ACRP Problem Statement 17-02-15 **Recommended Allocation:** $300,000

Evaluating the Use of Gate Electrification in Varying Climates

ACRP Staff Comments

The scope could be expanded to include additional relevant factors (other than just climate) and the budget increased.

TRB Aviation Committee Comments

ENVIRONMENTAL IMPACTS OF AVIATION: Supported. Relevant, timely, and useful to airports that have or plan to have ground power and PCA. Research is needed to support airport PCA and auxiliary units to reduce airline dependency and reduce airport emissions under certain weather conditions.

Review Panel Recommendation and Comments

Recommended. The proposed research would be beneficial for airports, especially those in non-attainment areas. It would help validate and support VALE updates and assumptions. It would also help airports address climate resiliency.

AOC Disposition

This problem statement received an average rating of 3.9 points out of a possible 5 points among voting AOC members. No discussion. Approved and funded at $300,000 as ACRP Project 02-76.

ACRP *Problem Number* **17-02-15**

FY 2017 RESEARCH PROBLEM STATEMENT

TRANSPORTATION RESEARCH BOARD
AIRPORT COOPERATIVE RESEARCH PROGRAM

I. TITLE

Evaluating the Use of Gate Electrification in Varying Climates

II. BACKGROUND

Airport-related emissions are an increasing global and local air quality concern as air travel increases and airports are challenged to reduce their environmental impacts. The increasing stringency of the Environmental Protection Agency (EPA) National Ambient Air Quality Standards (NAAQS) and global climate protection initiatives require U.S. airports to implement clean technologies to reduce emissions.

Industry-wide, airports have installed electric pre-conditioned air (PCA) and ground power converter units to reduce emissions associated with aircraft auxiliary power units (APU) and diesel ground power units. Through the Voluntary Airport Low Emissions (VALE) Program, the Federal Aviation Administration (FAA) encourages installation of this infrastructure at airports in EPA nonattainment areas to address air quality concerns such as ozone.

Research is needed to evaluate the impacts of local climate and weather on airline use of gate electrification systems. Additionally, airports need guidance on technology and best practices to improve utilization rates and resiliency of these systems. This project will inform climate adaptation plans and air emissions modeling efforts at airports in various regions across the U.S.

III. OBJECTIVE

The objective of this research is to provide guidance to airports on the impacts of weather and climate on gate electrification systems and provide recommendations to improve utilization rates. The guidance should address the following:

1. Determine current and historic utilization rates based on airline data
2. Evaluate how weather and climate impacts utilization
3. Identify best available electric PCA and ground power technology
4. Develop climate resiliency strategy for these systems

IV. PROPOSED RESEARCH TASKS

It is envisioned that the research will be conducted following the primary objective outlined in Section III above. Specifically, the research is anticipated to:

1) Determine the level of infrastructure utilization

    a. Research proportion of aircraft which use provided gate power and PCA equipment
    b. Identify alternatives used in place of gate power and PCA equipment
2) Evaluate factors which determine infrastructure utilization
    a. Define ranges of temperature at which equipment is most effective
    b. Define ranges of temperature and weather during which gate power is utilized most
    c. Define ranges of temperature and weather during which gate power is utilized least
3) Identify opportunities for improvement in infrastructure utilization including best available electric PCA and ground power technology
4) Develop climate adaptation and resiliency strategies

V. ESTIMATE OF THE PROBLEM FUNDING AND RESEARCH PERIOD

It is anticipated that this project would require $275,000 with an 18 month completion period. However, this will be more accurately quantified following the development of specific project scope of services. The funding estimate was based on the funds provided for ACRP Report 149, which updated the current ground support equipment (GSE) default settings for airport emissions modeling and had some similar research tasks.

VI. URGENCY AND PAYOFF POTENTIAL

When implementing measures to reduce emissions, airports have control over their own emissions from buildings, fleet, construction, and purchased electricity. Aircraft, which are often the largest emissions contributor to the entire airport footprint, are not under the airport's direct control. Gate power and PCA are valuable because they are proven measures that airports can take which directly reduce the emissions from aircraft. The challenge associated with gate power and PCA equipment is maximizing utilization. Due to the broadly varying climatic conditions for airports throughout the year, the use and effectiveness of gate power and PCA differs. Identifying usage in a range of climates would help airports identify areas of improvement.

This research would better inform climate resiliency plans and the emissions calculated in modeling systems such as the FAA Aviation Environmental Design Tool (AEDT) for the estimated gate power and PCA utilization, which would allow airports to better estimate and understand their aircraft emissions reductions associated with gate power and PCA use.

VII. RELATED RESEARCH

Research exists which complements this problem statement's objectives by providing needed data on APU and GSE emissions factors. ACRP recommended funding for a project to explore emissions factors for APUs last year (FY2016 Problem Statement: Emissions Factors for Non-Aircraft Sources), and ACRP Report 149 updated GSE emissions defaults. Specific research on the topic of gate power and preconditioned air infrastructure use is not known to exist at the level proposed.

VIII. PERSON (S) DEVELOPING THE PROBLEM

The problem was developed by Ms. Emily Conway, Environmental Operations Analyst, and Kris Russell, Senior Environmental Operations Analyst, Dallas/Fort Worth International Airport, Texas.

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IX. PROCESS TO DEVELOP PROBLEM STATEMENT

The problem statement was developed by Emily Conway and Kris Russell based on observed needs at Dallas/Fort Worth International Airport.