You can get there from here - Developing an emissions roadmap for airports

Thursday, May 21, 2020
2:00-3:30 PM ET
Learning Objectives
At the end of this webinar, you will be able to:

• Describe how to create a compelling business case for zero emissions
• Describe now to develop an achievable emissions target
• Identify GHG reduction practices that are currently being implemented by airports
American Association of Airport Executives (AAAE)

1.0 Continuing Education Units (CEUs) are available to Accredited Airport Executives (A.A.E.)

Report your CEUs: www.aaae.org/ceu
Brendan Reed
San Diego County Regional Airport Authority

- Director of Planning & Environmental Affairs
- 20 Years in Environmental Policy
- Chair of ACI-NA Environmental Affairs Committee
- Previous Panelist on:
  - ACRP Synthesis 91: Microgrids and Their Application for Airports and Public Transit
Five Ways to Get Involved!

1. Join the ACRP IdeaHub community
2. Volunteer for a project panel
3. Prepare a research proposal
4. Answer an ACRP survey
5. Apply the research results

Visit us online: www.trb.org/ACRP
Today's Speakers

Geoffrey Morrison, Cadmus

Presenting
ACRP Report 220: Guidebook for Developing a Zero- or Low Emissions Roadmap at Airports

Stephen Barrett, Barrett Energy Resources Group, LLC

Presenting
ACRP Synthesis 100: Airport Greenhouse Gas Reduction Efforts
Geoff Morrison, PhD, PMP
Principal Investigator

Q Senior Associate, Cadmus
Q Formerly at US DOE
Q PhD from UC Davis
Q Navy veteran ("nuke")
ACRP Report 220 Oversight Panel

Treber Andersen, Salt Lake City International Airport
Kane Carpenter, Austin-Bergstrom International Airport
Tom Cuddy, Federal Aviation Administration
Rangasayi Halthore, Federal Aviation Administration
Sam Hartsfield, AECOM
Mark Kunugi, Denver International Airport
Stephanie Meyn, Seattle Tacoma International Airport
Kris Russell, Dallas Fort Worth International Airport, Panel Chairman
Adam Walters, Southwest Airlines
Melinda Pagliarello, Airport Council International Liaison
Christine Gerencher, TRB Liaison
Marci Greenberger, ACRP Senior Program Officer
Guidebook Status

- Project start
- Online publication
- Two in-depth pilots
- Final edited guidebook
Many Similar Planning Products

- Carbon Reduction Roadmap
- Climate Action Plan
- Sustainability Management Plan
- Energy Management Plan
- Carbon Neutral Growth Roadmap
What is an Emission Roadmap?

1. **Target-oriented.** Limits GHG emissions to a specified quantity by a specified date.
2. **Sequential.** Outlines major steps or milestones needed to reach the emissions target.
3. **Stakeholder informed.** Internal and external stakeholders involved.
4. **Assisted by visuals.** Heavy visual component including infographics, diagrams, conceptual figures, and qualitative tables.
Emission Scopes at Airports

Scope 1
Direct emissions associated with airport activities

Scope 2
Indirect emissions from purchased energy

Scope 3
Indirect emissions as a consequence of the airport's activities

Offsets
CO₂
CO₂

**Graphic is illustrative only**
Examples of Zero Emission Planning

**Heathrow**
- Goal of carbon neutrality by 2020
- Goal of zero emissions by 2050
- Investing in restoring peatland bog near Manchester
- Terminal 2 uses 100% renewable electricity
- Purchasing 100% renewable electricity since 2017

**Swedavia**
- Goal of zero emissions by 2020
- Biofuel used for heating oil
- Energy efficiency
- Biogas and biodiesel used in vehicle fleet
- Firefighting exercises use ethanol-based fuel

**Dallas-Fort Worth**
- Carbon neutrality
- 100% renewable electricity purchased
- Onsite solar and geothermal electricity
- Operational efficiency
- Incorporation of efficiency in existing & new construction
- Purchase of local offsets
What’s in the Guidebook?

Contents

1. Initiate roadmap
2. Stakeholder engagement
3. Setting goals
4. Emission reduction strategies
5. Funding opportunities
6. Monitoring and outreach
1. Initiate Roadmap

Checklist

Q Governance of Roadmap: Teams and processes
Q Vision: What does success look like?
Q Define key terms: Net, neutral, zero, low, etc.
Q Voluntary program: ACA, SBT, etc.
Q Business case: How will airport benefit?
1. Initiate Roadmap

**Governance:** Teams and processes

- **Advisory Team** (External)
- **Core Decision-Making Team** (Internal)
- **Implementation Team** (Internal & External)
1. Initiate Roadmap

**Vision:** Postcard from the future

It is the year 2035 and your airport’s Roadmap has been wildly successful...

