Electrical and Hydrogen Infrastructure Considerations

Presented to: Airport Safety & Standards National Consultant Workshop

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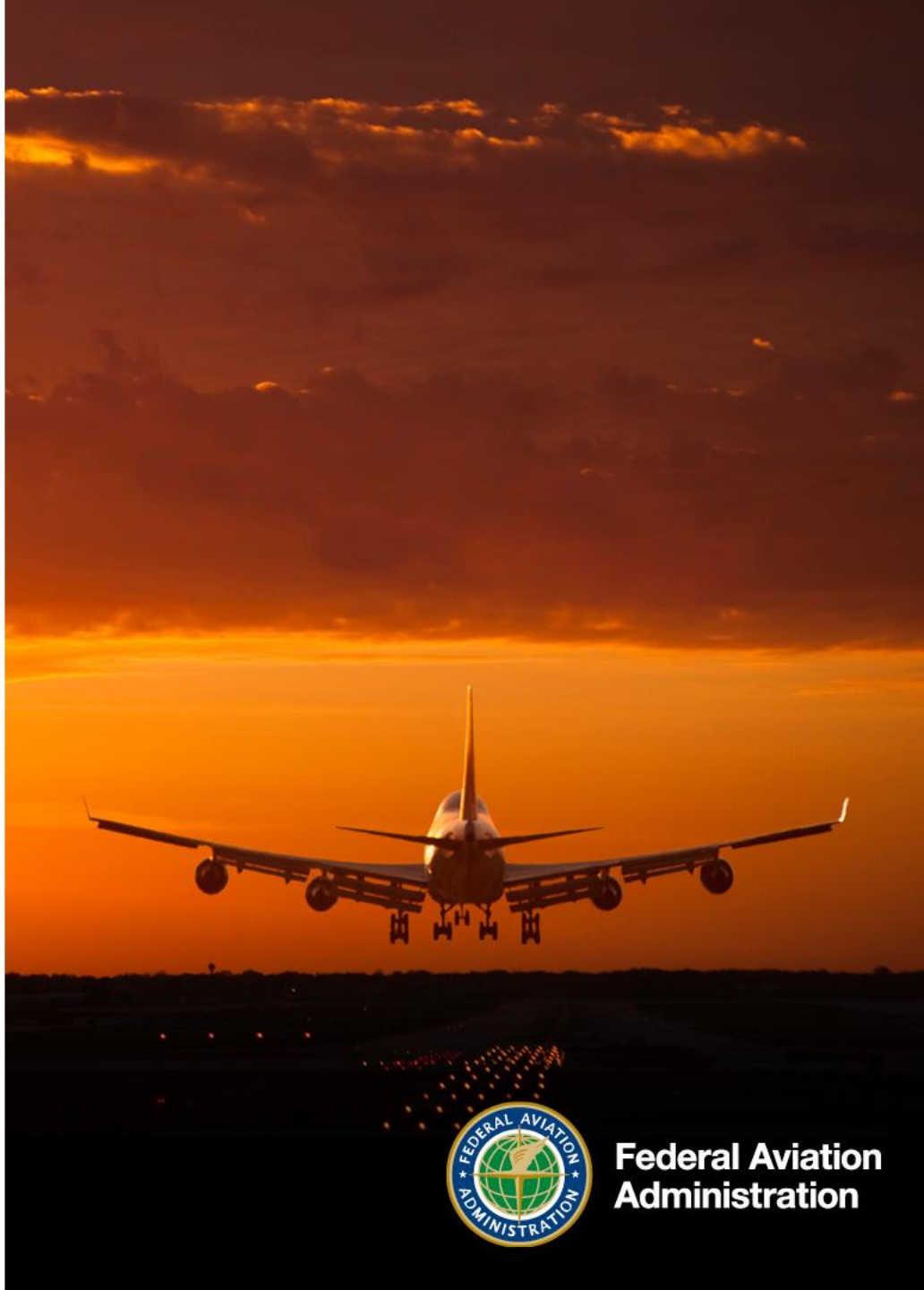


Increased Alternative, Renewable Fuel Demand at Airports

- Many aircraft manufacturers are developing new aircraft or modifying existing aircraft that leverage alternative, renewable fuels.
- New alternate, renewable fuel demand isn't limited to just emerging aircraft, but also for other uses such as ground support equipment, shuttle busses, and rental cars.

