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- [www.TRB.org/ACRP](www.TRB.org/ACRP)
- Regular news and updates on:
  - Upcoming and ongoing research projects
  - New publications
  - Success stories
  - Announcements
  - Webinars
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November 2: Improving and Enhancing the Airport Customer Experience

November 17: Collecting Data for Airport Emissions Modeling

December 14: Effective Stakeholder Relationships at Airports

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Additional ACRP Publications Available on this Topic

- **ACRP Report 108**: Guidebook for Energy Facilities Compatibility with Airports and Airspace

- **ACRP Report 110**: Evaluating Impacts of Sustainability Practices on Airport Operations and Maintenance

- **ACRP Report 119**: Prototype Airport Sustainability Rating System—Characteristics, Viability, and Implementation Options

- **ACRP Report 141**: Renewable Energy as an Airport Revenue Source

- **ACRP Synthesis 69**: Airport Sustainability Practices—Drivers and Outcomes for Small Commercial and General Aviation Airports

You can learn more about these publications by visiting [www.trb.org/publications](http://www.trb.org/publications)
Today’s Speakers
Moderated by Barbara Busiek
NW Arkansas Regional Airport

1) Synthesis Report 77: Airport Sustainability Practices
   • Amy Malick, Haley & Aldrich, Inc.

2) ARCP Report 151: Developing an Airport Business Case for Renewable Energy
   • Stephen Barrett, Barrett Energy Resources Group, LLC
Amy Malick
Principal Investigator

- Client Leader for Sustainability, Haley & Aldrich, Inc.
- Former Deputy Commissioner of Sustainability, Chicago Department of Aviation
ACRP Report 44 Oversight Panel

- DAVID J. FULL, Reynolds, Smith, and Hills, Inc., San Francisco, CA
- KRISTIN M. LEMASTER, Changing Climates Consulting, San Francisco, CA
- I. RICHMOND NETTEY, Kent State University, Kent, OH
- ARLYN PURCELL, Port Authority of New York & New Jersey, New York, NY
- PHILIP A. RALSTON, Port of Portland, Portland, OR
- RYAN A. SPICER, Dallas/Fort Worth International Airport Board, DFW Airport, TX
- TODD H. WELTY, Reno–Tahoe Airport Authority, Tahoe, NV
- PATRICK W. MAGNOTTA, Federal Aviation Administration (Liaison)
- RHONDA SOLOMON, Federal Aviation Administration (Liaison)
- KATHERINE B. PRESTON, Airports Council International–North America (Liaison)
Project Objectives

- Contribute to continued enhancements to the Sustainable Aviation Guidance Alliance (SAGA) website
- Generate data on 10 sustainability practices that had not yet been documented in SAGA
- Promote use of SAGA by a new group of users
What is SAGA?

- Developed in 2008 by a coalition of aviation organizations
- Assists airport operators in developing sustainability programs
- Consolidate existing information about sustainability
- Contains entries on 900+ sustainability practices
- Roughly 65% of these entries do not contain actual practice data
Project Scope & Methodology

- **Criteria Development**: Develop parameters & priorities for potential sustainability practices & case studies
- **Stakeholder Outreach**: Engage with airports & airport business partners to solicit participation
- **Data Collection**: Conduct survey to assemble sustainability practice data & case study narrative information
- **Data Entry**: Collaborate with practitioners to enter data into SAGA
- **Feedback Interviews**: Conduct & evaluate feedback interviews to gather feedback on SAGA usability
Criteria for Practice & Case Study Selection

1. Practices that have yet to be included on the SAGA website

2. Focus on:
   - “Big impact” strategies related to a range of sustainability themes (e.g., climate change, sustainability management)
   - Emerging sustainability areas (e.g., social responsibility)

