

TRANSPORTATION RESEARCH BOARD

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

Thursday, May 21, 2020
2:00-3:30 PM ET

@NASEMTRB
#TRBWebinar

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 how to develop an achievable emissions target
- Identify GHG reduction practices that are currently being implemented by airports



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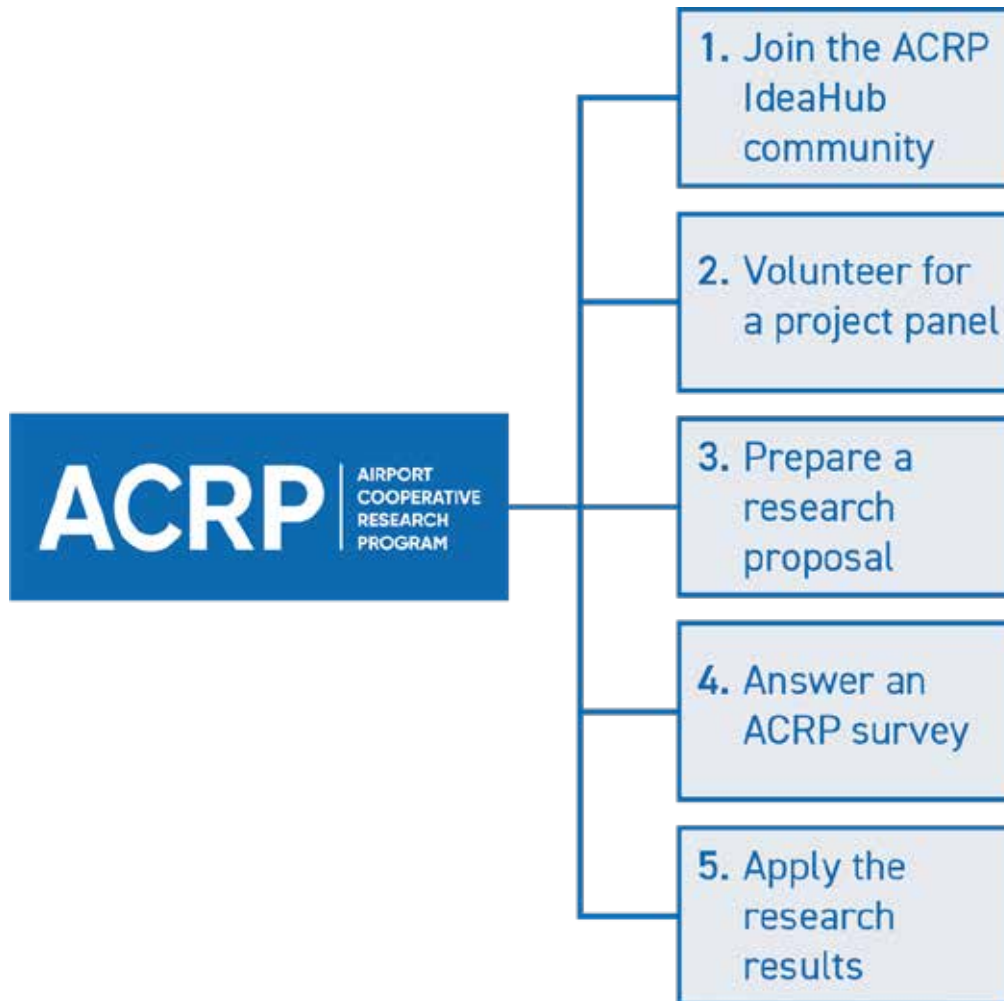
Brendan Reed

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.
 - [ACRP Synthesis 100](#): Airport Greenhouse Gas Reduction Efforts.



Five Ways to Get Involved!



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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

