

A Note from the Executive Director

This CAAFI Quarterly newsletter describes the CAAFI activities and events that occurred January through March 2018.

In this issue, we describe challenges with the ASTM approval process along with efforts to streamline the process. We also get to know our Certification & Qualification Team Lead, Mark Rumizen, a bit better.

I also want to make sure you're aware of the following upcoming items:

- **CAAFI's General Meeting, December 4-6, Washington, DC (See initial agenda [here](#).)**
- [BIO International Convention, June 4-7, Boston, MA](#)
- [BIO World Congress on Industrial Biotechnology, July 16-19, Philadelphia, PA](#)
- [ABLC Global 2018, November 7-9, San Francisco, CA](#)

We appreciate questions, comments, and suggestions at any time. Enjoy!

Steve Csonka and the CAAFI Team

Quick Links

⇒ Check out "[What's New](#)" for a brief review of noteworthy SAJF news from the last quarter, including funding opportunities.

⇒ Go to "[Ask CAAFI](#)", a segment that highlights and explains relevant topics that impact the SAJF industry, to read about Qualification Process.

⇒ Take off to "[Get to Know](#)" section to learn about CAAFI's Certification & Qualification Team Lead.

⇒ See "[CAAFI Team Highlights](#)" for a snapshot of CAAFI work teams' projects and progress last quarter.

⇒ Jump to "[SAJF Deployment Projects](#)" for a summary of select deployment projects around the United States.

What's New?

CAAFI developed new and updated Focus Area content for caafi.org.

[Braathens Regional Airlines](#) and [Ryanair](#) are providing passengers the opportunity to help the airlines improve their sustainability by purchasing alternative jet fuel and carbon offsets, respectively.

One of America's largest suppliers of biodiesel, [World Energy has acquired AltAir](#) and the adjacent oil refinery in Paramount CA in a \$72M deal, enabling the potential expansion of renewable jet/diesel production.

[DOE granted the Renewable Oil Generated with Ultra-productive Energy cane \(ROGUE\) research project \\$10.6 million](#) to support their alternative fuels work.

The [Aviation Sustainability Center \(ASCENT\)](#), also known as the FAA Center of Excellence for Alternative Jet Fuels and Environment, has hired Carol Sim, previously Director of Environmental Affairs for Alaska Airlines as the new Assistant Director.

A historic [Qantas](#) flight took off from LAX on January 28th and landed in Melbourne, Australia 15 hours later after a successful flight demonstration using a 10% blended fuel processed from Carinata. This was the first commercial flight between the two countries that used alternative jet fuel. AltAir, who recently [achieved RSB certification](#), converted the feedstock and World Fuel Services provided fuel supplier support for the effort.

Baere Aerospace Consulting, Inc. provided CAAFI with a white paper on "[Considerations for Using Existing Standards as Part of Alternative Jet Fuels Approval and Deployment](#)", summarizing their report performed for the Coordinating Research Council (CRC) under the document [AV-23-15 "Adequacy of Existing Test Methods for Aviation Jet](#)

[Fuel and Additive Property Evaluation,”](#) July 2017, available from [CRCAO.org](#).

Additional information on these news items and additional funding opportunities can be found at [caafi.org](#).

Ask CAAFI

Question: What are the challenges faced by prospective SAJF producers when seeking approval to use their fuel on civilian aircraft?

Answer: SAJFs produced from specific SAJF conversion processes must be shown to meet the existing FAA-approved jet fuel operating limitations before their use is permitted on civilian aircraft. This is accomplished by achieving industry approval to list the conversion process in ASTM D7566. But, before this can happen, the conversion pathway and fuels produced from the pathway must undergo a rigorous evaluation in accordance with ASTM D4054 to determine if the SAJF is a fit-for-purpose Jet A fuel. This process requires the producer to produce fuel in sufficient quantities to support laboratory, rig and, possibly, engine testing, and to demonstrate that the conversion pathway is scalable to commercially viable levels. The testing and review of the associated data is an iterative process that can be quite challenging, with the need for additional testing or analysis frequently required. In addition, the data review is conducted by the engine and aircraft manufacturers, and therefore competes with Original Equipment Manufacturers (OEM) resources required for other business needs and may lengthen the duration of the qualification process. Finally, ultimate approval requires two rounds of balloting to the ASTM membership which can add months to the process. The FAA has established the D4054 Clearinghouse under its [ASCENT Center of Excellence](#) to manage and support the D4054 process for candidate SAJF producers. It is expected that this will improve the efficiency of the overall process and therefore save time and money necessary for ultimate approval. Other activities, such as work towards a “generic annex”, where nominal percentages of SAJF from any conversion process

may be blended with jet fuel, are also hoped to accelerate the introduction of SAJFs into service.

