A More Sustainable Future - Sustainable Aviation Fuel

Center Forward Basics

January 2024

What is Sustainable Aviation Fuel (SAF)?

In the post-pandemic era, airlines have experienced a significant resurgence in passenger traffic as travel restrictions eased and many resumed air travel. Accompanying this beneficial surge in air travel comes a rise in emissions, and the environmental concerns that follow them. The challenge of balancing the increasing demand for travel, with the sustainable options available is brought to attention and up for discussion. Sustainable Aviation Fuel (SAF) has emerged as an environmentally conscious choice for airlines, specifically those who are looking to lower their carbon footprint. Sustainable Aviation Fuel is a liquid alternative to traditional fossil jet fuels, created from sustainable resources rather than refined from petroleum. These sustainable resources, known as sustainable feedstocks, can be from biological sources such as waste oils, agricultural and forestry residues, or non-biological origins, such as green hydrogen. This diverse range of sources helps reduce the reliance on fuel derived from conventional sources. However, the use of these SAFs also raises questions about sustainability, energy inputs, and other environmental considerations related to the underlying feedstocks that require an ongoing analysis. The renewable portion of SAF has the potential to decrease greenhouse gas emissions by up to 80% throughout its life cycle. With the inclusion of liquid hydrogen, the path for reduction is even greater. SAF is also a fuel that can replace conventional jet fuel without changing existing engines, infrastructure, or storage facilities. In this basic we look at Sustainable Aviation Fuel, examining its significance in fostering a more environmentally friendly world.

Center Forward Basics

Center Forward brings together members of Congress, not-for profits, academic experts, trade associations, corporations and unions to find common ground. Our mission: to give centrist allies the information they need to craft common sense solutions, and provide those allies the support they need to turn those ideas into results.

In order to meet our challenges we need to put aside the partisan bickering that has gridlocked Washington and come together to find common sense solutions.

For more information, please visit www.center-forward.org

The Pathway to Production

Many pathways to make sustainable aviation fuel exist. As of July 2023, 11 conversion processes for SAF production had been approved by the American Society for Testing and Materials (ASTM), and many other conversion processes were currently under evaluation. This means 11 different technologies capable of producing SAF that meet the strict technical requirements to be used in commercial aircraft are already being used by companies to generate this fuel. In addition to these 11 pathways, many more feedstock and technology combinations for SAF production are currently under development and in the process of getting certification from the ASTM. This certification provides international recognition for SAF to be used in commercial aviation.

Among these pathways, SAF could reduce the life cycle of emissions dramatically compared to conventional jet fuel. Some of the feedstocks that can be used to make SAF include agricultural residues, algae, corn grain, forestry residues, oil seeds, wood mill waste, and other fats, oils, and greases.

These pathways not only allow the production of SAF to take place but also provide opportunities across the country to farmers. According to the Department of Energy, by growing biomass crops for SAF production, farmers can earn more money during off seasons by providing feedstocks to this new market, while also securing benefits for their farms like reducing nutrient losses and improving the soil quality. In addition, by producing SAF from wet waste resources, like manure

and sewage sludge, pollution pressure can be reduced in watersheds. Reducing this pressure while also keeping potent methane gas, a key contributor to global warming, out of the atmosphere, has a great potential for a positive impact in the years to come.

Decarbonization & Sustainability

In recent years and with the post-pandemic resurgence in travel, a dual development has been put into action, involving the implementation of SAF policies and mandates. This pressures governments, individuals, and private-sector businesses in the aviation industry to become more sustainable. In response to this demand comes a renewed interest in sustainable aviation fuel. Airline and airports are publicly declaring their ambition to utilize SAF for flights, although uptake remains challenging without sufficient policy support. With more choices than ever on where to turn, it is important to remember the most important quality of SAF: its sustainability. It is projected that demand for passenger flights in 2050 will greatly exceed and double that compared to 2019. This will produce double the levels of greenhouse gas emissions if current fuel usage remains unchanged. The aviation industry is actively working on a path to decarbonization that will address this adverse effect, and in the United States, the biggest players in aviation have set a goal of net-zero emissions by 2050 and a 10% reduction in emissions by 2030.