- What does the ground transportation look like?
- What is the source of your electricity?
- What do passengers tell you about your airport?
1. Initiate Roadmap

Define key terms:

- Zero Emissions
- Deep Decarbonization
- Carbon Neutral Growth
- Carbon Free
- Zero Carbon Footprint
- Zero Carbon Growth
- Net Carbon
- 100% Renewable
- Climate Neutral
- Carbon Neutrality
# Voluntary Program: Join industry program?

<table>
<thead>
<tr>
<th>Program</th>
<th>Who’s Adopting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airport Carbon Accreditation (ACA)</td>
<td>304 global airports</td>
</tr>
<tr>
<td>Science-Based Targets (SBT)</td>
<td>Heathrow, Auckland</td>
</tr>
<tr>
<td>Global Reporting Initiative (GRI)</td>
<td>30 global airports (5 US)</td>
</tr>
<tr>
<td>UNFCCC Climate Pledge</td>
<td>116 European airports</td>
</tr>
<tr>
<td>The Climate Registry (TCR)</td>
<td>Port of Seattle, Port of Portland</td>
</tr>
<tr>
<td>CDP</td>
<td>All ACA and TCR airports</td>
</tr>
</tbody>
</table>
1. Initiate Roadmap

**Business Case: How will airport benefit?**

- **Improved Bond Rating**
  - FitchRatings
  - A+

- **Risk Mitigation on Climate Change**

- **Improved Employee Relations**

- **Attracting Airport Partners**
  - Amazon
  - IKEA

- **Improved Public Relations**
  - DFH Becomes Largest Airport in the World to Achieve Carbon Neutral Status

- **Energy Resiliency & Efficiency**
2. Stakeholder Engagement

- Develop internal and external teams
- Stakeholder mapping of influence vs. power
- RACI Chart to assign responsibilities
3. Setting Goals

- Conduct GHG Inventory
- Define Goal Boundary
- Choose Goal Type
- Define Goal Timeline
- Define Goal Level
4. Emission Reduction Strategies

Example Replacement Cycles 2020-2050

- **Transit Buses**: 3 Replacements 2020 → 2035 → 2050
- **Vans**: 2 Replacements
- **Passenger Cars**: 2 Replacements
- **Crossovers**: 2 Replacements
- **Refuse Trucks**: 2 Replacements
- **InterCity Buses**: 2 Replacements
- **SUVs**: 2 Replacements
- **Long Haul Trucks**: 2 Replacements
- **Pickup Trucks**: 1 Replacement
- **Ferries**: 1 Replacement
- **Marine Freight**: 1 Replacement
- **Aircraft**: 1 Replacement
5. Funding Opportunities

Chapter 5.1: Public Funding
- VALE
- FAA ZEV & Infrast.
- AIP
- FAA EE Grants
- State grants & rebates
- Energy savings contracts

Chapter 5.2: Airport-Based Funding
- Aircraft fuel taxes
- GHG markets
- Capital and operation
- Green revolving funds
- Power mgt opportunities
- Pssgr voluntary contribut.

Chapter 5.3: Third-Party Funding
- Tax exempt financing
- PPAs
- Performance contracts
- P3
- As Service Model
- Green leases
6. Monitoring & Outreach

Chapter 6.1: Develop Monitoring and Reporting Program

Chapter 6.2: Identify Triggers for Re-Evaluation

Chapter 6.3: Conduct Outreach
Recap

Contents

1. Initiate roadmap
2. Stakeholder engagement
3. Setting goals
4. Emission reduction strategies
5. Funding opportunities
6. Monitoring and outreach
FOR ADDITIONAL INFORMATION

Geoff Morrison
Geoff.Morrison@cadmusgroup.com
240-204-6216
Airport Greenhouse Gas Reduction Efforts

Stephen Barrett, LEED-AP
Barrett Energy Resources Group, LLC
Stephen B. Barrett, LEED-AP
Principal Investigator

→ Lead author of the FAA’s Solar Guide
→ Principal Investigator for three ACRP Project Reports and three Synthesis Reports
→ Lead author of ICAO’s “Renewable Energy and Aviation”
→ Consultant to airports and renewable energy companies
ACRP Synthesis 100 Oversight Panel