For more information about the fuel qualification process, check out CAAFI’s [Fuel Qualification](#) page.

Get to Know Mark Rumizen, CAAFI’s Fuel Qualification Team Lead

What do you do within your CAAFI role?

I focus on the airworthiness, or safety, of alternative jet fuels produced using conversion processes developed for non-petroleum materials. From this perspective, I lead the industry efforts to evaluate the candidate fuels, ultimately leading to the issuance of fuel specification annexes in ASTM D7566. I work closely with the aircraft and engine manufacturers to ensure that new SAJFs are fit for purpose, or suitable, for use on aircraft. I also engage with airlines and aviation authorities from other countries to help them understand our qualification process and to voice the FAA support of the approved SAJFs.

What is your background and how does it relate to SAJF?

I spent many years working in engineering, certification, and marketing roles for jet engines at Pratt & Whitney, GE, and the FAA. While at the FAA, I also picked up the responsibility for regulatory oversight of aviation fuels.

How did you become involved with CAAFI?

When the interest in SAJFs emerged in the mid-2000’s, “certification”, or FAA approval, of alternative fuels was quickly identified as one of the key risk areas of introducing these fuels. So, I was in the right place at the right time, because I was one of a few FAA personnel with the knowledge and skills necessary to define an approach to certify SAJF fuels. This led to my current role as the lead of the CAAFI Certification & Qualification group.

What are your long-term goals for your work with CAAFI?

There are many challenges for candidate SAJF producers navigating the evaluation and specification issuance process at ASTM. My primary goal has been to refine, improve, and organize this process. My hope is that each year we get better at approving these fuels. As the FAA member of the ASTM aviation fuel community, I am in a unique position to influence the process, and my challenge is to effectively utilize this influence to improve the process.

Within your CAAFI role, what are you focused on in the next 12 months?

Establishing the D4054 Clearinghouse as a viable and visible entity for advancing candidate SAJFs through the ASTM specification issuance process. This is a challenge, because of the way in which we fund the clearinghouse, it is not a permanent or dedicated “brick and mortar” facility. Rather it is a virtual facility that exists in the program plans of the FAA and the contracted labs and manufacturers who have agreed to participate in the clearinghouse.

What do you see as the greatest challenge to pathways achieving qualification?

It always comes down to funding, because the companies that are developing new SAJF pathways are typically not well capitalized. But also, we need government policy that provides strong economic incentives to airlines to purchase these fuels. This will then flow down to the investment community, the engine and aircraft manufacturers, and others involved in the qualification effort.

What do you feel is the single most compelling need for streamlining the qualification process?

If the ASTM D4054 process takes too long, candidate SAJF companies will drop out of the process, and some may never start after learning of the experiences of those that dropped out. We’ve taken the first step by removing the requirement to obtain direct FAA approval of new SAJFs, and by delegating the approval process to industry via ASTM fuel specifications. But now we need to improve the ASTM process to support a viable business case for SAJF companies to move into aviation fuel.

What is your view on the current progress of streamlining approaches like the Clearinghouse and Generic Annex?

The ASTM D4054 qualification process is really a two-step process. First, we need to get OEM consensus that the candidate SAJF pathway is fit-for-purpose, or suitable, for use as a jet fuel. Next we need to get consensus (via balloting) from the rest of the ASTM aviation fuel community that it is a viable jet fuel pathway. Both of these steps involve many separate companies and individuals with their own unique perspective and opinions of what is acceptable. The effort to bring all of these people to consensus can quickly become widely disorganized if we don’t have a very well-structured process such as the Clearinghouse. And the generic annex concept can help a great deal. If issued, it will allow companies with new conversion pathways to produce SAJFs (at nominal blend percentages) without the need to go through the D4054 process.

What other interests do you have in the industry?

In my role as the FAA’s Senior Technical Specialist for Aviation Fuels, I have a broad responsibility to support any fuel (or propulsion lubricant) activity at the FAA. This could include service problems, or new engine or aircraft certification programs. More specifically, I am also supporting the General Aviation industry effort to evaluate and authorize the use of new unleaded aviation gasolines for aircraft piston engines and overseeing the propulsion lubricant specification activity.

What are your interests away from work in the industry?