Multiple commercial airlines have pledged to dramatically increase their SAF use to 10% of fuel by 2030, and the U.S. government has stated its shared ambition of achieving 3 billion gallons per year of domestic SAF by 2030. Electrification is not yet a viable option for most of the aviation sector, though that sector continues to develop, and hydrogen is neither economically nor practically feasible. Therefore, currently, the best pathway to decarbonization resides in the use of low-carbon biofuels and efficiency improvements. SAF is the sole near-term path for decarbonization.

SAF Challenges

Sustainable Aviation Fuel faces a few significant challenges. It is more expensive than fossil jet fuel and currently constitutes less than 0.1% of the total aviation fuel usage. To effectively decarbonize the aviation industry, a substantial increase in product capacity is critically needed. Encouragingly, optimistic indications of growth within the SAF market exist and are rapidly expanding. While the demand for SAF is no longer an issue, the greater challenge now lies in ensuring an adequate supply to meet it. The top challenges that SAF faces could be summed up into three categories, supply, policy, and price.

When it comes to supply, only a very limited amount of SAF production in the world is available. Scale is needed to meet global demand, stimulated by ambitious policy. Along with the supply, stable policy, and regulatory frameworks to support SAF market development is a cornerstone to helping it grow. While some governments across the world are pioneering in their immediate support of the SAF market, much still needs to be done. The evolution of this market is also heavily dependent on the value and stability of key subsidies and current/future supportive policies. SAF has the potential to reduce life cycle emissions to very low or net-negative, depending on the technology, feedstock, and permissible blending ratio. Individuals and corporations can help play their part by stepping in to pay a part of this premium to reduce their emissions from flying, which improves the commercial case for airlines in their ambition to purchase more SAF.

Future Predictions

The airline industry and fuel producers are genuinely dedicated to lowering carbon emissions from the aviation sector, yet they still need help from the government to establish appropriate policies to expedite SAF growth at scale. Achieving increased production demands sustained policy certainty for minimizing some of these investment risks. Additionally, emphasis on research, development, and the commercialization of enhanced production technologies and innovative sustainable feedstocks is crucial. Investments in SAF would allow for several types of jobs to be created and in turn, contribute to the development of a new sector within the aviation industry. Various fields of research and development, production, logistics, and policy advocation will need qualified individuals, therefore creating a multitude of job opportunities.

Along with the increase in job opportunities, investments in SAF have the potential to revolutionize the aviation industry and significantly reduce carbon emissions. By utilizing sustainable options such as feedstock, SAF offers a promising opportunity for the aviation industry to become more environmentally friendly. The key to getting this greater acceptance and use of SAF is a reduction in costs. In the short term, support from governments and other stakeholders through policy incentives or other market drivers is needed. This support would help to provide a long-term framework for SAF to grow.

Links to Other Resources

- Bayer - CoverCress | Bayer Global
- BP - What is sustainable aviation fuel (SAF) and why is it important? | News and views | Air bp
- Business Traveller - Sustainable Aviation Fuel production to triple in 2024 – Business Traveller
- CAAFI - Focus Area - Sustainability
- Carbon Direct - Sustainable Aviation Fuels Primer
- Department of Energy - Sustainable Aviation Fuels | Department of Energy
- ExxonMobil - Sustainability Report | ExxonMobil
- Forbes - Aviation Wants Sustainable Fuels. The Problem Is There Isn't Enough
- Growth Energy - Sustainable Aviation Fuel (SAF) - Growth Energy Policy Priorities.
- ICAO - Conversion processes
- NYT - A Sudden Rush to Make Sustainable Aviation Fuel Mainstream
- Renewable Fuels Association - News Releases
- SAF Modeling Innovator Letter - SAF Leaders Support Recognition of the Argonne GREET Model
- SkyNRG - Sustainability is at the core of what we do – SkyNRG
- U.S. Department of Energy - SAF Grand Challenge Roadmap: Flight Plan for Sustainable Aviation Fuel Report