Guidebook for Developing Zero and Low Emission Roadmaps at Airports

Geoff Morrison, PhD, PMP

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



2018



-Project start

2019



-Online publication

-Two in-depth pilots

2020



-Final edited guidebook

Many Similar Planning Products

Carbon
Reduction
Roadmap

Climate
Action Plan

Sustainability
Management Plan

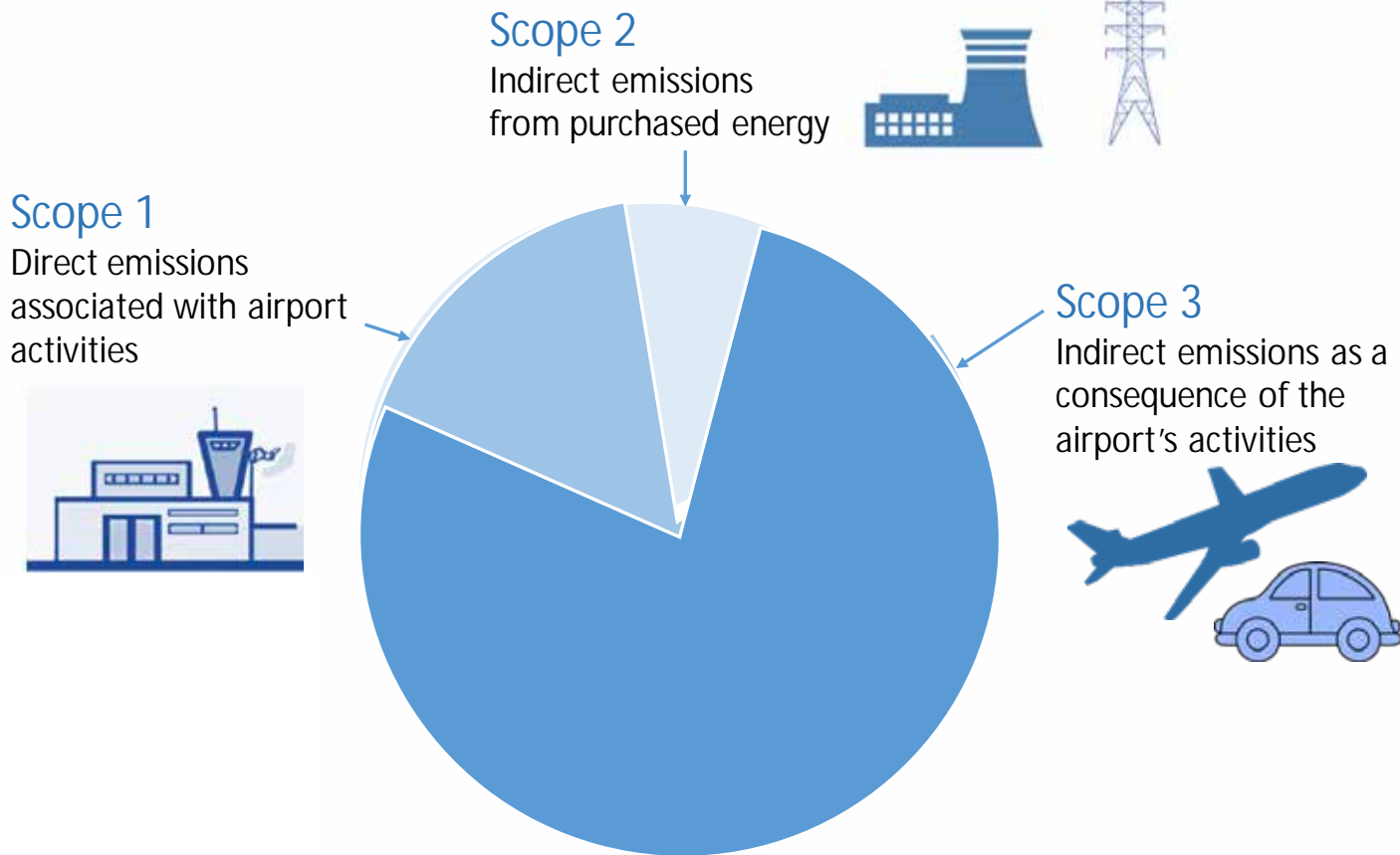
Energy
Management Plan

Carbon Neutral
Growth Roadmap

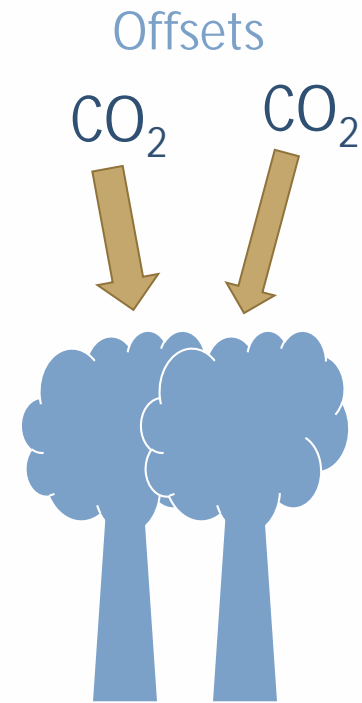
What is an Emission Roadmap?

