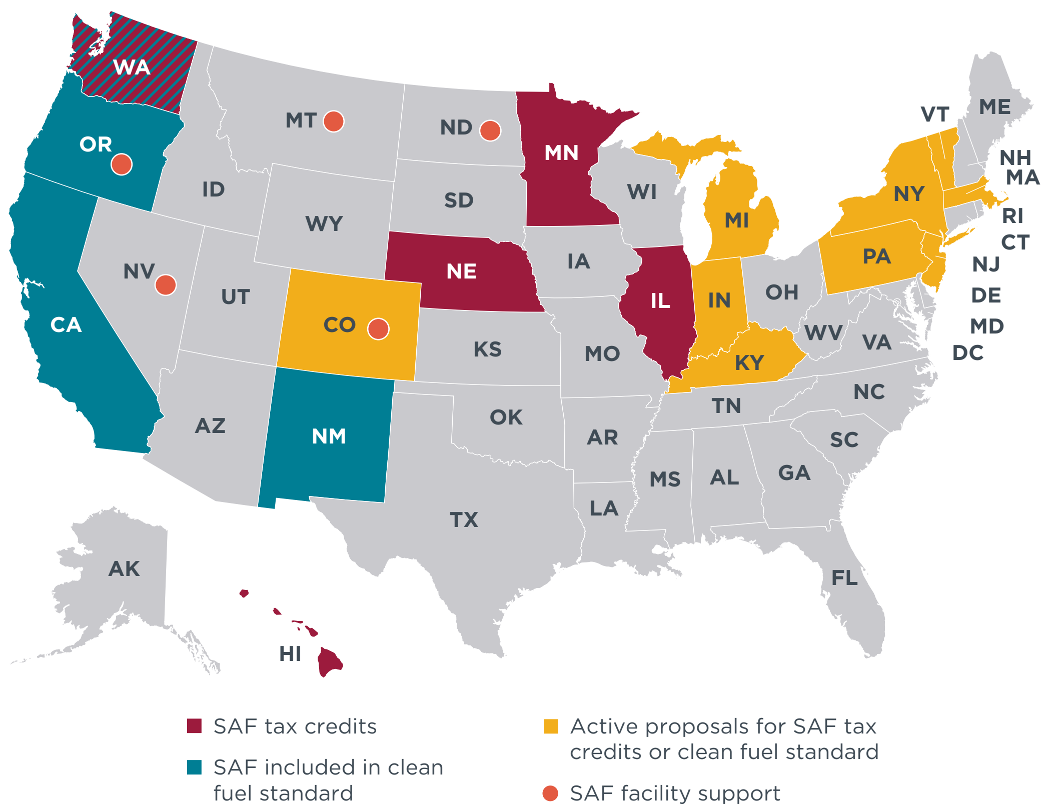
NOVEMBER 2024

Making the grade: Ranking state-level SAF policies in the United States

Policies aimed at promoting sustainable aviation fuel (SAF) vary considerably across states. To see how they stack up, we graded each policy on its ability to support long-term decarbonization targets, implement sustainability safeguards, and equitably use state funding.

State	Grade
California	**B**
Washington	**B**
Nebraska	**C+**
Oregon	**C+**
Illinois	**C**
Minnesota	**D**
Hawaii	**D-**



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INSIGHTS FROM EXISTING SAF POLICIES

- » Policies such as those in California, Oregon, and Washington—which link the value of SAFs to greenhouse gas (GHG) reductions and extend beyond a 10-year horizon—are most likely to spur investment in advanced low-carbon SAF production facilities.
- » Some state SAF subsidies run the risk of shuffling the limited supply of low-carbon fuels and fuel feedstocks from other states or the road sector to aviation, which will not lead to a net reduction in GHG emissions. These policies may also increase the demand for using food oils for fuel. Caps on these types of fuels, such as Illinois' limit on using soybean oil to receive SAF credits, are the most straightforward way to avoid this outcome.
- » Nebraska's focus on in-state fuel production can help ensure that its SAF policy benefits the local economy. A greater focus on reducing the risk of investing in advanced SAF technologies at the local level may be an effective way for state policies to contribute to long-term aviation decarbonization.
- » All current federal and state SAF policies rely on a "carrot-only" approach of subsidizing SAF without penalizing the use of fossil jet fuel.