3. Diversity regarding airport size, geography, and operational structure

4. Include at least one cold-weather example practice

5. Not “usual suspect” participants

6. Include airport business partners
<table>
<thead>
<tr>
<th>Selected Sustainability Practice</th>
<th>Case Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Develop an Asset or Infrastructure Management Plan</td>
<td>Dallas Fort–Worth International Airport</td>
</tr>
<tr>
<td>2 Develop and implement an Environmental Management System to track progress in improving environmental performance</td>
<td>Reno Tahoe International Airport</td>
</tr>
<tr>
<td>3 Integrate climate resilience considerations in airport development projects</td>
<td>Port Authority of New York &amp; New Jersey</td>
</tr>
<tr>
<td>4 Tie sustainability goals and objectives into the operations and maintenance and capital improvement program budget process</td>
<td>San Diego International Airport</td>
</tr>
<tr>
<td>5 Donate surplus equipment and other goods to charity</td>
<td>American Airlines</td>
</tr>
<tr>
<td>6 Donate surplus food to charity</td>
<td>HMS Host</td>
</tr>
<tr>
<td>7 Develop an onsite materials recovery facility</td>
<td>Charlotte–Douglas International Airport</td>
</tr>
<tr>
<td>8 Use recovered glycol as a “feedstock” for reformulated aircraft de-icing fluid, vehicle anti-freeze, aircraft lavatory fluid, coolants, coatings, and paints</td>
<td>Wayne County Airport Authority</td>
</tr>
<tr>
<td>9 Establish an Airport Composting Program</td>
<td>Vancouver International Airport</td>
</tr>
<tr>
<td>10 Upcycle materials from indoor advertising</td>
<td>United Airlines</td>
</tr>
</tbody>
</table>
Anatomy of a SAGA Entry

Develop and implement an Environmental Management System (EMS) to track progress in improving environmental performance.

An Environmental Management System (EMS) is a management structure that helps organizations achieve environmental goals through a systematic approach toward regulatory compliance as well as sustainability issues such as energy and water management. An EMS allows organizations to clearly articulate regulatory requirements and voluntary goals, track compliance and progress, and manage data through an electronic database. This systematic approach can help reduce the risk of non-compliance, improve health and safety practices for employees and the public, enhance transparency about environmental practices, and support continuous improvement. An EMS can be tailored to meet specific requirements and goals that apply to an organization, and does not imply that a particular level of achievement must be attained.

Practice Information
- Cost: Low Cost ($5,000 - $100,000 USD)
- O&M Cost: Low ($5,000 - $20,000 USD)
- Payback Period: Immediate (1 - 2 years)
- Staffing Requirements: Low (10 - 50 hours per month)
- Readiness of Markets: Ready for implementation but already practiced
- Maturity of Practice: practiced at multiple airports
- Energy Reduction: Decreases energy consumption and generates renewable energy
- Environmental Benefits: Significantly multiple environmental benefits
- Social Benefits: Modest social benefit

Airport Characteristics
- Climate: Mild and Hot
- Airport Type(s): Scheduled Passenger Service
- Categories: General Aviation, Cargo, Military

Case Studies
- Reno-Tahoe International Airport
  - The Reno-Tahoe Airport Authority (RTAA) is the owner and operator of the Reno-Tahoe International Airport (RTA) and a general aviation reliever airport, Reno-Owens Airport (RTO). The RTAA believes that a healthy natural environment plays a crucial role in the strength of the local economy and the local community's quality of life and is essential for the sustainability of the aviation industry. In order to meet the demands of sustainable aviation development and to protect the natural environment, the RTAA's environmental programs endeavor to improve environmental practices, support pollution abatement and prevention, and foster environmental stewardship. This commitment goes beyond compliance with the law and encompasses the integration of sound environmental practices into daily operations and procedures. RTAA has pioneered, since 2008, an Environmental Management System (EMS) into its everyday practices to continually promote environmental awareness, resource conservation, waste reduction, reuse and recycling. Aspects of the EMS include a terminal wide recycling program at RNO which annually diverts approximately 50 to 80 tons of recyclables from the local landfill. Additionally, an asphalt concrete demolition and reuse program for construction projects results in a 100 percent reuse of demolished pavement. An office supply reduction and green purchasing policy has helped reduce paper usage by approximately 10 percent and to ensure the purchase of products containing higher recycled content. Using the EMS approach, the RTAA has also implemented projects that have resulted in substantial energy savings. This includes energy efficient lighting retrofits, heating, ventilation, and air conditioning (HVAC) upgrades and installation of alternative energy systems. Energy efficient lighting projects involving replacement of existing lighting fixtures with high-efficiency light emitting diodes (LED) have resulted in an annual energy cost savings of over $200,000. HVAC projects have also resulted in considerable energy cost savings as well as operating and maintenance cost reductions of approximately $200,000 annually. Lastly, installation of a 155kW solar photovoltaic system at RNO's Aircraft Rescue and Firefighting Facility (ARFF) reduces the annual purchased electricity usage by approximately 200,000 kWh and reduces the annual electrical utility cost by approximately $30,000. Furthermore, the most effective provision of the RTAA's EMS is that it revalues the responsibility of each person to conduct activities in a manner that will promote protection of employees, the local environment and sustainable aviation.

