



Washington Aviation System Plan

**WSDOT Statewide Aviation Sustainability Plan**

December 2024





# WSDOT Statewide Aviation Sustainability Plan

*Prepared for*



Washington State Department of Transportation

Washington Aviation System Plan

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**December 2024**

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*Prepared by*

**Kimley»»Horn**

[www.kimley-horn.com](http://www.kimley-horn.com)

1201 Third Avenue, Suite 2800

Seattle, WA, 98101

*and*



[www.cascadiaconsulting.com](http://www.cascadiaconsulting.com)

1109 First Avenue, Suite 400

Seattle, WA 98101



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### Special thanks to:

#### Washington State Department of Transportation

- **Jonathan Olds** Senior Policy Specialist – Climate Change
- **Stephanie Ignell** Transportation Planning Specialist, Environmental Services Office
- **Ann Richart** Director, Aviation Division
- **Eric Johnson** Assistant Director, Aviation Division
- **David Ison** Aviation Planner, Aviation Division

#### Sustainability Plan Working Group

- **David Ryan** Arlington Municipal Airport
- **Tim Mensonides** Auburn Municipal Airport
- **Samantha Peterson** Century West Engineering
- **Brandon Rakes** Chehalis-Centralia Airport
- **Dave Garringer** Colville Airport
- **Monroe Whitman** Port of Bremerton
- **Rich Mueller** Port of Moses Lake
- **Chris Paolini** Port of Olympia
- **Warren Hendrickson** Port of Olympia
- **Chris Fax** Port of Othello
- **Brandon Palmer** Port of Shelton
- **Keith Love** Port of Skagit County
- **Robert Hodgman** Yakima Air Terminal (formerly WSDOT)



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# **WSDOT Statewide Aviation Sustainability Plan**



## FOREWORD: HOW TO USE THE STATEWIDE AVIATION SUSTAINABILITY PLAN

Airport sustainability encompasses various actions to reduce environmental impacts, maintain economic growth, and benefit communities. This document is intended for operators of airports of all sizes in Washington state. It provides step-by-step guidance for developing a site-specific sustainability plan, including scope and structure, outcomes and goals, sustainability strategies and actions, data tracking, and progress evaluation.

**Chapters 1-3** provide background and context including the purpose, objectives, and definitions of sustainability, sustainability activities, and examples, and types of airport sustainability planning efforts.

**Chapter 4** describes a step-by-step approach to developing an airport sustainability plan. While all steps are important for completing a thorough planning process, the steps are iterative. They can be followed in the best sequence to meet the specific circumstances, interests, and available resources of each airport.

**Chapter 5** provides a summary of available federal and state grant funding opportunities available related to sustainability efforts from planning through implementation.

Every step includes recommendations for small airports with limited resources. In Step 1, for example, small airports without a dedicated planning team may adopt their sustainability definition from applicable examples rather than following an ideation process. Airports with an already established group of interested stakeholders may begin their planning process with stakeholder engagement (Step 3). In contrast, others may start by conducting a baseline assessment (Step 5) to determine what is readily measurable before deciding on desired outcomes and goals (Step 2) or before selecting strategies and actions (Step 6). Airports should read through all seven planning steps before determining where and how to begin their planning process.

The steps to developing an airport sustainability plan are shown in **Table F-1**.

**Table F-1: Planning Steps and Activities with Corresponding Chapter and Section**

Planning Step	Planning Activity	Chapter & Section
1	Draft Sustainability Vision & Mission Statements	▶ 4.1
2	Identify Desired Sustainability Outcomes & Goals	▶ 4.2
3	Engage Stakeholders	▶ 4.3
4	Establish Plan Scope and Structure	▶ 4.4
5	Conduct a Baseline Assessment	▶ 4.5
6	Select Strategies & Actions, Finalize Plan	▶ 4.6
7	Implement, Evaluate, and Communicate Progress	▶ 4.7

Source: Cascadia Consulting Group, 2024

The appendices shown in **Table F-2** contain resources supporting the above steps, with links to each appendix in the bottom row. Appendices will also be referenced throughout the document where applicable. Reviewing these resources prior to initiating planning will inform the planning process.

**Table F-2: Appendices Content, Descriptions, and Links**

Appendix A	Appendix B	Appendix C	Appendix D	Appendix E
<p><b>Recommended Sustainability Strategies and Actions</b></p> <p>Appendix A includes recommended sustainability strategies and actions, organized by airport operational areas, with assessed level of effort and applicability to the EONS framework<sup>1</sup>.</p>	<p><b>Airport Sustainability Plan Examples and Pros &amp; Cons of Plan Types</b></p> <p>Appendix B includes examples and additional context for airports deciding on the best pathway for their planning process.</p>	<p><b>Recommended Planning and Implementation Resources</b></p> <p>Appendix C includes planning and implementation resources for more information and airport examples of sustainability actions.</p>	<p><b>KPIs<sup>2</sup> to Measure Progress on Airport Sustainability</b></p> <p>Appendix D lists examples and available resources for sustainability performance tracking.</p>	<p><b>Planning Templates</b></p> <p>Appendix E provides planning templates for airports to use while completing each step of the process and subsequent integration into their plan.</p>
▶ <a href="#">Appendix A</a>	▶ <a href="#">Appendix B</a>	▶ <a href="#">Appendix C</a>	▶ <a href="#">Appendix D</a>	▶ <a href="#">Appendix E</a>

Source: Cascadia Consulting Group, 2024

Notes: (1) EONS refers to *Economic Viability*, *Operational Efficiency*, *Natural Resource Management*, and *Social Responsibility*. See Section 1.4 for more information about the EONS framework. (2) KPIs – Key Performance Indicators.

## Chapter 1. Introduction

### 1.1. Purpose

The Washington State Department of Transportation (WSDOT) is responsible for the state’s multimodal transportation system. WSDOT’s vision is that “Washington travelers have a safe, sustainable, and integrated multimodal transportation system,” and sustainability is one of its six core values. WSDOT focuses on three areas to advance sustainable transportation: energy efficiency, reducing pollution, and enhanced resilience.<sup>1</sup>

WSDOT’s Aviation Division (WSDOT Aviation) focuses on improving the statewide aviation system, which includes protecting aviation facilities, safe air transportation, airport capacity to meet demand, and mitigation of environmental impacts. This work aligns with its mission that WSDOT Aviation “fosters the development of aeronautics and the state’s aviation system to support sustainable communities and statewide economic vitality.” The state adopted its first Aviation System Plan in 1973, and WSDOT is now updating the previous Washington Aviation System Plan (WASP) published in 2017.

The 2017 WASP recommended that airports of all sizes enact plans for waste, air, and water quality management and mitigation; complete a wildlife assessment; consider future extreme weather and climate resilience; and encourage alternative energy sources. According to a recent survey of Washington’s airport managers of 133 public-use airports (including 12 state-owned facilities) conducted in late 2022 and early 2023, a minority of airports have implemented these recommendations, and those that did typically adopted relatively minor changes.<sup>2</sup>

To advance sustainability at Washington’s airports, WSDOT Aviation has directed the current WASP update to include a standalone Statewide Aviation Sustainability Plan and convened an Aviation Sustainability Working Group to provide input on feasible sustainability strategies. This Statewide Aviation Sustainability Plan offers a sustainability framework, measurable goals and metrics, and a range of sustainability strategies for Washington airports to consider in developing individual plans. Airports can consider this guidance in creating a plan that works for their particular issues and the available resources to implement and monitor sustainability activities. Through such efforts, airports can enhance their role in a sustainable statewide aviation system in Washington state and beyond.

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<sup>1</sup> Secretary’s Executive Order E 1113.00, “Sustainability,” April 29, 2020, available online at <https://wsdot.wa.gov/sites/default/files/2021-10/WSDOT-EO-1113.pdf>.

<sup>2</sup> WASP Airport Managers Survey administered by consultant team in November 2022–January 2023, reported April 26, 2023. The number of public-use airports fluctuates depending on a variety of conditions. There were 133 public-use airports included in the WASP when the plan was initiated in 2022.

## 1.2. Why Sustainability is Important to Washington Airports

According to the United States Environmental Protection Agency (USEPA), commercial aircraft and business jets are responsible for three percent of the nation's total greenhouse gas emissions output and 10 percent of transportation emissions in the United States.<sup>3</sup> At the federal level, the U.S. Aviation Climate Action Plan outlines a path toward net-zero emissions by 2050 for the federal aviation sector.<sup>4</sup> The demand for aviation in Washington state continues to grow and will soon exceed the capacity of some existing airports.<sup>5</sup> Washington's airports, including commercial service and general aviation (GA), are challenged with accommodating the rise in travel and freight, meeting the demands of their communities, increasing operations, and maintaining sustainable financial stability.<sup>6</sup> Sustainability efforts can assist airports as they continue to be challenged.

The benefits of implementing sustainability strategies for airports include but are not limited to the following:

- Reduced energy consumption and operating costs.
- Efficient use of resources and reduced waste.
- Improved air and water quality.
- Financial stability and positive contributions to local economies.
- Enhanced community relations and public perception.
- Increased resilience to climate change and other environmental risks.
- Improved health and safety for airport employees, tenants, and residents in nearby communities.
- Compliance with environmental regulations and standards and reduced risk.

By incorporating sustainable practices into airport operations and other activities, airports can contribute to a more sustainable future and reduce environmental impacts while also improving their efficiency, finances, and long-term viability. Sustainable practices not only reduce airports' environmental impact but also help build goodwill with passengers, employees, and the surrounding community. A well-executed sustainability plan can provide a competitive advantage, attract travelers and tenants, and reduce operating costs over time.

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<sup>3</sup> U.S. Environmental Protection Agency, "Regulations for Greenhouse Gas Emissions from Aircraft," 2020. [www.epa.gov/regulations-emissions-vehicles-and-engines/regulations-greenhouse-gas-emissions-aircraft](https://www.epa.gov/regulations-emissions-vehicles-and-engines/regulations-greenhouse-gas-emissions-aircraft)

<sup>4</sup> Federal Aviation Administration, "Aviation Climate Action Plan," 2021. <https://www.faa.gov/sustainability/aviation-climate-action-plan>

<sup>5</sup> WSDOT, "Aviation commission recommends two potential options for new aviation capacity: Final recommendation to Legislature due in June 2023," October 2022. <https://wsdot.wa.gov/about/news/2022/aviation-commission-recommends-two-potential-options-new-aviation-capacity-final-recommendation>

<sup>6</sup> Feedback during workshop of the Aviation Sustainability Working Group on May 2, 2023.

### 1.3. WSDOT Aviation Sustainability Policy, Mission, and Vision Statements

WSDOT’s Strategic Plan names sustainability as one of the agency’s six core values, prioritizes sustainability as a part of its vision, and outlines sustainability actions within its Resilience goal.

- **Vision:** “Washington travelers have a safe, sustainable, and integrated multimodal transportation system.”
- **Values:** Safety, engagement, innovation, integrity, leadership, sustainability.
- **Resilience:** WSDOT seeks to “Improve the resilience of the transportation system” (Part 1) and “Lead in the development of transportation that combats climate change and enhances healthy communities for all” (Part 2). This work includes prioritizing actions that reduce risk and build preparedness for climate change and natural hazards; investing in efficient, equitable, and healthy transportation options; and reducing greenhouse gas emissions at WSDOT and throughout Washington’s transportation sector.<sup>7</sup>

WSDOT’s agency-wide sustainability vision provided a solid foundation for a WSDOT Aviation-specific sustainability mission and policy and was considered in the development of this Plan.

WSDOT Aviation’s Sustainability Mission Statement and Policy were developed by drawing on examples from similar organizations, identifying common needs expressed by public airports, and considering general discussion at the Aviation Sustainability Working Group meeting in May 2023. By adopting its own sustainability mission and policy, WSDOT Aviation can “walk the talk” and help lead the state’s airports in sustainability planning.

#### WSDOT Aviation Sustainability Mission

WSDOT Aviation is committed to leading airports across Washington in defining and implementing sustainable solutions, improving economic benefits, increasing operational efficiency, and building community relationships and resilience, so that aviation can meet growing needs statewide.

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<sup>7</sup> WSDOT, “Strategic Plan,” accessed September 2023. <https://wsdot.wa.gov/about/secretary-transportation/strategic-plan>

## WSDOT Aviation Sustainability Policy

### WSDOT Aviation will:

- Support Washington airports in advancing sustainability by developing resources, models, and trainings that are useful for airports across the state or connecting with existing sustainability planning and implementation resources, models, and trainings.
- Build momentum for airports to achieve sustainability goals by funding efforts, piloting innovative ideas, sharing lessons learned, leading by example, and encouraging and supporting others.
- Increase resiliency by investing in actions that advance sustainability, support financial operations, and address community needs.
- Continually learn and adapt to the changing economic, environmental, and social needs of our state by proactively seeking information, prioritizing training, and partnering with local agencies and organizations.
- Advance sustainability-driven leadership and support from partner organizations and national agencies to implement sustainable solutions.

## 1.4. Sustainability Definitions and Principles

According to the Federal Aviation Administration’s (FAA’s) approach to airport sustainability, sustainable actions:

- *Reduce environmental impacts.*
- *Help maintain high, stable levels of economic growth.*
- *Help achieve ‘social progress,’ a broad set of actions that ensure organizational goals are achieved in a way that’s consistent with the needs and values of the local community.<sup>8</sup>*

This “triple bottom line” of environmental stewardship, economic growth, and social responsibility is a common approach to defining and advancing sustainability. To recognize the importance of operational efficiency to the ongoing stability and sustainability of an airport’s operations, this WSDOT Statewide Aviation Sustainability Plan applies the “EONS” framework, which stands for **E**conomic Viability, **O**perational Efficiency, **N**atural Resource Management, and **S**ocial Responsibility. As shown in **Figure 1-1**, the EONS framework was developed by the Airports

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<sup>8</sup> Federal Aviation Administration, “Airport Sustainability,” accessed September 2023. [www.faa.gov/airports/environmental/sustainability](http://www.faa.gov/airports/environmental/sustainability).



Council International–North America (ACI-NA) for sustainability in the airport industry. Sustainability planning should address all four areas of the EONS framework.

**Figure 1-1: EONS Framework**



*Source; Adapted from Airports Council International – North America and Sustainable Aviation Guidance Alliance (SAGA), 2015, by Cascadia Consulting Group, 2024*

A second framework for sustainability planning organizes airport sustainability by operational area, as shown in **Figure 1-2**. The two frameworks are blended in **Appendix A: Recommended Sustainability Strategies and Actions**, which organizes by airport operational area and includes recommended sustainability strategies and actions assessed for alignment with the EONS framework.

