

*Photo from Denver International Airport*

# 5 Key Messages From the Alternative Fueling (Energy) Infrastructure 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 alternative fueling (energy) infrastructure.

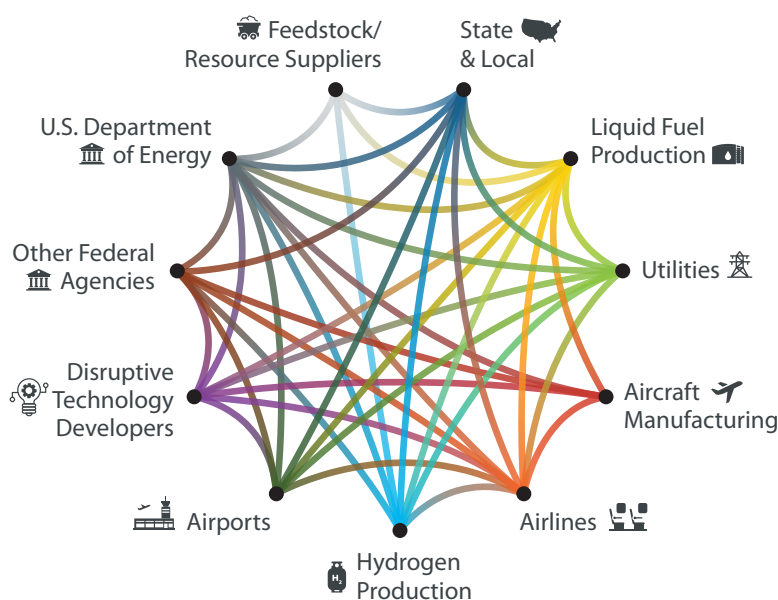
## 1. Industry Needs Detailed Energy Roadmaps That Are Broadly Applicable to Airports of All Sizes

Airports do not traditionally generate energy or produce fuel, but they will need a lot of it in the future to support hydrogen use and potential large increases in electricity loads.

Key discussion points:

- An energy roadmap can inform long-term budgeting and labor planning, as well as safety plans, utility infrastructure design, and operational/energy concerns.
- Close collaboration among airlines, aircraft, and engine manufacturers can ensure infrastructure scales with new technology adoption, including future fueling and charging requirements.

## Sustainable Aviation Ecosystem



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

- Airports must understand space demands for new energy assets—such as energy storage—especially for highly urbanized airports with a limited footprint.
- Planning documents must consider the whole energy picture, including energy needs for alternative fuel ground vehicles, ground support equipment, and aircraft.
- Airports should involve utilities early in future energy plans, as they are critical in understanding and utilizing infrastructure (e.g., natural gas lines) and energy assets.
- Airport energy plans should include regional transit agencies, which likely have concurrent plans for alternatively fueled vehicles.
- A research gap list can inform action plans and might dovetail into a cooperative research structure—with associated funding—that various players can contribute to. Federal and state stakeholders are often looking for specific research needs to potentially fund.
- Microgrids can support airport energy needs, but they must be seamlessly integrated into existing and future infrastructure.
- Airports need to understand resiliency implications of changes in fuel diversity—including possibilities of using hydrogen, other sources for backup or supplementary power, and energy storage.
- Airports can be recovery centers for large events (e.g., wildland fires, earthquakes, cyber events)—supplying emergency power through their diesel or alternatively fueled generators.
- Producing hydrogen on-site at airports could be challenging from a space perspective; however, it may provide an early transition pathway to demonstrate the benefits and potential of hydrogen.
- Airports need to understand what questions to ask, what research is occurring, and who can help.

## 2. Data, Models, and Demonstrations of Emerging Technologies Can Help Inform Energy and Infrastructure

It can take years to plan, certify, and build energy infrastructure, so planners need resources to anticipate future demands, even as airports constantly evolve with changes in service and demand.

Key discussion points:

- Smaller airfields might be used to demonstrate vehicles or flight tests, as the industry needs test beds to “de-risk” technology integration.

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 Boussetot, Dallas Fort Worth International Airport*

- Planners need to understand potential energy needs of emerging aircraft.
- Energy data or simulations can help inform terminal expansion planning.
- Sophisticated simulations and digital twins can help planners visualize future energy scenarios.
- Airports need operational strategies to handle peaks in energy demand when electric aircraft charge, which should be accounted for alongside loads from other assets and operations.
- Models can help utility partners understand how and where to expand infrastructure and transformers to handle loads.
- More research is needed to bridge the disconnect between electric aircraft manufacturers and energy providers at airports.
- Algorithms can help manage high-speed charging to minimize overall impacts to the grid.

### **3. New Energy Infrastructure Should Be Flexible and Scalable**

With technology evolving rapidly—and airlines, airports, and operators only beginning to understand their future use cases—new energy infrastructure should be adaptable.

Key discussion points:

- Utility lines and access tunnels should be built to accommodate expansions and possibly alternative energy carriers (e.g., hydrogen, electricity).
- Aviation should study challenges and progress of hydrogen ground vehicle infrastructure and adopt lessons learned.
- Plans should understand that components—such as fueling nozzles—may need to be switched out over time to adapt to advances, new requirements, and needs of larger vehicles.
- Aviation demand is growing rapidly even as existing aircraft have long life cycles, meaning there may be a delay before new aircraft can feasibly be integrated.
- Airports lack clarity on when advanced aircraft may start showing up, which makes infrastructure planning challenging.

## 4. Airport Geography Should Inform Infrastructure Planning

Whether rural or urban, domestic or international—airport size and location will influence energy infrastructure options and needs.

Key discussion points:

- Airports must be prepared to accommodate a wide variety of aircraft—both small and large.
- General aviation airports—with smaller airlines that serve smaller communities—are seeking solutions for shifting away from leaded aviation fuel due to emissions concerns from local communities.
- In some cases, domestic airport energy plans and aircraft must align with international needs.
- Smaller airports may need to embrace energy alternatives that are most accessible, such as local or on-site microgrids.
- Sustainable aviation fuel might not be readily available or accessible in all locations.
- To start developing supply chains to supply hydrogen to airports, producers must first understand future demand at airports across the United States.
- A set of energy roadmaps might be developed to address various airport sizes and markets.

## 5. Unconventional Business Models and Cooperative Research Might Mitigate Risk and Accelerate Progress

Airports can explore novel contracts, leasing mechanisms, and partnerships to help advance the larger industry while lowering their financial risk.

Key discussion points:

- Clarity is needed on where obligations sit on building and owning future energy infrastructure.
- Planners and regulators should consider whether new assets or infrastructure should be privatized.
- New technologies—such as fuel cell vehicles—might be leased to reduce ownership burdens on airports and facilitate technology advancement (e.g., assets can be swapped out with newer technologies).
- To encourage rapid progress, a coalition of stakeholders might contribute to a “design reference mission”—driven by government funding with list of research needs to address key knowledge gaps.

### Learn More

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