What we are seeing

- Proponent would like to install hydrogen storage tank for aircraft fueling.
- **Not enough information is being provided.**

Aircraft Fueling Infrastructure Planning, Notification, and Approvals

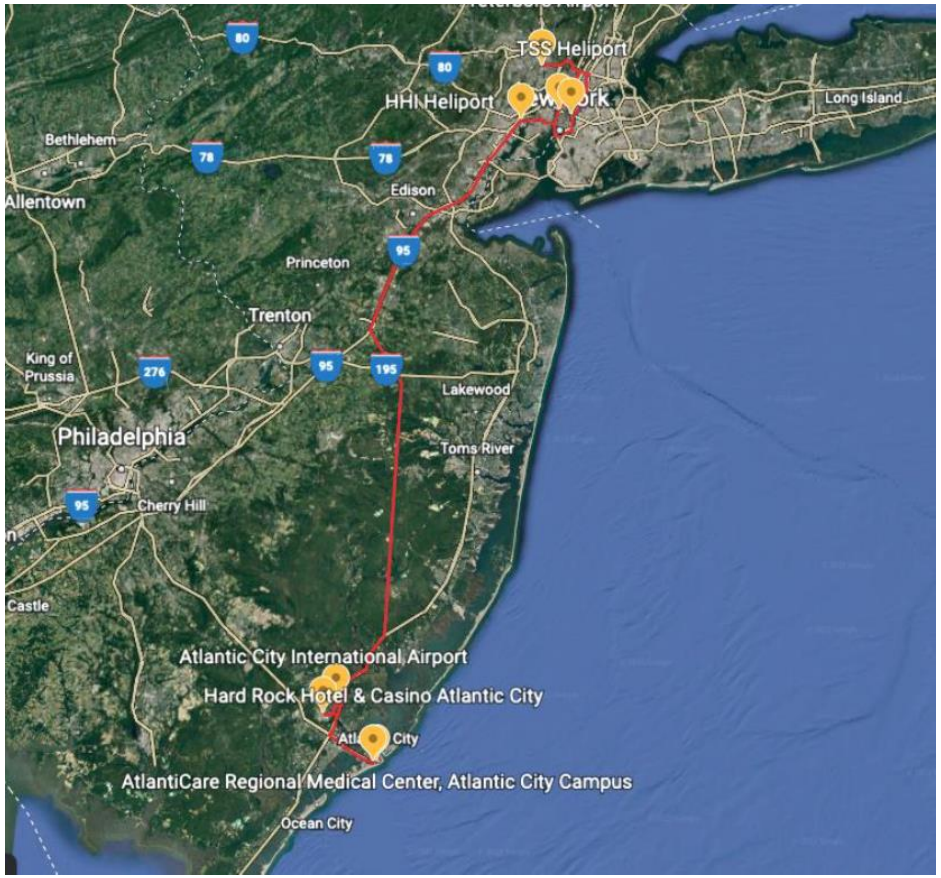
- FAA is **leveraging existing federal regulations (14 CFR Parts 77)** that require notification, FAA assessment, and issuance of an airspace determination for proposed aircraft fueling infrastructure on airports.
- Proposed aircraft fueling infrastructure on **federally-obligated airports are also required to be depicted on the FAA-approved Airport Layout Plan (ALP).**
- Proponents and sponsors are encouraged to **provide as much information about their proposed fueling infrastructure.**

FAA and Department of Energy Research Collaboration

- Since 2020, the FAA entered into an interagency agreement with the Department of Energy's National Renewable Energy Laboratory (NREL) to research how different renewable energies can impact the airport environment.
- Two areas of focus:
  - Electrical Vertiport Infrastructure Study in support of Advanced Air Mobility (AAM)
  - Hydrogen Infrastructure at Airports

AAM Electrical Infrastructure Study

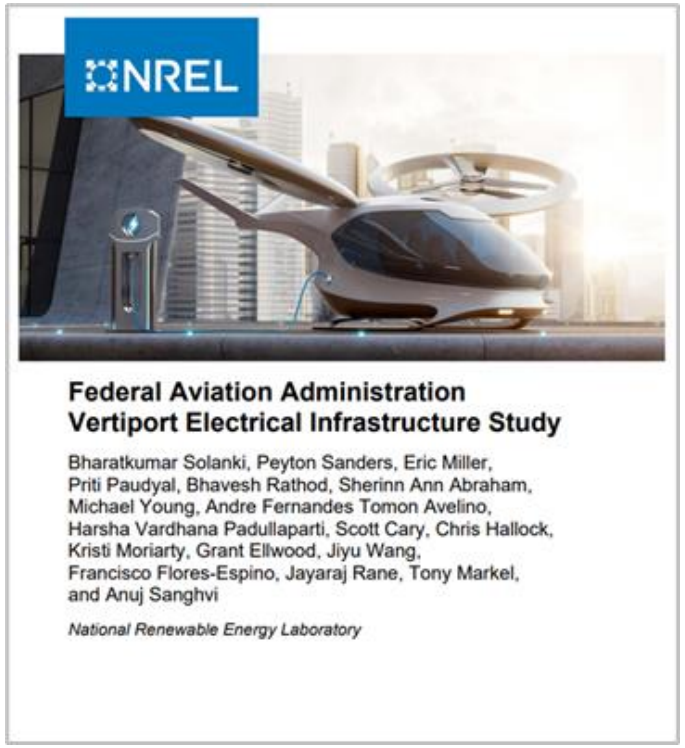
- Purpose: Determine how electrical vertical takeoff and landing (eVTOL) aircraft electrification affects a landing facility's electrical grid.
- Modeling based on power grid data from actual sites and EVTOL aircraft specifications.
- **eVTOL charging is likely to increase site load demand 6 to 7 times***:* Current feeders generally could accommodate a 2-3x increase.



