

TRANSPORTATION RESEARCH BOARD

**More Than Recycling -
Best Practices in Airport Waste Management**

**Tuesday, February 5, 2019
2:00-3:30 PM ET**

Purpose

Discuss research from the [Airport Cooperative Research Program](#) (ACRP) [Research Synthesis 92](#): Airport Waste Management and Recycling Practices.

Learning Objectives

At the end of this webinar, you will be able to:

- Describe the waste management hierarchy and strategies applied at each level
- Determine how to find strategy toolkits developed through this project



ACRP Webinar

More Than Recycling - Best Practices in Airport Waste Management

February 5, 2019



B. J. Carpenter, REM, CESSWI

City of Austin/Austin-Bergstrom International Airport

✈ Sustainability Program Coordinator

- 2.5 years with Austin Bergstrom
- 20+ years in environmental field
- Glorified Dumpster Diver 😊



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Today's Speakers

Morgan Turner
Mead & Hunt, Inc.

and

Jeremy Webb
Port of Seattle / Seattle-Tacoma
International Airport

Presenting ACRP Synthesis 92

Airport Waste Management and Recycling Practices

Airport Waste Management and Recycling Practices

Morgan Turner
Mead & Hunt

Morgan Turner

Principal Investigator

- ✈ Airport Recycling and Waste Planning Service Leader, Mead & Hunt
- ✈ Former Airport Planner, Environmental Health and Safety Specialist, and Airport Engineer



ACRP Synthesis 92 Oversight Panel

Kane Carpenter, Austin-Bergstrom International Airport

Jerry Haws, City of Phoenix Aviation Department

Liza Milagro, Hartsfield-Jackson Atlanta International Airport

Bryan C. Wagoner, Wayne County Airport Authority-DTW

Jeremy Webb, Port of Seattle Aviation Division

Jerry P Williams, Denver International Airport

Shenghua Wu, University of South Alabama

Jennell Barrilleaux, FAA Liaison

Christine Greencher, TRB Liaison

Gail Staba, TRB Staff Officer

ACRP Synthesis 92: *Airport Waste Management and Recycling Practices*

- ✈ Focuses on airport waste management and recycling practices
- ✈ Incorporates findings from literature review, airport survey, and case example airport interviews
- ✈ Includes toolkits of existing effective practices
- ✈ Published September 2018

Research Opportunity

Airports



Key Stakeholders

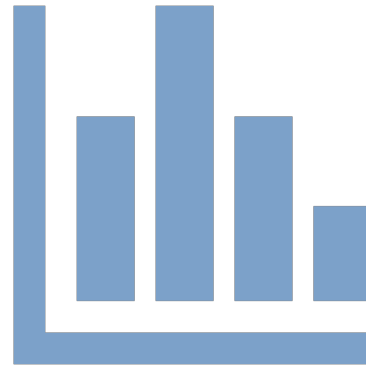


Research Approach



Literature Review

- ACRP Studies
- FAA Resources
- US EPA Resources
- Other Reports



Airport Survey

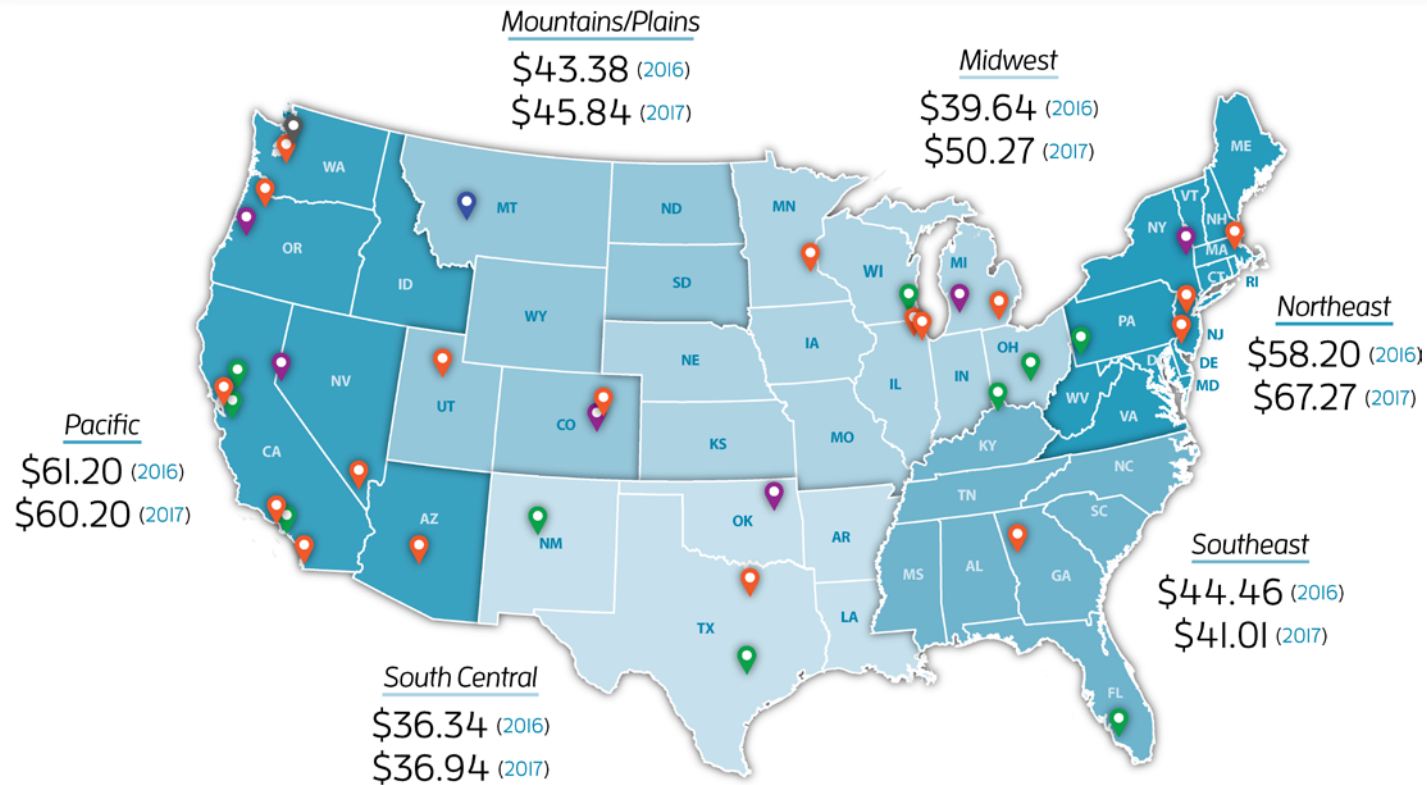
- 36 Airports



Case Example Interviews

- 21 Airports

Research Results: Survey Representation



Participating Airport NPIAS Hub Classification

- Small
- Medium
- Large
- Non-Hub
- General Aviation

Average Tipping Fees for U.S. Landfills by Region (January 2016/2017) and Surveyed Airports by Location and NPIAS Classification