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



****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



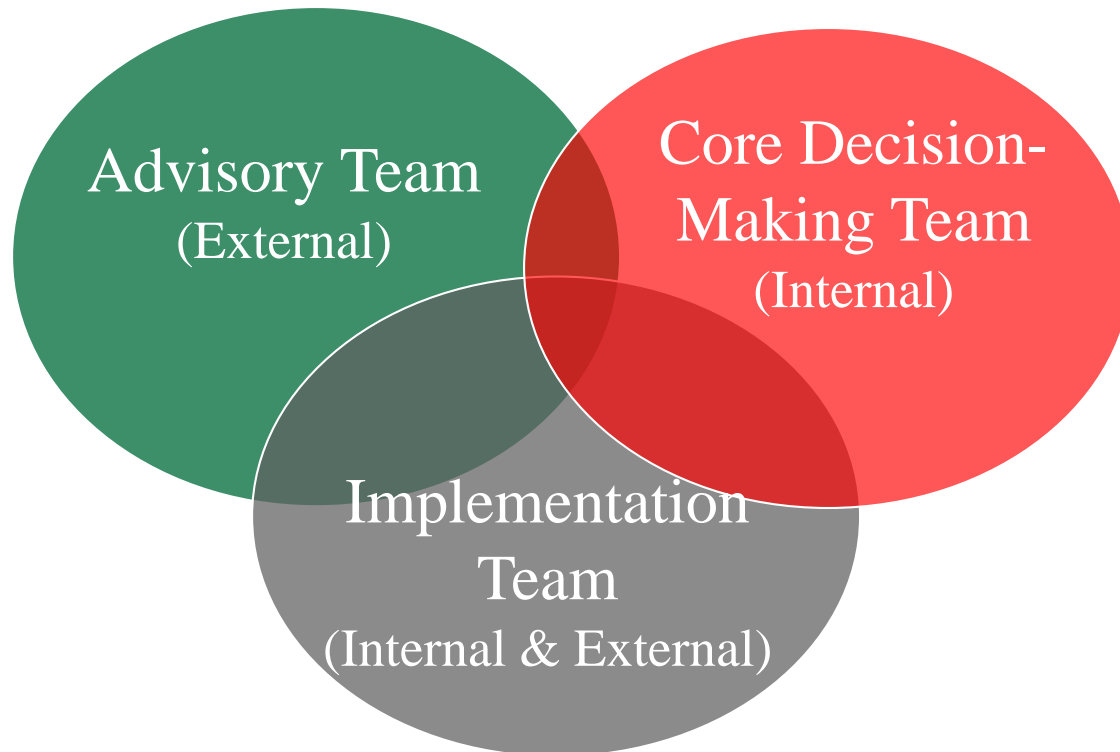
1. Initiate Roadmap

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



1. Initiate Roadmap

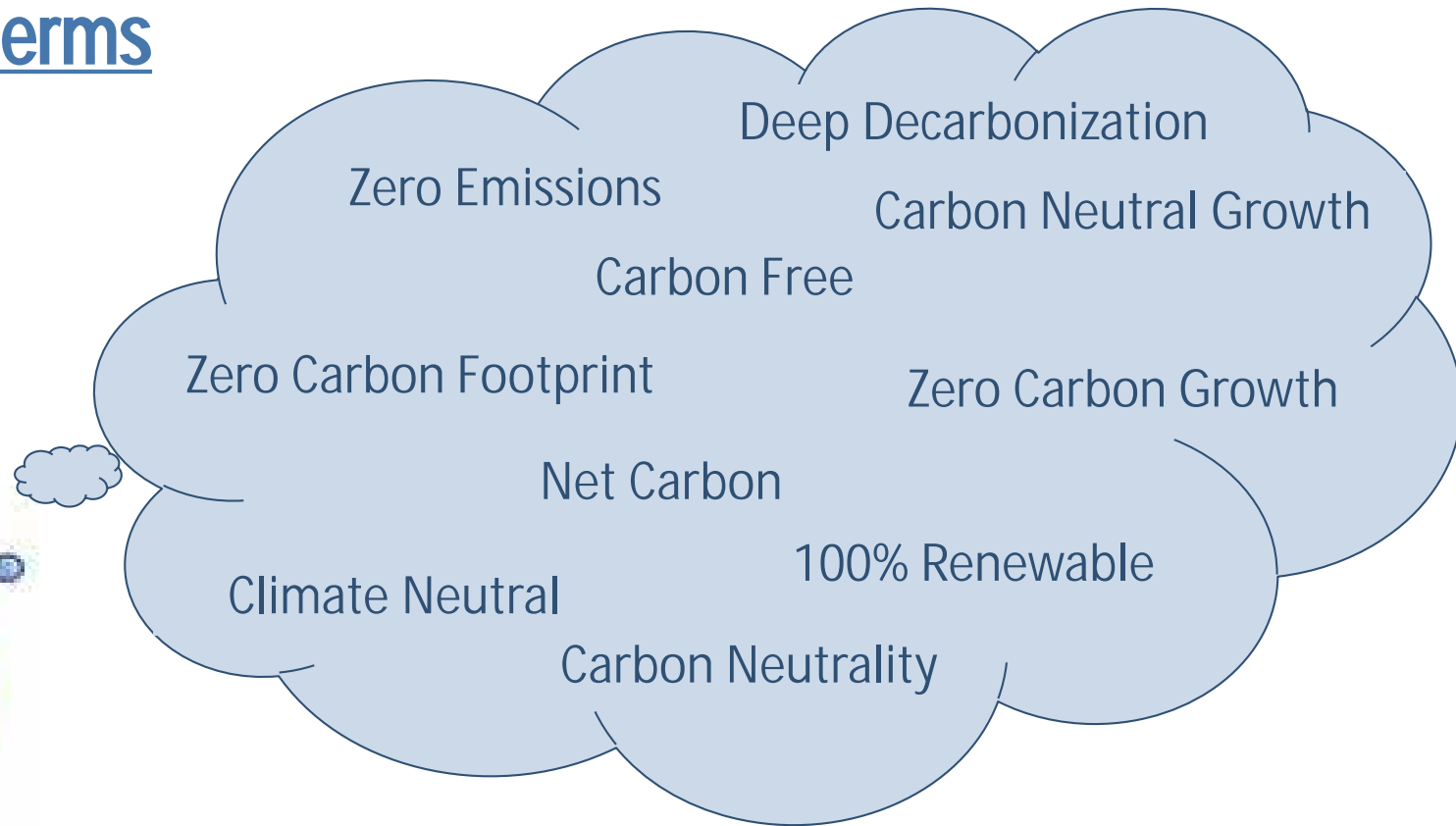
Vision: Postcard from the future

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



1. Initiate Roadmap

Voluntary Program: Join industry program?

Program	Who's Adopting
Airport Carbon Accreditation (ACA)	304 global airports
Science-Based Targets (SBT)	Heathrow, Auckland
Global Reporting Initiative (GRI)	30 global airports (5 US)
UNFCCC Climate Pledge	116 European airports
The Climate Registry (TCR)	Port of Seattle, Port of Portland
CDP	All ACA and TCR airports

