



A 2019 Look-Ahead ... building on 2018's many successes and addressing remaining industry challenges!

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Dear Stakeholder,

Thank you for working as a member of the Commercial Aviation Alternative Fuels Initiative (CAAFI®) to advance the industry's pursuit of sustainable alternative jet fuels (SAJF)! This past year was another great year for industry cooperation and progress, and we're expecting more of the same in 2019!

At the end of each year, the CAAFI Leadership team goes through a process for determining prioritization of CAAFI activities for the coming year. We base this on feedback from the CAAFI steering group and membership, informal feedback from the industry and partners, as well as our own observations about challenges and needs in the marketplace.

At the 2018 CAAFI Biennial General Meeting (CBGM) we solicited input from our stakeholder attendees via a questionnaire and asked attendees to let us know what they viewed to be the top priorities for CAAFI in 2019. We also asked attendees to let us know what we are doing well and what we could improve and/or change. Based on this input, CAAFI leadership will continue to work in four major areas of activity (as we did in 2018), with emphasis placed on the concepts identified by the sub-bullets in each category below.

CAAFI 2019 Priorities

- 1. Communicate the Value Proposition of SAJF** – CAAFI will communicate the economic, social, and environmental benefits of SAJF to the federal government, state and local governments, regional bodies, non-governmental organizations, private sector and public to broaden the base of stakeholders supporting SAJF.
 - **Focus on communicating value proposition** to regional, state and local audiences.
 - **Expand outreach** via a more active social media presence.
 - **Increase participation in outreach activities** (e.g. conferences, seminars, and virtual events).
- 2. Enhance the Fuel Qualification Approach** – CAAFI will promote a broadly supported, streamlined certification/qualification program and a more durable, higher capacity process to handle the significant queue of potential SAJF candidates.
 - **Strengthen the ASTM D4054 Clearinghouse** by leveraging new, shared funding and staffing approaches, and improved methods.
 - Continue to **develop and implement the D4054 Fast Track approach**.
 - **Enable coordination with international qualification activities** to share costs and accelerate approvals.
 - **Evaluate learnings from the [National Jet Fuel Combustion Program \(NJFCP\)](#)** that might facilitate additional improvements to the D4054 fuel qualification process.
 - **Advise potential SAJF producers** on the most appropriate ways to navigate fuel qualification.

3. **Develop the U.S. SAJF Supply by Aligning Efforts to Enable Commercial Deployment** – CAAFI will focus on real-world implementation by supporting feedstock and fuel project development, foster producer-buyer engagement that leads to offtake agreements, and build upon federal, state and regional supply chain efforts:
 - **Leverage the capabilities of the FAA’s Aviation Sustainability CENTER ([ASCENT](#))** in combination with local, state and regional supply chain opportunities and efforts.
 - **Develop new approaches for partnering with federal agencies** (e.g. explore a follow on to the Farm to Fly (F2F2) program that expired at the end of 2018, Federal AJF R&D Strategy, and NJFCP).
 - **Expand our engagement to work with regional, state, and local efforts/partners** (e.g. Appalachian Regional Commission, National Governors Association, and America’s Pledge).
 - **Partner with airports**, in cooperation with ACI-NA, to address questions about the logistics and use of SAJF, identify opportunities to monetize SAJF benefits that might enhance market pull, and assess infrastructure needs for SAJF usage.
 - **Implement a Commercialization Council** of airline members to facilitate easier and more productive interactions for both fuel producers and airline customers in commercialization discussions.
 - **Work with business aviation** to partner with corporations with ambitious corporate social responsibility goals for fuel supply development and offtake agreements.

4. **Implement Frameworks & Share Best Practices** – CAAFI will provide tools and share best practices to evaluate the readiness of feedstocks and fuels and their potential economic, social and environmental benefits.
 - **Expand the use and topical content of [CAAFI Webinars](#) (formerly SOAP-Jet webinars).**
 - **Expand the library of [Feedstock Readiness Level \(FSRL\) Evaluations](#)** available on USDA’s National Agricultural Library.
 - **Implement a Commercial Readiness Level Framework** to support the Commercialization Council approach outlined above.
 - **Implement the use of existing analytical tools** to support supply chain development and identify needs for additional tools (e.g. ASCENT, Volpe Freight and Fuel Transportation Optimization Tool, and others).
 - **Support analyses of economic benefits and jobs impacts** of SAJF supply chains including analyses relevant to regional, state and local levels.
 - **Focus on identifying/addressing/educating on impediments** associated with integrating SAJF into the jet fuel supply system (e.g. access to transport, pipeline capacity constraints, points of integration, policy elements that dis-incentivize SAJF versus other fuels and chemicals).
 - **Provide technical and commercial analysis and data** to the community of stakeholders who are working with policy makers to remove impediments to commercialization.