I enjoy snow sports such as skiing and snowshoeing, but it is getting difficult to find time to do these activities because the winters here in Boston seem to be getting shorter. And this reveals my real motivation to support CAAFI; I want to reverse the effects of climate change to lengthen the ski season!

CAAFI Team Highlights

Business —

- ⇒ Continued to expand work with prospective alternative fuel producers and airlines to facilitate opportunities for airline and other end user engagement, identifying supply logistics needs and informing contract processes.
- ⇒ CAAFI leadership continue to work with several firms approaching commercialization, including SG Preston, ARA (and several of its licensees), Velocys, LanzaTech, and others.
- ⇒ Continuing to foster on the expansion of engagement of the latest two NIFA/AFRI/CAP projects, [SPARC](#) and [SBAR](#).
- ⇒ CAAFI is creating a Commercialization Engagement Framework to assist future SAJF producers with business maturation leading to airline engagement for the purpose of achieving offtake agreements.

Certification/Qualification —

- ⇒ ATJ-SPK (Ethanol): LanzaTech's proposed revision to D7566 Annex A5 to add ethanol as a feedstock successfully passed the ASTM balloting process on April 1 and is therefore an approved pathway. The updated Annex A5 with ethanol specified as a feedstock will be issued in mid-April. Additionally, the aviation community has approved an increase to the maximum blending level allowable for ATJ-SPK fuels in Annex A5 to 50%, from 30%.
- ⇒ HFP-HEFA (Green Diesel): The OEMs have completed their review of the Phase 1 version of the research report, but additional investigation of the feedstock quality and composition is currently underway. Additional fit-for-purpose testing and rig testing (combustor, fuel nozzle spray, APU cold/altitude starting) has been recommended. The FAA will collaborate with the OEMs to conduct the required rig testing under the CLEEN 2 R&D program.
- ⇒ ARA CHJ: ARA is compiling responses to the OEM comments to the Phase 1 research report. The U.S. Navy has completed their engine test and is in process of issuing the associated report. The OEMs will work collaboratively with ARA to advance this conversion pathway to ASTM ballot as soon as ARA provides the requested responses.

- ⇒ Refinery Co-processing: The concurrent ballot issued in February to the subcommittee and committee in February has passed. The co-processing provision will be added to Annex A1 of ASTM D1655 and should be issued in May. The Annex will initially include co-processing of fats and oils feedstocks, but the co-processing task force will now work on adding FT crude feedstocks to the annex.
- ⇒ The Virent Hydrodeoxygenation Synthesized Aromatic Kerosene (HDO-SAK) research report was submitted to the OEMs for their Step 3 initial review on January 17. This review is nearing completion and will determine if any additional testing is required prior to balloting an annex for this fuel.
- ⇒ Shell/CRI has submitted their initial batch of test fuel from their IH² demo facility to the D4054 Clearinghouse at UDRI and Tier 1 and 2 testing has been initiated.

Sustainability —

- ⇒ Worked to develop [Sustainability](#) content for caafi.org
- ⇒ Continued to participate in the ICAO CAEP AFTF.

R&D —

- ⇒ Continued to discuss how best to engage companies with emerging alternative jet fuel pathways and attempted to follow-up with the companies which they've already spoken.
- ⇒ Posted the latest white paper, [Transportation Challenges Associated with Alternative Jet Fuel Distribution](#).
- ⇒ Hosted two SOAP-Jet webinars on January 19th Dr. Joshua Heyne presented, [The National Jet Fuel Combustion Program \(NJFCP\), Initial Results of Alternative Fuel Effects on Combustor Performance: Lean Blowout and Ignition](#) and on February 23rd Nate Brown (FAA), Dr. Scott Turn (University of Hawaii) and Dr. Mike Wolcott (Washington State University) presented, [ASCENT's Approach to Regional Projects Under Project 01: Alternative Jet Fuel Supply Chain Analysis](#).
- ⇒ The next SOAP-Jet webinar is scheduled for May

4th when Dr. Bill Anderson will present on the Creation and Role of the USDA Biomass Research Centers.