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



DFW Becomes Largest Airport
in the World to Achieve
Carbon Neutral Status



Energy Resiliency &
Efficiency

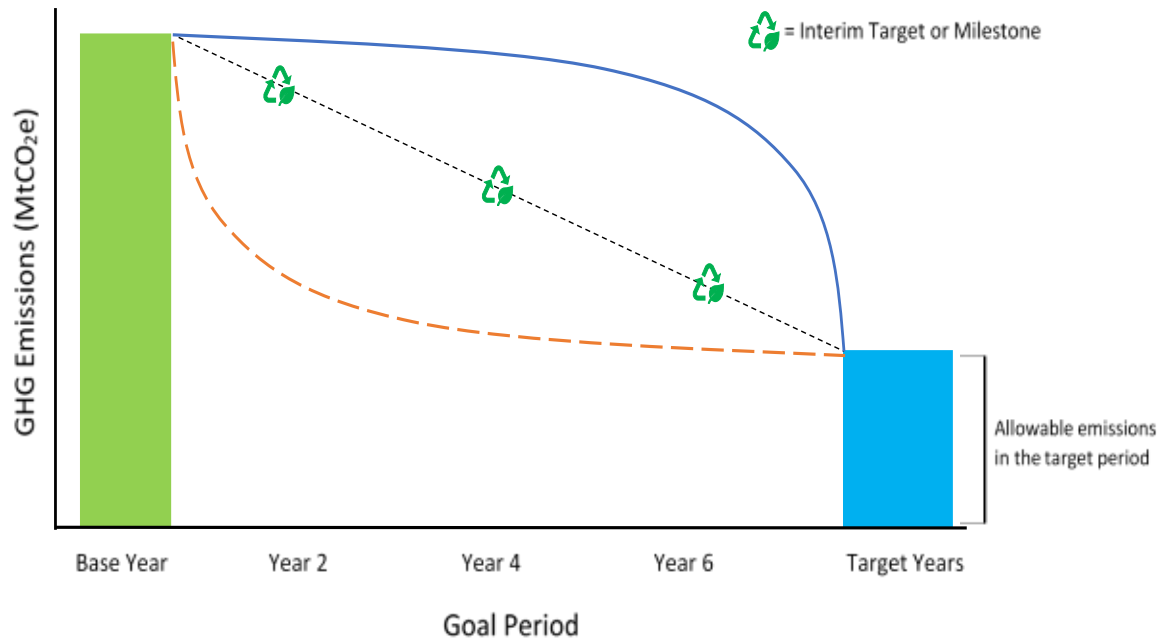


2. Stakeholder Engagement



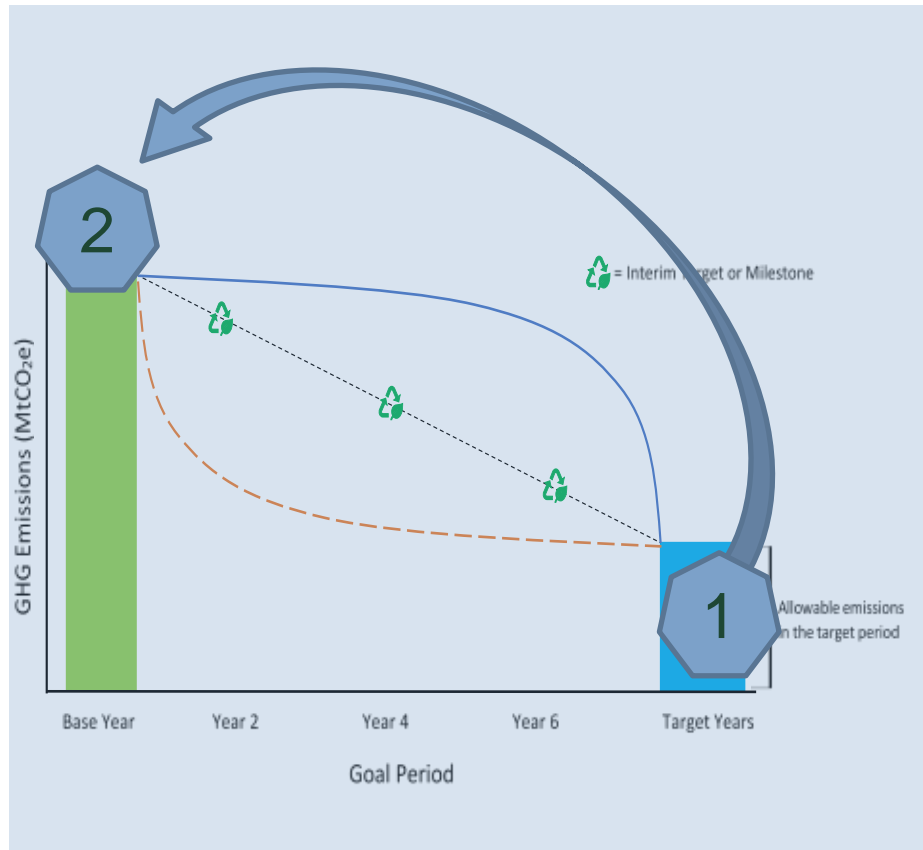
- Develop internal and external teams
- Stakeholder mapping of influence vs. power
- RACI Chart to assign responsibilities

3. Setting Goals

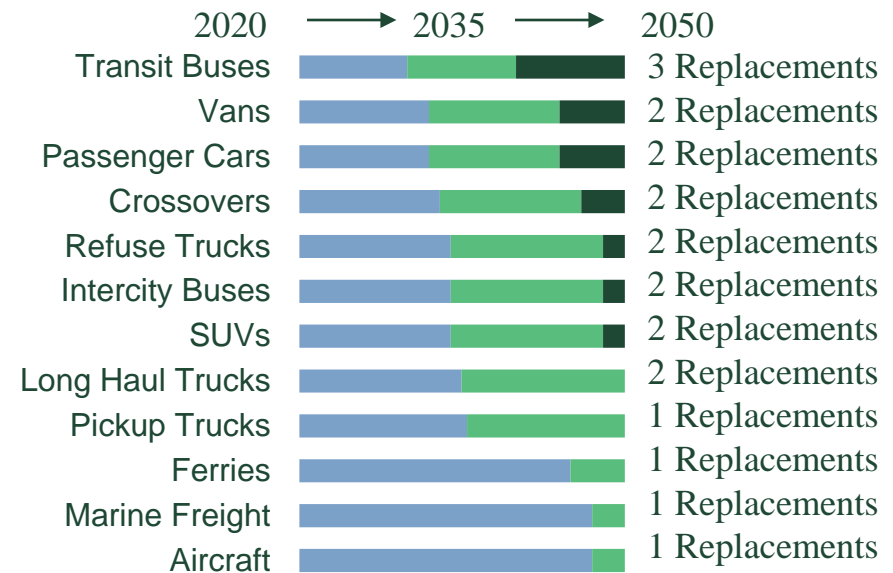


- Conduct GHG Inventory
- Define Goal Boundary
- Choose Goal Type
- Define Goal Timeline
- Define Goal Level

