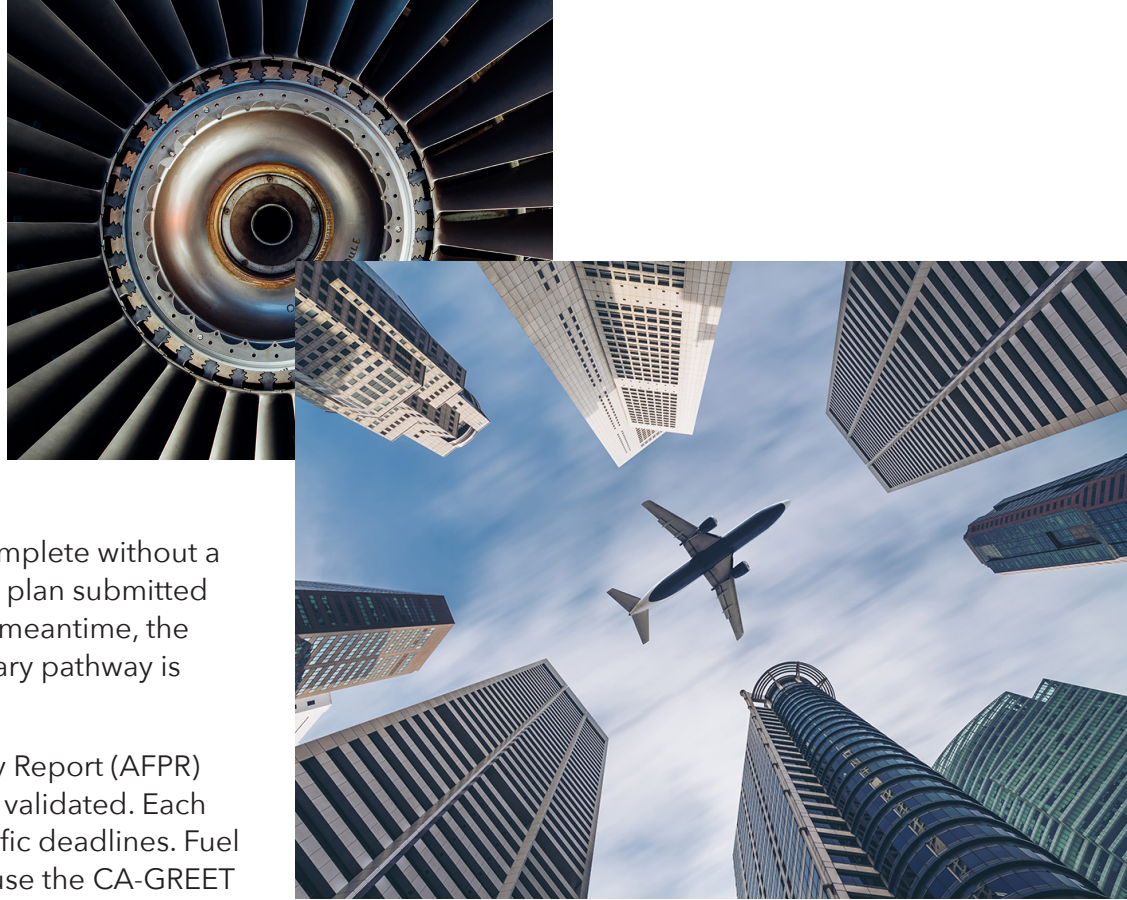
CA-LCFS CI Compliance Curve through 2030



Source: California Air Resources Board

Each producer participating in the CA-LCFS must apply for their own pathway. The process can be initiated after three months of continuous operations, and an application is not complete without a compliance monitoring plan submitted within two years. In the meantime, the option to use a temporary pathway is available.

An Annual Fuel Pathway Report (AFPR) must be submitted and validated. Each report activity has specific deadlines. Fuel pathway holders must use the CA-GREET 4.0 model for new AFPRs.



U.S. Inflation Reduction Act (IRA) and the One Big Beautiful Bill Act (OBBBA)

The IRA is a federal program that was originally introduced in 2022 and amended in 2025 using the OBBBA. The remaining Section 45Z Clean Fuel Production Credit provides tax credits for implementing clean energy solutions. 45Z is a technology-neutral tax credit for domestic production of clean transportation fuels, including SAF, beginning in 2025 and expiring in 2029. Only producers located in the U.S. are eligible for these tax credits. Additional credit is available if prevailing wage and apprenticeship (PWA) requirements are met, and it is adjusted annually for inflation.

Voluntary Carbon Market (VCM)

The VCM refers to various voluntary schemes or registries for trading carbon credits outside the regulated markets, including transactions of fuels and products outside of regulatory frameworks. Carbon emission removal and reduction projects, like those producing RD and SAF, generate credits that can be sold to other companies seeking to achieve their sustainability goals, reduce their carbon footprint, and meet environmental, social, and governance (ESG) objectives. Factors like feedstock type, geography, project scale, and market demand influence a project's revenue-earning potential.