**Figure 1-2: Airport Operational Areas for Sustainability Planning**



Source: Cascadia Consulting Group, 2024

**Section 4.4**, Step 4, further describes sustainability frameworks and the application of planning structures for airports in Washington.

## Chapter 2. Current State of Aviation Sustainability in Washington

Washington’s 133 public-use airports are at differing stages of integrating sustainability into their planning and operations. The current WASP includes sustainability as a goal and has four objectives, each with numerous system performance measures to evaluate progress toward achieving the goal. Sample current WASP system performance objectives include:

- Airports that have completed a stormwater pollution prevention plan (SWPPP)
- Airports that have a recycling program
- Airports that support revenue-generating activities
- Airports that have developed a sustainability plan that has energy conservation goals

WSDOT Aviation offers a Sustainable Aviation Grant Program that provides funding for sustainability planning and small project implementation. **Chapter 5** provides more information on federal and state funding, with **Section 5.1.2.1** detailing this specific state grant program.

Both nationally and in Washington state, larger commercial airports like Seattle–Tacoma International Airport (SEA) have developed and started to implement comprehensive sustainability plans (see **Section 2.2** and appendices for more information on these). In contrast, many smaller commercial service and GA airports have not yet adopted or enacted sustainability plans. While this WSDOT Statewide Aviation Sustainability Plan is intended to be broadly applicable to all airports, its primary focus is on the Regional, Community, and Local airports that represent most Washington airports and do not yet have sustainability plans.

Research conducted to support this Plan found that GA airports that have acted on sustainability typically prioritize implementing actions that demonstrate impact over shorter periods while requiring lower capital costs and levels of staff effort. Examples of sustainability-related actions at GA airports include but are not limited to:

- Regularly inspecting and maintaining facilities, infrastructure, and equipment.
- Educating airport staff, passengers, and tenants on energy conservation strategies.
- Installing energy-efficient lighting (e.g., upgrading facility or airfield lighting to LEDs) to reduce electricity consumption and operating costs.
- Reducing total waste generation, such as waste diversion programs (e.g., recycling and composting) or reductions in purchasing.
- Providing a process for community members to weigh in on airport issues and concerns so that airports can respond.

## 2.1. Airport Managers Survey Results on Sustainability

In late 2022 and early 2023, a survey was conducted with managers of 133 public-use airports within Washington’s aviation system to support updating the WASP. The Airport Managers Survey covered various topics to inform the WASP update and received responses from 107 airports. **Table 2-1** shows the findings related to current WASP system performance measures addressing the sustainability goal. Note that stormwater pollution prevention plans are a legal requirement in addition to being sustainability related. (These findings are as reported by airport managers in the survey and may differ from plans, permits, and studies on record elsewhere.)

**Table 2-1: Airport Manager Survey Results**

System Performance Measure	Number of Airports Implemented
Stormwater pollution prevention plans (SWPPPs)	30 total <ul style="list-style-type: none"> <li>▪ 18 completed in the previous decade</li> <li>▪ 8 older SWPPPs (1984–2010)</li> <li>▪ 4 no date indicated</li> </ul>
Recycling programs	43 total
Alternative fuel vehicles	<ul style="list-style-type: none"> <li>▪ 3 ground vehicles or equipment with biofuels</li> <li>▪ 6 electric vehicle (EV) charging infrastructure for airport fleet vehicles</li> <li>▪ 14 EV charging for private vehicles</li> </ul> Additional airports intend to provide EV integration in the future, including buses and shuttles, ground support equipment (GSE), electric aircraft, personal vehicles, and others.
Noise contours	29 total <ul style="list-style-type: none"> <li>▪ 13 completed in the last decade</li> <li>▪ 10 older noise contours or planning (1990s–2013)</li> <li>▪ 3 did not</li> </ul> Note: these figures differ from information compiled from a review of existing airport Master Plan Updates and Airport Layout Plans as described in this footnote. <sup>9</sup>
Sustainability plans with energy conservation goals	<ul style="list-style-type: none"> <li>▪ 20 sustainability plan or sustainability component of airport master plan</li> <li>▪ 5 energy conservation goal</li> </ul>
Financial sustainability measures	Unknown - survey did not explicitly address

*Source: Cascadia Consulting Group, 2024*

Survey respondents also reported the sustainability actions shown in Table 2-2. Note: the majority of airports responded “No,” or did not respond to the survey questions on sustainability-related topics.

<sup>9</sup> Kimley-Horn, the prime consultant, reviewed the existing Master Plan Updates (MPUs) and Airport Layout Plans (ALPs) compiled to support aviation system planning. According to their analysis, 22 airports developed noise contours in their MPU/ALP updates, and 2 airports conducted separate Part 150 studies. Of those 24 airports, 9 had noise contours developed in 2013-present, and 15 airports had older noise contours (up to 2012). 33 airports did not have a MPU or ALP available, and noise contours were not developed as part of the MPU/ALP process for 74 airports.

**Table 2-2: Reported Airport Sustainability Actions**

Reported Action	Number of Airports
Applied for a WSDOT Sustainable Aviation Grant	<ul style="list-style-type: none"> <li>17</li> </ul>
Onsite energy generation sources	<ul style="list-style-type: none"> <li>5</li> </ul>
Considered renewable energy sources or uses during planning efforts, with solar being the most common	<ul style="list-style-type: none"> <li>33</li> </ul>
Provide or plan to provide sustainable aviation fuel (SAF) at the airport	<ul style="list-style-type: none"> <li>1 provides SAF</li> <li>10 plan to provide SAF</li> </ul>
Plan to provide EV integration for GSE	<ul style="list-style-type: none"> <li>15</li> <li>Note that GSE is typically associated with commercial passenger or air cargo activities; some survey respondents from smaller airports that do not have these activities may be using the term more broadly for other airport equipment</li> </ul>
Planning to provide charging infrastructure for private EVs in the future	<ul style="list-style-type: none"> <li>31</li> </ul>
Considered extreme weather or future climate change resiliency in their planning efforts	<ul style="list-style-type: none"> <li>28</li> </ul>
Implemented energy efficiency measures for lighting	<ul style="list-style-type: none"> <li>46</li> </ul>
Water efficiency measures	<ul style="list-style-type: none"> <li>9 for buildings or fixtures</li> <li>5 for aircraft or vehicle washing</li> <li>16 for Irrigation or landscaping</li> </ul>

Source: Cascadia Consulting Group, 2024

## 2.2. Sustainability Examples at Selected Washington Airports

Larger airports typically have more resources to develop more extensive sustainability plans. For example, SEA prepared an extensive Sustainable Airport Master Plan (SAMP) that includes the elements of an airport master plan and is integrated with sustainability goals and objectives supporting the Port of Seattle’s goal to be the “greenest and most energy-efficient airport” (and seaport) in North America.<sup>10</sup> The SAMP identifies a long-term vision and 30 near-term projects to meet passenger and cargo demand, comply with FAA standards, improve operational efficiency, provide additional fuel capacity, and meet its SAF initiative. Sustainability efforts include minimizing impacts to neighbors, passengers, business partners, and habitat; reducing impervious surfaces and the need for stormwater infrastructure; energy and water conservation; renewable energy; and energy-efficient transportation, equipment electrification, and renewable fuel initiatives.<sup>11</sup>

Renton Municipal Airport (RNT) participated in FAA’s Sustainable Master Plan Pilot Program. RNT adopted an Airport Sustainability Management Plan (SMP) in 2012 and has more recently been working to update its Airport Master Plan to align future improvements with the SMP and update its approach to financial stability, operational efficiency, natural resource conservation, and social responsibility. The airport reduced operating costs and environmental impacts by replacing sewer pipes and stormwater infrastructure on airport grounds, reducing deicer use, upgrading to more fuel-efficient mowing equipment, and renovating other physical infrastructure to improve efficiency.<sup>12</sup>

Other examples of airport sustainability in Washington include Arlington Municipal Airport (AWO) obtaining a grant to place solar panels on its airport office building. Additionally, the Port of Bellingham set goals and targets for reducing greenhouse gas (GHG) emissions and increasing resilience to climate change and has identified multiple strategies and actions to help reach those goals. The Port of Bellingham purchases its energy from solar and wind sources.<sup>13</sup> Bellingham International Airport (BLI) added EV charging stations.<sup>14</sup> The airport’s master plan also calls for replacing airfield lighting with LEDs, developing solar energy systems, and converting GSE to electric equipment.<sup>15</sup> At Seattle Paine Field International Airport (PAE, formerly known as Snohomish County Airport), Snohomish County and Washington State University (WSU) are jointly establishing a SAF Research and Development Center. PAE and SEA have also earned Salmon-Safe certifications for maintaining water quality and natural habitat.

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<sup>10</sup> Port of Seattle, “The Green Guide to Sustainable Travel,” accessed September 2023. [www.portseattle.org/blog/green-guide-sustainable-travel](http://www.portseattle.org/blog/green-guide-sustainable-travel)

<sup>11</sup> Seattle–Tacoma International Airport, Sustainable Airport Master Plan (SAMP), accessed September 2023. [www.portseattle.org/plans/sustainable-airport-master-plan-samp](http://www.portseattle.org/plans/sustainable-airport-master-plan-samp)

<sup>12</sup> Transportation Research Board, *ACRP Synthesis 66 – Lessons Learned from Airport Sustainability Plans*.

<sup>13</sup> Port of Bellingham, “Port Switching to 100% Wind and Solar Energy.” [www.portofbellingham.com/CivicAlerts.aspx?AID=272](http://www.portofbellingham.com/CivicAlerts.aspx?AID=272)

<sup>14</sup> Port of Bellingham, “Bellingham Airport Installs Electric Vehicle Charging Stations for Travelers, Employees.” [www.portofbellingham.com/CivicAlerts.aspx?AID=285](http://www.portofbellingham.com/CivicAlerts.aspx?AID=285)

<sup>15</sup> Bellingham International Airport, “Bellingham International Airport: Master Plan Presentation,” August 2018. [www.portofbellingham.com/DocumentCenter/View/7836/BLI-Master-Plan-Summary-Sept-4](http://www.portofbellingham.com/DocumentCenter/View/7836/BLI-Master-Plan-Summary-Sept-4)

### 2.3. WSDOT Aviation Sustainability Working Group

WSDOT established an Aviation Sustainability Working Group with representatives of airports around the state including Arlington (AWO), Auburn (S50), Bellingham (BLI), Bremerton (PWT), Chehalis (CLS), Colville (63S), Kelso (KLS), Kittitas County (ELN), Moses Lake (MWH), Olympia (OLY), Othello (S70), Shelton (SHN), Skagit County (BVS), Snohomish (PAE), and Yakima (YKM) volunteering to participate in this vital effort. The purpose of the working group is to provide input on the Statewide Aviation Sustainability Plan.

In the Working Group's two workshops, held in May 2023 and May 2024, participating airport managers expressed interest in efforts that support each airport's sustainable operations and raised concerns about costly or labor-intensive activities. Budgets and staffing are limited, with some smaller airports relying on volunteers to maintain operations. Some airport managers have adopted waste management solutions like waste diversion and recycling, and others expressed concern about more involved and potentially costly projects like replacing runway lights with LEDs and upgrading existing fleets to electric vehicles. AWO is finalizing a field of solar panels for their airport, joining a wave of airports dedicating unused land to energy creation.<sup>16</sup> Many airports currently offer community days, which can highlight the importance of airports as connectors of communities and strengthen relationships. Airports also provide internships and mentorship to local students, inspiring youth to join the aviation industry.

Airports expressed the need for state support and more funding for sustainability planning and implementation. They noted that basic airport functions and infrastructure, such as runway pavement, must be addressed first. State and federal funding levels are insufficient to meet current airport needs, including addressing sustainability efforts.

Sustainability measures that are feasible and appropriate for smaller airports with limited budgets and staffing are needed, and this Plan offers a range of options for airports to consider and tailor to their own needs and opportunities for advancing airport sustainability. See **Chapter 3** for information on the types of airport sustainability planning efforts, **Chapter 4** for information on sustainability planning steps, and **Appendix A** for a menu of recommended sustainability strategies and actions to consider.

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<sup>16</sup> Arlington Municipal Airport, "Arlington Airport Commission Meeting" April 9, 2024.

## Chapter 3. Types of Airport Sustainability Planning Efforts

Airport sustainability planning involves identifying opportunities to implement sustainable practices that reduce the airport’s environmental impact, improve efficiency, and contribute to a more sustainable future. Implementing sustainability is not intended to be done in a single step or in a rigid manner; instead, it provides airports with the flexibility needed to determine which approach will be the most suitable given their characteristics, current needs, and opportunities.

The FAA recognizes two main planning approaches for airport sustainability: **Airport Sustainability Plans** (standalone sustainability-specific plans, sometimes called Sustainable Management Plans) and **Sustainable Airport Master Plans** (also known as airport master plans, that integrate sustainability goals and strategies into long-term overall airport planning). Additionally, some airports undertake sustainability activities as needed without an overarching plan; these “ad hoc” efforts are another way to advance airport sustainability. This chapter summarizes these three main pathways for incorporating sustainability into airport processes:

- Standalone Airport Sustainability Plans (**Section 3.1**)
- Sustainability in Airport Master Plans (**Section 3.2**)
- Ad Hoc Airport Sustainability Efforts (**Section 3.3**)

Airports are encouraged to consider the two main approaches (standalone or integrated into master planning) to see which better aligns with the airport’s existing conditions, plans, opportunities, and available resources. **Appendix B** includes links to examples and the advantages and disadvantages of each approach. The approaches can also be applied interchangeably. For example, if an airport is starting a master plan update, it would be appropriate to include sustainability; a standalone sustainability plan could be added later for more specific details and implementation plans. If the airport recently completed its master plan update, starting with a standalone sustainability plan would make sense. Ad hoc initiatives can help address short-term needs and opportunities but do not take the place of a complete sustainability plan. Airports should consider how sustainability planning fits with their existing plans and related goals, objectives, and policies, in addition to compliance with federal, state, and local regulations. The literature review research supporting this work includes examples of airport sustainability planning ranging from national guidance to individual airport sustainability plans.

### 3.1. Standalone Airport Sustainability Plans

Airport Sustainability Plans, also called SMPs, are standalone documents focused on sustainability measures for an airport. An airport sustainability plan typically incorporates baseline assessments of environmental resources and community outreach to identify sustainability objectives that will reduce environmental impacts, realize economic benefits, and improve community relations. Airport sustainability plans can clearly and cohesively highlight an airport’s dedication to advancing sustainability projects.

Although such sustainability plans are prepared independently of other airport plans and projects, these plans should consider the objectives and priorities stated in other planning documents and



be coordinated with different approaches to ensure that the airport's overall strategy is supported. This approach to planning ensures that sustainability receives a significant focus and does not become lost in competing priorities. Sustainability plans can be scaled to suit airports of all sizes and types.