Research Results: Drivers and Challenges

Established Drivers

- Requirements
- Financial Impacts/Costs
- Environmental Impacts
- Requests/Expectations
- Other Airports

Emerging Drivers

- International Market
- Greenhouse Gas / Carbon Accounting
- Social Impacts
- Zero Waste Goals
- Resource Management
- Circular Economy

Airport Challenges

- Security Restrictions
- Limited Resources
- Stakeholder Challenges

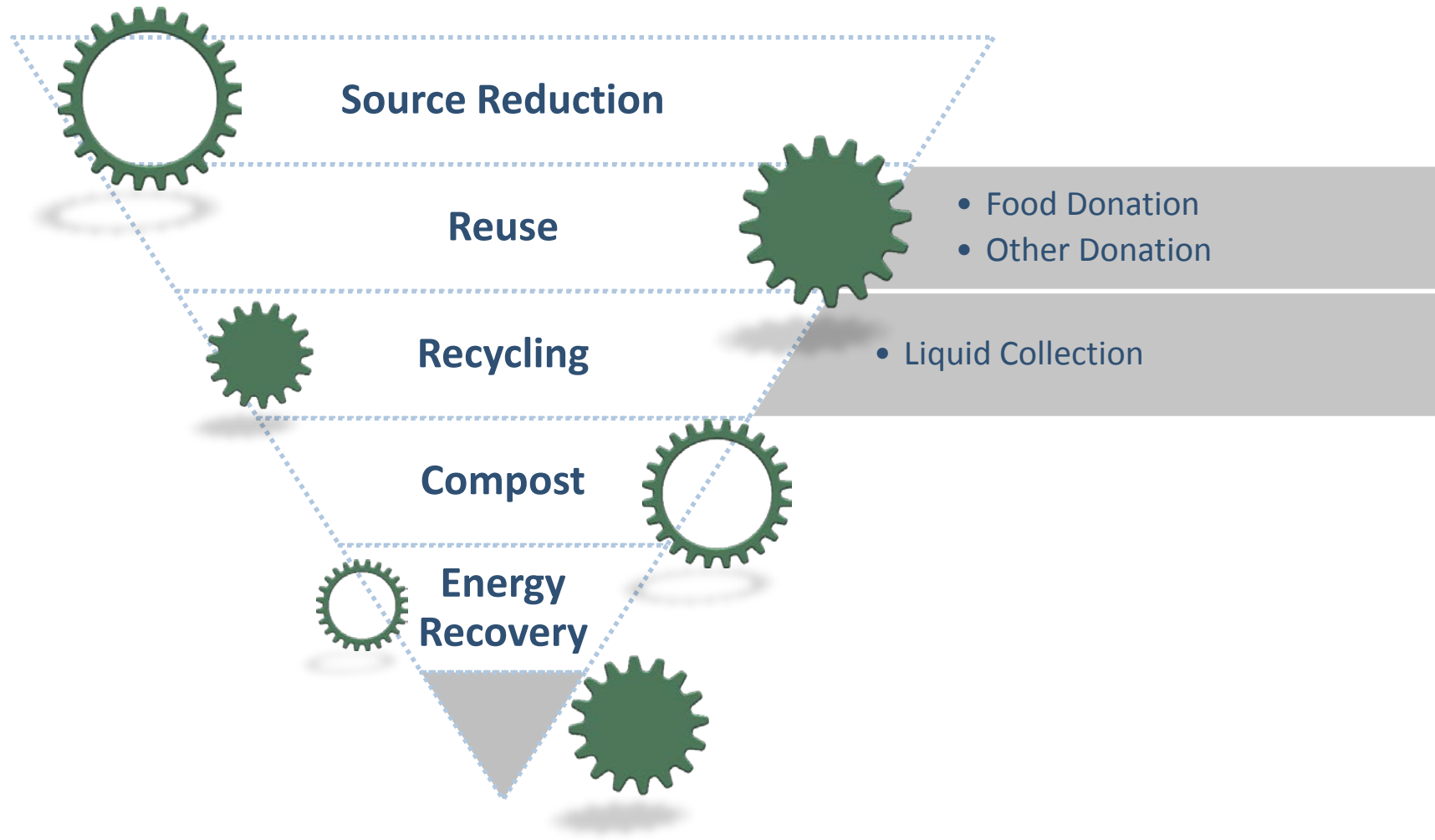
Waste Management Industry Challenges

- Varied Metrics
- Contamination
- Lost Capture
- Material Markets

Research Results: Program Management Strategies



Research Results: Physical Strategies



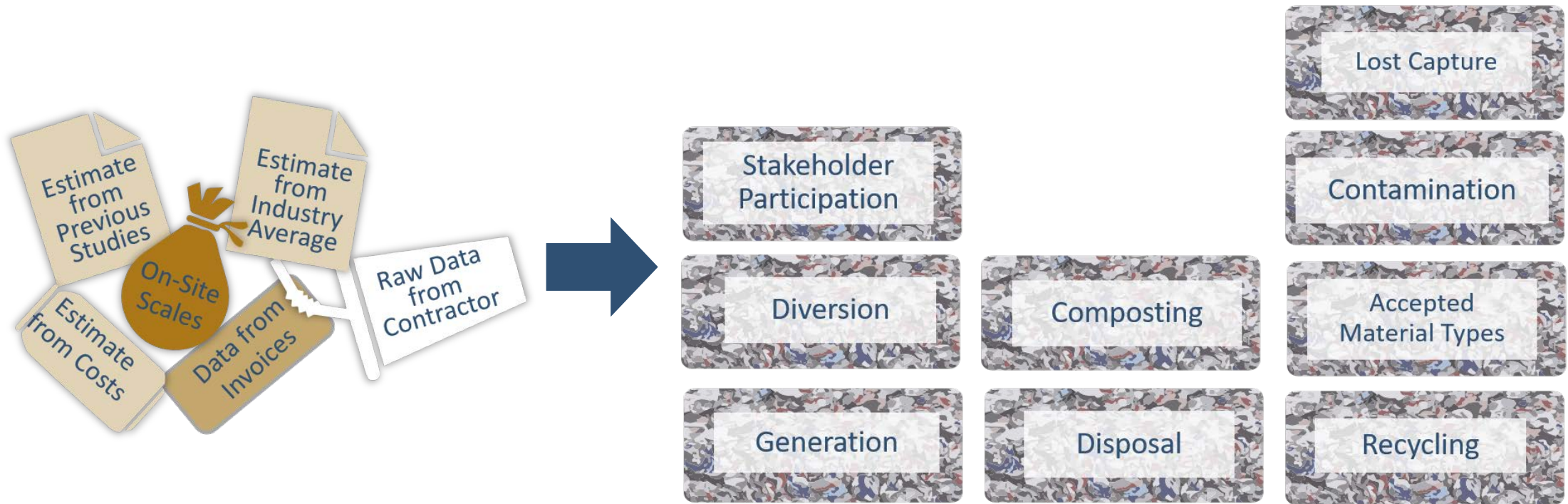
Partner Research Results: ~~Stakeholder~~ Practices and Other Strategies



