

Problem Statement No.: 285

Determining Carbon Removal Opportunities at Airports to Achieve Net Zero Emissions

Recommended Allocation: \$400,000

Tags: air-quality, airport-planning, construction, design, environment, operations, policy, public-relations, sustainability

Related Emerging Issues/Themes: AIRPORT SUSTAINABILITY--Evaluate current airport sustainability efforts.

Research Roadmaps: Environment--Sustainability

Staff Comments: This problem statement was previously submitted for AOC funding consideration in the set of the FY 2021 problem statements. No revisions appear to have been made since its last submittal. ACRP Research Report 220: Guidebook for Developing a Zero- or Low Emissions Roadmap at Airports touches on the topic. The author did not provide a cost estimate; an allocation of \$400,000 is recommended based on similar research efforts.

Average Airport Employee Review Rating: 4.14

ACRP Oversight Committee (AOC) Disposition: Problem statements 285, 708, and 728 were combined as ACRP Project 02-100 and funded at \$600,000.

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Summary

The proposed research project would evaluate carbon removal strategies that could be deployed at airports to help achieve "Net Zero Emissions" in order to align with global emission reduction targets and to address increasing public scrutiny. Carbon removal strategies include both natural (e.g., tree plantings and agricultural soil management) and technological approaches (e.g., carbon-absorbing concrete and direct air capture).

Background

Airports across the US have successfully implemented a wide array of projects, programs, and policies to reduce carbon emissions associated with their operations. However, airports are under increasing public scrutiny by elected officials, environmental organizations, and community members (i.e. "flight shaming") to more drastically reduce their emissions to align with the Intergovernmental Panel on Climate Change's target of "Zero Net Emissions" by 2050. Some industry experts even predict that this external pressure will only increase now that air travel and its associated emissions have been temporarily reduced due to the COVID-19 crisis. As such, airports will likely have to complement their current emission reduction projects (such as installing renewable energy systems and electrifying ground transportation fleets) with onsite carbon removal strategies.

Carbon removal strategies have not yet been widely adopted at airports (if at all) and there is a general lack of knowledge on them in the aviation industry. Therefore, the proposed project would provide foundational research for airports to better understand carbon removal strategies (both technology and nature-based) and their potential applicability at an airport setting. Understanding that there is unlikely a "one size fits all" solution, the research will help differentiate strategies by variables like geological conditions, geographic location, land use characteristics, funding availability etc. This information will be critical to help US airports successfully integrate carbon removal into their long-term planning and development initiatives and to effectively respond to their community's concerns on aviation's climate change impacts.

Objective

The objective of this research project is to develop a "roadmap" for airports interested in achieving Net Zero Emissions by evaluating the applicability and feasibility of carbon removal strategies to various airport settings and by developing recommendations for their successful on-the-ground implementation.

Research Approach

- Summarize available carbon removal strategies (technology & nature-based), with special attention to near-term options such as carbon-absorbing building and pavement materials.
- Compile case studies on their application in other industries, especially other transportation sectors if available.
- Evaluate their general applicability to an airport setting.

- Evaluate siting parameters to help airports determine the optimal strategies for their facilities.
- Assess possible funding options and financing approaches, such as public-private partnerships.
- Provide recommendations for integrating into airport planning and capital development programs.
- Provide recommendations for successful on-the-ground implementation.

Cost Estimate and Backup

N/A

Related Research

ACRP Synthesis 53: Outcomes of Green Initiatives: Large Airport Experience.

ACRP Synthesis 100: Airport Greenhouse Gas Reduction Efforts.

ACRP Report 57: The Carbon Market: A Primer for Airports.

ACRP Report 80: Guidebook for Incorporating Sustainability into Traditional Airport Projects.

ACRP Report 02-82: Developing a Roadmap to Achieve Zero Emissions at Airports.