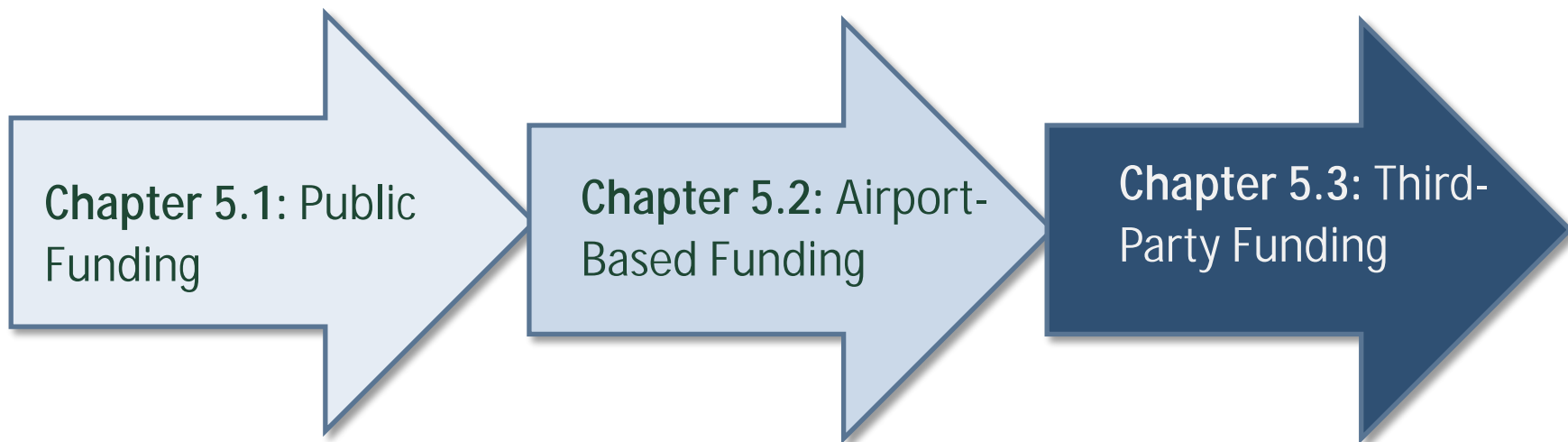
4. Emission Reduction Strategies



Example Replacement Cycles 2020-2050



5. Funding Opportunities

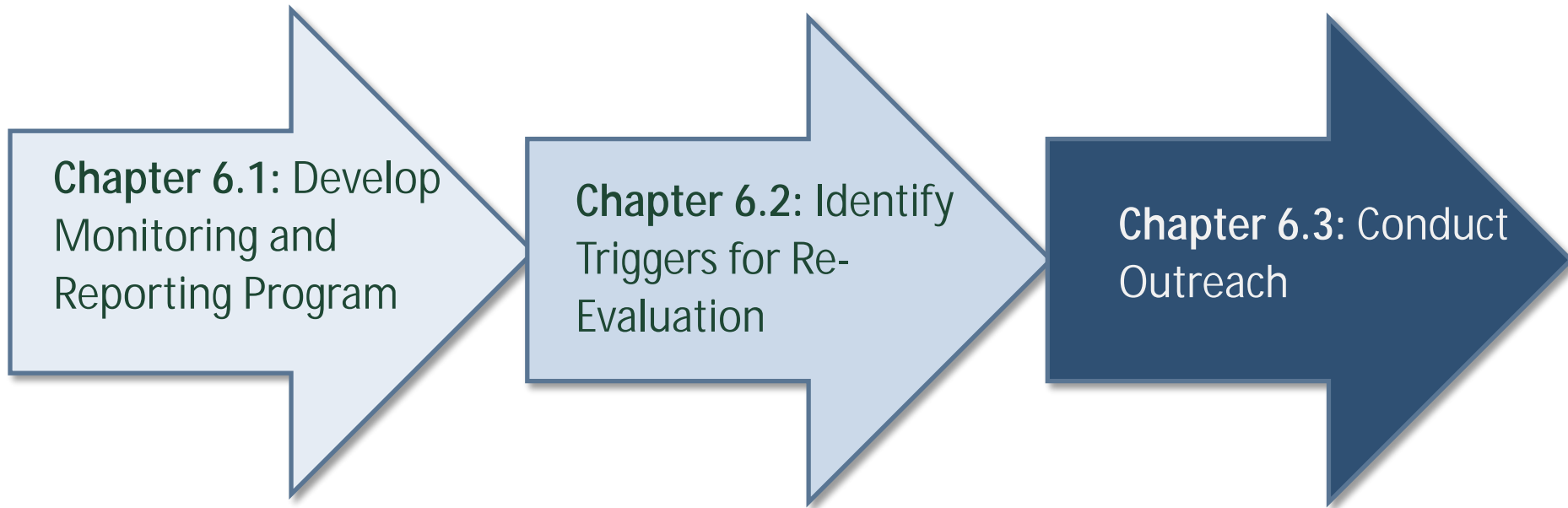


- VALE
- FAA ZEV & Infrast.
- AIP
- FAA EE Grants
- State grants & rebates
- Energy savings contracts

- Aircraft fuel taxes
- GHG markets
- Capital and operation
- Green revolving funds
- Power mgt opportunities
- Pssgr voluntary contribut.

- Tax exempt financing
- PPAs
- Performance contracts
- P3
- As Service Model
- Green leases

6. Monitoring & 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



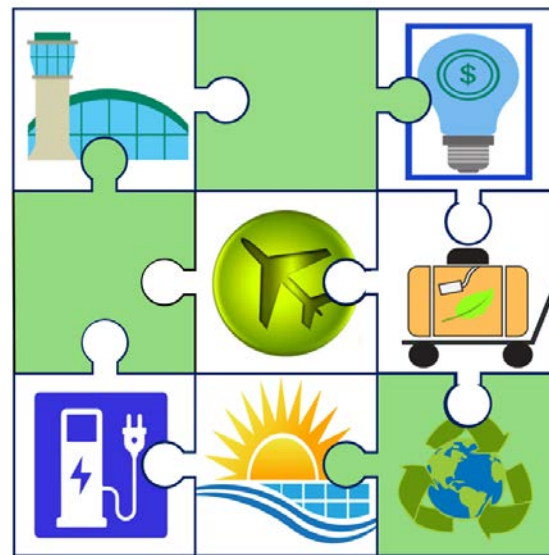
Geoff Morrison

Geoff.Morrison@cadmusgroup.com

[240-204-6216](tel:240-204-6216)

ACRP Synthesis 100

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

- ➔ ACRP Report 56, “Handbook for Considering Practical Greenhouse Gas Emission Reduction Strategies for Airports” (2012)
- ➔ 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