Research Results: Effective Practices



Research Results: Data and Metrics



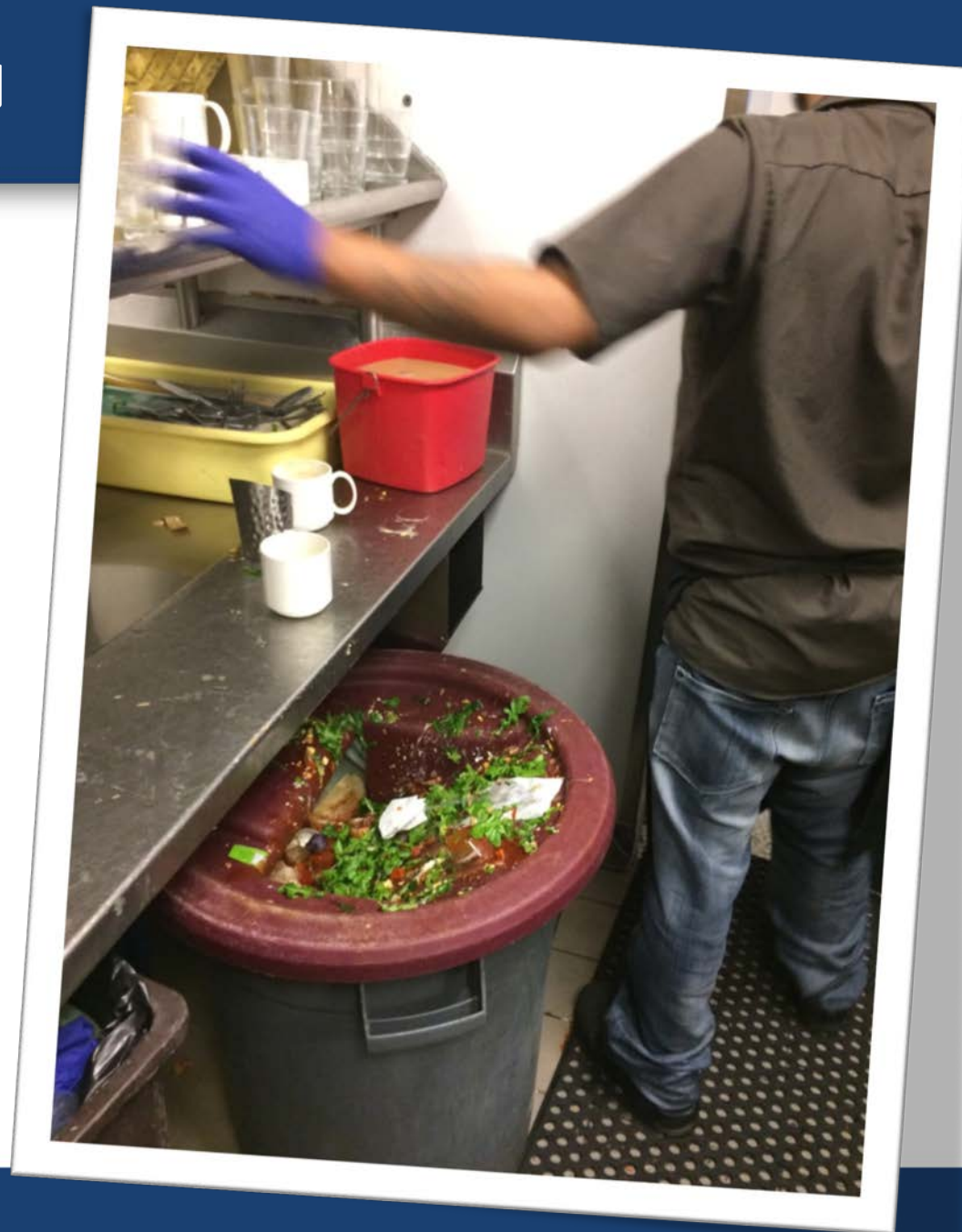
Case Example: AUS



Case Example: COS



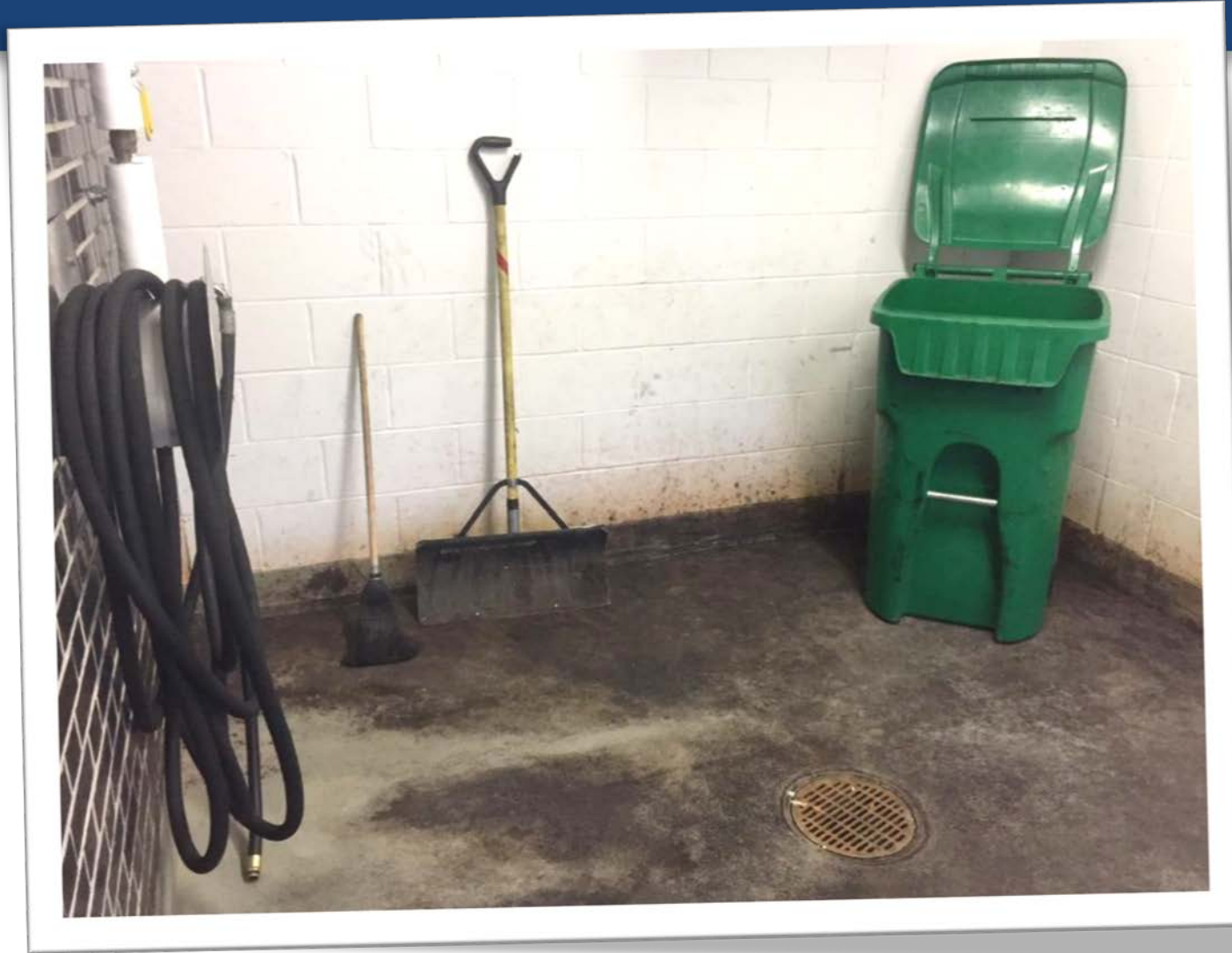
Case Example: DEN



Case Example: LAS



Case Example: MSP



Case Example: PDX



Case Example: SFO



Case Example: SLC



Case Example: SMF



Case Examples

ABQ

- Reuse of previous containers
- Sole source procurement process
- Stakeholder survey

ATL

- Coreless toilet paper rolls
- Eliminated toilet paper cardboard packaging
- Requiring compostable serviceware and carryout containers

DTW

- Employee tumblers and mugs

EWR

- Recycle Across America© container labels

Case Examples

MKE

