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*Photo by Joe DelNero, NREL 85390*

# 5 Key Messages From the Accelerating Aerospace Technology Deployment Workshop

2024 SUSTAINABLE AVIATION ENERGY CONFERENCE

**The energy transition brings unprecedented complexity and opportunity to the aviation ecosystem. At the 2024 Sustainable Aviation Energy Conference, more than 100 aviation leaders gathered in Dallas, Texas, to discuss collaboration and research needed to clear the path to widespread adoption of sustainable aviation technologies.**

During open workshops, participants from state and federal agencies, airports, aircraft and engine manufacturers, liquid fuel producers, and other stakeholder groups brainstormed the biggest barriers and opportunities for realizing a sustainable aviation ecosystem.

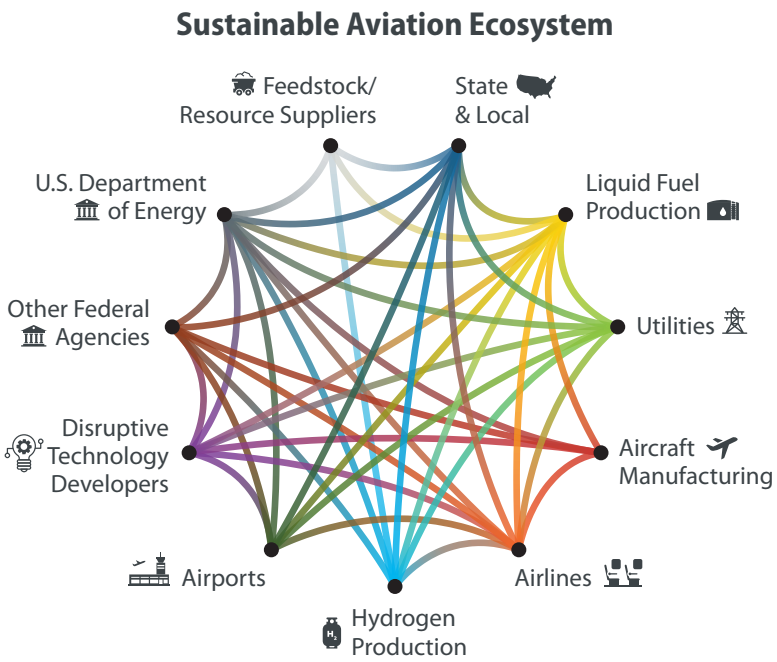
Below are five key messages and discussion points that emerged during a workshop on accelerating aerospace technology deployment.

## 1. Sustainable Aviation Fuel (SAF): Engine Manufacturers Want More Clarity and Standardization

Engine manufacturers are eager to understand how to classify drop-in and non-drop-in SAF, as well as account for their emissions reduction potentials.

Key discussion points:

- SAF companies are developing unique fuel formulations with associated intellectual property, which could limit needed collaboration to accelerate production and adoption.
- For certification of new engines, the broader aerospace community must collaborate with SAF manufacturers and feedstock stakeholders to broadly increase SAF volumes.




Strategic collaboration and knowledge-sharing will be essential for meeting aviation's decarbonization goals. *Figure by Elizabeth Stone, NREL*

- Manufacturers have concerns about SAF emissions and contrails (i.e., will SAF produce more or fewer), combustion performance, and the possibility of airplanes being fueled with different formulations at different airports globally.
- Clearer definitions of a "drop-in fuel" could be helpful, especially as SAF producers work to ensure fuels are compatible with existing jet engines around the world.
- It is critical to have engine companies involved as SAF production and variety grows, as understanding engine performance and possible degradation over time is critical.
- SAF engine tests require a minimum of 100 gallons of fuel.
- The industry could use a cooperative SAF database, supported by a simulated combustion chamber to test different SAF samples.
- As the industry aims for SAF with net-zero greenhouse gas emissions, life cycle assessments must comprehensively account for complex supply chains and net impacts.
- Researchers should work to mature SAF life cycle assessment models.