Author

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Airport Employee Comments

As ACI and many industries throughout the world talk about Net Zero by some year I think this is a Problem Statement where numerous airports could benefit.
Tackling the global warming is very important and urgent issue. This research would be beneficial to all airports for develop a strategic plan of reducing emissions.
Topic that is of interest with pros of providing options from other industries, roadway for what can work at airports of all sizes related to terminal/facility, landside and airside infrastructures and items to be encountered along the way. Concerns include FAA funding eligibility related to new technologies, meeting FAA grant assurances, if topic can encompass all sized airports, and local aspects that may vary from one location to another. This problem statement appears similar to number 708.
Good topic with a few obstacles. If we are looking holistically at an airport, understanding new technology related to FAA eligibility is key as well as the grant assurances. Appears to be similar topic to 674, 708 and 728.
Increasingly a topic of public concern. This could ultimately impact passenger travel decision-making.
Strategic priority for aviation industry commitments to Net Zero emissions supporting ICAO, UN global goals to achieve net zero carbon by 2050
With renewed green efforts from the federal government, this is a timely study to outline steps for airports large and small, to implement carbon reduction activities.
This is an important area of study that will only get more attention in the coming years. The potential difficulty is trying to create a one size fits all model as each airport has unique opportunities and challenges. Regardless, important and relevant.
Carbon removal stands as the most impactful area for airports to influence their environmental impact.
Carbon, power, and resilience are all part of 285, 605, 651, 672, 693, 708, and 728, and could be combined to provide a roadmap for carbon sequestration, removal, reduction (in production), towards efficient replacement of existing infrastructure, building envelop improvements (and end-of-life-facilities-replacement), electrification, and climate/energy resilience.
I think this concept will become more and more of interest to airports over the next few years, however, I believe this area is something only large airports have the capacity to truly focus on currently.
A very timely topic, as aviation reckons with public pressure to decarbonize. An already difficult sector to accomplish this in, carbon capture is a tool in the toolbox which must be explored.

TRB Committee Comments

Reviewing Committee(s)	Committee Comments

AV030	ENVIRONMENTAL ISSUES IN AVIATION: Recommended (with comments): Reviewers agree that this problem statement is applicable and generally a good idea. However, it could benefit from more details and possibly be combined with other similar carbon-focused problem statements. Additionally, this problem statement should further define specific "net-zero" vs. other climate goals (e.g., neutrality, carbon-free/carbon-zero, etc.)
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IdeaHub Votes and Comments

Idea Number: **285**

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The votes and comments below were provided by the **IdeaHub** community prior to the idea's submission as a problem statement.

Idea Link: <http://ideascale.com/t/UKsrZBhgN>

Tags: air-quality, airport-planning, construction, design, environment, operations, policy, public-relations, sustainability

Votes:

Votes	
Up	20
Down	0
Total	20

Comments:

This is going to be a huge challenge, but definitely worth investigating. Could be combined with some of the other proposals on microgrids and the energy needs of a fully electric airline fleet, which are substantial.

The project should definitely look into partnership opportunities that airports could develop to help conceive/develop/fund this type of project. It would provide one pathway for airports to achieve zero emissions and will build off the good work done in 02-82. If the technology is found to currently not be feasible for implementation on an airport, the research can determine what the trajectory is. This project would also serve as a market signal that there is a potential opportunity for these types of projects at airports.

This is a great concept and it would be very valuable to the industry! In addition to Katie's comments above:

- 1) It is unlikely to find a "one size fits all" solution, so it would help to differentiate strategies by variables like geological conditions, geographic location, available land, etc. Under Objectives, consider adding "Evaluate siting parameters to help airports determine optimal strategies/technologies for their facilities."
- 2) Given the current situation, it will be very challenging for individual airports to invest in research like this. It is therefore crucial for ACRP to fill the gap. I suggest emphasizing this in the problem statement.
- 3) On a related note, the project should look at funding and financing options.

I think this a great research topic and I appreciate the research project objectives.

I think you can further elaborate on your problem statement while building on your original idea. To make the case that more research is needed, perhaps explicitly mention that 1) carbon capture

technologies have not yet been widely adopted at airports (if at all) 2) there is a general lack of feasibility understanding (is it even possible to do in an airport setting?) and 3) airports as high profile ghg emissions generators have a responsibility and desire to find innovative solutions to our emissions problem. You could include this type of language right before you start the sentence "The proposed research project would allow airports to better understand..."

Per IdeaHub FAQ: "Ideas and problem statements are justifications for funding a research project to address a particular issue." Focusing on why there should be funding to address carbon capture at airports will make for a strong case.

Thanks for your research idea!

Glad you've added it to IdeaHub early so folks can comment and vote on it. I notice that your OBJECTIVE lists what I'd consider to be research steps. You might want to move those to the APPROACH section and make the OBJECTIVE something closer to a specific deliverable (or deliverables)--such as a guidebook or tool. ACRP recently did webinars on writing an effective problem statement and putting it into IdeaHub. I've included them in my comment:

<https://vimeo.com/387744099>

<https://vimeo.com/387744394>