- Airside airline recycling facility

PAE

- Recycling from Airport areas

PHL

- Dealing with liquids/contamination
- Dedicated recycling coordinator

PHX

- Waste stream composition study

Case Examples

RNO

- Airside recycling facility
- Self-haul of recyclables

SAN

- Plastic film recycling
- Recycling from Airport areas

SEA

- “Pay As You Throw” waste charges and usage monitoring
- Airfield recycling

TUL

- Transitioning to recycling from energy-from-waste

Toolkits



[Contracting](#)

[Environmental Preferred Purchasing](#)

[Food Donation](#)

[Terminal Recycling](#)

[Office/Workplace Recycling](#)

[Liquid Collection](#)

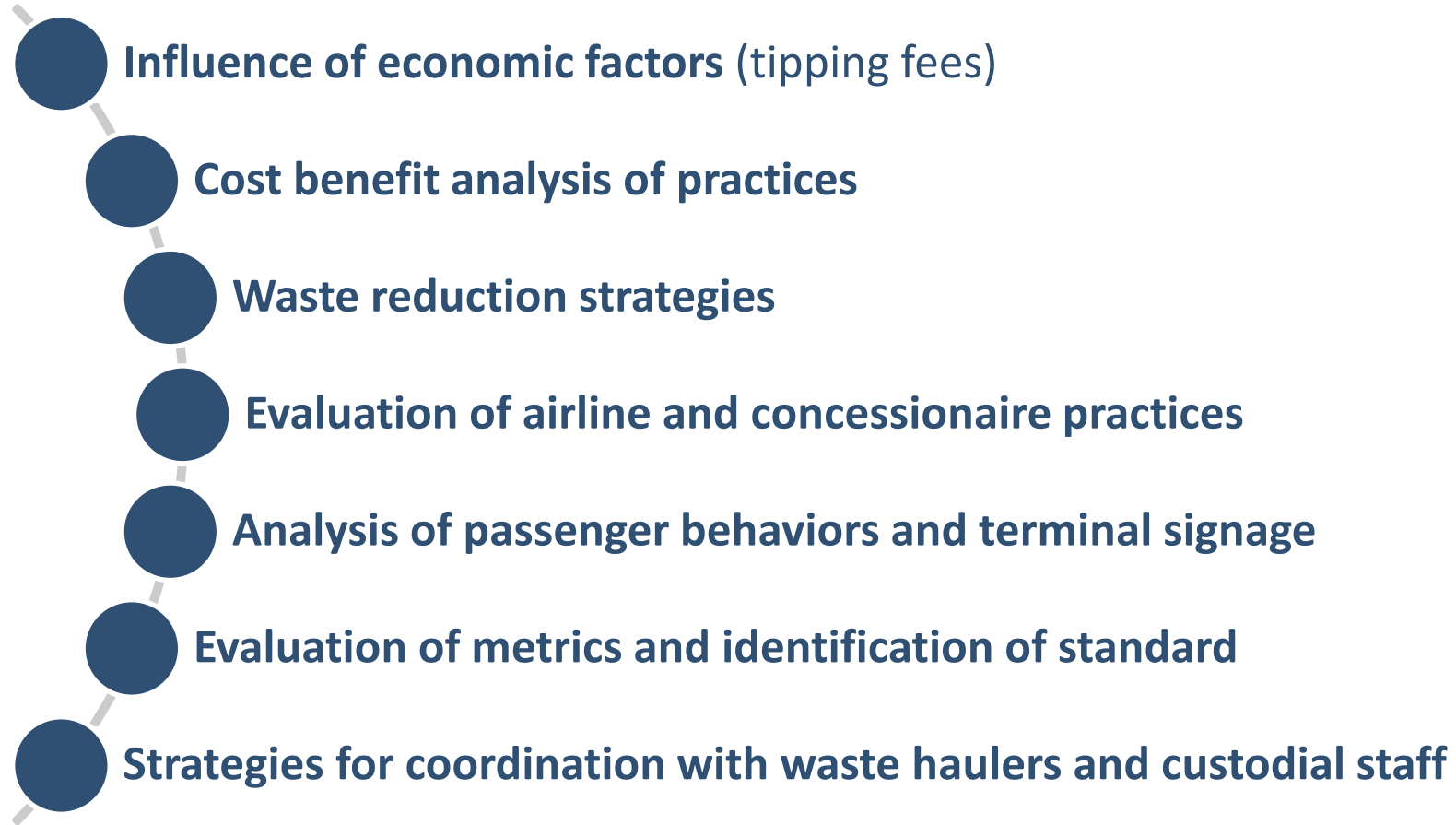
[Back-of-House Composting](#)