This approach to sustainability planning is the focus of this Statewide Aviation Sustainability Plan and will guide airports in planning and implementing standalone sustainability plans. The approaches and strategies this Plan covers can also be adapted for other planning efforts, such as integrating sustainability into overall airport master planning.

### 3.2. Sustainability in Airport Master Plans

Airport master plans that incorporate sustainability may be called Sustainable Airport Master Plans or Sustainable Master Plans or sustainability elements may be included under the general umbrella term of an airport master plan. Such plans represent a comprehensive approach to planning for the near-term, intermediate, and long-term aviation demands and needs of an airport, users, and community. Elements include existing conditions, aviation forecasts, facility requirements and plans, alternatives analysis, environmental considerations, financial feasibility, and public involvement. Master planning can integrate sustainability and incorporate initiatives and strategies such as preferred development alternatives. Regarding this approach to airport sustainability planning, FAA's *Report on the Sustainable Master Plan Pilot Program and Lessons Learned* stated:

*Despite the challenges, integrating sustainability into a master plan affords more opportunities to align sustainability and planning. Airports that chose to prepare a Sustainable Master Plan were pleased with their decision. With one document to work from, it was easier for airport management and consultants to marry needed development with sustainability initiatives.<sup>17</sup>*

Within this planning approach, airports can incorporate sustainability into an airport master plan with a focused sustainability chapter; sustainability can be integrated throughout other elements, or a hybrid approach can weave sustainability into different topics and include some sustainability-specific sections.

Including a sustainability-specific chapter in the master plan allows airports to have an entire section dedicated to outlining the airport's sustainability plan, existing conditions, previous efforts, and upcoming projects. This approach can provide a streamlined and centralized way to summarize the airport's sustainability goals. A challenge of this approach may be that other sections of the master plan—such as alternatives analysis, facilities planning, and financial analysis—may not sufficiently consider sustainability unless explicit efforts are made.

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<sup>17</sup>Federal Aviation Administration, *Report on the Sustainable Master Plan Pilot Program and Lessons Learned*, 2012.  
[www.faa.gov/sites/faa.gov/files/airports/environmental/sustainability/SustainableMasterPlanPilotProgramLessonsLearned.pdf](http://www.faa.gov/sites/faa.gov/files/airports/environmental/sustainability/SustainableMasterPlanPilotProgramLessonsLearned.pdf)

Another approach is to weave the airport’s goals, objectives, and strategies for sustainability throughout all chapters of the master plan (not just the environmental considerations). This approach involves discussing sustainability-related topics in multiple locations throughout the airport master plan. This approach can be highly effective for ensuring that sustainability is considered in all significant airport decisions. However, its less structured system can make it more challenging to identify and focus on top priorities for implementation. Of the master plans reviewed during its pilot program, the FAA found “those that intersperse sustainability throughout the document are more effective than ones that devote a chapter to the topic.”<sup>18</sup>

This Plan focuses on the standalone sustainability planning approach (as described in **Section 3.1**), though the general approaches could be applied to integrating sustainability into an overall airport master plan update.

### 3.3. Ad Hoc Airport Sustainability Efforts

Not all sustainability planning and implementation at airports occurs through significant planning efforts. Some airports conduct sustainability initiatives as needed, on a case-by-case basis, or as opportunities arise during other airport activities. For instance, if an airport determines that its taxiway lighting needs to be updated, it may evaluate the financial and environmental benefits and costs of installing new LED lighting compared to other replacement options. Sustainability opportunities in paving airfield infrastructure may also be considered by airports as they evaluate the benefits and costs of projects. These include, but are not limited to, using permeable pavement or considering the lifecycle impacts of concrete vs. asphalt in paving decisions.

This “ad hoc” approach can be helpful for airports with limited capacity, time, and budget to develop and implement complete sustainability plans but are still interested in making sustainable choices in their daily operations where applicable. Identifying the “low-hanging fruit” can help airports to get started and build momentum. Such efforts can address short-term needs and opportunities while the airport develops a more complete sustainability plan.

In summary, airports can use a variety of planning structures such as standalone plans (**Section 3.1**) or master plans (**Section 3.2**), and various models and frameworks, such as EONS (**Figure 1-1**) or operational areas (**Figure 1-2**) to guide their sustainability planning efforts. These structured approaches focus efforts to identify and implement sustainable practices within an airport and the most beneficial areas to maximize the effectiveness of sustainability strategies. Even a simple plan for airport sustainability can yield improved results through baseline data, consistent metrics, and alignment with airport goals. **23** offers a step-by-step, scalable approach to airport sustainability planning that can be “right sized” to support meaningful improvements at smaller commercial service and GA airports.

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<sup>18</sup> Federal Aviation Administration, *Report on the Sustainable Master Plan Pilot Program and Lessons Learned*, 2012.  
[www.faa.gov/sites/faa.gov/files/airports/environmental/sustainability/SustainableMasterPlanPilotProgramLessonsLearned.pdf](http://www.faa.gov/sites/faa.gov/files/airports/environmental/sustainability/SustainableMasterPlanPilotProgramLessonsLearned.pdf)

## Chapter 4. Sustainability Planning Steps

Sustainability planning and implementation is not one-size-fits-all; each airport is unique in size, geographic location, climate, types of flight operations, and the needs of the community, tenants, and other stakeholders. Planning processes take time. Clear processes help planners stay focused. Designating one person responsible for planning may be sufficient for very small airports. For larger airports, collaboration between the people leading, the people participating in, and those impacted by the planning process is critical to its success.

Overall, airport sustainability can take many forms, such as:

- Implementing energy-efficient lighting and HVAC (heating, ventilation, and air conditioning) systems,
- Using electric or hybrid vehicles for airport operations,
- Installing renewable energy production assets (e.g., solar, biodigester),
- Installing energy storage solutions to enhance reliability and resilience,
- Evaluating lifecycle costs of potential projects,
- Reducing waste through recycling and composting programs,
- Supporting public transit for ground transportation,
- Conserving water through low-flow fixtures and landscaping,
- Engaging with neighbors to address concerns and share benefits,
- Training employees on efficiency and safety practices and
- Partnering with local businesses.

At a minimum, all airports should designate a sustainability lead, develop a sustainability plan, collect baseline data, and ensure compliance with all mandates, e.g., SWPPP, hazardous waste management, and noise mitigation. These minimum actions are included in the Administration, Leadership, and Workforce operational areas of **Appendix A**.

Table F-1, previously shown in the Foreword of this report, shows planning steps to help airports identify, evaluate, select, implement, track, and communicate their sustainability efforts effectively throughout the planning and implementation process.

**Table F-1: Planning Steps and Activities with Corresponding Chapter and Section**

Planning Step	Planning Activity	Chapter & Section
1	Draft Sustainability Vision & Mission Statements	▶ 4.1
2	Identify Desired Sustainability Outcomes & Goals	▶ 4.2
3	Engage Stakeholders	▶ 4.3
4	Establish Plan Scope and Structure	▶ 4.4
5	Conduct a Baseline Assessment	▶ 4.5
6	Select Strategies & Actions, Finalize Plan	▶ 4.6
7	Implement, Evaluate, and Communicate Progress	▶ 4.7

*Source: Cascadia Consulting Group, 2024*

The appendices provide tools to assist airports in planning and implementation.

## 4.1. Step 1: Draft Sustainability Vision and Mission

A sustainability vision and mission that reflect an organization’s current conditions (baseline), aspirations, and community can help guide organizational goals, decisions, and actions. This section describes the development of a definition of sustainability, a vision, and a mission. Airport planners may opt to begin with Step 3 to form a sustainability planning team, including external partners and community members, to ensure partner and community perspectives are integrated into the definition, vision, and mission. Alternatively, very small airports may have one individual who will develop the definition, vision, and mission, or adopt them from the examples included in **Table 4-1** or resources included in **Appendix C**. Whether accomplished with a team or one individual, Step 1 is foundational to developing a sustainability plan.

Crafting a sustainability vision and mission works best when the process begins by reviewing sustainability principles, considering the context, identifying related words and phrases, and developing a sustainability definition. Additional helpful steps include assessing the organization’s current approach to sustainability and the baseline conditions, conducting research on sustainability policies and practices of peer organizations, and soliciting input from partners.

The term sustainability can suggest different meanings to different audiences; accordingly, defining what sustainability means to the specific airport is important. Having a clear idea of what sustainability means to the organization will help justify the plan, inform and engage staff and partners on sustainability, and set direction for the planning process and goals. Each airport operator is encouraged to define sustainability in a way that appropriately reflects the particular circumstances and roles within their community.

Creating a customized definition of sustainability will vary by airport, depending on the size, capacity, and functions of the airport. The National Cooperative Highway Research Program

(NCHRP) *Guidebook for Sustainability Performance Measures for Transportation Agencies* guides how to develop a sustainability definition using the following steps:<sup>19</sup>

1. Review Sustainability Principles
2. Consider the Context
3. Identify Goal-Related Keywords/Phrases
4. Develop Sustainability Definition

Follow the step-by-step approach in this section to guide a planning group or sustainability team, including stakeholders (**Table 4-8** includes a description of a sustainability team). More information about identifying stakeholders is included in Step 3.

### 4.1.1. Review Sustainability Principles

The first step is to familiarize the planning group with principles of sustainability. **Appendix A** provides sample overarching sustainability goals, strategies, and actions for airport operational areas. Reviewing this content when considering sustainability principles and definitions for use in developing a plan may be helpful. **Table 4-1** provides examples of sustainability definitions in everyday use. Once these various resources are reviewed, discuss if elements of the definitions surprised the group. Did the definitions challenge anyone's preconceptions on sustainability? Are there fundamental principles missing?

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<sup>19</sup> National Cooperative Highway Research Program, *A Guidebook for Sustainability Performance Measures for Transportation Agencies*, Rept. 708, Washington, DC: Transportation Research Board, 2011.

**Table 4-1: Examples of Sustainability Definitions**

Sustainability Definitions	Agency
“Development that meets the needs of the present without comprising the ability of future generations to meet their own needs.”	Brundtland Commission 1983
“To create and maintain conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic, and other requirements of present and future generations.”	National Environmental Policy Act (NEPA)
“A holistic approach to managing an airport so as to ensure the integrity of the Economic viability, Operational efficiency, Natural resource management, and Social responsibility (EONS) of the Airport.”	Airports Council International–North America
“Sustainability is about making decisions that meet our needs today without compromising the ability to meet our needs, and future generation’s needs, in the future. It is more than just ‘being green.’ It means planning ahead and thinking holistically about the social, economic, environmental, and operational elements of business at the Airport.”	Tampa International Airport Sustainability Management Plan
<p>“Sustainability entails meeting human needs for the present and future while:</p> <ul style="list-style-type: none"> <li>▪ Preserving and restoring environmental and ecological systems</li> <li>▪ Fostering community health and vitality</li> <li>▪ Promoting economic development and prosperity</li> <li>▪ Ensuring equity between and among population groups and over generations.”</li> </ul>	NCHRP Report 708

*Sources: Brundtland Commission, NEPA, ACI-NA, Tampa International Airport, and NCHRP, 2011*

### 4.1.2. Consider the Context

When developing a sustainability plan for an airport, it is crucial to consider the context of the airport, including its environmental impact and particular challenges. Context questions to answer in developing a sustainability definition include the following:

- What is the function of the airport?
- What are some of the challenges faced by the airport?
- Who are the airport stakeholders?

By addressing the airport’s location, size, and operations, the sustainability plan can be tailored to address specific concerns and opportunities. This integrated approach ensures that the plan is effective and aligned with the airport’s goals and objectives.

### 4.1.3. Identify Related Keywords and Phrases

Once the planning group has a shared understanding of sustainability and the context of the airport, the next step is to identify sustainability-focused keywords and phrases. The group can begin with brainstorming an extensive and wide-ranging list. After all the brainstormed words are listed, the group can select the preferred keywords and themes, which will be used to help create the airport’s customized sustainability definition. **Figure 4-1** shows examples of sustainability keywords to help with brainstorming (also called ideation).

**Figure 4-1: Examples of Sustainability Keywords and Themes to Guide Brainstorming**



Source: Cascadia Consulting Group, 2024

### 4.1.4. Develop Sustainability Definition

Next the planning team will draw on its work in the three previous steps to develop the airport’s sustainability definition. An approach to the definition is to state the airport’s understanding of *what* sustainability is and *how* the airport intends to apply those concepts of sustainability.

NCHRP Report 708 provides the example definition:

*“The [organization] pursues sustainability by providing a multimodal transportation system for all citizens while working with local and regional stakeholders to promote accessibility for all, to support economic development, and to protect the environment for current and future generations.”*

Considering the example statement above, **Table 4-2** shows the “how” and “what” elements that combine to create the sustainability definition.

**Table 4-2: Sustainability Definition Elements in NCHRP Example**

Who	<u>How</u> to apply the concepts of sustainability	<u>What</u> sustainability is in the airport’s understanding
The [airport]...	“pursues sustainability by providing a multimodal transportation system for all citizens while working with local and regional stakeholders...”	“...to promote accessibility for all, to support economic development, and to protect the environment for current and future generations.”

Source: NCHRP Report 708, 2011

### 4.1.5. Setting the Vision

With a clear, common definition of sustainability, the group is prepared to set a sustainability vision. The vision will provide a shared understanding of the airport’s path forward. A vision statement works best when it is inspiring, energizing, and forward-looking. Vision statements are often called a “north star” and can be applied in decision-making, internal and external communications, and policy-setting.

The planning team can discuss what sustainability success looks like at the airport. Elements to consider are how future operations are functioning, the financial health of the airport, what the employee experience looks like, and how the community interacts with the airport. The examples of sustainability visions in **Table 4-3** can help with idea generation or may be adopted as appropriate.

**Table 4-3: Sustainability Vision Examples**

Vision Example	Agency
We strive to be one of the greenest and most energy-efficient ports in North America.	<a href="#"><u>SEA</u></a>
Our vision is to have an informed workforce and engaged business partners that deliver a well-planned, accessible, and world-class airport experience for our customers. Further, we demonstrate our environmental responsibility to our community as we strive to enhance local, regional, and national economic benefits from the Phoenix airports.	<a href="#"><u>Phoenix Aviation Department</u></a>
Our Green Vision is to Celebrate environmentally sustainable decisions, strengthen local partnerships with other governments and community organizations, and to share good community relations.	<a href="#"><u>Greater Orlando Aviation Authority</u></a>

Sources: Seattle-Tacoma International Airport, Massport, Phoenix Aviation Department, and Greater Orlando Aviation Authority



### 4.1.6. Developing the Sustainability Mission Statement

A sustainability mission statement focuses on the present and defines purpose. When crafting a sustainability mission statement, airports should consider their approach to achieving sustainability goals.