## 2. Hydrogen: More Research Is Needed To Understand Its Application for Aviation

Research into hydrogen components is thriving, but more is needed to tailor and optimize ground vehicle solutions for aviation.

Key discussion points:

- Systems must be specially designed for airport applications, including lightweight tanks, gauges, distribution lines, and other components for safe fueling on the ground.
- Testing, modeling, and simulations might help sort through challenges in airport applications, as long as hydrogen and materials experts are engaged to help interpret results.
- Hydrogen transportation, storage, fueling, and infrastructure solutions must be standardized—for airports of all sizes and a diverse range of aerial vehicles (e.g., fixed-wing, helicopter).
- Aviation should leverage infrastructure and lessons learned from hydrogen ground transportation research and systems.

Sponsored by DFW International Airport and hosted by NREL, the 2024 Sustainable Aviation Energy Conference brought federal agencies and industry leaders to the whiteboard to find focused collaboration areas that can accelerate existing federal, state, and industry programs. *Photo by Chris Bousselot, Dallas Fort Worth International Airport*

## 3. Battery Electric: Certification and Testing Are Critical for Electrical Aircraft Components and Charging Infrastructure

Transitioning components from ground mobility to flight requires navigating a demanding set of certification standards and safety requirements.

Key discussion points:

- National-scale testing facilities could acquire data and develop standard practices, using hypothetical testing for real-world scenarios.
- Companies need data on battery cell behavior during flight to understand the impacts of elevation and other operational conditions on performance and safety.
- Because components are not yet standardized, it is challenging to design solutions (e.g., structural considerations in airplanes).
- The industry could use clear standards for high-voltage aerospace power systems (which operate at 800–1,000 V).
- When seeking to make a comparison to conventional fossil-fuel-powered aviation, researchers should undertake a more holistic approach to measuring the carbon footprint of electric aviation, which includes emissions produced through the generation of power at the grid.
- Strategic public–private partnerships can help regional manufacturers bring electric aircraft to market.
- It is important to consider the intersection of sustainable aviation and advanced air mobility, with the possibility of regional airports using electric aircraft to reduce costs per passenger and better connect people to medical care and other services.

## 4. Collaboration Among Stakeholders Is Critical

Collaboration among aviation sectors—which are interdependent—could be critical for quickly identifying challenges with emerging technologies and understanding their integration into larger energy, economic, and regulatory systems.

Key discussion points:

- Researchers can simulate aircraft travel to determine energy use, but they lack data to model and study systems.
- Different disciplines and aviation stakeholders often work in silos, which contributes to communication challenges (e.g., some working on battery-electric aircraft, others on hydrogen, and still others on more exotic configurations).
- To achieve a sustainable ecosystem, the aerospace industry must work together to clearly outline potential fuel costs, environmental impacts, and other impact metrics, which might require a culture shift.
- The larger system of aviation stakeholders must agree on a common framework and gather consensus.

## 5. Focused Panels, Workshops, and Information Resources Promote Solutions

Industry needs to easily communicate challenges to the research community—with a feedback loop for returning results back into the commercial space.

Key discussion points:

- The industry needs a platform for support collaboration, communication, and information-sharing—and that platform must be widely promoted, as well as easy to browse and find in search engines.
- Findings and data should be publicly available to support a robust research ecosystem.
- Lots of enabling research has already been completed, but the community needs a mechanism or central location for accessing it and understanding research needs (e.g., websites, fact sheets).
- Enabling information must be available to different audiences and roles (e.g., academic, regulators, policymakers).
- The industry would be served by a unifying and strategic communication plan that uses a centralized vocabulary across disciplines and industries.
- Due to the extended timeline between technology innovation and the market, state and federal policymakers need a mechanism for knowing the state of research and what gaps exist.
- Small, new companies need a way to understand and facilitate dialogue with the Federal Aviation Administration, as well as connect with strategic partners for investment and scale-up.
- The industry might collaborate with regulators to help navigate challenging regulations and support mass adoption.

## Learn More

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