Petra Kandus, Port Authority of New York and New Jersey, Panel Chairman
Adam Klauber, Rocky Mountain Institute
Kristen M. Lemaster, Changing Climates Consulting
Stephanie Meyn, Port of Seattle
Brendan J. Reed, San Diego County Regional Airport Authority
Aaron Robinson, United Airlines
Patrick Magnotta, FAA Liaison
Melinda Pagliarello, Airports Council International - North America Liaison
Christine Gerencher, TRB Liaison
Gail Staba, ACRP Senior Program Officer
Research Problem

- It provided 125 strategies that can reduce GHG emissions
- Since then, many airports have undertaken GHG reduction initiatives and have lessons learned that can assist the industry

- Compile a variety of initiatives and organize them between Scope 1 and 2, and Scope 3 emissions
- Identify drivers for implementing GHG efforts
- Document case examples with information on ease of implementation, lessons learned, effectiveness
- Identify common themes, further research needs
Approach

- Literature Review including review of ACRP Report 56
- Industry Survey
- Case example interviews
Airports control less than 10% of aviation emissions, with the predominance produced by aircraft operation and passengers transiting to and from the airport (2015)

Airport emission sources organized by:
- **Scope 1**: direct emissions from airport owned and controlled
- **Scope 2**: indirect emissions from purchase of electricity, heat
- **Scope 3**: indirect emissions from other sources

Industry Progress since 2012:
- Airport Carbon Accreditation Program – 26 U.S. airports
- Airport Carbon and Emissions Reporting Tool (ACERT)
- FAA Funding Program Expansions (ZEV, energy efficiency)
- The Good Traveler Program (San Diego Airport led)
- Solar Glare Hazard Analysis Tool – improved solar PV siting
Survey Responses

AIRPORT RESPONSES TO GREENHOUSE GAS REDUCTION SURVEY

Legend
- Large
- Medium
- Small
- Non-hub
- General Aviation

97 Responses

General Aviation 20%
Large 19%
Medium 16%
NonHub 30%
Small 15%

ACRP AIRPORT COOPERATIVE RESEARCH PROGRAM
Drivers for GHG Reduction Efforts
# Most effective GHG Reduction Options

<table>
<thead>
<tr>
<th>Project Type</th>
<th># of Responses</th>
<th>Percentage</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Efficiency</td>
<td>23</td>
<td>36%</td>
<td>More efficient heating and cooling equipment, LED lighting, LEED buildings, convert from diesel heating to electric</td>
</tr>
<tr>
<td>Renewable Energy</td>
<td>14</td>
<td>22%</td>
<td>Purchasing wind power, installing solar PV, solar hot water, geothermal, biomass</td>
</tr>
<tr>
<td>Alternative Transportation</td>
<td>12</td>
<td>19%</td>
<td>Conversion of diesel buses to CNG, RNG, electric vehicles, charging stations</td>
</tr>
<tr>
<td>Airside Electrification</td>
<td>10</td>
<td>16%</td>
<td>Charging stations for GSE, gate electrification equipment</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>6%</td>
<td>Green roof, reuse of construction material, reducing vehicle trips, cropland for biofuel feedstock,</td>
</tr>
</tbody>
</table>
Survey Comments / Lessons Learned

▶ “Retrofitting lighting is very easy and an easy to sell to skeptical parties.”
▶ “It has to have the full support of the Director/President. The Leader has to fully embrace the initiative.”
▶ “Emission reduction projects need to have a strong business case.
▶ “It is extremely important to partner with the airlines and any other third parties who might help defray the cost of installation.”
▶ “GHG decisions at the Airport are based on a combination of good neighbor policies, providing a superior guest experience, meeting regulatory requirements, and the financial capability to undertake.”
▶ “Everything takes a considerable amount of time to implement, so patience is essential.”
▶ “We made the changes only to save on utility bills.”
## 17 Case Examples of GHG Efforts

<table>
<thead>
<tr>
<th>Airport size</th>
<th>Region</th>
<th>Emission Scope</th>
<th>GHG Category</th>
<th>Project Details</th>
<th>Implementation</th>
<th>Lessons Learned</th>
<th>Effectiveness</th>
<th>Co-benefits</th>
<th>Other airports that have implemented it</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Other airports that have implemented it</td>
</tr>
</tbody>
</table>