**Table 4-4** provides examples of a sustainability mission statement from other aviation organizations for reference and consideration.

**Table 4-4: Airport Sustainability Mission Statement Examples**

Airport Sustainability Statement Examples	Agency
To sustain the heartbeat of the Mid-South by cherishing its resources to ensure Music City keeps flying high.	<a href="#">Metropolitan Nashville Airport Authority</a>
DEN is committed to strategically considering the long-term economic, social, and environmental impacts of all airport activities in order to maximize long-term benefits and ensure that our success strengthens our community stakeholders.	<a href="#">Denver International Airport</a>

*Sources: Denver International Airport and Metropolitan Nashville Airport Authority, 2020*

Once completed, the sustainability lead or planning group should share the airport’s sustainability vision and mission broadly with stakeholders. This step will be unique to each airport based on stakeholder relationships and involvement. See Step 3 for additional guidance.

## 4.2. Step 2: Identify Desired Sustainability Outcomes and Goals

Clear goals help planners stay focused on achieving desired outcomes. Whether one person is responsible for goal setting, or the process is a collaboration, goal setting is critical to success. Before launching a planning process, it is helpful to establish the rationale for a sustainability plan and the airport’s desired outcomes and goals. Consider questions such as the following:

- Why are you undertaking the development of a sustainability plan?
- What do you want to accomplish in the sustainability planning process?
- How do you want to use the sustainability plan?
- What do you define as “success”? What changes are desired in five, 10, or 20 years?

Airport planners may reference strategies and actions in **Appendix A** to inform planning outcomes and goals and to tailor their planning process to achieve those desired outcomes. **Table 4-5** provides examples of outcomes and goals for each EONS area.

**Table 4-5: EONS Outcomes and Goal Examples**

EONS Planning Outcomes	Sustainability Goal Examples*
<b>Economic viability</b> , i.e., growth and employment	<ul style="list-style-type: none"> <li>▪ Support employment opportunities and professional development.</li> <li>▪ Conserve resources and reduce operational costs over time.</li> </ul>
<b>Operational efficiency</b> , i.e., ensure integrity of operations while achieving goals	<ul style="list-style-type: none"> <li>▪ Modernize infrastructure.</li> <li>▪ Reduce vehicle congestion.</li> <li>▪ Reduce emissions.</li> </ul>
<b>Natural resource management</b> , i.e., conserve, protect, and/or restore resources	<ul style="list-style-type: none"> <li>▪ Protect habitats and public health.</li> <li>▪ Minimize emissions, air pollution, and waste.</li> <li>▪ Maximize efficiency and resilience.</li> </ul>
<b>Social responsibility</b> , i.e., support social progress and vulnerable communities	<ul style="list-style-type: none"> <li>▪ Reduce emissions and other negative impacts on the surrounding community.</li> <li>▪ Support tenants.</li> <li>▪ Improve public health.</li> </ul>

*Source: Cascadia Consulting Group, 2024*

*\*Note: these are abbreviated goal examples. The complete versions are shown in Appendix A as Overarching Sustainability Goals in each operational area.*

How planning occurs is as important as the content of a sustainability plan. The process is often iterative; airports can revisit their goals, based on stakeholder input, to reflect changes and ensure the desired outcomes are accurate and achievable. Plans that involve key stakeholders early and often are typically implemented more efficiently and effectively over time, bringing long-term cost savings to the overall effort. Often, an iterative process of engagement and goal and strategy refinement is necessary—and most effective. More information about stakeholder engagement is included in Step 3.

### 4.3. Step 3: Engage Stakeholders

The success of a sustainability plan’s development and implementation relies on stakeholder involvement, both internal and external. An internal champion can take the lead on sustainability efforts, including implementation, but successful sustainability planning comes from engaging with more than one person. Engaging with and building agreement across multiple perspectives can help craft an informed, actionable, and well-supported sustainability plan.

## The Importance of Stakeholder Engagement

Stakeholder engagement is critical to the success of any planning effort and should be conducted at various touchpoints throughout the process. For example, it is never too early to notify and involve people who have expressed interest in airport operations about the planning effort, goals, and desired outcomes. Many airports have relationships with community members, other organizations and agencies, and tenants. A simple and informative conversation early or at any step in the process will go a long way toward building buy-in for sustainability strategies and actions. Each airport is unique and should tailor engagement to support its stakeholder relationships, expectations, and ongoing needs and interests.

Airports may opt to develop a stakeholder engagement plan or, less formally, consider the steps described in this section when developing their approach to working with stakeholders. Very small airports may simply conduct conversations with key interested parties throughout the planning process to confirm plan direction and content. Whether working with a large stakeholder group, one-on-one with key individuals, or both, this section provides guidance on identifying, engaging, and communicating with stakeholders as a part of the sustainability planning process.

## Stakeholder Engagement Case Study

The Venice Municipal Airport, a GA facility on Florida's Gulf Coast, was perceived by the community as "fenced off," too noisy, and causing a reduction in property values. The Airport Director held public meetings, developed airport tours, and offered local groups use of the airport's meeting rooms. In public meetings and educational events, the Airport Director focused on sharing how the airport has shaped the community, provided important economic and emergency services, and has let community groups use the facilities for meetings and events. The Airport Director also listened to neighbors' concerns about noise, which led to capital improvements that addressed needs of both the airport and the community. While some airport staff have expressed that community engagement is beyond their skills or available time, the Venice Municipal Airport encourages airport staff to learn the history of the airport and proactively share how the airport benefits the community. (FDOT, 2017)

### 4.3.1. Stakeholder Identification

It is recommended that airports involve stakeholders early and often. Take time at the start of the planning process to identify people and organizations to involve—both internal and external. Ask questions such as the following, considering individuals or groups for each:

- Who is most affected by sustainability strategies or lack of sustainability strategies?
- Who has the most power in deciding how sustainability strategies are implemented?
- Who is usually at the table for airport decisions? Who is usually missing from the table?
- Who has experience in, knowledge about, and/or a commitment to the EONS sustainability focus areas, and/or each airport operational area?
- Who would benefit from being aware of why the planning effort is occurring and any potential impacts it might have?
- Are diverse experiences and perspectives represented in this stakeholder list?

In addition to considering the questions above, airports may find it helpful to categorize stakeholders by potential impacts or to identify disproportionately high or adverse human and environmental health effects (see the [Tacoma Narrows Airport Plan](#), p. 5-13, for an example), thereby ensuring representation of different perspectives. **Table 4-6** shows categories of potential stakeholders for the sustainability planning process.

**Table 4-6: Potential Stakeholder Categories by Impact Type**

Job Responsibility <sup>1</sup>	Livelihood <sup>2</sup>	Other <sup>3</sup>
Airport management	Airport and nearby businesses	Airport boards
Airport staff	Community members	Building inspectors
Airport tenants	Passengers	Chambers of commerce
Airport volunteers		Contractors
FAA and WSDOT Aviation		County and city employees
		County commissioners
		Environmental experts
		Flying clubs
		Local schools
		Local tribes <sup>4</sup>
		Local utilities
		Sustainability organizations
		Transportation departments

Source: Cascadia Consulting Group, 2024

Notes: (1) Sustainability planning and implementation affects the person or group's ability to meet job responsibilities and/or performance of their company, organization, or department. (2) Sustainability planning and implementation affects the person or group's livelihood and/or wellbeing. (3) Other partners and subject matter experts. (4) Local tribes should be engaged in the process. However, as sovereign nations, they are not stakeholders and should be engaged as independent government entities.

### 4.3.2. Stakeholder Roles

Different stakeholders have distinct roles in a sustainability planning process. Some will be extremely active and help guide many steps of the plan, while others will simply read updates and communications about the plan. Planning for stakeholder engagement early will help the airport define roles and stay connected with stakeholders throughout the process.<sup>20</sup>

The International Association for Public Participation (IAP2) created a spectrum of public participation shown in **Table 4-7** to assist with determining level of participation for various stakeholders in any engagement process. As the spectrum indicates, airports may use a variety of engagement strategies depending on the intent and appropriate level for each stakeholder. For example, stakeholders with key roles in sustainability implementation will likely need to collaborate on the plan and be empowered to carry out specific tasks once the plan is completed. Other stakeholders may need to be informed or consulted about the plan through emails or periodic progress reports. Airports may use this spectrum to determine the capacity and resources needed to engage with various stakeholders successfully.

**Table 4-7: Stakeholder Engagement Spectrum**

Inform	Consult	Involve	Collaborate	Empower
Provide balanced, objective information to the public and stakeholders. There is no expectation of a feedback loop.	Gather input and share if/how input was used in decision making.	Work directly with the public and stakeholders to reflect their concerns and goals throughout a process. Share how input was used in decision making.	Partner with the public and stakeholders throughout the process, seeking and incorporating their advice and ideas as much as possible. Share how input was used in decision making and influenced the final result.	The public or stakeholders are the final decision makers and are partners throughout the process. What they decide is what is implemented.

*Source: Adapted from International Association for Public Participation (iap2.org) by Cascadia Consulting Group, 2024  
 Note: The public or stakeholders have increasing impact on the decision as you move left to right along the spectrum.*

Another strategy for considering and determining stakeholder roles and responsibilities is shown in **Table 4-8**, adapted from the Sustainable Aviation Guidance Alliance (SAGA) *Sustainable Aviation Resource Guide*. Planners can use these roles to consider what might work best in the context of their airport. Some stakeholders may have more than one role throughout plan development and implementation.

<sup>20</sup> AirTAP University of Minnesota, “Five Ways to Proactively Engage Stakeholders with Your Airport Projects,” January 2021.

**Table 4-8: Potential Roles for Planning and Implementation**

Role	Responsibility	Potential Participants
Sustainability Team	<p>A Sustainability Team can support the airport in developing a sustainability plan by providing direct input and expertise, leading the plan development processes, and working together to set the direction and goals of the plan. The Sustainability Team can help with elements like stakeholder engagement, public presentations, and research.</p> <p>Once a small sustainability planning team has been recruited, schedule a kick-off session to start defining and envisioning sustainability for the airport. Building a diverse sustainability team will support effective integration of sustainable practices.</p>	<ul style="list-style-type: none"> <li>▪ Airport departments</li> <li>▪ Community groups</li> <li>▪ Sustainability experts</li> <li>▪ Consultants</li> <li>▪ Tenants</li> </ul>
Champion(s) and Community	<p>An internal Champion(s) leads the development of the sustainability plan and works to ensure that it addresses sustainability issues across the breadth of the airport’s management practices and operations. The Champion(s) also oversees the implementation of sustainability strategies and is ultimately accountable for the success of the program.</p> <p>Community represents people whose livelihoods and/or wellbeing could be affected by airport sustainability planning and implementation. <i>Note: community members may not have time or ability to participate in meetings but still should have the opportunity to participate in the process.</i></p> <p>For both Champion(s) and Community, it is advised that the responsibilities not be added to an existing position without consideration of whether the appropriate time can be dedicated to the program or if other resources are needed.</p>	<ul style="list-style-type: none"> <li>▪ Sustainability coordinator</li> <li>▪ Environmental manager</li> <li>▪ Facilities manager</li> <li>▪ Airport planner</li> <li>▪ Local volunteers</li> <li>▪ Community groups</li> </ul>

Role	Responsibility	Potential Participants
Advisory Council	An Advisory Council can provide input to the Champion(s) in establishing priorities that are consistent with the airport's goals and aligned with its overall business strategy. The Advisory Council can review progress on sustainability performance, identify recommendations to the Champion(s) on activities to enhance the program further, and identify opportunities for collaboration with external partners.	<ul style="list-style-type: none"> <li>▪ City managers</li> <li>▪ Community groups</li> <li>▪ Consultants</li> <li>▪ Board of Airport Commissioners</li> <li>▪ Aviation industry leaders</li> </ul>
Steering Committee	A Steering Committee can oversee ongoing implementation once a plan is in place, including synchronizing across multiple strategies within the sustainability program. Because much of an organization's internal sustainability performance improvement will be achieved through the work of multiple departments, the Steering Committee works to streamline resources and facilitate cross-departmental coordination.	<ul style="list-style-type: none"> <li>▪ Airport departments</li> <li>▪ Airport tenants</li> <li>▪ Consultants</li> <li>▪ City departments</li> </ul>
Implementation Teams	Implementation Teams may be formed for each focus area or grouping of strategies and will include staff at various levels from different departments. The Implementation Teams can be assembled for a specified duration (typically several months) to achieve sustainability actions. The results of each team will be shared with the Steering Committee for oversight.	<ul style="list-style-type: none"> <li>▪ Airport departments</li> <li>▪ Consultants</li> <li>▪ Tenants</li> </ul>

Source: Adapted from Sustainable Aviation Guidance Alliance (SAGA), *Sustainable Aviation Resource Guide*, 2015

### 4.3.3. Step-by-Step Engagement Guide

The timing of engagement with various stakeholders throughout the process depends on each airport's capacity and needs and should be "right-sized" accordingly. **Table 4-9** shows the engagement actions and intent for each planning step described in this document, including recommended approaches to engagement regardless of the order in which an airport decides to go through the planning steps. In other words, the engagement actions and intent apply whether an airport is beginning with Step 1 or 5, for example, and each is critical for a successful planning process.

Reporting back to inform stakeholders about if and how their input has been incorporated into the plan, and why that decision was made, builds trust with stakeholders and is critical for ongoing collaboration and cooperation as the airport implements sustainability efforts. For

example, [Huntington Tri-State Airport](#) utilized their sustainability working group to help guide project initiatives and keep stakeholders engaged. Ultimately, communication should result in stakeholders who are well-informed about sustainability considerations, decisions, roles and responsibilities, and ongoing involvement.