As always, please reach out to me or any of the CAAFI Team Leads if you would like to be more involved in the initiative, some of the above efforts, or have recommendations on new types of engagement you would like us to consider. We remain open to adjusting our priorities as the need arises.

Following is a list of industry highlights from 2018 that helped guide our thinking with respect to how and when our efforts can make a difference, and what things we need to continue or do differently.

SAJF Highlights in 2018

In 2018, the industry continued to make significant progress with many SAJF advancements and highlights for CAAFI and our stakeholders, including:

- **Progress on ASTM Fuel Pathway Qualification**
 - The ethanol-based alcohol-to-jet (ATJ-SPK) pathway [was approved](#) for use with the addition of ethanol to the ASTM D7566 Annex A5 as an acceptable ATJ-SPK feedstock. The blending limit for ATJ-SPK was also increased to up to 50%.
 - The catalytic hydrothermolysis (CH-SK) pathway task force, led by ARA, has completed a final research report, following an iterative review with manufacturers, with final balloting and publication targeted for the first half of 2019.
 - Co-processing in petroleum refineries of free fatty acids and fatty acid esters [was approved and added to ASTM 1655](#) Annex A1, at levels of up to 5%, further enabling the introduction of renewable molecules in jet fuel. An additional Task Force activity was initiated by Fulcrum, to now pursue the same concept using Fischer-Tropsch-derived biocrudes.
 - High freeze point hydroprocessed esters and fatty acids (HFP HEFA-SPK) is in Phase 1 review by the industry, with additional investigations ongoing around feedstock quality controls.
 - The hydrodeoxygenation synthetic aromatic kerosene (HDO-SAK) pathway task force, led by Virent, has completed Phase 1 testing and reporting. Virent is working with the University of Dayton Research Institute (UDRI) to respond to comments on results obtained to date, and to initiate Tier 3 testing requests.
 - Global Bioenergies and SkyNRG [announced](#) their intent to collaborate on ASTM certification of a new SAJF pathway (isobutene-to-jet).
 - Tier 1 testing of the IH² pathway, being pursued by Shell/CRI, began under the ASTM D4054 Clearinghouse at UDRI with funding provided by the FAA via ASCENT.
- **Alternative Jet Fuel Operational Demonstrations**
 - The [Canada Biojet Supply Chain Initiative \(CBSCI\) team finalized the supply](#) of SAJF to Toronto. On Earth Day, Air Canada, through a book-and-claim approach, detailed the savings of 160 tonnes of carbon. This innovative fuel project was funded by Canada's GARDN Network to identify and resolve potential challenges to integrating SAJF supply into the existing airport fueling systems.
 - [Airbus and JetBlue announced a joint commitment](#) to sustainable aviation fuel with first-ever customer delivery flights of new aircraft from the Mobile, AL production facility.
 - [Qantas demonstrated a U.S.-Australia trans-Pacific commercial flight](#) between Los Angeles, CA, and Melbourne, Victoria using SAJF with 10% HEFA-SPK processed from carinata developed by Agrisoma. This was the first commercial flight between the two countries that used alternative jet fuel. World Energy Paramount (formerly AltAir Fuels) converted the feedstock and World Fuel Services provided fuel supplier support for the effort.
 - [Cathay Pacific announced](#) a plan to fly all of its new Airbus aircraft home to Hong Kong using a 10% alternative jet fuel blend, using ASTM-qualified hydroprocessed fermented sugars to synthetic isoparaffins (HFS-SIP) produced by Total.
 - [Gevo announced that they are partnering with Virgin Australia Airlines](#) (with the support of the Queensland Government), and would be the first company to supply renewable jet fuel into a commercial airport infrastructure in Australia. Gevo's renewable jet fuel was used in

approximately 195 domestic and international flights departing from the Brisbane Airport during the week of September 10, 2018.