**Legend**
- Large
- Medium
- Small
- Non-hub
## Energy Efficiency

Columbus –
**LED Runway Lights**

### St. Louis Energy Audit Program

<table>
<thead>
<tr>
<th>Year</th>
<th>Project Count</th>
<th>Cash Incentive</th>
<th>Annual kWh Savings</th>
<th>Annual Bill Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>1</td>
<td>$9,162</td>
<td>142,683</td>
<td>$11,885</td>
</tr>
<tr>
<td>2011</td>
<td>2</td>
<td>$24,439</td>
<td>520,224</td>
<td>$43,335</td>
</tr>
<tr>
<td>2013</td>
<td>6</td>
<td>$23,804</td>
<td>424,138</td>
<td>$35,331</td>
</tr>
<tr>
<td>2014</td>
<td>10</td>
<td>$67,085</td>
<td>1,130,327</td>
<td>$94,156</td>
</tr>
<tr>
<td>2015</td>
<td>12</td>
<td>$332,486</td>
<td>6,637,416</td>
<td>$552,897</td>
</tr>
</tbody>
</table>

Cortez (CO)
**More Efficient Boilers**
Renewable Energy

Sacramento

South Bend

Ketchikan
Cleaner Ground Transportation Vehicles

Port Authority NY & NJ
Electric Buses

Dallas
Renewable Natural Gas

Birmingham
eGSE
How to put results into Action

- Review the Case Examples
- Consider which ones might be applicable to your airport
- Contact other airports for information (case examples and list of other airports that have implemented the practice)
- Collect data from your airport to understand current costs
- Collect data on costs and benefits of a GHG reduction alternative
- Present initial analysis for internal review and discussion
- Provide a polished planned to Leadership with clear understanding of costs and benefits
- Refer back to case examples and survey information to support your conclusions
Consider the Findings of this Report

➔ Plan for and implement energy efficiency programs
➔ Review options where partners and funding can help reduce costs
  ▪ Utilities for building energy systems
  ▪ Airlines for gate power and electric GSE
  ▪ Energy companies for renewable energy
➔ Evaluate how potential projects fit into the airport’s existing plans
➔ Consider the long-term costs and benefits of pursuing projects
FOR ADDITIONAL INFORMATION

Stephen Barrett
steve@barrettenergygroup.com

** Upcoming!
ACRP Synthesis: Airport Renewable Energy Projects Inventory and Case Examples
ACRP is an Industry-Driven Program

Q Managed by TRB and sponsored by the Federal Aviation Administration (FAA).
Q Seeks out the latest issues facing the airport industry.
Q Conducts research to find solutions.
Q Publishes and disseminates research results through free publications and webinars.
Other Ways to Participate

Become an Ambassador. Ambassadors represent ACRP at events and conferences across the country!

Sponsor or become an ACRP Champion. The champion program is designed to help early- to mid-career, young professionals grow and excel within the airport industry.

Visit ACRP’s Impacts on Practice webpage to submit leads on how ACRP’s research is being applied at any airport.

Visit us online:
www.trb.org/ACRP
Other ACRP Research on Today’s Topic


Report 71: *Guidance for Quantifying the Contribution of Airport Emissions to Local Air Quality*

Report 78: *Airport Ground Support Equipment (GSE) Emission Reduction Strategies, Inventory and Tutorial*

Report 84: *Guidebook for Preparing Airport Emissions Inventories for State Implementation Plans*

Report 97: *Measuring PM Emissions from Aircraft Auxiliary Power Units, Tires and Brakes*

Report 149: *Improving Ground Support Equipment Operational Data for Airport Emissions Modeling*

Report 164: *Exhaust Emissions from In-Use General Aviation Aircraft*
Have you missed a past ACRP webinar that you wish you could have attended?

No worries! All ACRP webinars are recorded and posted to TRB’s website for viewing at any time!

There are over 100 webinar recordings on a variety of aviation topics available to you at http://www.trb.org /Aviation1/ElectronicSessions.aspx
Upcoming ACRP Webinars

June 17
Let’s Do This Together - Collaborative Partnering for Airports

July 7
Smooth Road Ahead – Best Approaches for Applying Pavement Condition Data

August 6
Reach for the Sky – Attracting the NextGen of Aviation Career Professionals
Brendan Reed, San Diego County Regional Airport Authority

Geoff Morrison, Cadmus

Stephen Barrett, Barrett Energy Resources Group, LLC
TRB turns 100 on November 11, 2020

100 YEARS 2020

Help TRB:

- Promote the value of transportation research;
- Recognize, honor, and celebrate the TRB community; and
- Highlight 100 years of accomplishments.

Learn more at

www.TRB.org/Centennial
#TRB100

MOVING IDEAS: ADVANCING SOCIETY—100 YEARS OF TRANSPORTATION RESEARCH

The National Academies of
SCIENCES • ENGINEERING • MEDICINE