**Table 4-9: Step-by-Step Engagement Actions and Intent**

Planning Step	Engagement Actions and Intent
Step 1: Draft Sustainability Vision and Mission Statements	<ul style="list-style-type: none"> <li>▪ Solicit input on vision and mission either during development or once draft is completed.</li> <li>▪ Report back on whether and how input was incorporated.</li> </ul>
Step 2: Identify Desired Sustainability Outcomes and Goals	<ul style="list-style-type: none"> <li>▪ Collaborate with stakeholders to identify outcomes and goals, or solicit input once identified.</li> <li>▪ Report back on whether and how input was incorporated.</li> </ul>
Step 3: Engage Stakeholders	<ul style="list-style-type: none"> <li>▪ Share and discuss the stakeholder engagement plan or list of stakeholders with another decision maker to ensure inclusion and appropriateness of engagement approach.</li> </ul>
Step 4: Establish Plan Scope and Structure	<ul style="list-style-type: none"> <li>▪ Solicit input to identify other planning efforts.</li> <li>▪ Coordinate with stakeholders involved in other planning efforts to ensure consistent approaches, and collaborate and leverage, as appropriate.</li> </ul>
Step 5: Conduct a Baseline Assessment	<ul style="list-style-type: none"> <li>▪ Communicate clearly about data needed for the planning effort, including why metrics are needed and how they will be used.</li> <li>▪ Request assistance with data collection, as appropriate.</li> <li>▪ Share final baseline assessment so everyone is similarly informed.</li> </ul>
Step 6: Select Strategies and Actions; Finalize Plan	<ul style="list-style-type: none"> <li>▪ Gather ideas for strategies and actions via workshops, 1-on-1 conversations, surveys, etc.</li> <li>▪ Review, incorporate additions and changes, and approve final list of strategies and actions for inclusion in the plan.</li> <li>▪ Thank all stakeholders for their input and participation in plan development.</li> <li>▪ Share final plan to inform all stakeholders.</li> </ul>
Step 7: Implement, Evaluate, and Communicate Progress	<ul style="list-style-type: none"> <li>▪ Clearly communicate and assign responsibilities to implementers.</li> <li>▪ Check-in with implementers periodically to ensure progress on tasks and re-engage as necessary.</li> <li>▪ Problem-solve with others to address challenges as they arise.</li> <li>▪ Share progress. Celebrate success.</li> </ul>

Source: Cascadia Consulting Group, 2024



## 4.4. Step 4: Establish Plan Scope and Structure

Questions to address in launching an airport sustainability planning process include how extensive the plan should be and how it should be structured. The answers to these questions vary with the particular needs and context of each airport. Each airport needs to decide the scope and structure of their own sustainability plan, though similar core elements should be included.

“Right-sizing” the scope of the airport sustainability plan involves considering the resources (including funding, staff, consultants, and facilities), constraints, opportunities, stakeholders, airport functions, and impacts. Effective plans balance aspiration and reality—meaning they both spur excitement and support tangible progress on actions that yield measurable improvements. The baseline assessment, described in Step 5, can help inform the needs and opportunities to prioritize in selecting strategies and actions (Step 6) and determine the scope and structure of the plan.

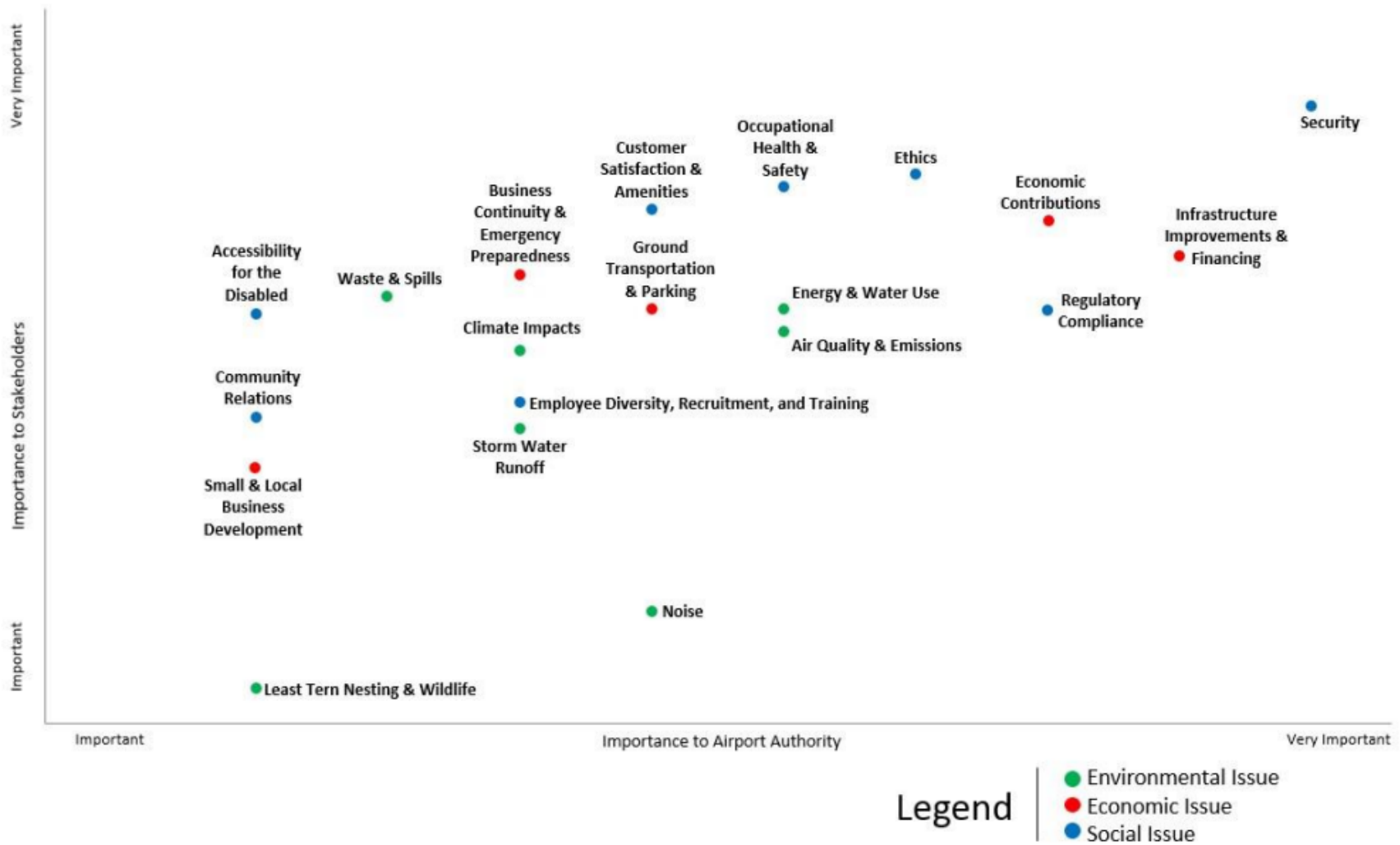
As noted in the beginning of this chapter, all airports should, at a minimum, designate a sustainability lead, develop a sustainability plan, collect baseline data, and ensure compliance with all mandates, e.g., SWPPP, hazardous waste management, and noise mitigation. These minimum actions are included in the Administration, Leadership, and Workforce operational area of **Appendix A**.

These questions and considerations may help:

- **Is the airport currently compliant with all environmental and noise rules and regulations?** Meeting minimum standards or actions may be the most appropriate scope for the sustainability plan, at least initially.
- **Will the airport develop a standalone sustainability plan or integrate sustainability into an existing master planning effort?** An existing plan or effort may impact structure and scope for sustainability planning. See [Chapter 3](#) for a description of and considerations for each.
- **What are the airport’s greatest environmental and community risks?** For example, what are the largest GHG emissions sources, sources of water and/or air pollution, and/or impacts on public health? Identifying these areas may help focus the plan’s scope and structure. Some larger airports prepare a materiality assessment, which is a stakeholder-informed assessment of the environmental, economic, and social risks to the airport. See **Figure 4-2** for an example from the San Diego County Regional Airport Authority and **Appendix C** for resources to conduct a materiality assessment.
- **What is the current or planned staff capacity and budget for planning and implementation once the plan is completed?** Determining the capabilities of the airport to act and make reasonable progress toward desired outcomes and goals is a critical consideration in plan development.
- **What needs and opportunities emerged from the baseline assessment (Step 5)?** Is there already momentum toward sustainability that the airport can capitalize on, or areas that are lagging and require investments and attention? Return to this question once the baseline assessment is completed to ensure the data support the plan scope and structure.

Airports that are very resource-constrained may still engage in sustainability planning and implementation. Several actions, shown in **Appendix A**, require limited time and resources. Look for those indicated as Low level of effort / expertise in the tables, and those indicated as Significant in Economic Viability (shown in the “E” of the EONS columns), indicating greater potential return on investment. Even the smallest operations with one or very few staff can make incremental investments and progress toward more sustainable operations.

Figure 4-2: Materiality Assessment Example



Source: San Diego County Regional Airport Authority [Sustainability & DEI Report](#) (p. 62), 2022-2023

### 4.4.1. Sustainability Plan Structure

The structure of the sustainability plan represents the organization and key areas the airport decides to address. Once determined, all strategies and actions will fit within this structure.

Airports can customize their own sustainability plan structure, though it is recommended to consider the following elements and approaches:

- Use operational areas or functional areas of the airport such as building, facility, and airside operations. **Appendix A** describes eight operational areas and lists recommended strategies and actions for each.
- Use the EONS framework, with Economic Viability, Operational Efficiency, Natural Resource Management, and Social Responsibility each serving as a sustainability focus area. Examples throughout this planning document and in **Appendix A** apply this approach.
- Use a structure specific to the airport’s own sustainability definition and vision. These may be, for example, reducing GHG emissions, health risks, or environmental impacts. See **Appendix A** for a list of strategies and select those that most closely align.
- Use a sustainability structure that aligns with existing tools or frameworks that the airport is already using. For example, Dallas Fort Worth International Airport (DFW) uses an environmental, social, and governance (ESG) framework for its sustainability focus areas.
- Use level of effort assessments in **Appendix A** to determine “low hanging fruit”, or actions requiring the minimum level of effort and expertise. Low level actions may be most appropriate and accessible for very resource-constrained airports with minimal staff capacity.

### 4.4.2. Integrate Sustainability with Other Planning

Integration with other planning efforts is critical so that no plans are created in a vacuum. The airport should identify relevant airport documents, regulations, and external agencies when developing a sustainability plan. They should consider how the sustainability plan can integrate with other airport plans, existing environmental permits and plans such as SWPPPs and other waste minimization and pollution prevent plans, as well as with other agencies to advance mutual goals. **Figure 4-3** illustrates examples of related planning efforts.

- **Airport Master Plans.** As noted in **Chapter 3, Types of Airport Sustainability Planning Efforts**, sustainability plans can be interwoven into airport master plans by incorporating a standalone chapter, integrating sustainability efforts throughout, or both.
- **Airport Layout Plans (ALPs).** These plans provide useful information for sustainability planning on existing and planned facility development and land use.
- **Strategic Plans.** If available, airport strategic plans may address community connections, organizational health, operational direction, and economic development. Aligning with an

airport’s strategic plan (if available and applicable) when developing the sustainability plan can help strengthen sustainability efforts.

- **Airport Business Planning.** If available, airport business plans may include specific actions that support airport financial performance and can help inform sustainability planning, particularly the focus areas of economic viability and operational efficiency.
- **Capital Improvement Programs (CIP) and Grant Management Plans.** These plans address the financial health and future of the airport’s operations. Integrating sustainability strategies into the CIP and/or identifying projects that have sustainability components can help airports apply for federal and state funding.
- **National Environmental Policy Act (NEPA) studies.** If available, environmental studies, from a Categorical Exclusion (CATEX) to an Environmental Assessment (EA) or an Environmental Impact Statement (EIS) can provide information on factors to address in sustainability planning.
- **Local Government Plans and Initiatives.** Local cities, counties, and regional agencies may have requirements for airports to meet and opportunities to support sustainability strategies.
- **National Initiatives and Grants.** FAA, USEPA, and other federal agencies may have grant funding opportunities (including under the Bipartisan Infrastructure Law) that can support airport sustainability efforts.<sup>21</sup>

**Figure 4-3: Examples of Other Airport Planning Efforts that Relate to Sustainability Planning**



Source: Adapted from literature review research and FDOT, 2017, by Cascadia Consulting Group, 2024

<sup>21</sup> Adapted from Florida Department of Transportation, *Airport Sustainability Guidance*, 2017.

### Local, State, and Regional Sustainability Collaboration

In addition to aligning the sustainability plan with other airport plans, it can be helpful to consider how the sustainability plan can relate to local, regional, and even national sustainability initiatives. SAGA notes that such collaboration can help the airport “broaden the overall perspective of their program, pool resources and expertise, receive guidance, and capture and share information that may assist in decision-making regarding the selection of sustainability activities.” SAGA recommends airports consider working with groups like local businesses, local and national sustainability groups, related industries, regional transportation organizations, and local planning organizations to amplify sustainability initiatives.

#### 4.5. Step 5: Conduct a Baseline Assessment

A baseline assessment of existing data is intended to identify the airport’s current status, historical trends, and strengths and weaknesses. Accordingly, the baseline assessment will help inform the selection and refinement of strategies, actions, and metrics for tracking progress. The scope of the baseline assessment can be tailored to fit the airport’s specific needs, context, and capacity. The assessment can be conducted iteratively, beginning with a high-level overview, and then delving more deeply into specific data areas where needed. The goal of the baseline assessment is to understand the airport’s current conditions and needs.

It is recommended that the airport identify and assess data that aligns with the structure of the plan determined in Step 4. (See **Section 4.1** for guiding questions about how to structure the sustainability plan, and **Appendix A** for example organizational structure, overarching goals, strategies and actions that may help determine the most appropriate data for the baseline assessment.) Note that in many cases, preparing a GHG emissions inventory provides much of the baseline data needed for sustainability. If conducting a GHG inventory is not feasible, beginning to track the data that goes into a GHG inventory (e.g., energy consumption, waste generation) is a lower effort option.

Communication is an integral part of data collection and evaluation efforts—including *why* metrics are needed and *how* they will be used. Airports should plan sufficient time, both for conducting the data collection and for the communication regarding data collection. Planning the data collection and analysis will support both the success of the baseline assessment and the resulting sustainability plan. Data collection can be time-consuming and prone to scope creep, so clarifying roles, responsibilities, and timelines at the start is helpful.

Airport planners can consider the following questions in planning the baseline assessment:

- **What data are available to the airport?** Taking time to inventory the data already available to the airport is a useful first step. What are sources for additional data needs?
- **What existing performance measure processes does the airport have?** Can sustainability measures be integrated with or supported by this process? Staff time and capacity is often a barrier to data tracking and measurement. If possible, create efficiencies by using or improving the performance measure processes already used at the airport and consider creating a central data center.
- **What year(s) will the baseline be for?** Answering this will help provide clarity to staff collecting data. The most recent year for which complete data are available is preferred; often, this may be one or two years prior. Some airports may like to choose a “round” year such as 2020, a time prior to the COVID-19 pandemic (2019), or a time period after the COVID-19 pandemic that reflects the “new normal” of operations (2023) may be preferred. If available, trend data for several prior years (e.g., 2010, 2015, and 2020) may be included, though such an effort may not be worthwhile if older data are not readily available from the same source or conditions have changed drastically that make a comparison less valuable (e.g., COVID-19 pandemic, airport expansion). That said, if data is normalized to account for year-over-year differences (e.g., measuring energy use per conditioned square foot instead of total energy use), gathering trend data over several years is feasible.
- **How much data needs to be collected and analyzed, and how soon?** Data collection and analysis can involve substantial time and effort. Answering these questions early in the process will help the airport set realistic expectations without over-extending resources and staff time.
- **Are there external sustainability performance measure requirements?** Airports can use their sustainability plan as a way to track and support any *required* sustainability efforts, for example, stormwater pollution prevention, hazardous waste minimization, or noise reduction. What near-term and long-term sustainability measures are required by local, state, and federal groups like Washington state, FAA, or USEPA?
- **Who can help with data collection?** What staff members (or consultants) are available who have the knowledge and time to contribute? Are there local experts that could assist? Can interns, students, or volunteers help collect data?

