



Sustainable Aviation Fuels – Progress through Collaboration

By International Coordinating Council of Aerospace Industries Associations (ICCAIA)

The development and use of sustainable aviation fuels (SAF) is critical for aviation to meet its commitments to greenhouse gas emissions reduction. Climate change is a global challenge that affects the whole planet, and is driven in part by the actions of all participants in the aviation value chain. The development of SAF is an effort that requires a similarly broad set of stakeholders to work together toward common goals in a coordinated manner. It also necessitates stable policy frameworks to incentivize its capacity and production.

The original equipment manufacturers (OEM) that supply the aviation industry, and work together under the banner of the International Coordinating Council of Aerospace Industries Associations (ICCAIA), are not users nor producers of significant volumes of SAF. However, they have a strong interest in the successful commercialization of large-scale supplies of these new fuels, as the continued growth and social license to operate for the OEMs' customers depends upon that outcome. Therefore, OEMs have recognized the need for partnership and collaboration as a key strategy in addressing their strong, but indirect, interest in SAF's success.

EXAMPLES OF COLLABORATION

OEMs have been active members of a range of different partnerships for collaborative action over the last decade of SAF development. The following are a few important examples, but are by no means an exhaustive list. They are presented here to illustrate the range of partnerships that have helped move the industry toward its SAF aims,

and the types of engagements that have been developed to address important market barriers.

CAAFI: One of the first coordinated multi-stakeholder collaborative was the Commercial Aviation Alternative Fuel Initiative (CAAFI). Launched in 2006 in the United States, CAAFI is a coalition of aviation operators, OEMs, biofuel companies, technology providers, researchers, and U.S. government agencies. This public-private partnership has coordinated action across industry and government to “build relationships, share and collect data, identify resources, and direct research, development, and deployment of alternative jet fuels”¹. Although the focus and center of gravity of CAAFI's membership is the United States, it does draw on an international membership and actively engages with a range of parallel and connected stakeholder groups in other regions of the world.

SAFUG: In a more direct display of support for their customers, several OEMs are affiliate members of the Sustainable Aviation Fuels User Group (SAFUG) founded in 2008. Boeing, Airbus and Embraer have joined 28 of their customer airlines in SAFUG, along with Honeywell UOP and Aeropuertos y Servicios Auxiliares. This organization strongly signals market demand for SAF from buyers of nearly a third of the global jet fuel market, and places a clear emphasis on the importance of sustainability in the provisioning of these fuels.

ASTM: One clear example of the important role OEMs have in easing market barriers for SAF is in their collaboration with the wider aviation fuel community in the working of the standard-setting body ASTM International. Novel fuel

1 <http://caafi.org/about/caafi.html>

types are assessed and approved by subcommittee D02. JO on Aviation Fuels in ASTM International Committee D02 on Petroleum Products and Lubricants, which consists of more than 2,000 members representing 66 countries. Within this subcommittee, the evidence supporting the development of new specifications is synthesized and presented by SAF producers. OEMs then review the properties of the fuel and whether it is fit for purpose, before a new specification goes to a vote across the whole subcommittee. This broadly inclusive process is a model of collaboration around ensuring that the top priority of the aviation industry — safety — always comes first in the deployment of new fuel solutions.

In order to support this certification and enhance its efficiency, OEMs are also strongly involved in collaborative research projects dedicated to the better understanding and modelling of fuel interactions with all aircraft parts. Projects such as JETSCREEN (JET Fuel SCREENing and Optimization) in EU or ASCENT NJFCP (National Jet Fuel Combustion Program) in the US are excellent examples of such efforts.

ICAO: Through membership in ICCAIA, OEMs participate in the work of ICAO in supporting its member states to achieve the 2050 ICAO Vision for Sustainable Aviation Fuels. ICCAIA is an observer and has participated in the establishment of the CORSIA scheme and its rules by which SAF will be eligible for inclusion and credit. The deliberations over CORSIA have encompassed the opinions and expertise of representatives from countries across the globe, aviation and energy industry experts, NGOs and OEMs. In addition, again through membership in ICCAIA, OEMs such as Bombardier participated in the technical committee of the working group assessing and defining sustainability criteria based on scientific based life cycle analysis (ICAO Alternative Fuels Task Force (AFTF)). This is an example at the truly global scale of collaboration necessary to ensure that aviation's environment goals are met, and that sustainable fuels are a component of that solution.

Business Aviation: our Sustainable Alternative Jet Fuel (SAJF) Guide was launched by a consortium of five of the sectors' associations led by GAMA, with support from EBAA, IBAC, NBAA and NATA, and with significant contributions from Bombardier, Gulfstream, Av Fuel

and World Fuel. The guide seeks to demystify the use of alternative fuel for our operators and sets a path to ensure the wider use of alternative fuel across our sector. Business aviation has already completed and plans further demonstration events, working closely with business aviation specific airports to further the wider use and take-up of this important technology that will help the sector achieve its long-term climate goals as set out in the Business Aviation Commitment on Climate Change.