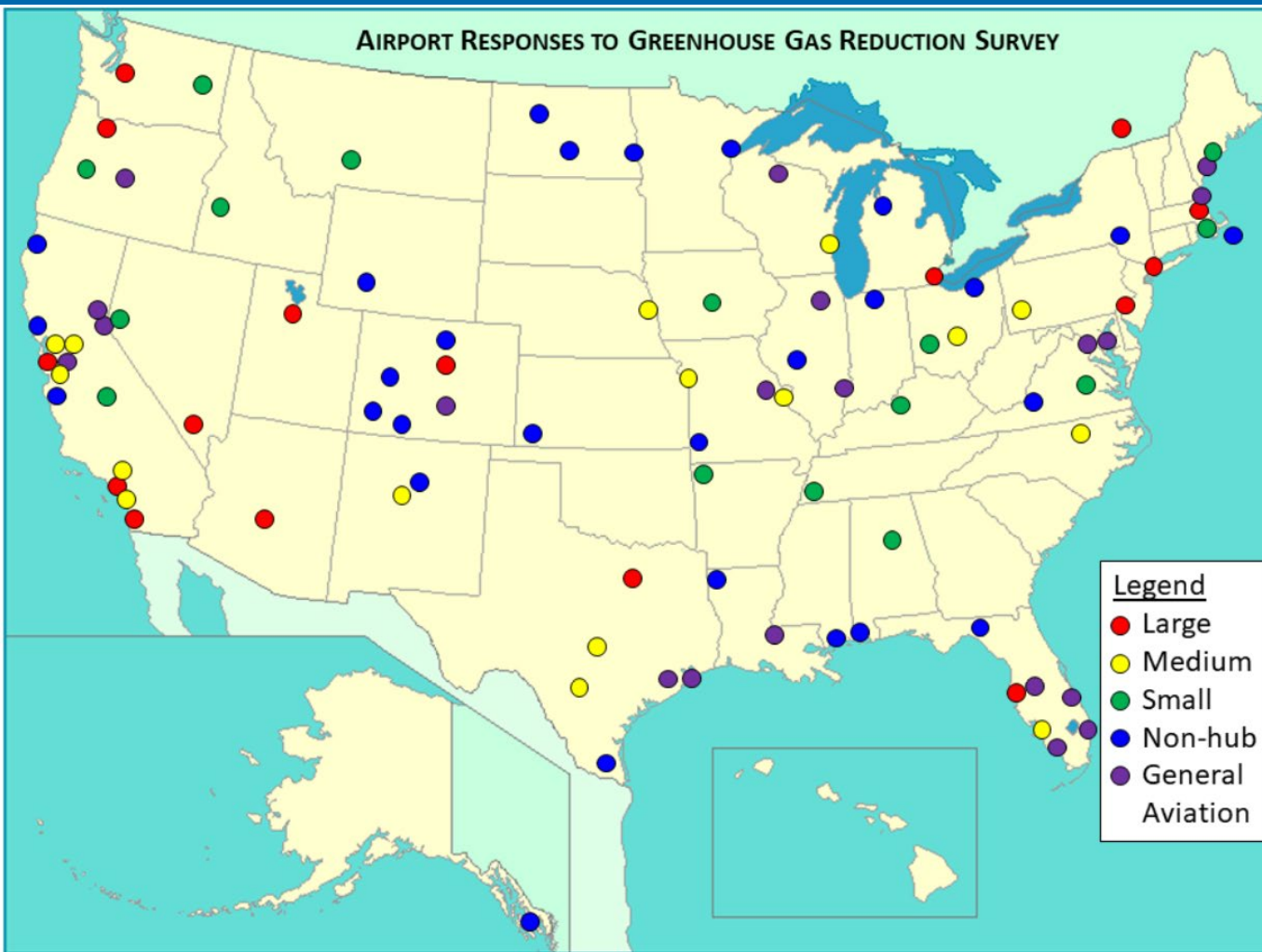
Approach

- Literature Review including review of ACRP Report 56
- Industry Survey
- Case example interviews