Next, identify the data sources and collect data for the baseline assessment. The data will lay the foundation for the sustainability plan’s performance measures. Most data will be internal to the airport, including its utility bills, operational records, and costs. External sources may also provide useful information. **Table 4-10** provides examples of data sources and analytical tools for the baseline assessment.

**Table 4-10: Potential Sources and Resources for Baseline Data and Analysis**

Potential Data Sources & Tools	Types of Information
Existing airport plans and NEPA reports	Existing airport plans addressing financial and operational factors may include data on land use, emissions, operating costs, vehicles, facilities, and other topics. Existing airport NEPA studies may involve relevant information, including in the “Integration with Other Planning” sections.
ACRP Report 154	ACRP’s <a href="#">end use water audit tool</a> can help calculate water efficiency and gallons used per day. It draws on water data regarding restrooms, food service, landscaping, maintenance, cooling, and other airport activities.
<a href="#">LEED</a>	LEED (Leadership in Energy and Environmental Design) provides rating systems and scorecards that can be used to assess facilities and identify baseline measures for airport buildings, such as lighting and energy use intensity. Similar rating systems, such as Living Building Challenge, could also be considered.
<a href="#">Envision</a>	Envision is a framework administered by the Institute for Sustainable Infrastructure (ISI) that includes a rating system designed to help infrastructure stakeholders implement more sustainable, resilient, and equitable projects. ISI also engages with airports through the Envision and Airports Working Group and offers an Envision AIRO Guide providing guidance on applying the framework on airport capital projects.
<a href="#">U.S. Census Bureau</a>	Census data provides information about the communities surrounding the airport. Types of data include employment rates, population, race and ethnicity, languages, education, household income, and more.
ACRP Report 43	ACRP’s <i>Guidebook of Practices for Improving Environmental Performance at Small Airports</i> includes many definitions, potential measurements, and actions for air quality, emergency planning, noise, planning and development, waste management, water resources, and environmental stewardship.
ACRP Report 11	ACRP’s <i>Guidebook on Preparing Greenhouse Gas Emissions Inventories</i> shares formulas and tools specific to airports regarding greenhouse gas emissions (GHGs). <a href="#">U.S. Department of Transportation</a> offers updated calculators and resources for GHG inventories and climate action planning, an element of sustainability planning.

Source: Cascadia Consulting Group, 2024

Step 7 includes more information about data tracking and evaluation, as well as examples of key performance indicators for measuring airport sustainability.



## 4.6. Step 6: Select Strategies and Actions, Finalize Plan

In this stage, the work to date is integrated to develop a tangible sustainability plan. After conducting research, defining the sustainability definition, vision, and mission, identifying and working with stakeholders, establishing desired outcomes and goals, determining the scope and structure for the plan, and developing a baseline assessment, the airport is ready to determine what steps they will take to move towards a more sustainable system. For the purposes of sustainability planning, “strategy” is defined as a group of actions, and “actions” further detail specific activities that, once implemented, will lead toward measurable outcomes. As strategies and actions are developed, it is important that airports continue to work with stakeholders to select items that meet the needs of both the airport and the greater community. Rather than completing the ideation process, small, resource-constrained airports may opt to select actions for their plan from **Appendix A**, focusing on those that require the lowest level of effort and investment.

### 4.6.1. Idea Generation

This step is a time for generating a range of ideas. Have stakeholders brainstorm ways to achieve the desired outcomes and goals outlined so far in the sustainability plan. At this point, it is helpful to avoid putting restrictions on the type of strategies and actions that can be brainstormed by stakeholders. Stifling creativity too early with benefit/cost analysis and decision making might leave great ideas unshared. Even if strategy ideas are ideated that are too big for the airport, these ideas could lead to discussion around what could be possible, or what other ways the airport might achieve a similar outcome. There will be plenty of time to narrow, refine, and decide on strategies and actions in the steps ahead.

To develop the first list of ideas, reach out to stakeholders in individual conversations or in groups by hosting workshops. The following are some prompts that can be used to help ideate:

- For each desired outcome: What could the airport do to achieve this?
- How could the airport improve efficiency and decrease costs?
- What types of activities would benefit the well-being of the surrounding community and airport employees?
- What sustainability strategies and actions are other organizations taking that might be beneficial for the airport to take?

Again, do not worry about brainstorming “too many” strategies and actions. Just focus on generating ideas for every desired outcome outlined in the sustainability plan so far. For example, Tampa International Airport started with over 425 actions, and through reviewing, distilling, and screening, they ended up with 36 actions identified for implementation (FDOT, 2017).

## 4.6.2. Exploring a Tiered Approach

Airports can select actions that involve varying levels of effort, cost, time, and impact. Starting with the “low-hanging fruit” often provides a path to launch the action and can help build momentum based on achieving initial success and benefits. Use the following questions to help brainstorm actions of different sizes to create a tiered approach to sustainability planning.

A tiered approach means developing a range of different strategies and actions that have varying levels of effort, cost, time, and impact. This helps the airport customize their sustainability plan to meet their needs and capacity. To assist with developing a tiered approach, **Appendix A** indicates the level of effort needed to implement each action.

- 1) How could we work towards achieving this desired outcome or goal with our day-to-day actions? (e.g. turning off unused electronics, printing double sided, changing the thermostat by a couple of degrees)
- 2) How could we change current processes or systems to achieve this goal?
- 3) If we had unlimited resources, how would we achieve this goal?
- 4) What could we achieve with very limited resources and staff capacity?

This document includes several helpful resources for airports to use when generating ideas for potential strategies and actions and selecting those most appropriate for their unique needs.

- **Appendix A: Recommended Sustainability Strategies and Actions** is organized into eight operational areas: administration, leadership, and workforce; buildings and facility operations; community; construction and planning; fleet vehicles and equipment; ground transportation and parking; tenant operations; and wildlife and open areas. Each operational area includes an overarching sustainability goal and recommended strategies and actions. **Appendices C, D, E, and F** provide information and resources to support the funding, planning, implementation, and measurement of these strategies and actions. Action tables also include assessed level of effort and alignment with EONS. Airports can use these strategies, actions, and assessments to structure and guide their sustainability planning efforts.
- **Airport examples.** Airports using this document are encouraged to consider the included examples throughout to help generate ideas for potential actions, assess feasibility, and then determine specific actions appropriate for their airport. Many examples are from larger airports due to the greater availability of their public sustainability plans, research, and reporting. For Regional and GA airports, scaling efforts to fit the needs, resources, and opportunities of the specific airport is essential.

### 4.6.3. Benefit/Cost Analysis

Strategies and actions need to be appropriately sized for the airport’s fiscal and labor capacity. After the idea generation stage, conducting a benefit/cost analysis will help the airport begin to winnow the list down.

The cost equation uses the following variables to estimate the financial benefit of an action: current annual cost, implementation cost, future annual cost, and annual cost difference (FDOT, 2017). The calculation of current and future costs should consider the same variables and may include capital costs, operating costs, or other costs. For example, if maintenance costs are part of current costs, they should also be included in future cost calculations. Future costs should also account for net present value (NPV) and use a discount rate when being calculated. Future costs may be lower than current costs, indicating a cost savings, or greater than current costs, indicating a net cost; in both cases, there may be additional benefits or dis-benefits from implementation (see subsequent co-benefits information).

- $\text{Current Annual Cost} - \text{Future Annual Cost Calculated with NPV and Discount Rate} = \text{Annual Cost Difference}$ <sup>22</sup>
- $\text{Implementation Cost} / \text{Annual Cost Difference} = \text{Years Until Monetary Benefit (i.e., Payback Period)}$ <sup>23</sup>

When developing a benefit/cost analysis, considering other pieces of the overall picture, not just those easily quantified, can be beneficial too. For each strategy, consider:

- Recurring benefits of the action. Examples include lower overhead, improved stakeholder perception, and a safer working environment.
- Lifespan of the action. How often will it need to be revisited or reinstalled? For example, if the airport is installing LED lights, how long will they last, compared to the current light fixtures?
- Labor cost reductions. How will labor increase or decrease with this action? For example, electric vehicles generally require less maintenance over their lifetimes than their gas- and diesel-fueled counterparts.

By using the equation and questions above, airports will have a realistic idea of how long it will take to recoup the initial investment and weigh that against the other benefits and dis-benefits of an action. When assessing the benefit/cost analysis of sustainability measures, airports should also consider co-benefits, or additional, positive qualitative outcomes. These traditionally qualitative co-benefits can help put the overall cost of implementing sustainability strategies and actions in context—and reduce the perception of cost as a barrier.

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<sup>22</sup> If the difference is positive, it is a cost savings. If the difference is negative, it is a cost. All cost calculations should consider the same variables (e.g., operating cost, capital cost) to provide an equivalent comparison.

<sup>23</sup> If the annual cost difference is negative, there is no monetary benefit. However, there may be other reasons to pursue the action (see the subsequent co-benefits information).

Co-benefits include but are not limited to improvements to:

- Community support
- Efficiency
- Environmental qualities like biodiversity, air quality, and water quality
- Customer satisfaction
- Employee and customer experience
- Workforce development and green jobs
- Noise complaints
- Regulatory compliance

It is important to note that, increasingly, qualitative co-benefits can also be quantified, albeit with more effort. For example, there are direct costs associated with poor stakeholder perceptions, such as the time and money needed to repair and manage those relationships. These costs can often be greater than the costs of proactive and effective engagement. Similarly, unsafe working conditions lead to expensive Labor and Industries claims and healthcare costs.

Airports may look to available literature for quantifiable metrics associated with co-benefits such as improved public health, natural disaster response, economic value of green jobs, ecosystem services, morale, and well-being.<sup>24</sup> Conversely, the costs of inaction to public health, the economy, the environment, and communities are increasingly available in the literature. For example, if an air quality investment is a net cost to the airport over time (based solely on a calculation of labor costs, maintenance costs, and capital costs), the health consequences and costs of continued poor quality can be considered in the investment decision to give a fuller picture of costs and benefits.

#### 4.6.4. Review, Approve, and Add Strategies and Actions to the Sustainability Plan

Airports should share and receive feedback on the finalized list of strategies and actions before moving to the next step. Refer back to Step 3 to review identified stakeholders and their defined roles. Airports should communicate with and seek approval from all stakeholders connected with the actions identified up to this point. Once the list is approved, add each action to the appropriate strategy row in **Template 1: Action Selection Template (Appendix E)**.

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<sup>24</sup> This information is not yet well-synthesized for easy access and use, but targeted literature reviews can be completed at relatively low effort by individuals or organizations with an intermediate understanding of climate science and impacts. If a targeted literature review is not an option, the 5<sup>th</sup> National Climate Assessment chapters on [Human Health](#), [Economics](#), [Risks to Supply Chains](#), and the Pacific [Northwest](#) offer a starting point.

### 4.6.5. Finalize and Communicate the Sustainability Plan

Sustainability plans are never truly final. Requirements and expectations will continue to change with increasing focus on reducing emissions, modernizing technology, data collection, and sustainability reporting. Updates should also reflect internal changes such as available funding and resources, leadership and stakeholder expectations, as well as new understanding and progress that impact goals, strategies, and actions. Airports may decide to update their plans annually or every several years to refresh sustainability actions and associated investments accordingly.

The sustainability plan, once completed and ready for implementation, should be shared with all staff and stakeholders who participated in its development or will play a role in its implementation. Consider also sharing information about the plan with stakeholders who will be impacted or benefit from implementation. Posting the plan on the airport website may be the most accessible method for sharing.

## 4.7. Step 7: Implement, Evaluate, and Communicate Progress

Plan implementation requires assigning responsibility for each action to ensure the plan is executed and goals are achieved, and developing a timeline that is reasonable given available staff capacity and resources for accomplishing each action. Communicating periodically with responsible staff will be important to keep implementation on track toward achieving desired outcomes and sustainability goals. Airports may encounter barriers during implementation. Engaging with stakeholders or a sustainability team may help problem-solve as challenges arise.

For very small airports it is critical to “right-size” the plan to the available staff capacity and resources. Committing and making progress on low-level actions still leads to measurable progress on sustainability.

### 4.7.1. Data Tracking and Evaluation

As airports implement their sustainability plan, data tracking and evaluation of the performance measures (see **Appendix D**) gathered and analyzed during the baseline assessment can help inform and guide future sustainability actions. Tracking and comparing to baseline data allows airports to check their progress towards sustainability goals, re-evaluate, and revise the sustainability plan to meet evolving needs. Tracking and communicating progress on sustainability can help with:

- Encouraging broad participation by stakeholders
- Evaluating sustainability tradeoffs
- Meeting or anticipating new requirements
- Finding programmatic barriers

Airports should determine the most appropriate and suitable processes for tracking and evaluating progress based on their size, available resources, existing systems, other initiatives, and internal and external interests. A good starting place is to identify existing key performance indicators (KPIs) and metrics that are already measured and are applicable to desired sustainability outcomes and goals. Energy, water, and waste are often already tracked and regularly reported. Other KPI examples are included in **Appendix D**.

Airports may elect to use the EONS framework as a structure for gathering baseline data and KPIs to measure, monitor, and report, as shown in **Table 4-11**.