[Metrics](#)

[Signage](#)

[Training](#)

Future Research

- 
- Influence of economic factors (tipping fees)
 - Cost benefit analysis of practices
 - Waste reduction strategies
 - Evaluation of airline and concessionaire practices
 - Analysis of passenger behaviors and terminal signage
 - Evaluation of metrics and identification of standard
 - Strategies for coordination with waste haulers and custodial staff

FOR ADDITIONAL INFORMATION



Morgan Turner

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Airport Waste Management and Recycling Practices

Jeremy Webb, Seattle-Tacoma
International Airport (SEA) | Port of Seattle

Jeremy Webb

Project Panelist

- ✈ Environmental Program Manager, Seattle-Tacoma International Airport
- ✈ Aviation Environmental Programs Sustainability & Compliance
- ✈ EPA, FAA, and local waste industry research contributor
- ✈ American Association of Airport Executives Member
- ✈ Washington State Recycling Association Member

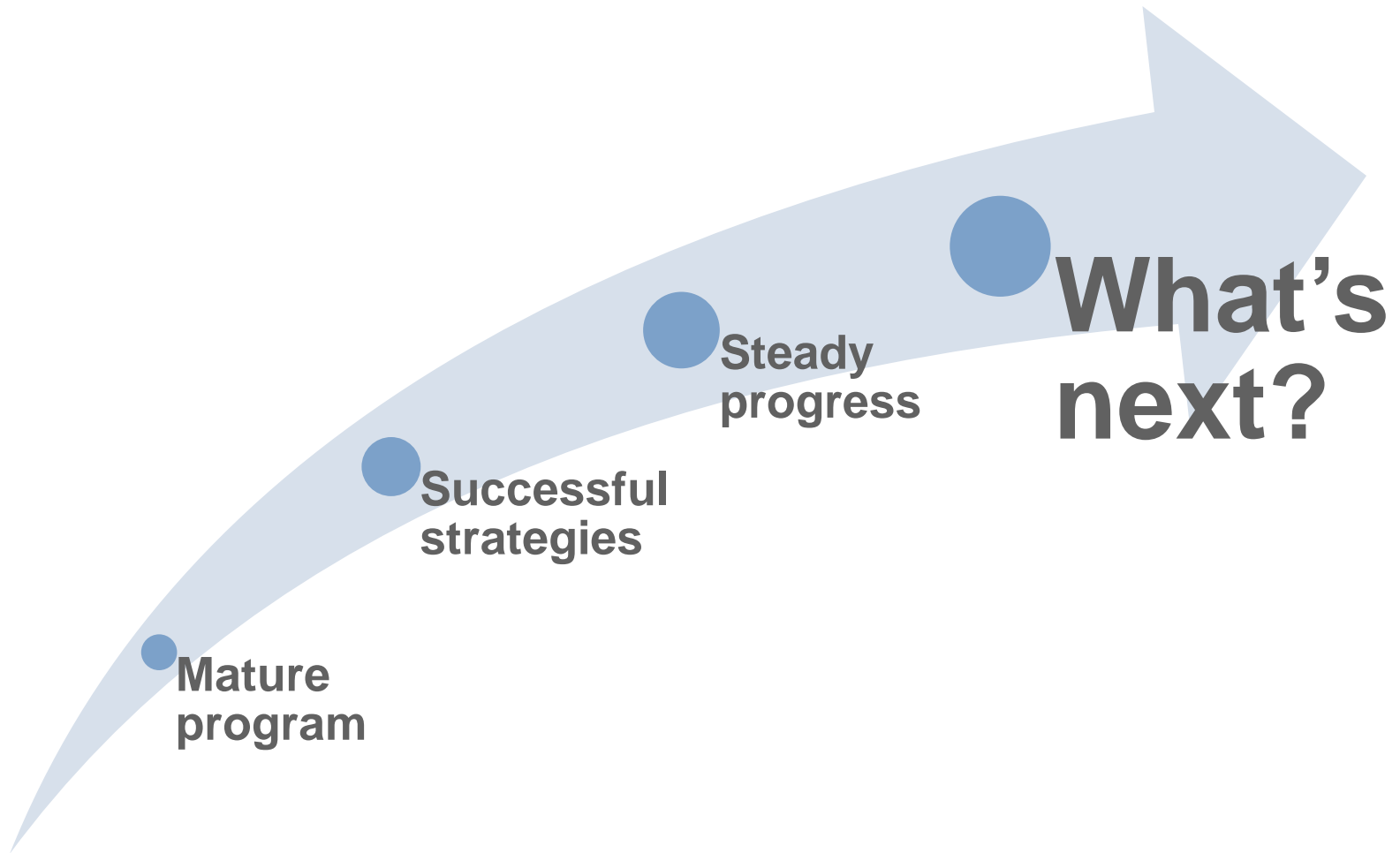


General Takeaways from Report

- ✈ New go-to airport recycling reference
- ✈ Diverse perspectives and Regional context
- ✈ Common strategies, trends, and priorities and challenges
- ✈ Competition prompts comparisons but measurement methods pose challenges
- ✈ Case examples provide practical guides based on successful strategies
- ✈ Toolkits highlight best-in-class waste prevention, recycling, and diversion solutions



SEA's Waste Diversion Program



SEA Activity and Waste Profile

Activity

47 million passengers

1,500 employees

28 airlines

90+ Concessions

Waste

Terminal:

8,223 generated

3,018 diverted

37% (goal 60%)

Airfield:

2,862 generated

235 diverted

8% (goal 15%)

SEA Case Example Highlights (Appendix 20)

25+ years recycling

Airport &
Public
Support

Terminal,
Airside,
Landside

Passenger
s, tenants,
employees

Centralized
PAYT
system

Food
Recovery

Service &
market
access

Policy &
Contracts

Education,
training,
resources

Favorable
economics

More...

