



November 1, 2023

VIA EMAIL: SAFSupplyChainRFI@ee.doe.gov

Re: DOE Request for Information: Sustainable Aviation Fuel Grand Challenge: Building Supply Chains (DE-FOA-0003157)

The Renewable Fuels Association (RFA) appreciates the opportunity to submit these comments in response to the U.S. Department of Energy's (DOE) request for information (RFI), "Sustainable Aviation Fuel (SAF) Grand Challenge: Building Supply Chains."

RFA is the leading trade association for America's ethanol industry. Its mission is to drive growth in sustainable renewable fuels and bioproducts for a better future. Consistent with our mission, RFA supports the SAF Grand Challenge that is being implemented by the DOE, the U.S. Department of Agriculture and the Department of Transportation to decarbonize the aviation industry.

One of the most promising forms of SAF involves the conversion of ethanol to jet fuel (ETJ). Ethanol is by far the largest-volume biofuel produced in the U.S, with output of nearly 16 billion gallons per year, and its advantages include cost-competitiveness and significant greenhouse gas (GHG) savings.

Efficiency of the Ethanol Supply Chain

The ethanol supply chain is highly efficient. On the raw material side of the supply chain, corn is the primary feedstock used in the manufacture of ethanol, and the production, storage and transportation of corn have evolved over decades. There has been tremendous investment in seed corn technology and on-farm grain storage capacity over roughly the last 25 years. This expanded storage capacity complements a network of local and terminal elevators that have existed and adapted over time.

On the fuel side, ethanol is produced mainly in the Midwest, but it is transported nationwide and blended with gasoline downstream at terminals for distribution to retail stations. The vast majority of gasoline sold in the U.S is E10, a blend containing 10% ethanol.

Ethanol production facilities in corn-growing areas often receive a substantial share of their feedstock directly from farmers, with additional quantities sourced from grain elevators. Farmers typically deliver corn by truck, while elevators can ship by truck or rail, depending on their location relative to ethanol plants. It is

estimated that 70-75% of fuel ethanol shipments take place by rail, with most of the remainder occurring by truck and a modest share by barge.¹

Rail transportation is highly efficient. Unit trains, which often consist of 100 or more railcars carrying the same product (e.g., corn or ethanol), have become commonplace for long hauls. Truck transportation makes use of the extensive network of state and interstate highways in the U.S. Although a minority of ethanol facilities has access to navigable waterways, barge is a cost-effective mode of transportation given the large volumes involved in a single shipment, and it is an important means of supplying facilities and markets along the Gulf Coast.

The Role of the Supply Chain in Decarbonization

As noted in the RFI, “The goals of the SAF Grand Challenge are to (a) achieve production of 3 billion gallons per year of domestic sustainable aviation fuel with a minimum 50% reduction in life cycle greenhouse gas emissions (GHG) compared to conventional fuel by 2030, and (b) produce sufficient sustainable aviation jet fuel to meet 100% of projected jet fuel use, or 35 billion gallons of annual domestic production, by 2050.”

Ethanol already cuts GHG emissions by 44-52% compared to gasoline, and the carbon intensity (CI) of ethanol has been reduced significantly in recent years.² Moreover, in July 2021, RFA’s renewable fuel producer-members unanimously committed to achieving substantial additional decarbonization goals:

- By 2030, ensuring that ethanol reduces average GHG emissions by at least 70% when compared to traditional fossil-based gasoline.
- By 2050, ensuring that ethanol achieves an average net-zero lifecycle GHG emissions.³

There are multiple pathways by which this can be achieved.⁴ However, reaching the 50% reduction in life cycle GHG emissions targeted in the SAF Grand Challenge adds a layer of complexity in the near term because of the additional processing involved in converting ethanol to jet fuel.

Perhaps the largest single step that can be taken to reduce the carbon footprint of ethanol and, by extension, ETJ is the capture and sequestration of the highly pure stream of carbon dioxide that is produced during the fermentation of ethanol. According to a blog by the DOE’s Bioenergy Technologies Office, carbon capture and sequestration (CCS) can reduce the CI of ETJ by approximately 34 g

¹ <https://dr.lib.iastate.edu/entities/publication/85f1c109-f222-497f-b825-d09951347434>

² <https://doi.org/10.1002/bbb.2225>

³ <https://ethanolrfa.org/pledge>

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<https://d35t1syewk4d42.cloudfront.net/file/2146/Pathways%20to%20Net%20Zero%20Ethanol%20Feb%202022.pdf>

CO₂e/MJ, or 48%.⁵ The blog noted, “Since CO₂ from the corn fermentation unit is the CO₂ uptaken from the air by corn plants in the cornfield, capture and injection of the fermentation CO₂ into geologic formations may generate a significant GHG credit, causing net GHG emissions of ETJ to be negative.”

A handful of pipelines to transport and sequester carbon dioxide from ethanol plants (and other industrial facilities) have been proposed in the Midwest, with the two largest being Summit Carbon Solutions and Navigator CO₂ Ventures. However, after the South Dakota Public Utilities Commission denied Navigator's application for a construction permit, the company announced that it would cancel the project.⁶ The Summit pipeline and smaller projects by ADM/Wolf Carbon Solutions and Tallgrass Energy are still moving forward, as are onsite CCS projects at individual ethanol facilities, but coordinated opposition by environmental groups and resistance by some landowners has the potential to severely limit the rollout of CCS.

Whereas the supply chains for ethanol and corn are highly efficient, it is an emerging supply chain—the one for carbon dioxide—that might present the most significant barrier to the scaling and commercial buildout of ETJ qualifying for the SAF Grand Challenge (and Inflation Reduction Act credits) in the near term. Environmental considerations and the rights and opinions of landowners need to be respected in the development of CCS projects, but a more comprehensive and coordinated approach to the consideration of such projects could help promote workable solutions and allow the adoption of this critical means of decarbonization.

In our view, the single most important step DOE can take to help facilitate the development of SAF supply chains (and achievement of the SAF Grand Challenge) is to help promote and advance emerging CCS projects. Specifically, RFA believes DOE should consider launching a public-private initiative with industry focused on educating the public, state and local government officials, community leaders, landowners, and other stakeholders about the important economic and environmental benefits of CCS.

Conclusion

Thank you again for the opportunity to provide these comments in response to the RFI related to the SAF Grand Challenge. Please do not hesitate to contact me at srichman@ethanolrfa.org or (314) 330-4786 if you should have questions or wish to discuss these comments.

Sincerely,

Scott Richman
Chief Economist

⁵ <https://www.energy.gov/eere/bioenergy/articles/sustainable-aviation-fuels-low-carbon-ethanol-production>

⁶ <https://navigatorco2.com/press-releases/heartland-greenway-project-update>