Michigan Department of Transportation
RESEARCH Administration

RESEARCH SPOTLIGHT

Project Information

REPORT NAME: Multimodal Airport Charging Station Deployment – Phase I

START DATE: April 2023

REPORT DATE: August 2024

RESEARCH REPORT NUMBER: SPR-1742

PROJECT COST: $214,404

COST SHARING: 20% MDOT, 80% FHWA through the SPR, Part II, Program

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Developing infrastructure at airports to charge electric aircraft and vehicles

As electric aircraft become viable for short, regional trips and the number of electric vehicles at airports continues to rise, the Michigan Department of Transportation (MDOT) sees a growing need to make electric charging capabilities available at these facilities. To better understand a path forward to offering this capability, MDOT evaluated the feasibility of a multimodal charging station at a Michigan airport and developed guidance for designing and implementing future installations. Identifying an efficient implementation plan will help the agency to ensure this infrastructure has sufficient electrical capacity.

PROBLEM

Electric aircraft are emerging as an alternative method for moving freight and passengers in Michigan. In addition, electric vehicle use at airports continues to increase. Adopting electric technologies at airports will decrease the reliance on fossil fuels and reduce greenhouse gas emissions. But airports in Michigan did not have the battery charging infrastructure to charge both electric aircraft and electric vehicles simultaneously.

Increasing the use of electric aircraft decreases the reliance on fossil fuels and reduces greenhouse gas emissions.

To provide this service and to successfully install multimodal charging stations, MDOT needed to determine which airports are best suited to effectively host multimodal charging stations. This project evaluated Tier 1 and Tier 2 airports in Michigan to identify the most feasible locations and also examined the preliminary design requirements, costs and other impacts of installing a multimodal charging station.

RESEARCH

Prior review of existing research indicated ongoing efforts by local communities,

(continued)

"The results of this research provided MDOT with clear guidance on moving forward with implementing multimodal charging stations at airports. We look forward to four installations in fiscal year 2025."

Linn Smith
Project Manager

research organizations, MDOT, and the Federal Aviation Administration (FAA) to assist airports in planning and installing infrastructure for efficient operations. The research emphasizes that long-term planning is essential for ensuring resilient electric systems as new flight technologies develop. Investigators for the current project also conducted a thorough review of available charging systems and batteries, charging metering and monitoring systems, and electric aircraft manufacturers.

To identify the most suitable airports in Michigan, investigators analyzed 95 Tier 1 and Tier 2 airports by completing an initial survey and scoring each airport on 10 variables. From this initial group, six airports were selected for further analysis, which included site visits and an evaluation of each airport based on 16 criteria. The three most significant criteria were environmental justice areas that would benefit from economic development, electrical capacity and connectivity to other airports with electric aircraft.

In addition to selecting one site for the initial implementation, investigators took steps to make future installations more efficient. This included documenting the process for requesting FAA approval for a multimodal charging station and developing a design concept for future installations of multimodal charging stations at Michigan airports. The design concept provides a base model design and plan scalable to specific airports that meet the electrical capacity requirements.

RESULTS

Based upon the site analysis and scoring results of the 16 criteria, the Capital Region International Airport in Lansing was recommended for the initial installation of a multimodal charging station. The facility received a score of 11 (out of 12), has the requisite power capacity, is in an area classified as disadvantaged, is accessible to other airports that serve electric aircraft, and has placed a priority on electric aircraft charging infrastructure. The next two highest rated airports were Gerald R. Ford International Airport and Willow Run Airport.

The preliminary base model design developed in the project specifies a central power source with nearby electric chargers on both the airside and landside of the airport. Requirements of this design include:

- Ability to charge two electric aircraft and four passenger vehicles simultaneously.
- Minimum 30-foot radius parking area for each aircraft.
- Charging requirements of 678 kilowatts.
- Electrical service of 1,000 amps.

The estimated cost for installing the base model design is approximately $1.1 million.

IMPLEMENTATION

Going forward, the report recommends MDOT and Michigan airports take further action, including to:

- Evaluate and finalize the design of the initial multimodal charging station.
- Collaborate with electric charger and electric aircraft manufacturers to develop a manufacturing location near a Michigan airport.
- Promote the installation of multimodal charging stations at other airports in Michigan.
- Identify funding opportunities within Michigan and the FAA to offset installation costs.

The Capital Region International Airport and three additional Michigan airports have received funding for the installation of multimodal charging stations. These installations are expected to be completed by the end of fiscal year 2025.

Research Administration

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The final report is available online at
MDOTjboss.state.mi.us/TSSD/tssdResearchAdminDetails.htm?keyword=SPR-1742.

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