- **Fuel Production Activity Announcements**

- On May 16, [Fulcrum broke ground on the Sierra Biorefinery](#) in Storey County, NV. When the plant begins commercial operations in the first quarter of 2020, Sierra will convert approximately 175,000 tons of household garbage into more than 10.5 million gallons of fuel each year.
- On July 18, [Red Rock Biorefinery broke ground](#) on their \$320 million renewable fuel facility that will produce 15 million gallons of jet fuel each year.
- Based on the success of AltAir Fuels, [World Energy, one of America's largest producers of biodiesel, acquired AltAir](#) and the adjacent oil refinery in Paramount CA in a \$72M deal that included tank farm and pipeline assets. The combined entity, World Energy Paramount, subsequently [announced a \\$350 million expansion](#) of the facility to enable production of 306 million gallons per year (gpy) of renewable diesel and SAJF, a more than seven fold expansion of the current level of 40 million gpy.
 - [World Energy Paramount won another DLA Energy Contract](#) to provide renewable diesel to the U.S. Navy for FY 2019.
- [LanzaTech's first commercial facility](#), producing ethanol from industrial waste-gases, began operations in Jingtang Steel Mill in Caofeidian, Hebei Province, China. LanzaTech subsequently announced plans to build a commercial-scale ATJ-SPK facility in Georgia that will enable 10 M gpy production of neat SAJF with initial fuel production commencing in 2020, followed by a 30 M gpy ATJ-SPK facility in the UK.
- Tokyo-based [euqlena opened their demonstration plant](#) in Yokohama, Japan, utilizing the catalytic hydrothermolysis technology developed by ARA. The facility will be capable of producing SAJF using the CH-SK pathway, expected to be approved by the aviation industry in 2019. Analysis and data collection are ongoing to determine the site of *euqlena's* planned commercial scale plant.

- **Fuel Supplier Engagement**

- [Shell Aviation and SkyNRG announced agreement](#) for long-term collaboration on SAJF deployment.
- [The Port of Seattle and 13 airlines announced their partnership](#) to create a work plan for providing SAJF to all airlines at Seattle-Tacoma International Airport (Sea-Tac).
- [San Francisco International Airport \(SFO\) and a group of eight airlines and fuel producers signed a MoU](#) to expand the use of SAJF at the airport. The parties include United Airlines, Alaska Airlines, American Airlines and Cathay Pacific (collectively represent nearly 70% of all flights at SFO) and the airport's two primary fuel suppliers, Chevron and Shell, along with Neste and LanzaTech.
- [Shell, World Energy and SkyNRG joined forces](#) to supply three European airlines – KLM, SAS and Finnair – with SAJF at San Francisco Airport (SFO) beginning in 2019.
- A consortium made up of Fetola, the World Wide Fund for Nature South Africa, and SkyNRG will [launch a Waste to Wing project](#) that will determine the feasibility of using waste biomass to produce SAJF in South Africa.
- [SAS and Preem Signed a Letter of Intent](#) to produce SAJF at Preem's refinery in Gothenburg, Sweden starting in 2022.