SAJF Deployment Projects

◇ Virginia and Multistate –

- UT Knoxville with VA partners CCALs and Center for Natural Capital submitted a proposal to the Biomass Research and Development Initiative and are awaiting a response. The project is centered on developing the region's hardwood supply to support possible fuel supply to Dulles Airport, United Airlines' northeast hubs, the Tidewater region of VA and federal facilities, and Southwest Airlines operations in Nashville.
- CCALS is developing a proposal to the Center for Innovative Technology (CIT) as follow up to an earlier CCALS survey of multiple feedstocks.
- A second collaborative proposal with UT Knoxville was submitted to the Forest Service under its Wood Innovation Grant program regarding wood availability for fuel conversion in the region.
- A proposal to region 3 is under consideration in the "Go Virginia" program. Support from interests in eastern Virginia, including the Tidewater area, is anticipated and discussions with other interested parties are scheduled for mid-April.
- In anticipation of the state/region becoming a second home for the commercial wood processing operations of Red Rock (Oregon under DPA), and Velocys (Mississippi) activities with wood suppliers are expected to increase. CAAFI's possible role in these projects will be as a facilitator for supply chain development in concert with processors and end users.

◇ South Florida Farm-to-Fly –

- Worked to transition the 2017 USDA RBDG feasibility findings to a commercial model via private sector efforts, with CAAFI

participating in an advisory role. Specifically, our 2016-2017 efforts have led to:

- The successful cultivation of 2,700 acres of beets for full co-product processing and sale in the second quarter of 2018.
- Detailed agreements with both citrus processors (for animal feed and molasses) and fuel end product processors.
- Plans for increased production in calendar year 2019 with possible expansion with added citrus and fuel processors.
- South Florida developments hold the promise of acting as a template for commercial supply chain development and transitioning from USDA planning efforts to greater grower engagement and commercialization.

◇ North Florida [Coordinated Agricultural Project \(CAP\)](#) Grant –

- CAAFI engagement is guiding important precedents for analysis and supply chain development being set for the Southeast Partnership for Advanced Renewables from Carinata (SPARC) Initiative.
- The SPARC area of interest consists of three core states: FL, GA, and AL.
 - A USDA Rural Development Value Added Grant proposal was submitted by a grower to put in place the opportunity for an ARA carinata fueled facility in South Georgia. The area provides the best opportunity for carinata growers by having the supply of needed resources in place.
 - For CAAFI the approach could offer a template for transitioning from feedstock trials to actual production.
- Possible funding from the AL Delta Regional Authority is being investigated in concert with Auburn University and Agrisoma, a Carinata seed company. Proposals are due at the end of the June.

- The focus is on examining commercialization starting from Agrisoma's requirements to develop a supply chain centered on shipping grain to Mobile, AL.
- A proposal has been made to Volpe by SPARC leadership to utilize the services of University of South Florida (USF) to execute a first of its kind "bottoms up" analysis focused on the South Georgia region using Volpe's Freight and Fuel Transportation Optimization Tool (FTOT).
 - Discussions are underway to develop the initial scenario that would be iterated on in FY18 using inputs from USF and SPARC to and Volpe to run the FTOT model. Note that FTOT is not now deployable. This has the potential to offer important precedents for future bottoms-up analysis via FTOT.

◇ Vermont Farm-to-Fly –

- The end of the first quarter marked the completion of the USDA VAPG planning grant for the production of "dark algae" for fuel, fertilizer, potable drinking water and animal feed.
- Parallel ongoing efforts moving toward fuel and co-product readiness via a pilot project and supply chain development have been identified for execution for which specific targets have been selected. Cooperative efforts to regionalize the effort are in discussion with leadership at Newtrient, a dairy co-operative, and individual co-op members.
- In order to expedite further development, [GSR](#), the technology developer, is working with Todd Campbell, former USDA Chief Technical Advisor and co-lead of both the anaerobic digester oriented biogas roadmap and F2F2 lead under former Sec Tom Vilsack.

◇ Connecticut Farm-to-Fly –

- The opportunity for re-energizing efforts in CT emerged during the first quarter. The

situation has developed due to disagreement between the city and the state regarding new solutions for a trash-to-energy facility in Hartford.

- Internal meetings with the Connecticut Center for Advance Technology, the CT project lead, are planned to further this effort during the second quarter.

◇ Minnesota –

- A group of significant corporations associated with food production and farming have been collaborating with the Great Plains Institute to explore and foster the development of winter-cover cash crops. CAAFI will continue working with this group to explore potential funding scenarios for a program of R&D that could accelerate their development.

If you are aware of other scenarios that could be appropriate for a regional development effort, please let us know. For more information, see [CAAFI's State Initiatives](#) page.

Please check the [CAAFI website](#) on a regular basis for more detail on pending activities.

Email peter.herzig@dot.gov with any ideas for CAAFI Quarterly items of interest, caafi.org news suggestions, or inquiries about subscription to the CAAFI Membership group.