Additional State SAF Incentives

State SAF credits are vital to increase adoption of the fuel. SAF is not currently a regulated fuel in LCFS programs in California, Washington, and Oregon. So, SAF produced, sold, or blended for use as aircraft fuel in the state may generate credits, but there is no obligation to use it. Also, the value of LCFS credits fluctuates based on program performance. The below table shows how new state-level tax credit programs compare.

Basic Credit Value	Washington	Illinois	Nebraska	Minnesota
	\$1.00/gal	\$1.50/gal	\$0.75/gal	\$1.00/gal
GHG Reduction Requirement	50%	50%	50%	50%
Max Credit Value	\$2.00/gal, +2 cents per additional 1% GHG reduction	None (flat \$1.50/gal)	\$1.25/gal, +1 cent per additional 1% GHG reduction	\$2.00/gal; +2 cents per additional 1% CI reduction (SAF sold after June 30, 2025)
Duration	Not yet triggered; nine years after the Department of Ecology verifies 20 M gal/yr in-state capacity	July 1, 2023 – December 31, 2032	Tax years 2027-2034; max five tax years per producer	SAF sold July 1, 2024 – June 30, 2035
Feedstock Requirement Restrictions	None specified; co-processed fuel eligible; CI scored under the state's Clean Fuels Standard	Biomass (domestic biomass only from June 1, 2028), waste, renewable energy or gaseous carbon oxides; no palm	Biomass (26 USC 45K Code); no palm and co-processed SAF	U.S.-produced biomass (agricultural land cultivated pre-December 19, 2007), gaseous carbon oxides or low-CI hydrogen; no palm fatty acid distillates
Credit Volume Limitations	None	10 M gal/yr of soybean oil feedstock (all carriers, calendar year)	\$500,000 per fiscal year, all producers (approx. 0.4-0.67 M gal)	\$36.9 M total FY25-FY35; \$2.1 M/yr FY29-35 (approx. 1.4 M gal/yr); unused rolls forward
SAF Sale Requirements	Purchaser credit for fuel used on flight departing the state; producer credit limited to counties under 650,000 population	Credit to air common carrier; SAF certified for use in state; offsets 6.25% state use tax; non-transferable	Producer income tax credit; qualified mixture produced and fueled in the U.S.; producer registered with Nebraska Department of Revenue	Credit to in-state producer or blender (not both); sold in state for flights departing a Minnesota airport

Source: EcoEngineers

Summary

Strict adherence to regulations is crucial to the success of RD and SAF projects. Staying updated on and complying with federal and state policy requirements is imperative. The value of RD and SAF is directly tied to the carbon market, where even 99% compliance equates to 100% non-compliance, ultimately nullifying the expected value. Engaging early with experts like EcoEngineers can provide valuable support in project development, financial assessments, and regulatory guidance. Companies and investors can optimize incentives and credits by proactively engaging with governments early in project development and continuing regular engagement, ensuring long-term success in the low-carbon fuel market.

Acronyms and Definitions

Advanced Biofuel	Any fuel derived from cellulosic or advanced feedstocks. This may include sugarcane or sugar beet-based fuels; biodiesel made from vegetable oil or waste grease; renewable diesel co-processed with petroleum; and other biofuels that may exist in the future. Fuels in this category must demonstrate a life-cycle GHG emissions reduction of 50%.
AFPR	Annual Fuel Pathway Report
BBD	Biomass-based diesel; A diesel fuel substitute made from renewable feedstocks, including biodiesel and non-ester renewable diesel. Fuels in this category must demonstrate a life-cycle GHG emissions reduction of 50%.
CARB	California Air Resources Board
Cellulosic Biofuel	Any fuel derived from cellulose, hemicellulose, or lignin–nonfood-based renewable feedstocks. Fuels in this category must demonstrate a life-cycle GHG emissions reduction of at least 60%.
CFR	Code of Federal Regulations
CI	Carbon Intensity
Conventional Biofuel	Any fuel derived from starch-based feedstocks (e.g., corn and grain sorghum)
D-Code	A code that identifies the type of RIN to be generated based on the renewable fuel type, feedstock used, and percentage of GHG reduction.
ESG	Environmental, social, and governance
GHG	Greenhouse gas
IRA	Inflation Reduction Act of 2022
LCFS	Low Carbon Fuel Standard
LCA	Life Cycle Assessment
OAL	Office of Administrative Law
Obligated Parties	Any refiner that produces or imports gasoline or diesel fuel into the U.S. An obligated party is required to demonstrate that it has satisfied all RVO requirements.
PWA	Prevailing wage and apprenticeship requirements
QAP	Quality Assurance Program
RFS	Renewable Fuel Standard
RIN	Renewable identification number; A unique number generated when a volume of renewable fuel is produced or sold for transportation use in the U.S. Each RIN is a “credit” and is assigned monetary value based on the market.
RVO	Renewable volume obligation
USEPA	United States Environmental Protection Agency

For more information, please contact clientservices@ecoengineers.us.