- [Gevo and Avfuel Agreed to Long Term Supply Agreement](#), making Avfuel Gevo's exclusive aviation fuel distributor to business aviation and its entire portfolio of customers. Avfuel is a leading global supplier of aviation fuel and services servicing more than 3,000 locations worldwide.
- **Additional Announcements**
 - [U.S. Department of Energy awarded grants](#) to 36 bioenergy research & development projects, including four alternative jet fuel projects. These grants are intended to make progress toward DOE's goal of reducing bio-based drop-in fuel costs to below \$3/gallon by 2022.
 - Natural Resources Canada released a [call for entrants to "The Sky's the Limit Challenge"](#), including prizes for a Cross-Canada Flight Competition and a Green Aviation Fuels Innovation Competition.
 - [LanzaTech and Velocys were among seven successful grantees](#) for UK Government grants supporting advanced fuels production facilities. The grants are part of the UK governments drive to reduce carbon emissions as part of the Future Fuels for Flight and Freight Competition.
 - [The Business Aviation Community Released "Business Aviation Guide to the Use of Sustainable Alternative Jet Fuels"](#) at European Business Aviation Convention & Exhibition (EBACE2018). The industry further announced their intention to hold a [SAJF day at Van Nuys, CA airport \(VNY\)](#) on January 17, 2019, at which four fixed-base operators (FBOs) at the airport will fuel aircraft with SAJF to demonstrate SAJF supply chain viability for general aviation.
 - The [United Kingdom \(UK\) added alternative jet fuel into the UK Renewable Transport Fuel Obligation \(RTFO\)](#) scheme for reducing GHG emissions, which will reward UK-based SAJF production and use.
 - The International Civil Aviation Organization (ICAO) continued to advance technical work to allow crediting of international airlines for the use of SAJF in the [Carbon Offsetting and Reduction Scheme for International Aviation \(CORSA\)](#) due to begin in 2021.
 - Policy makers in the states of California and Oregon agreed to incentivize SAJF via the [California Low Carbon Fuel Standard \(LCFS\) and Oregon Clean Fuels Program. Coupled with the existing](#) support of the U.S. Renewable Fuel Standard, these programs will help boost SAJF production.

CAAFI Activities

- The [CAAFI Leadership Team Expanded](#) with the addition of Chris Tindal as CAAFI Assistant Director. Chris came to CAAFI following his work leading the U.S. Navy's Great Green Fleet program and his limitless support of sustainable fuels. Chris also continues to collaborate on corresponding SAJF issues with several entities in Australia, under related, but non-CAAFI contractual arrangements.
- **CAAFI Tools and Resources** continued to be developed and applied by the community
 - CAAFI expanded its [Feedstock Readiness Level evaluations repository](#) on the USDA Agricultural Library's Ag Data Commons. The repository will help researchers, funding agencies, and fuel producers and purchasers better understand feedstock maturity and identify gaps and needs.
 - CAAFI released a major [caafi.org website](#) update to better respond to the needs of our stakeholders.
- **CAAFI supported** several SAJF deployment projects in 2018, via:
 - Engagement with USDA NIFA AFRI Coordinated Agriculture Projects
 - [SPARC](#) – working on the commercialization of the oilseed carinata

- [SBAR](#) – working on the commercialization of guayule and guar
 - CAAFI’s Farm-to-Fly 2.0 (F2F2) public-private-partnership and [CAAFI’s State Initiatives](#)
- [Four CAAFI Webinars](#) introduced CAAFI stakeholders to key activities and provided a forum for member information sharing and learning.
- **CAAFI assisted** IATA in planning and executing its annual [Alternative Fuel Symposium](#) that occurred in Singapore following the fall IATA Fuel Forum meeting in November 2018. This annual activity provides a platform for industry professionals worldwide, targeting airlines and producers, to interact and find out about the latest progress and insights from across the world of SAJF development and commercialization. The next meeting will occur in New Orleans, LA on November 21-22, 2019.
- Members of the **CAAFI leadership team participated** in more than 50 workshops, seminars, and project discussions, both domestically and internationally, during 2018. This highlights the expanding scope of interest among many parties and our ongoing effort to achieve awareness and collaboration. Several additional companies initiated engagement with CAAFI to explore opportunities for additional technologies and approaches for SAJF supply.
- We held the [2018 CAAFI Biennial General Meeting \(CBGM\)](#) on December 4-6, 2018 in Washington, DC with over 200 attendees and three days of panels, discussions, VIP speakers and networking sessions. We hold the CBGM every two years to enable stakeholders to share experiences, highlight existing opportunities and strategize to maintain our forward progress on the development and deployment of SAJF. The 2018 CBGM was an invigorating gathering that witnessed tremendous progress and momentum in the SAJF arena. The members of the CAAFI leadership team (Steve, Chris, Kristin, Nate and Peter) were energized by the enthusiasm of those who attended, and thank you for your inputs and positive feedback.

On behalf of the CAAFI Leadership Team, the CAAFI Steering Group, and all our constituents, thank you for your contributions to the industry’s collective effort to commercialize SAJF! I’m looking forward to sharing another great year with you in 2019!

Sincerely,



Steve Csonka
CAAFI Executive Director