Challenges

Contamination

China recycling
restrictions

Participation

Growth &
Capacity

Training

Industry,
Market
Changes

Solid Waste Management Planning

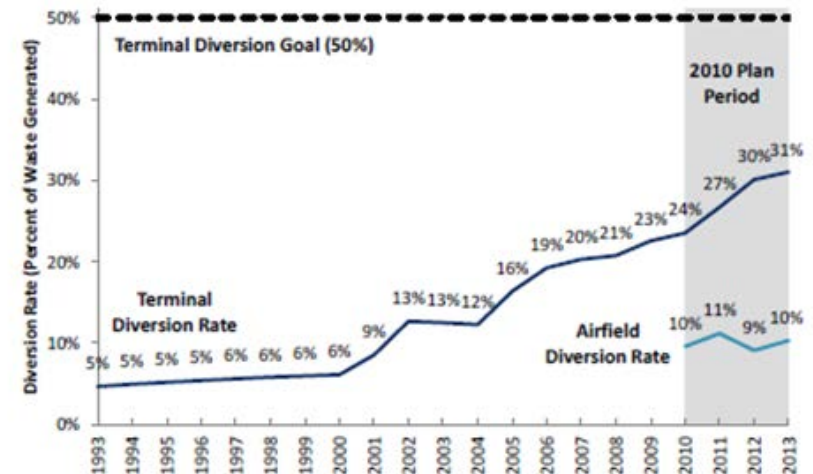
- ✈️ Roadmap to success
- ✈️ Update in 2019/2020 (5-year cycle)
- ✈️ FAA Recycling Plan Compliant
- ✈️ Document conditions
- ✈️ Set Goals and Priorities
- ✈️ Evaluate Strategies



App 9,18,20,24

Seattle-Tacoma International Airport
Solid Waste Management Plan 2014
Final: June 30, 2015

Figure 1. Airport Waste Diversion Rate History, 1993–2013



Forecast and Capacity Analysis

- ✈ Projected solid waste trends
- ✈ Assessed activity and policy impacts
- ✈ Identified system capacity limitations
- ✈ Schedule system changes



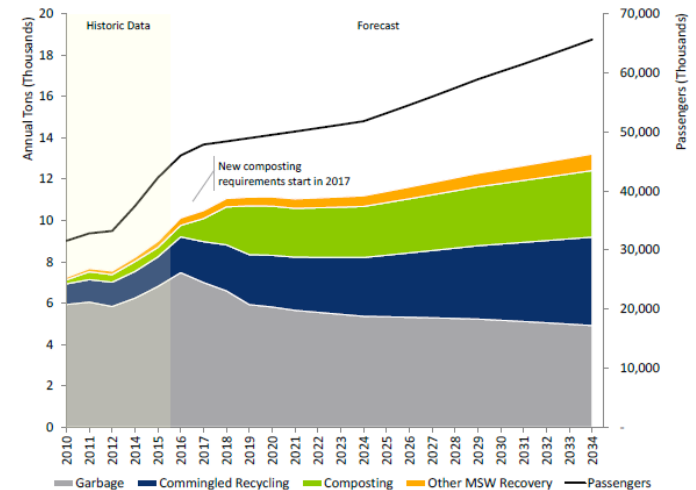
App 20

Seattle-Tacoma International Airport Solid Waste Growth Forecast and Capacity Analysis 2016–2034

FINAL REPORT: November 11, 2016

Seattle-Tacoma International Airport
Solid Waste Growth Forecast and Capacity Analysis 2016–2034

Figure 1. Aggregate Airport Passenger and Waste Forecast



Waste Characterization Study

- ✈ 2018 Airfield Waste Characterization
- ✈ Confirmed composition, quantities, generators
- ✈ Identified priorities and diversion opportunities
- ✈ Analyzed disposal data to optimize outreach/policy
- ✈ Surveyed Airfield users to assess feasibility



App 8, 9, 20

Figure 3. Tons by recoverability class: Airfield garbage

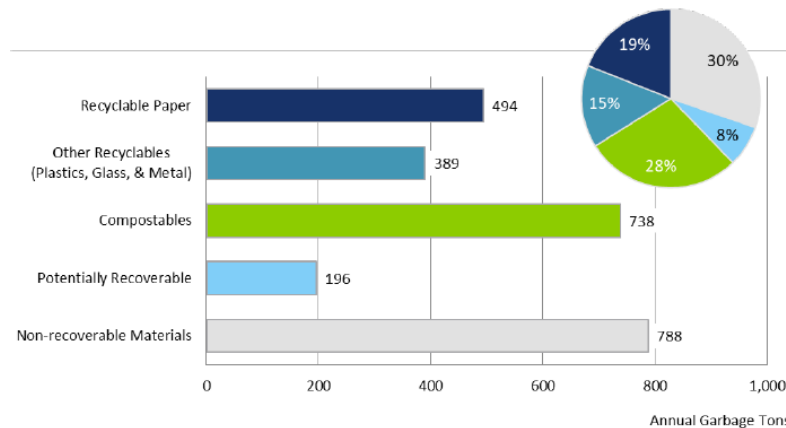
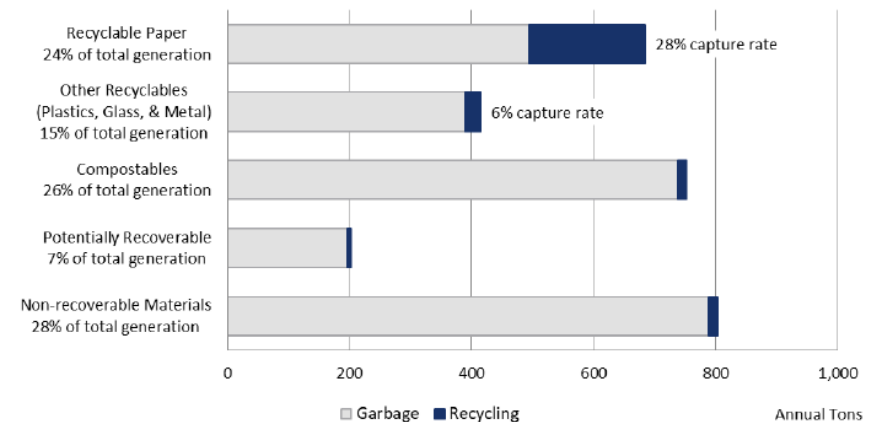