Related Links
- No related links for this practice, add a related link.
Practice Example: Integrate Climate Resilience Considerations In Airport Development Projects

Contributor: Port Authority of New York & New Jersey

- Resilience design guidelines address anticipated climate impacts when designing infrastructure and buildings
- Consider higher temperatures, increased precipitation, sea level rise, and severe storms
- Process led by project engineer or architect with input across organization
- 10-step design review includes identification of flood risks, Port-assigned flood protection level, relation to system-wide flood protection strategy, and cost-benefit analysis
Practice Example: Integrate Climate Resilience Considerations In Airport Development Projects

**Practice Information**
- **Capital Cost:** Marginal Cost (<$5,000 US)
- **O&M Cost:** Moderate (>50,000 – $100,000 US)
- **Payback Period:** Moderate (5 – 15 years)
- **Staffing Requirements:** Moderate (50 – 200 hours per month)
- **Reportability of Metrics:** Qualitative metric
- **Maturity of Practice:** Trial tested
- **Energy Reduction:** No effect on energy consumption
- **Environmental Benefits:** Moderate environmental benefit
- **Social Benefits:** Significant, multiple social benefits

**Airport Characteristics**
- **Climate:**
  - Primarily hot
  - Primarily cold
  - Mixed hot and cold
- **Airport Types:**
  - Scheduled passenger service
  - General aviation
  - Cargo
  - Military

Practice Example: Integrate Climate Resilience Considerations In Airport Development Projects
Practice Example: Integrate Climate Resilience Considerations In Airport Development Projects

Practice Categories

Energy and Climate: Climate change adaptation
Economic Performance: Airport financial viability
Risk management
Regional economic contributions
Design and Materials: Material selection
Engagement & Leadership: Airport-wide stakeholder engagement
Public outreach
Airport user engagement and outreach

Natural Resources: Landscape and grounds
Pervious surface

Human Well-Being: Passenger experience
Occupational health and safety
Practice Example: Establish an Airport Composting Program

Contributor: Vancouver International Airport (YVR)

- Metro Vancouver regional waste diversion targets for 80% diversion rate by 2020 includes regulation banning organics from landfills
- YVR established terminal-wide organics waste diversion program to complement existing recycling program
- Began with back-of-house concessionaire operations
- Introduced passenger-facing component, requiring significant signage and infrastructure modifications, as well as training and hands-on support by YVR
Practice Example: Donate Surplus Equipment And Other Goods To Charity

**Contributor: American Airlines**

- Employees are provided new uniforms every five years, or any time changes to the American Airlines brand are made.
- Old uniforms are typically stripped of their logos and sent to landfill so as to avoid security concerns.
- Donated 2500 heavy winter coats and jumpsuits to homeless veterans in Chicago over three years.
- Donated obsolete electronic waste to community organization that provides employment for disabled adults through e-waste deconstruction.
User Feedback on SAGA Website

Technical Issues
- Responsiveness
- Use of filters
- Error messages
- Connectivity issues

