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***Sustainable  
Aviation Fuel  
Emerging  
Trends***

## Appendix K

### Sustainable Aviation Fuels Emerging Trends

Like other forms of transportation, aviation is working to become more sustainable; however, it has different challenges from modes of surface transportation due to the enormous energy required to fly heavy aircraft long distances. One promising solution that has already been implemented in the industry is the use of sustainable aviation fuels (SAFs). These fuels can power turbine-powered propeller driven aircraft, turbine-powered rotary wing aircraft, jet-engine aircraft, and piston-engine aircraft powered by diesel fuels. Unlike traditional aviation fuels, which are petroleum-based and produce carbon dioxide (CO<sub>2</sub>) and greenhouse gas (GHG) emissions, SAFs are produced using biomasses. Biomass sources include waste oil and fats, greases, algae, agricultural and forestry residues, municipal waste, manures, wastewater treatment sludge, and non-food dedicated crops. The Florida Department of Transportation Aviation Office (FDOT AO) is uniquely positioned to help further the advancement and promotion of SAFs in Florida. This summary provides background on SAFs as well as challenges and next steps associated with implementation. How SAF use can affect Florida’s aviation system and users, as well as recommended actions for the FDOT AO to support its airports and users, are also presented.

#### Background

SAF is like traditional jet fuel; however, its use reduces CO<sub>2</sub> emission by up to 80 percent. In addition to the environmental benefits of reduced emissions, using SAFs can improve the performance of turbine- and jet-aircraft engines because SAFs contain fewer aromatic components and burn cleaner during combustion. In addition, SAF is a “drop-in” replacement for existing fuels, meaning that no modifications to engine elements are needed.

Commercial air carriers began to incorporate the use of SAFs in 2008. Since then, airlines have operated commercial flights using SAF fuel blends that include up to 50 percent biomass product. The continued demand for SAF fuels has led to the development and implementation of policies to not only regulate their use, but also to ensure that ecological balances in producing biomasses avoid a subsequent depletion of natural resources for their production. Fuel manufacturers, industry trade groups, air carriers, and aviation and environmental regulatory agencies have initiated policies and procedures to address the demand for the increased production, distribution, and use of SAFs; however, further advancement of these initiatives is needed as the demand for SAFs continues to grow.

#### Challenges and Next Steps

In September 2022, the United States Department of Energy (DoE) released the SAF Grand Challenge Roadmap, which identifies an approach for the DoE to work with industry stakeholders to reduce the cost, enhance the sustainability, and expand the production of SAF. The goals of this plan are to:

- Achieve a minimum of a 50 percent reduction in GHG emitted by aircraft by 2030.
- Increase production of SAFs to meet 100 percent of industry demand by 2050.

Achieving these goals will be challenging. The most significant challenge is associated with the shortfall in available biomass to meet the demand for its use in all sustainable energy production needs. In addition to SAFs, biomasses are in demand to produce other forms of sustainable energy including renewable diesel and energy to power homes, businesses, and industries. In the United States, approximately 1 billion dry tons of biomass is potentially available each year. If used solely to produce SAFs, this biomass supply could produce 50-60 billion gallons of fuel, enough to meet the 26 billion gallons in demand that was estimated to be needed in 2019; however, only 3 million gallons of SAF was produced in the United States 2019 due, in part, to biomasses being used for other higher demand sustainable energy producing needs. Sustainably producing a sufficient volume of biomass is also a challenge. To address this challenge, the aviation industry and the agricultural industry have forged partnerships to research and identify methods to increase biomass production sustainably.

Perhaps cost is the most significant challenge associated with SAF production and implementation. SAF prices are currently two to four times greater than prices for traditional jet fuel. This is an important consideration for air carriers and air taxi operators that operate with low profit margins. In response, fuel producers, members of the aviation industry, and governmental agencies have developed partnerships to develop methods to make SAF fuel costs more competitive with traditional turbine- and jet-engine powered fuels. The development of new and innovative technologies will be key to making SAF a more cost-effective option for aircraft operators.

Collaboration of all stakeholders such as governmental entities, air carriers, fuel producers and distributors, farmers and biomass producers, and environmental regulators will be needed to successfully expand the production and availability of these fuels. Systemwide collaboration to implement policies and procedures for SAF development, certification, and use will be critical. An example is the development of accepted practices to ensure that crop production for biomass is undertaken in a sustainable manner. The development of accepted production practices will also help to streamline SAF approval processes and standardize production methods to reduce costs.