Figure 5. Annual tons and recycling capture rates by recoverability class



Contracts and Policy

- ✈ Updating Rules & Regulations
- ✈ Support contamination mitigation/sanitation
- ✈ Expand Monitoring and Enforcement
- ✈ Monitoring compliance with tenant lease requirements



App 25

SCHEDULE OF RULES AND REGULATIONS NO. 5

(CANCELS SCHEDULE OF RULES AND REGULATIONS NO. 4
IN ITS ENTIRETY)

SEATTLE-TACOMA INTERNATIONAL AIRPORT



Food Recovery

- ✈ Triple bottom line benefits
- ✈ Reduce waste, feed community, reduce costs
- ✈ Predominant portion of terminal and airfield waste
- ✈ EPA 2018 Food Recovery Challenge Regional Award



App 27, 31

Food Donation



Composting



Used Cooking Oil Recycling

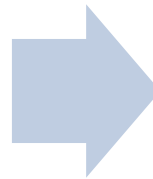


Checkpoint Liquid Collection

- ✈️ Drain stations at each security checkpoint
- ✈️ Paired with recycle and garbage bins
- ✈️ Refill stations beyond security
- ✈️ Custodial teams service and measure



App 30



Education and Outreach

- ✈ Critical for passengers, tenants, employees
- ✈ Revising recycling bin labels & signage standards
- ✈ Updating tenant Recycling Guide and posters
- ✈ “Sustainable InSights” window graphics



App 33,34

Garbage			Recycle			Food + Compostables		
Snack Bags Candy Wrappers Chip Bags	Condiment Packages Plastic Utensils Bottle Caps	Solid Foil Foam Containers	Cans & Bottles Empty Cups	Plastic Lids and Containers	Empty Cartons Mixed Paper	Food Scraps	Food Soiled Paper	Compostable Packaging

Thanks for pitching in.
Together, we recycle waste from the terminal and aircraft to keep it from ending up in landfills. See those **big blue bins** out on the tarmac? They're filled with recyclables that will become new products. How great is that!

Seattle-Tacoma International Airport

Recycling Guide

Why Recycle?
Waste reduction and recycling is a key element of the Airport's Environmental Strategy Plan that generates financial, environmental, and social returns.

Tenant Recycling & Food Service Ware Requirements
Recycling and using durable or approved compostable and recyclable food service ware is also a requirement for tenants operating at Sea-Tac.

Visit our website: www.portseattle.org/Environmental/Material-Management/Recycling/ for more information about Airport recycling programs, free resources for tenants, and requirements.

Our Recycling Goal
Sea-Tac Airport's goals align with those of communities we serve and further support broader regional and national waste diversion efforts.

Terminal Waste Diversion Rate
60% by 2020

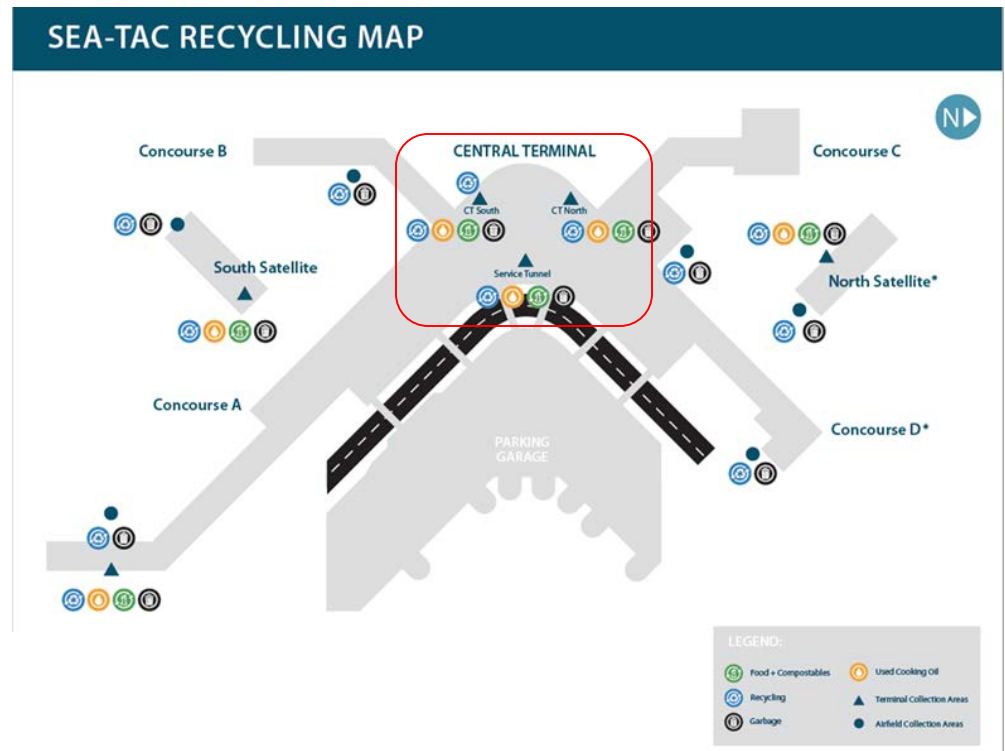
Airfield Waste Diversion Rate
15% by 2020

How to, and where
There are many places around the airport where recyclable materials are generated. Tenants can help by placing convenient and clearly marked recycling bins in their leased areas, training staff in airport recycling procedures, and setting goals and celebrating progress with employees.