There are many types of SAF; effective policies take this into account. Sustainable aviation fuels are essential to decarbonizing the aviation sector, but can vary widely in scalability, cost, GHG savings, and technology readiness. As illustrated in the following figure, fuels offering the greatest potential for deep decarbonization have yet to be deployed at a commercial scale.

Key characteristics of relevant SAF pathways in the United States

2023 Jet fuel consumption
25.1 billion gallons
Fossil CI: 89g CO_2e/MJ

GHG reduction %
100 50 0

Fuel pathway	Domestic supply potential (billion gallons/year)	Carbon intensity (g CO_2e/MJ)	Estimated production cost ($/gallon) (Low – **Median** – High)	Technology readiness
Waste oil HEFA	1.3	17.9	$3.03 – **$4.06** – $6.62	Proven commercial operation
Soybean oil HEFA	0.7–2.7	64.9	$4.16 – **$5.16** – $5.28	
Corn grain alcohol-to-jet	6.9	77.9	$3.03 – **$6.68** – $7.62	First of a kind commercial
Municipal solid waste gasification	1.4	5.2	$2.64 – **$4.07** – $6.19	Pre-commercial demonstration
Agricultural residue gasification	4.9	7.7	$5.45 – **$7.95** – $8.22	
Other second-generation feedstocks	3.9	-22 to 29	$5.44 – **$7.41** – $11.41	
Power-to-liquids	15+	2.4	$6.35 – **$8.21** – $12.40	Full prototype at scale

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- Turning used cooking oil and other waste oils into SAF is a commercially mature and relatively cheap process, but supplies of waste oil feedstocks are limited and already being used in the road sector. Imported feedstocks carry a significant risk of being fraudulently mislabeled as waste oil.
- Crop-based feedstocks such as corn ethanol and soybean oil offer minimal GHG reductions in part due to indirect land use impacts. Diverting these commodities to fuel production leads to an expansion of farmland in sensitive forested regions around the globe, canceling most of the GHG benefit of using these fuels.
- Advanced scalable SAF pathways—such as producing power-to-liquid fuels from renewable electricity—are at an early stage of technology development and need significant support to help drive down costs. As with the early development of wind and solar energy and electric vehicles, policies that enable the demonstration and improvement of these technologies can have an outsized impact on long-term GHG reductions.

RECOMMENDATIONS FOR NEW AND UPDATED STATE-LEVEL SAF POLICIES

We find that some state-level SAF policies favor existing, commercialized technologies, which risks shuffling existing fuel and feedstocks among states and diverting these fuels from the road sector without necessarily motivating new, additional SAF production. To avoid this outcome, we recommend that states focus on enabling the local deployment of advanced low-carbon SAF technology while maintaining sustainability safeguards. With this in mind, we suggest that states prioritize the following principles of SAF policy design:

Prioritize second-generation pathways and deep GHG reductions. Feedstocks suitable to present-day SAF technology can only meet a small fraction of jet fuel demand. To fully decarbonize aviation, policies must enable the deployment of less mature but scalable SAF pathways.

Certainty is key for investment. Advanced SAF production facilities require high levels of upfront investment and significant planning. To influence investment decisions, policies need to be locked in place such that investors can be sure policy support will cover the period of project design, construction, and fuel production.

Establish binding policies to drive long-term SAF deployment. Uncertainty regarding the level of future demand for fuels with high production costs is a major barrier to investments in advanced SAF technology and facilities, as producers may struggle to find reliable long-term customers for their fuels. Policies that ensure a continued growth in demand for low-carbon SAFs are most likely to enable continued progress in aviation decarbonization. Likewise, carbon taxes or other policies that put a price on aviation emissions can create market signals for fossil fuel alternatives and narrow the price gap with SAF.

PUBLICATION DETAILS

Title: *SAF policy scorecard: Evaluating state-level sustainable aviation fuel policies in the United States*

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Download link: theicct.org/publication/saf-policy-scorecard-us-nov24

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