### **SAF and Florida Airports**

Florida is home to one of the busiest air carrier and general aviation (GA) markets in the country. With 19 primary air-carrier airports and dozens of GA airports with users capable of using SAFs, it is important to understand how Florida airports are affected by this emerging trend. The following considerations are important in gauging the effects of the growing use of SAFs for the users and airports that comprise Florida's aviation system:

- **Availability** – The insufficient supply of biomasses means SAF production cannot meet demand. Airlines wanting to implement SAFs may be challenged to obtain the amount of SAF desired or necessary to support their fleets.
- **Sustainable Fuel Infrastructure** – Though sustainable aviation fuels are considered a drop-in replacement for existing turbine- and jet-engine fuels, airport operators will be required to provide additional storage and distribution infrastructure to accommodate SAF use. The initial small volume rollout of SAFs may require blending with existing fuels. Options for this blending include storing sustainable and existing fuels in separate tanks and then blending them as needed for use and/or installing equipment for blending traditional and sustainable fuels stored in the same tank. In addition, Florida airports must also consider the delivery mechanism of these fuels. Jet-A fuels are typically piped across the country to major airports and to distribution centers for delivery at other airports. Installation of separate pipeline delivery systems for sustainable fuels will incur additional costs and may pose logistical challenges for both airports and aviation system users.
- **Cost** – As noted previously, the cost of SAFs is comparatively greater than the cost for traditional Jet-A fuels. As a result, airports face fuel pricing challenges in promoting SAF use. The associated cost to install SAF fuel storage and distribution infrastructure may also be a challenge. Air carriers using SAFs are also affected by the high price, which could result in increases to airline ticket prices and changes in route structures to maintain profit. GA users will also likely be discouraged from using SAF because of its comparatively higher cost.

### How the FDOT AO Can Assist

As home to one of the largest air carrier and GA markets in the country, it is important that the FDOT AO help accommodate the growing trend of SAF use given the importance of aviation to the state's economy. The FDOT AO has opportunities to assist airport sponsors statewide in response. Some of these opportunities involve facilitation with other industry stakeholders on methods to increase production, while others involve communication campaigns to address challenges and respond to inquiries. Implementation of the following recommendations is encouraged so that the FDOT AO can assist airports and facilitate growth in the use of SAFs in the state.

- **Encourage Use of SAFs** – While air carriers who are already using SAFs may not need encouragement, the FDOT AO could establish programs to promote its use with the portion of the GA community that uses turbine- and jet-engine powered aircraft. Promotional campaigns through use of the FDOT AO's communication channels such as e-mail, social media, website, and conference / tradeshow appearances can inform airports and aviation users about the technical elements of SAFs and benefits of their use. In addition, through the same channels, the FDOT AO could help encourage airports and fuel distributors to increase their supply of SAFs in the state.

- **Encourage Production of Biomasses** – The FDOT AO could support efforts by stakeholders and other state governmental entities to increase biomass production in Florida. One way this could be accomplished is by promoting the growth of crops and algae that can be harvested for biomass fuel production, which has the potential to be a job / economic generator for the Florida economy. The FDOT AO could also help by supporting the establishment of methods to retrieve biomasses from the collection of wastes and other materials. Additionally, the FDOT AO could also support efforts from other state governmental and economic development entities to provide financial incentives and tax breaks for biomass harvesting activities.
- **Support Installation of SAF Storage and Distribution Infrastructure** – The FDOT AO could help airports with the installation of storage and distribution infrastructure for sustainable fuels by providing grant funding for such projects. While such grant funding could only include localized efforts to install these infrastructure elements on airport property, the FDOT AO could also provide non-financial support of efforts to improve larger distribution infrastructure logistics from refinery facilities. This includes coordination with industry and fuel distribution stakeholders to improve pipelines or establish other methods of delivery to increase the availability and supply of the product for system airports. Pursuit of federal funding for airports to construct fuel storage and distribution infrastructure for SAFs is another means of supporting these efforts.
- **Assist Federal and State Regulators and Industry Stakeholders to Establish SAF Policies** – The FDOT AO could collaborate with regulators, fuel producers and distributors, and other industry stakeholders to establish SAF policies that benefit the interests of Florida’s airports and citizens. Involvement could occur on national and international levels and in the development of state SAF policies. The FDOT AO could also represent the interests of Florida airports on the federal and state regulatory levels should efforts be made to restrict the use of traditional Jet-A fuel. Serving as an advocate for the interest of Florida airports in the development of SAF-related policies will help to ensure that challenges facing airports in the state are represented.

## Conclusion

An industry-wide effort that involves fuel producers and distributors, airlines, aircraft technology manufacturers, government, and the finance community will be required to adopt larger-scale SAF production and use at Florida airports. Industry-wide acceptance on use of the fuel is also needed to achieve the goal of environmental sustainability. The FDOT AO can play an important role with these developments by being involved to represent the interests and challenges of airports across the state. By doing so and adopting the recommendations from this emerging trend paper, Florida will be well positioned to be able to accommodate the increase in use of SAFs.