CASE STUDY - COLLABORATION FOR FUTURE OPPORTUNITY - ECODEMONSTRATOR 100% BIOFUEL FLIGHT

As mentioned above, OEMs have a unique position in being the key gateholders of verifying technical performance of novel SAF technologies. By collaborating with technology providers, OEMs can evaluate the performance of novel fuel chemistries, blends or production processes. Boeing's ecoDemonstrator program has, over the past few years, provided such an opportunity. Across platforms such as Boeing's 737, 757, 787 and 777 and Embraer's E170, novel biofuel technologies have been tested and demonstrated in a fully operational environment. In 2012, a 737 used a blend of biofuel sourced from used cooking oil supplied by Dynamic Fuels via SkyNRG. Green diesel biofuel was used for the first time in an airplane, when Neste-provided fuel was blended at 15% and flown on 787 and 757 ecoDemonstrators in 2014 and 2015, respectively. A blend of Brazilian-sourced SAF was used to power the 2016 ecoDemonstrator, an Embraer E170. Then, most recently, Boeing demonstrated the first flight using 100% SAF on a commercial airliner, by using a completely paraffinic biofuel in a 777 Freighter.

PRIVATE-PUBLIC PARTNERSHIP ON SAF DEPLOYMENT

The industrial development of sustainable alternative fuels implies a strong collaboration between all private actors (aerospace industry, fuel producers, biomass suppliers, airports, airlines etc.) but also with public bodies in order to remove potential barriers and support this deployment. As an example, the French initiative of ECV



“Engagement pour une Croissance Verte” – bio-jet fuel Green Deal) gathers main French industries (Total, Suez, Safran, Airbus, Air France) and French administrations (Environment, Transport, Industry) in order to study the technical, administrative and financial conditions that would allow the deployment of a SAF pathway in France. In Germany, the initiative for jet fuel made from renewable energy AIREG – Aviation Initiative for Renewable Energy in Germany e.V. – combines commitment, knowledge and years of experience from industry, business and science in the aviation sector. AIREG drives the research, production and usage of sustainable aviation fuel in Germany.

COMMERCIAL COLLABORATION

As the Sustainable Aviation Fuel enterprise is transitioning from pre-commercial activities in developing and maturing technologies – and addressing market barriers – toward now entering commercial deployment and routine application, the mode of collaboration is also changing. Contractual relationships and partnerships are emerging as companies are positioning themselves within the value chain.

A key lever that airframe OEMs have seized to help drive scale and affordability in supplies of SAF has been to enter into purchase contracts with first moving biofuel producers, so that their own operations in production, support, certification and the delivery of aircraft to their customers can be fueled sustainably. In this regard, Airbus has partnered with Air Total, Gulfstream has partnered with World Fuel Services, and Boeing has partnered with World Energy LLC and EPIC Fuels. Gulfstream recently announced it would offer SAJF to their customers using its Long Beach, CA facility. These contracts help demonstrate commercial feasibility, and contribute to the demand that will help drive greater scale in production of SAF.

Additionally, the General Aviation segment has becoming increasingly active in publicly demonstrating that SAJFs is reliable and safe to use. A dynamic coalition established in May 2018 that encompasses the International Business Aviation Council (IBAC), the General Aviation Manufacturers Association (GAMA), Bombardier, the National Air Transportation Association (NATA), the European Business Aviation Association (EBAA) and

the National Business Aviation Association (NBAA) has triggered key projects involving fuel suppliers and distributors with FBOs and OEMs as well as owners and operators to increase visibility and availability of SAF. This was highlighted on 17 January 2019 at Van Nuys, CA at business jet event called “Business Jet Fuel Green: A Step Toward Sustainability”. Similar events highlighting business aviation’s commitment are expected in the future.

Some manufacturers have worked at the level of delivery flights to airline customers. Since 2016 Airbus has initiated concrete aircraft operations including sustainable aviation fuels in regular delivery flights from its Final Assembly Lines across the world. Since then more than fifty flights of several types (A320s, A330s, and A350) have been successfully performed by five airlines.

Some aviation industry companies have demonstrated an even deeper commitment to not just being a buyer of SAF, but actually being financially involved in the companies and projects that produce these fuels. For example, Cathay Pacific, United and Japan Airlines have taken equity positions in Fulcrum BioEnergy, which is developing a municipal solid waste-to-fuels business. Fulcrum has also demonstrated the benefits of collaboration and partnership in the development of its business, formalizing a wide range of partnerships across the waste-to-fuels value chain, aside from the aviation industry entities already mentioned. Companies as diverse as Waste Management, Praxair, Marubeni and BP have all been brought into the development of Fulcrum’s business plan. This breadth of collaboration, and the novel connections made in establishing it, illustrate the necessity and advantages of cross-sector collaboration in the SAF space.

CONCLUSION

The development and commercialization of sustainable fuels for aviation has been an effort that has brought together a breadth of collaboration that is unprecedented in the history of aviation. It has encompassed not only airlines, OEMs, and energy companies, but also agricultural, forestry, and waste management stakeholders. There have been contributions from researchers, NGOs and government actors, as well as strong buy-in from the



flying public. Collaboration among all these stakeholders, as they have strived together towards common goals, has been the key to the progress made over the last decade of SAF development. For the future, it will be crucial to tackle issues linked to SAF commercialization and economic viability. The cost differential between fossil fuel and renewable jet fuel remains very high and stable policy frameworks are required to incentivize renewable jet fuel capacity and production.