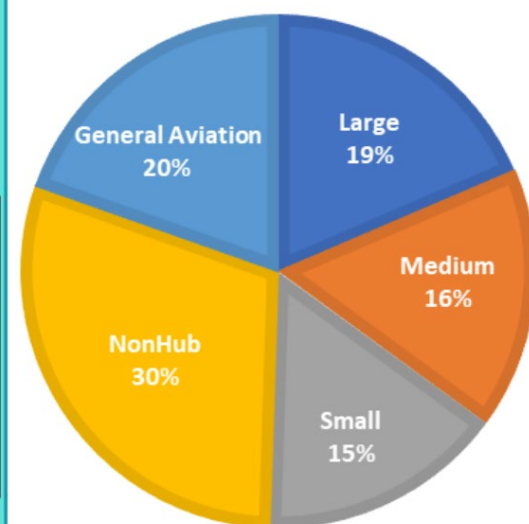
Literature Review

- 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

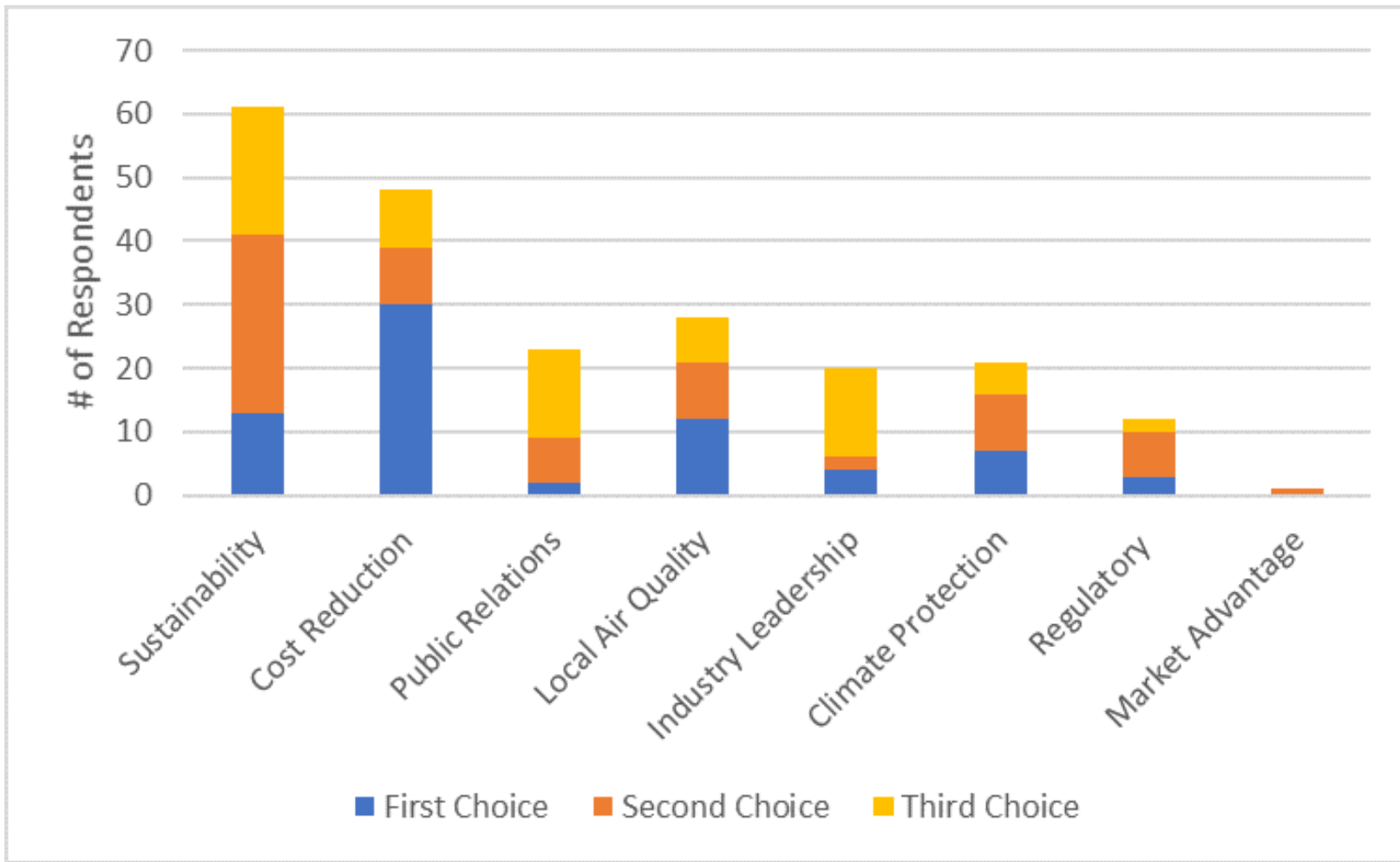
Survey Responses



97 Responses



Drivers for GHG Reduction Efforts



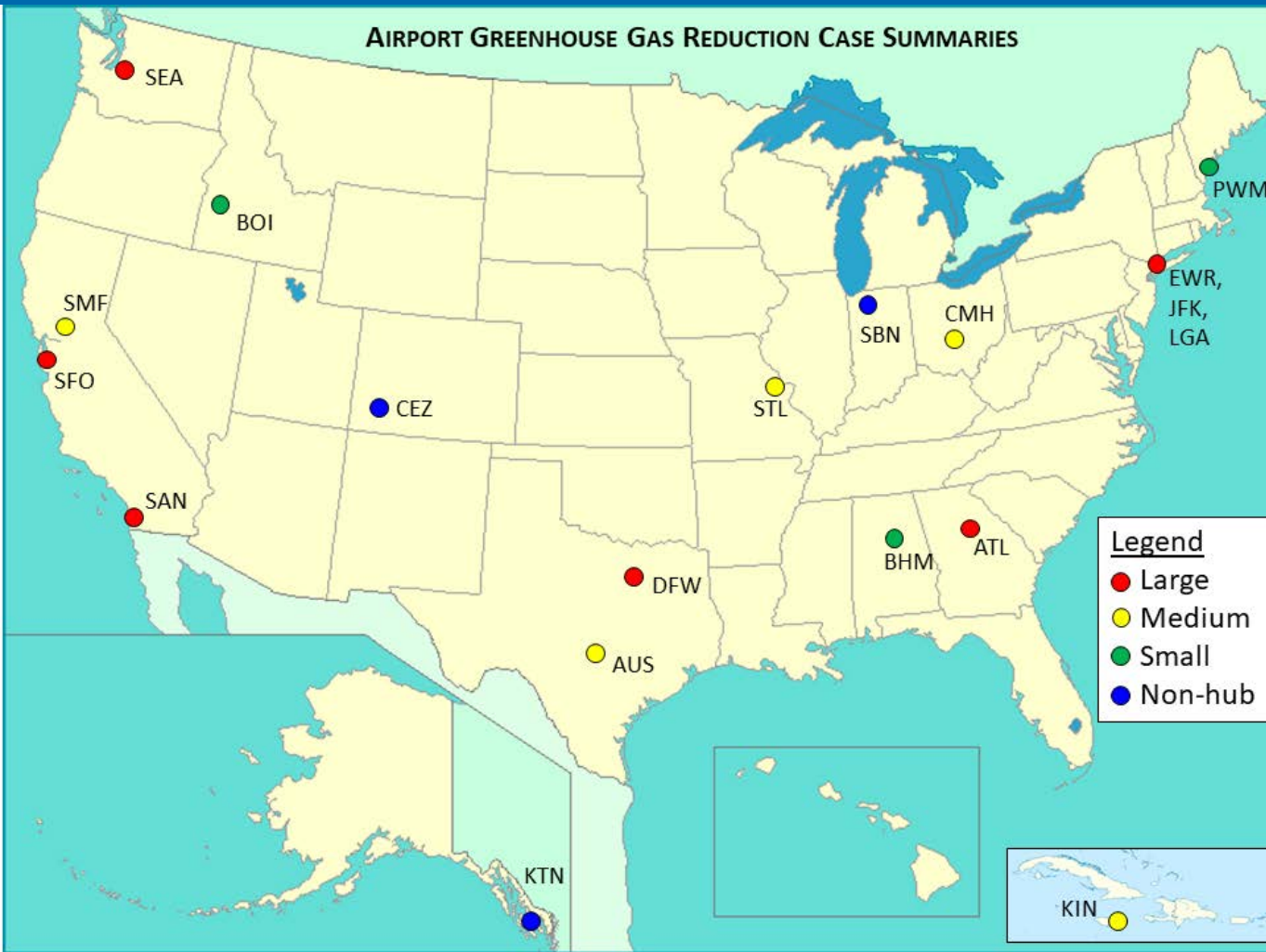
Most effective GHG Reduction Options

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

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



- Airport size
- Region
- Emission Scope
- GHG Category
- Project Details
- Implementation
- Lessons Learned
- Effectiveness
- Co-benefits
- Other airports that have implemented it