**Table 4-11: Potential Baseline Data and KPIs, Organized by EONS Pillar**

<p><b>Economic Viability</b></p> <ul style="list-style-type: none"> <li>▪ Total revenue</li> <li>▪ Operating costs</li> <li>▪ Financial assistance and grants received</li> <li>▪ Number of passengers or enplanements</li> <li>▪ Employee wages</li> <li>▪ Employee benefits</li> <li>▪ Aircraft operations</li> </ul>	<p><b>Operational Efficiency</b></p> <ul style="list-style-type: none"> <li>▪ Percentage of materials sourced that meet environmental standards (e.g., local, low toxicity, recycled content)</li> <li>▪ Waste diverted from the landfill</li> <li>▪ Mitigation actions achieved</li> <li>▪ Plans or projects with sustainability elements</li> <li>▪ Available modes of transportation including transit, biking, or ridesharing</li> </ul>
<p><b>Natural Resource Management</b></p> <ul style="list-style-type: none"> <li>▪ Energy intensity per square foot</li> <li>▪ Energy consumed annually</li> <li>▪ Greenhouse gas emissions</li> <li>▪ Area of land restored, or habitat protected</li> <li>▪ Water use annually</li> <li>▪ Amount of non-permeable and permeable pavement</li> <li>▪ Air quality levels</li> </ul>	<p><b>Social Responsibility</b></p> <ul style="list-style-type: none"> <li>▪ Total outreach activities</li> <li>▪ Number of noise complaints</li> <li>▪ Socially responsible financial investments</li> <li>▪ Workforce demographics</li> <li>▪ Employee trainings</li> <li>▪ Formal partnerships</li> <li>▪ Stakeholders engaged</li> </ul>

Source: Cascadia Consulting Group, 2024

The Colorado Department of Transportation (CDOT) and the Florida Department of Transportation (FDOT) each have their own reporting scheme, creating pathways for understanding and revising airport sustainability plans. CDOT follows a plan called “Plan. Do. Check. Act,” which continuously checks and adapts strategies to continue improving sustainability performance.<sup>25</sup> These processes should also be measured through a matrix to score the airport on its ability to meet sustainability goals. FDOT suggests creating multiple monitoring systems,

<sup>25</sup> Colorado Department of Transportation General Aviation Airport Sustainability Tool Kit, User’s Manual, 2016 and Florida Department of Transportation Airport Sustainability Guidebook, 2017

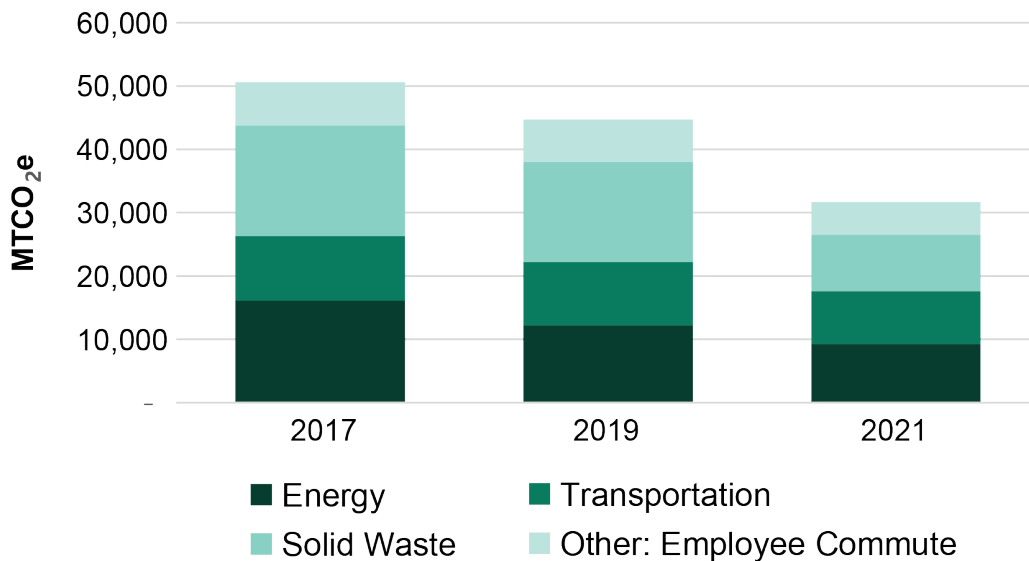
with varying complexity and documentation based on the size and budget of the airport creating the monitoring system.

Many larger commercial airports in Washington state have policy or stakeholder requirements to publish their sustainability performance. While these public reporting requirements may not currently apply to small airports, measuring and documenting standardized sustainability metrics is a growing trend that is driven in part by heightened stakeholder expectations, increasing regulatory requirements, and enhanced transparency.

**Figure 4-4, Figure 4-5, and Table 4-12** show examples of reporting on GHG emissions reductions at two-year intervals. Graphs and charts like these can be shared with stakeholders to indicate progress toward meeting targets, goals, and outcomes over time. Other operational performance indicators pertinent to airports include the following. Data can be gathered and shared, showing either month-to-month or annual changes.

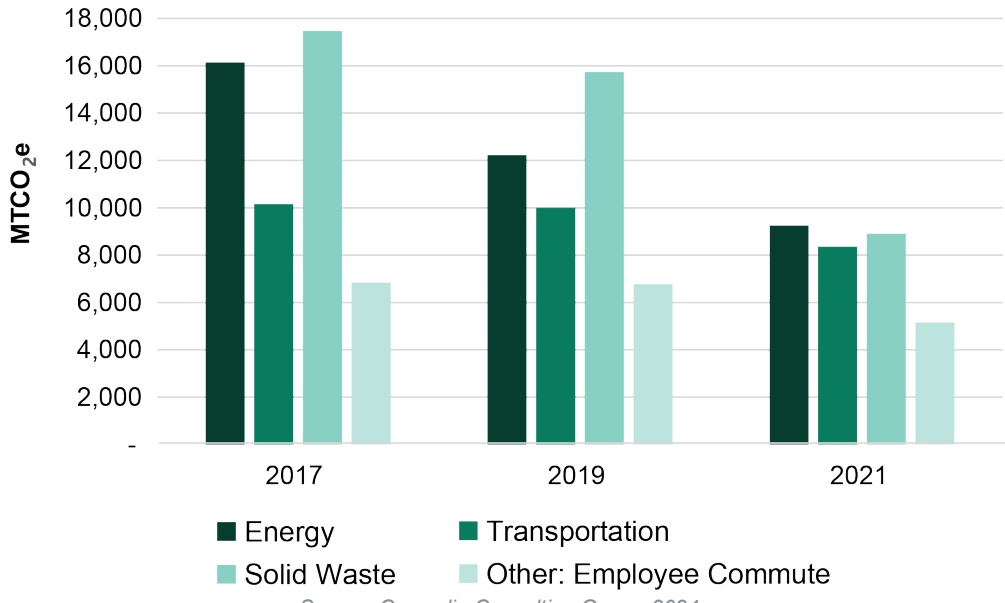
- Electricity use per facility square footage.
- Pounds of waste sent to landfill per employee.
- Gallons of water consumed per employee per day.
- Wildlife strikes per aircraft movement.

**Figure 4-4: Example Total GHG Emissions for 2017, 2019, and 2021**



Source: Cascadia Consulting Group, 2024

**Figure 4-5: GHG Emissions by Source for 2017, 2019, and 2021**





**Table 4-12: Total GHG Emissions by Emission Source, Sub-source, and Year**

Source	2017	2019	2021
<b>Energy</b>	<b>16,130</b>	<b>12,225</b>	<b>9,254</b>
Electricity	785	521	1,264
Natural Gas	13,278	10,821	7,925
Other Fuels	2,067	883	64
<b>Transportation</b>	<b>10,157</b>	<b>9,993</b>	<b>8,358</b>
Fleet Vehicles	5,383	5,143	4,496
<i>On-Road</i>	4,724	4,443	3,974
<i>Off-Road</i>	659	701	522
Transit Vehicles	4,774	4,850	3,862
<i>Fixed Route Bus</i>	3,906	4,068	3,347
<i>Paratransit Bus</i>	811	746	494
<i>Support Vehicles</i>	58	36	21
<b>Water and Wastewater</b>	<b>29</b>	<b>29</b>	<b>28</b>
<b>Solid Waste</b>	<b>17,474</b>	<b>15,736</b>	<b>8,912</b>
Landfills	14,688	12,911	6,888
Scope 3 Waste Generation	2,786	2,825	2,024
<b>Other: Employee Commutes</b>	<b>6,845</b>	<b>6,773</b>	<b>5,159</b>
<b>TOTAL</b>	<b>50,635</b>	<b>44,756</b>	<b>31,712</b>

Source: Cascadia Consulting Group, 2024

**Appendix D** includes additional KPIs, links to examples and information, and a sample worksheet for tracking airport data.

### 4.7.2. Communicating Progress

Communicating progress is critical for all types of stakeholders, whether to keep them engaged or to inform them that implementation is underway. When expectations are not met, progress review is important for problem-solving conversations and provides opportunity to revisit the plan and re-engage the community and partners. Successful implementation provides opportunity for celebration. Communication tools can vary from motivational announcements to more in-depth

meetings. Whatever form or frequency each airport uses, communication is a foundational part of sustainability planning, tracking, and implementation.

## Chapter 5. Funding and Grant Opportunities

Sustainability is a priority of both the federal government and the state of Washington. Sustainability initiatives range in cost, with some strategies or actions costing more than some airports can handle on their own budget. Federal and state programs are designed to fill the gap for airports looking to fund refurbishments and improvements that are sustainable and address sustainability. Multiple programs are available to large and small airports to apply for funding. Furthermore, for airports that will look to vendors to support implementation of sustainability initiatives, performance-based contracting can help ensure progress toward sustainability goals. [McKinsey & Company](#) notes that performance-based contracts “define metrics and acceptable quality levels as part of the scope of work and establish a clear governance structure for reporting and monitoring continuous improvement.”

**Table 5-1** (page 58) provides a summary of the following grant programs.

### 5.1.1. Federal Funding

#### 5.1.1.1. Airport Improvement Program (AIP)

The federal government offers several different grant programs for airport improvements. The Airport Improvement Program (AIP) offers grants for large and small airports for a number of improvements, including replacing lights with LEDs, building greener buildings, developing solar arrays, conducting sustainability plans, conducting energy assessments, and developing new noise maps. According to the FAA, the program is geared towards helping airports enhance airport safety, capacity, security, and environmental concerns.<sup>26</sup> Any public airport that is part of the NPIAS is eligible to apply for AIP funding. Examples of airports that received or anticipate receiving AIP funding for sustainability-related projects include:

- McGhee Tyson Airport (TYS) anticipates receiving \$2,000,000 to acquire three zero emissions vehicles (ZEV) and three charging stations.
- SEA anticipates receiving \$900,000 to conduct an energy efficiency assessment for a Decarbonization and Resiliency Analysis of the Central Mechanical Plant.<sup>27</sup>
- Drake Field (FYV) received \$189,450 to conduct an airport-related environmental assessment, plan, or study.<sup>28</sup>

<sup>26</sup> FAA, “Airport Improvement Program (AIP),” accessed June 2024. <https://www.faa.gov/airports/aip>

<sup>27</sup> FAA, “FY-2022 Supplemental Appropriation, Airport Improvement Program Anticipated Grants,” accessed July 2024. <https://www.faa.gov/sites/faa.gov/files/Announced-FY2022-Supplemental-NOFO-Discretionary-Selections-v3.pdf>

<sup>28</sup> FAA, “FY-2023 FAA Airport Improvement Program Grant Detail Report,” accessed June 2024. <https://www.faa.gov/sites/faa.gov/files/2023-10/FY2023-AIP-grants.pdf>

### 5.1.1.2. Voluntary Airport Low Emissions (VALE) Program

The VALE program helps airports comply with their state air quality responsibilities under the federal Clean Air Act and make investments in sustainability.<sup>29</sup> To be eligible, an airport must be a commercial service airport in a non-attainment or maintenance area for one of the National Ambient Air Quality Standards (NAAQS). Through VALE, an airport can use AIP or Passenger Facility Charges (PFCs) to invest in air quality and sustainability improvements such as low-emissions vehicles, refueling and recharging stations, and gate electrification. Examples of airports that have used VALE include:

- Spokane International Airport (GEG) received \$2.5 million for ground power units (GPUs) and pre-conditioned air (PCA) units.<sup>30</sup>
- Boise Airport (BOI) received multiple awards to install GPUs and PCA units.<sup>31</sup>

### 5.1.1.3. Airport Zero Emissions Vehicle and Infrastructure Pilot Program

The Airport Zero Emissions Vehicle and Infrastructure Pilot Program is a grant program created by the FAA in 2012 to secure new electric vehicles for airports using AIP funding. The program is open to all NPIAS airports, including those in the state of Washington, and provides funds for electric vehicle adoption, and the building of electric vehicle infrastructure, such as charging stations.<sup>32</sup> Examples of recent grant awards include:

- John Wayne Airport (SNA) purchased an electric bus and electric bus charger.
- Cherry Capital Airport (TVC) purchased two flatbed vehicles and installed 2 vehicle charging units.

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<sup>29</sup> FAA, "Voluntary Airport Low Emissions Program (VALE)," accessed June 2024. <https://www.faa.gov/airports/environmental/vale>

<sup>30</sup> Spokane Regional Clean Air Agency, "On the Air: Spring/Summer 2015," accessed June 2024. <https://spokaneairports.net/core/files/spokaneairports/uploads/files/VALE.pdf>

<sup>31</sup> FAA, "VALE Program Grant Summary: Fiscal Year (FY) 2005-2023," accessed June 2024. <https://www.faa.gov/sites/faa.gov/files/vale-grant-summary-2005-2023.pdf>

<sup>32</sup> FAA, "Airport Zero Emissions Vehicle and Infrastructure Pilot Program," accessed June 2024. [https://www.faa.gov/airports/environmental/zero\\_emissions\\_vehicles](https://www.faa.gov/airports/environmental/zero_emissions_vehicles)

#### 5.1.1.4. Bipartisan Infrastructure Law (BIL) Airport Infrastructure Grants

The BIL provides \$15 billion over several years for investments in airport infrastructure, \$5 billion for airport terminals, and \$5 billion for air traffic facilities. Eligible projects in these funding programs include those for runways, taxiways, terminal projects, airport-transit connections, roadway projects, and other safety and sustainability efforts. Funding is for airport-related projects as defined under the existing AIP grant and PFC criteria. The Airport Terminal Program (ATP) program utilizes an application process and criteria used to evaluate potential projects for selection emphasize greater sustainability, increasing accessibility, and serving smaller communities, in addition to providing a better passenger experience, expanding capacity, and improving safety. Examples of airports that have used BIL funding for sustainability projects include:

- SEA received \$10M to modernize restrooms to be Americans with Disabilities Act (ADA) compliant. Additional updates include low-flow fixtures and refillable water bottle stations, energy efficient lighting and three service-animal relief areas.<sup>33</sup>
- Idaho Falls Regional Airport (IDA) received \$5,200,000 to fund a portion of a project to expand the ticketing, bag screening, hold rooms, passenger exiting, and restroom areas of the terminal, including updating and consolidating the mechanical, electrical, and plumbing systems to substantially improve the energy efficiency and resiliency of the terminal.<sup>34</sup>

### 5.1.2. State Funding

#### 5.1.2.1. Washington State Sustainable Aviation Grant Program for Airports

WSDOT offers a statewide aviation grant for sustainability initiatives, called the Sustainable Aviation Grant Program for Airports. The program is available to any city, county, airport authority, political subdivision, federally recognized Indian tribe, public corporation, or person(s) that owns and operates a public-use airport included in the WASP, is considered an eligible airport sponsor, and may apply for WSDOT Airport Aid grant funds.<sup>35</sup> Grants are intended to support the modification of airport infrastructure to reduce GHG emissions by adopting clean forms of transportation, adopting clean power generation, or modifying existing infrastructure to reduce fossil fuel use. Projects include but are not limited to electrification of GSE, electric aircraft charging infrastructure, airport clean power production, EV charging or fuel cell hydrogen stations whose infrastructure may also support GSE and/or electric aircraft charging, and SAF fuel storage.<sup>36</sup>

<sup>33</sup> FAA, "FY2022 Airport Terminal Program Final Selections. [ATP\\_Final\\_FY22\\_07072022.pdf \(faa.gov\)](#)

<sup>34</sup> FAA, "FY2023 Airport Terminal Program Final Selections. [FY2023 ATP Selections for AOC 2023-2-27 \(faa.gov\)](#)

<sup>35</sup> WSDOT, "Aviation Grants," accessed June 2024. <https://wsdot.wa.gov/travel/aviation/aviation-grants>

<sup>36</sup> WSDOT, "WSDOT Aviation accepting applications for new Sustainable Aviation Grant," accessed June 2024. <https://wsdot.wa.gov/about/news/2022/wsdot-aviation-accepting-applications-new-sustainable-aviation-grant>

According to a [Dec 2022 report to the Legislature](#), the following projects were recommended for funding in fiscal year 2024:

- Arlington Municipal Airport (AWO) received \$250,000 for an airport administration office building solar project.
- King County International Airport – Boeing Field (BFI) received \$500,000 for an electric sweeper for airport operations.
- Friday Harbor Airport (FHR) received \$200,000 for EV charging stations.
- Harvey Airfield (S43) received \$218,500 for EV charging stations.
- Pearson Field (VUO) received \$237,500 for a 125.5 kW solar panel system.
- Skagit Regional Airport (BVS) received \$70,000 for an electric truck for airport operations.