The airport maintains conveniently located recycling collection areas throughout the main terminal, satellite and airfield. To find out where and what you

Infrastructure & System Updates

- ✈ Central Terminal Core Waste Capacity
- ✈ Cart Wash Stations
- ✈ Internal Transit
- ✈ Loading Dock Standards
- ✈ Research technologies
- ✈ Volume reduction options



Researching Alternative Disposal Options

- ✈ Advanced Material Recovery (Mixed Waste Processing)
- ✈ On-site Resource Consolidation & Recovery
- ✈ Preliminary review of waste-to-fuel technologies



App 5



Contamination Issues

- ✈ Significant challenge
- ✈ Coordinated multi-department response
- ✈ Increased and mandatory training
- ✈ Monitoring & Enforcement
- ✈ China recycling restrictions



For Additional Information

The screenshot shows the Port of Seattle website's "Environment and Sustainability" page. The header includes the Port of Seattle logo, navigation links for Careers, Contact Us, and a language selector. The main navigation bar highlights "COMMUNITY". The breadcrumb trail reads "Home / Community / Environment and Sustainability". The main heading is "Environment and Sustainability". A grid of nine topic cards is displayed, each with a representative image and a title: "Airport Noise Programs", "Clean Up", "Climate and Air Quality", "Energy Efficiency", "Environment Overview", "Habitat and Natural Resources", "Waste Reduction and Recycling", "Water Quality and Water Conservation", and "Wildlife Management". On the right, a sidebar titled "SEPA/NEPA Information" contains sections for "Explore More" (with a link to a boat tour) and "Other Documents" (with links to grant applications and a sustainable airport master plan).

Port of Seattle

Careers | Contact Us | Select Language | A A A

HOME SEA-TAC AIRPORT ▾ MARITIME ▾ BUSINESS ▾ COMMUNITY ▾ ABOUT ▾

Search

Home / Community / Environment and Sustainability

Environment and Sustainability

Airport Noise Programs

Clean Up

Climate and Air Quality

Energy Efficiency

Environment Overview

Habitat and Natural Resources

Waste Reduction and Recycling

Water Quality and Water Conservation

Wildlife Management

SEPA/NEPA Information

Explore More

- "Our Shared Duwamish River" Multilingual Boat Tour

Other Documents

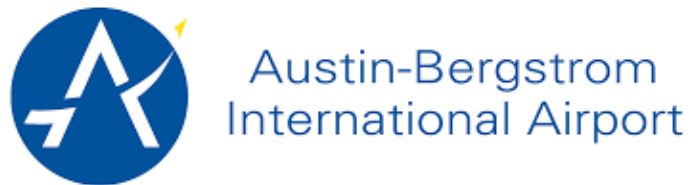
- APPLICATION - Spring 2019 ACE Fund Grants Cycle (PDF version)
- Sustainable Airport Master Plan (SAMP) Public Open House Materials, May - June, 2018

Jeremy Webb

Webb.j@portseattle.org

Today's Participants

- BJ Carpenter, *Austin-Bergstrom International Airport*, BJ.Carpenter@austintexas.gov
- Morgan Turner, *Mead & Hunt*, morgan.turner@meadhunt.com
- Jeremy Webb, *Port of Seattle/Seattle Tacoma International Airport*, Webb.J@portseattle.org



Panelists Presentations

<http://onlinepubs.trb.org/onlinepubs/webinars/190205.pdf>

After the webinar, you will receive a follow-up email containing a link to the recording

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2020

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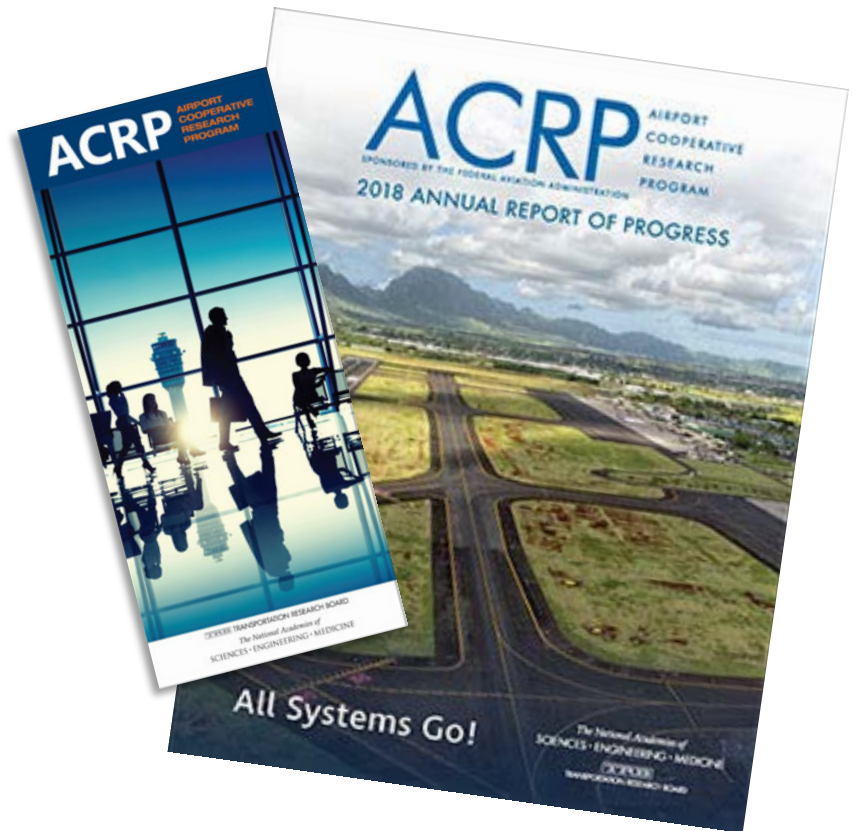
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- ✈ Conducts research to find solutions.
- ✈ Publishes and disseminates research results through free publications and webinars.



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Additional ACRP Publications Available on Today's Topic

Report 80: [*Guidebook for Incorporating Sustainability into Traditional Airport Projects*](#)

Report 100: [*Recycling Best Practices—A Guidebook for Advancing Recycling from Aircraft Cabins*](#)

Synthesis 42: [*Integrating Environmental Sustainability into Airport Contracts*](#)

Synthesis 66: [*Lessons Learned from Airport Sustainability Plans*](#)

Synthesis 77: [*Airport Sustainability Practices*](#)

Synthesis 81: [*Food and Beverage and Retail Operators: The Costs of Doing Business at Airports*](#)

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Upcoming ACRP Webinars

February 26

Digitize Your Checklists — Computerized Airport Maintenance Management (CMMS)

March 12

Getting Served — Legalities and Risks of Airport Contractual Agreements

March 20

Energetic Value — The Design and Economics of Microgrids at Airports