Energy Efficiency



Columbus – LED Runway Lights

St. Louis Energy Audit Program

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



Renewable Energy

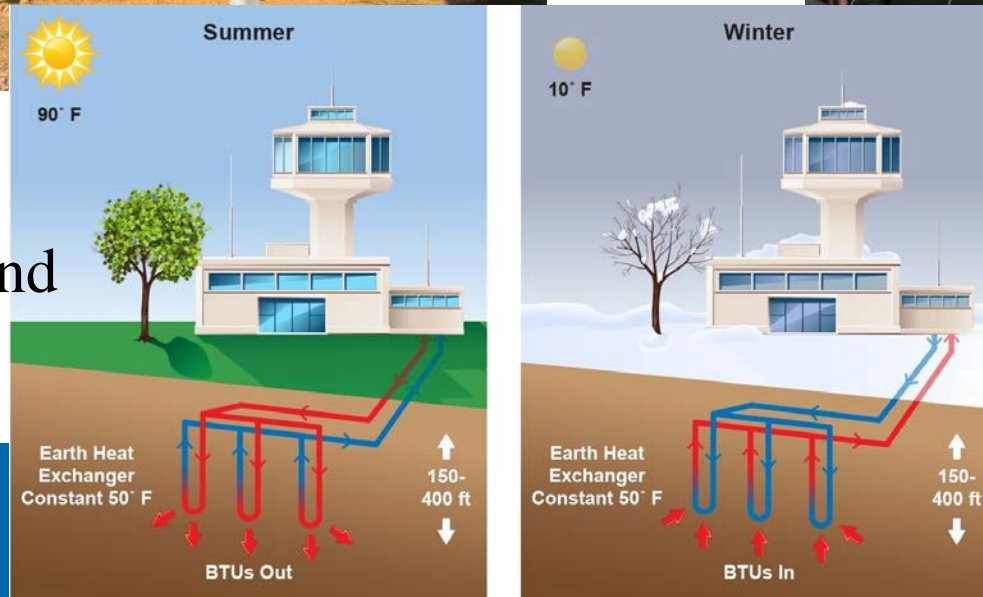
Sacramento



Ketchikan



South Bend



Cleaner Ground Transportation Vehicles



Dallas
Renewable Natural Gas



Port Authority NY & NJ
Electric Buses



Birmingham
eGSE

Innovation

San Diego – Transportation Network Companies GHG Program



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 plan 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

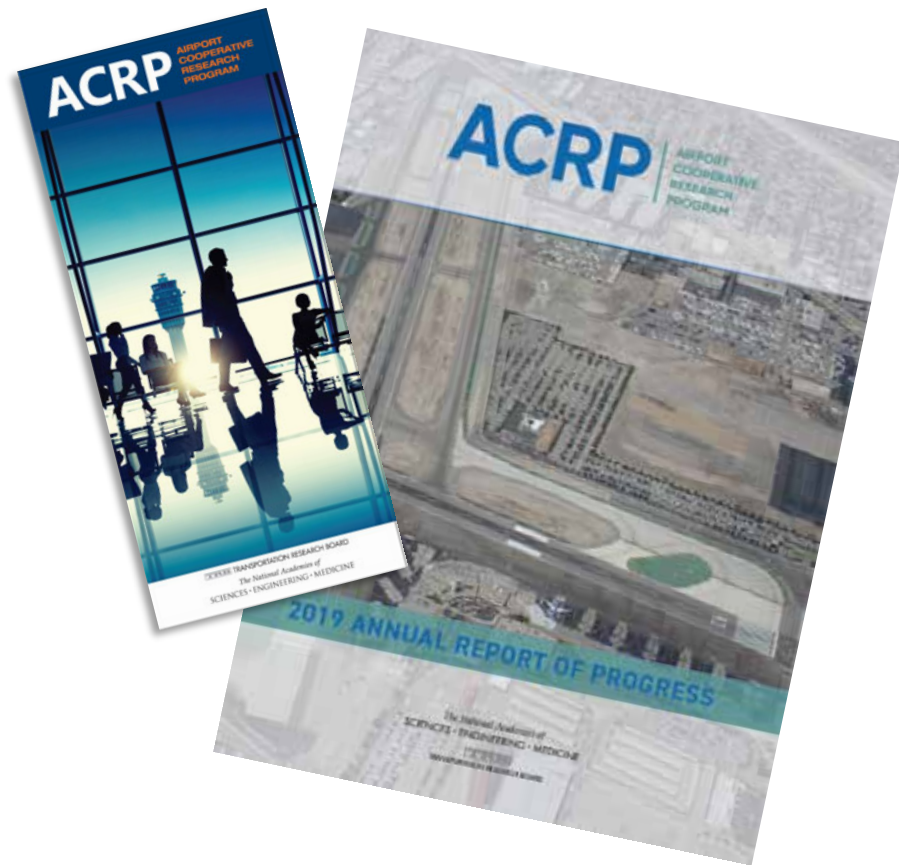
steve@barrettenergygroup.com

**** Upcoming!**

ACRP Synthesis: Airport Renewable Energy Projects Inventory and Case Examples

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



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

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www.trb.org/ACRP

Other ACRP Research on Today's Topic

Report 56: *Handbook for Considering Practical Greenhouse Gas Emission Reduction Strategies for Airports*

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*

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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
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