Federal Aviation Administration

Electrical Infrastructure Study Findings

- NREL’s Electrical Infrastructure Study findings are publicly available on NREL's website:
  - Federal Aviation Administration Vertiport Electrical Infrastructure Study
  - Overview of Potential Hazards in Electric Aircraft Charging Infrastructure
  - Addressing Electric Aviation Infrastructure Cybersecurity Implementation
- Simulation Tool: Aviation Energy Research and Operation Simulator (AEROSim)
- Currently working to expand study **to include different airport environments in a metropolitan area.**



Electrical Infrastructure Considerations Part 1

- Airports may be able to accommodate initial operations of a single operator with a few flights a day.
- As operation tempos increase and multiple operators start using an airport or other public-use venue, **the existing utility network won't be able to handle the proposed electrical demand unless upgrades are performed.**
- Airports are already expressing concerns about meeting the electric demands of rental car companies electrifying their fleets.

Electrical Infrastructure Considerations Part 2

- On-site energy storage and generation can be a potential solution to mitigate grid issues.
- Airports must plan for long lead times for materials.
- Airport planners are encouraged to work with city planners to **better understand the electrical needs of communities surrounding airports and identify potential collaboration for grid upgrades.**

Electrical Infrastructure Considerations Part 3

- For siting purposes, electric charging stations are **considered similar to self-fueling facilities.**
- Lack of consensus around a charging protocol may require airports to accommodate multiple types of charging stations and **airports may not have the real estate or electric infrastructure to accommodate multiple charging standards.**
- When submitting a 7460, the airport sponsor **should identify which charging station standard will be used and if it will be vehicle agnostic**.

Electrical Infrastructure Considerations Part 4

- Airports should ensure compliance with FAA standards that may apply to the surrounding environment and use industry standards where available.
- There are concerns about electric charging stations can potentially create electromagnetic interference to navigational instrumentation.
- Charging stations that have **wireless communications should be compliant with 47 CFR Part 15, “Radio Frequency Devices”.**
- **Engineering Brief 105, “Vertiport Design”** provides a series of charging station standards for siting and use of charging stations.

Additional FAA/DOE Collaborations

- The FAA is working closely with the Department of Energy to:
  - Identify the energy needs airports and other infrastructure developers should be planning for.
  - Educate utility providers and communities on those needs.
  - Expand ongoing projects, like Project Athena, which had previously focused on electrification needs of airport rental car fleets, to now include electrification needs of aircraft and airfield vehicles.

Hydrogen Infrastructure at Airports

- Hydrogen has become a fuel of interest for both aircraft and ground service equipment because of its abundant availability and production of low emissions when used as an alternative fuel.
- With increased interest in hydrogen fueling, airports will need standards and guidance to support the safe storage and handling of hydrogen fuels.
  - In September 2022, FAA awarded NREL a new task to support the development of hydrogen infrastructure guidance.

Hydrogen Infrastructure at Airports cont'd

- ARP is seeing an uptick in the number of airports interested in accommodating hydrogen fuel storage and fueling capabilities on their property.
  - **ARP created a Hydrogen Tiger Team to provide support to ARP Regional and District Offices** as they review and analyze these on-airport proposals.
  - The FAA is also a participant of the DOE's Hydrogen Interagency Taskforce: Infrastructure, Siting, & Permitting (ISP) Working Group.

Hydrogen Infrastructure Considerations Part 1

- What type of hydrogen is being stored (e.g., gas or liquid)?
- How will the hydrogen be stored at the airport?
- What standards are being using for the design, construction, and operation of the hydrogen fueling facility (e.g., OSHA, NFPA), and why?
- What are the dimensions for the facility?
- Where will the hydrogen facility be located at the airport, and where is the nearest FAA-funded facility (e.g., apron, taxiway, runway, lights)?

Hydrogen Infrastructure Considerations Part 2

- How does the airport plan to transport hydrogen to the airport?
- What rules, regulations, and safeguards will be implemented to protect the tank?
- Will there be any subsurface infrastructure that feeds the tank?
- How will the airport address an emergency, associated with a spill or leak?

Questions?

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