Interpretation of Data Categories
- Setup for drop-down choices
- Reportability of metrics
- Clarity on respondent’s perspective
Conclusions

► Definitions of success continue to evolve

► Increasing focus on engagement of business partners

► Outcomes reported in SAGA are not replicable

► Challenges in expanding the SAGA audience
For additional information:

ACRP Synthesis 77: Airport Sustainability Practices


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

- Principal, Barrett Energy Resources Group, LLC
- Consultant to the International Civil Aviation Organization
ACRP Report 151
Oversight Panel

Hana Rocek, Airport Consulting, Inc., Panel Chair
Peter Aarons, HNTB Corporation
Michael J. Cheyne, Hartsfield-Jackson Atlanta International
Adam Klauber, ICF International
Jonathan Rubin, University of Maine
Mary Soderstrum, AVCON, Inc.
Rhonda Solomon, FAA Liaison
Katherine Preston, Airports Council International – North America Liaison
Theresia Schatz, ACRP Senior Program Officer

- Describes what a business case is, and the attributes of renewable energy that support the business case
- Provides a step-by-step process for developing a business case from the vision through planning to implementation
- Provides criteria used to evaluate a renewable energy project and an alternative which includes weighting that values the self-sustainable, environmental and social values of renewable energy
- Identifies key internal and external stakeholders
- Presents renewable energy business cases from seven organizations including airports, an airline, a university, a hospital, and a corporation
- Published April 2016
Research Problem

- Current practice, airports typically pursue renewable energy projects based on an opportunity (grant, inquiry).

- Airports likely not conducting a thorough investigation of the alternatives to the proposed projects considering financial, environmental, operational, and social benefits.

- An effective, objective business case evaluation would assist airports embarking on renewable energy projects to advance future planning that targets economic, environmental, and social goals.
Research Solution

• Provide guidance on how to develop an objective business case.

• Prepare information and tools that adequately value financial, environmental, operational, and social benefits of renewable energy.

• Present a model that airports can follow and examples from both aviation and non-aviation organizations to see how the business case for renewable energy is constructed.
Key Point 1: Renewable Energy has Unique Value

- Provides stable, long-term energy price
- Infrastructure investment that provides energy reliability and control
- Advanced mitigation to facilitate future expansion
- Direct action to reduce greenhouse gas emissions
- Demonstrates Leadership both in the industry and in the region
Key Point 1 (continued): Unique Value - Microgrid
Key Point 2: Business Case is Long-Term

- Airports must have a long-term planning horizon.
- Renewable energy benefits are long-term.
- Business case analysis must be long-term.
Key Point 2 (continued): Long-term Stable Prices

Weekly Heating Oil and Propane Prices (October - March)

Source: U.S. Energy Information Administration
Key Point 3: Business Case = Airport Planning

- Airports already prepare Master Plans, Capital Improvement Programs
- These are steps in developing the Business Case for different projects.
- No need to change the process, just enhancements
Key Point 4: Weighting is Representative

- Weighting system is provided
- Identifies benefits that might not otherwise be considered (e.g., hedge against future constraints on airport development)
- Provides representative methods for valuing those benefits with guidance that value placed will be airport and project specific
Key Point 4 (continued):
Each case has different priorities

- Prevent Barriers to Expansion
- Infrastructure Investment
- Industry Leadership
- Long-term Cost Stability
- Near-term Revenue
Key Point 5: There are Lots of Models

• Hypothetical model provided in Chapter 6.
• Chapter 7 includes real-life business case models.
  • San Diego Airport – microgrid
  • Outagamie Airport – County coordination
  • Facebook – energy load at data centers
  • Luther College – commitment to do the right thing
Key Point 6: Every Project has a Business Case

- “We did the project but we did not develop a business case”
- “The project did not make a business case but we did it anyway”
- Business case captures reasons why a business pursued a project. There is always a business case to be found.
Key Point 6 (continued): each has a business story
For additional information:


http://www.trb.org/Publications/Blurbs/173592.aspx

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