#### 5.1.2.2. Airport Transformation Grant

Along with the Washington State Sustainable Aviation Grant Program, WSDOT also offers the Airport Transformation Grant program. Created in 2021, the Airport Transformation Grant program provides funds for Washington’s public use airports to adopt more environmentally sustainable airport infrastructure and operations. Investments can include, but are not limited to SAF storage, electrification of GSE, electric aircraft charging infrastructure, airport clean power production, and EV charging stations whose infrastructure also supports GSE and electric aircraft charging.<sup>37</sup>

Projects are evaluated on their ability to reduce GHG emissions through:

- Modification of airport infrastructure to adopt clean forms of transportation.
- Adoption of clean power for the airport.
- Modification of existing infrastructure resulting in less dependence on fossil fuels.

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<sup>37</sup> WSDOT, “Airports can submit grant applications and apply for a new environmentally sustainable grant,” accessed June 2024. <https://wsdot.wa.gov/about/news/2022/airports-can-submit-grant-applications-and-apply-new-environmentally-sustainable-grant>

**Table 5-1: Summary of Grant Programs**

Program	Agency	Requirements	Project Types	Funded Projects
Airport Improvement Program (AIP)	FAA	NPIAS airports	<ul style="list-style-type: none"> <li>Airport safety</li> <li>Capacity</li> <li>Security</li> <li>Environmental concerns</li> </ul>	<ul style="list-style-type: none"> <li>St. Elmo Airport (2R5): airport master plan update, \$135,999</li> <li>Aztec Municipal Airport (N19): runway lighting upgrades, \$600,000</li> <li>Pangborn Memorial Airport (EAT): runway lighting upgrades, \$10.1 million</li> </ul>
Voluntary Airport Low Emissions (VALE) Program	FAA	NPIAS commercial service airport in a non-attainment or maintenance area for one of the NAAQS	<ul style="list-style-type: none"> <li>Low-emissions vehicles</li> <li>Refueling and recharging stations</li> <li>Gate electrification</li> <li>Other air quality improvements</li> </ul>	<ul style="list-style-type: none"> <li>GEG: install GPUs and PCA units, \$2.5 million</li> <li>BOI: install GPUs and PCA units, Multiple awards</li> </ul>
Zero Emissions Vehicle (ZEV) and Infrastructure Pilot	FAA	NPIAS public use airports	<ul style="list-style-type: none"> <li>Zero emissions airport vehicles</li> <li>ZEV infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>SNA: purchase electric bus and electric bus charger</li> <li>TVC: purchase of two flatbed vehicles and installation of 2 vehicle charging units</li> </ul>
Bipartisan Infrastructure Law (BIL) Airport Infrastructure Grants	FAA	NPIAS airport-related projects as defined under the existing AIP grant and PFC criteria	<ul style="list-style-type: none"> <li>Airport-related projects as defined under the existing AIP grant and PFC criteria</li> </ul>	<ul style="list-style-type: none"> <li>TYS: EV vehicles and charging stations, \$2M</li> <li>SEA: energy efficiency assessment, \$900,000</li> </ul>

Program	Agency	Requirements	Project Types	Funded Projects
Sustainable Aviation Grant Program for Airports	WSDOT	The program seeks to support sustainability programs at any city, county, airport authority, political subdivision, federally recognized Indian tribe, public corporation, or persons that owns and operates a public use airport covered included in the WASP.	<ul style="list-style-type: none"> <li>SAF storage</li> <li>Electrification of GSE</li> <li>Electric aircraft charging infrastructure</li> <li>Airport clean power production</li> <li>Electric vehicle charging stations or fuel cell electric vehicle stations</li> </ul>	<ul style="list-style-type: none"> <li>AWO: airport administration office building solar project, \$250,000</li> <li>BFI: electric sweeper for airport operations, \$500,000</li> <li>FHR: electric vehicle charging stations, \$200,000</li> <li>S43: electric vehicle charging stations, \$218,500</li> <li>VUO: 125.5KW Solar Panel System, \$237,500</li> <li>BVS: electric truck for airport operations, \$70,000</li> </ul>
Airport Transformation Grant	WSDOT	Public use airports	<ul style="list-style-type: none"> <li>SAF storage</li> <li>Electrification of GSE</li> <li>Electric aircraft charging infrastructure</li> <li>Airport clean power production</li> <li>EV charging stations whose infrastructure also supports GSE and electric aircraft charging</li> </ul>	<ul style="list-style-type: none"> <li>None found.</li> </ul>

Source: Cascadia Consulting Group, 2024

## Chapter 6. Summary

Sustainability is an important opportunity for airports in Washington. Regardless of size, staff capacity, available resources, and past actions, airports can follow the guidance in this Plan to set their sustainability vision and mission, establish desired outcomes and goals, engage stakeholders, reflect unique needs and interests, gather useful data, select and implement actions, evaluate and report progress, and achieve outcomes. Whether completed incrementally or part of a large and comprehensive effort, planning that includes thoughtful consideration, analysis, and communication has the potential to increase efficiency across all airport operational areas, improve economic viability, conserve and protect natural resources, and improve employee and community relations. Recommended sustainability actions, available resources, progress metrics, and funding opportunities are included in the appendices.



# **Appendix A**

## **Recommended Sustainability Strategies and Actions**



## Appendix A: Recommended Sustainability Strategies and Actions

Appendix A includes recommended sustainability strategies and actions, organized by airport operational areas. Each section defines the operational area scope and overarching sustainability goal, as well as recommended strategies. A strategy is defined as a group of actions; actions describe specific activities that when completed, increase sustainability. Actions are shown in tables within each operational area.

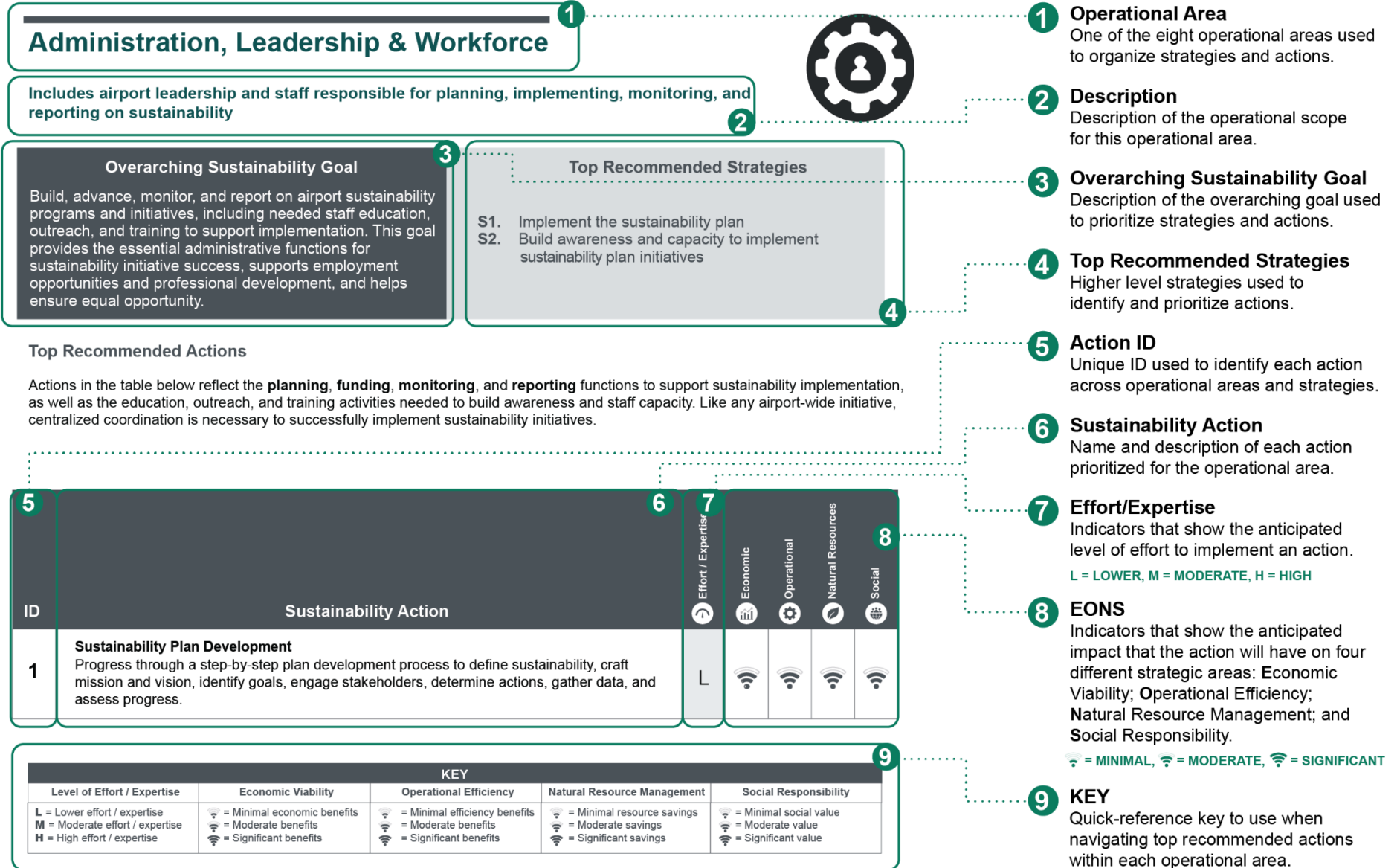
The recommended sustainability strategies and actions in this resource are organized into eight **operational areas**:

- Administration, Leadership & Workforce
- Building, Facility & Airside Operations
- Community
- Construction & Planning
- Fleet Vehicles & Equipment
- Ground Transportation & Parking
- Tenant Operations
- Wildlife & Open Areas

Each operational area includes an overarching sustainability goal and recommended strategies and actions, as shown in **Figure A-1**. Use this figure for reference when reviewing each section. Recommended planning and implementation resources can be found in Appendix C. Airports can use these operational areas and associated resources to structure and guide their sustainability planning efforts.



Figure A-1: Annotated Operational Area Section



Source: Cascadia Consulting Group, 2024

Every airport is unique and differs in sustainability needs and interests. Appendix A is organized to provide a variety of options for airports to take steps toward greater sustainability based on their organizational size and structure, leadership, goals, community or tenant involvement, available resources, and level of sustainability experience. To reflect this variety, the following section provides several options or pathways. Airports can select the option that best meets their needs and interests. If the airport finds they are taking on many actions at once, especially if they are dispersed across operational areas, it is strongly recommended to undertake a more formal planning process to prioritize actions, identify and resolve unintended trade-offs or inefficiencies, and determine a phased implementation approach that aligns with current and planned capacity and resources.

Appendix A includes information and organizational tools described below and shown in **Figures A-1, A-2, A-3, and Table A-1**:

- **Operational Areas.** As previously described and illustrated in **Figure A-2**, operational areas are functional areas of the airport. Some of these areas may be a high priority for an airport, while some may not exist at all, especially for very small airports. Airports may select one or more operational areas that are of particular interest or relevance to their operations and pursue and adopt the most appropriate sustainability strategies and actions listed for those areas.
- **Level of Effort / Expertise.** Levels indicate the relative **level of effort or expertise** required for each action, assuming an airport has no prior experience with sustainability. Airports may use this indicator to determine the next best sustainability actions for their facility.
  - **Low (L)** indicates a foundational step that requires less effort, expertise, or cost relative to other sustainability actions. Examples include installing water bottle refilling stations and high-efficiency water fixtures, buying green energy from the utility, or switching to LED light bulbs. **For airports working on sustainability for the first-time, Low-level actions may be the most appropriate pathway forward.**
  - **Medium (M)** requires moderate effort due to increased staff capacity, additional cost or need for funding, technical expertise requirements, and/or additional planning requirements.
  - **High (H)** involves the most effort, highest cost, higher staff capacity needs, highest technical expertise, and the most planning. See **Figure A-1** for how levels are represented throughout this Appendix.
- **EONS Framework.** The four areas of the EONS framework appear at the right side of each table and represent **Economic viability, Operational Efficiency, Natural Resource Management, and Social Responsibility**. Airports with specific interest or available resources in any of these areas may select applicable actions as indicated in the tables. For example, if financial return on investment is the highest priority, an airport would look for actions that are indicated as having significant benefits for economic viability. Likewise, if the community has expressed a high degree of interest in airport operations, an airport may prioritize actions indicated as having significant value for social responsibility. Similarly, airports may pursue interest in operational efficiency or natural resource management. It's important to note that the EONS assessments shown in the tables

are intended to provide *general guidance* and are not applicable to any specific airport or reflective of rigorous evaluation analysis. The EONS framework is shown in **Figure A-3** for reference.

- **Strategies.** Finally, airports may simply review the strategies and select those that align most closely with their unique interests and needs. A complete list of all strategies and their descriptions is included (see **Table A-1**). Each strategy number in the table corresponds with the numbers shown in the **Recommended Strategies** section at the top of each operational area.



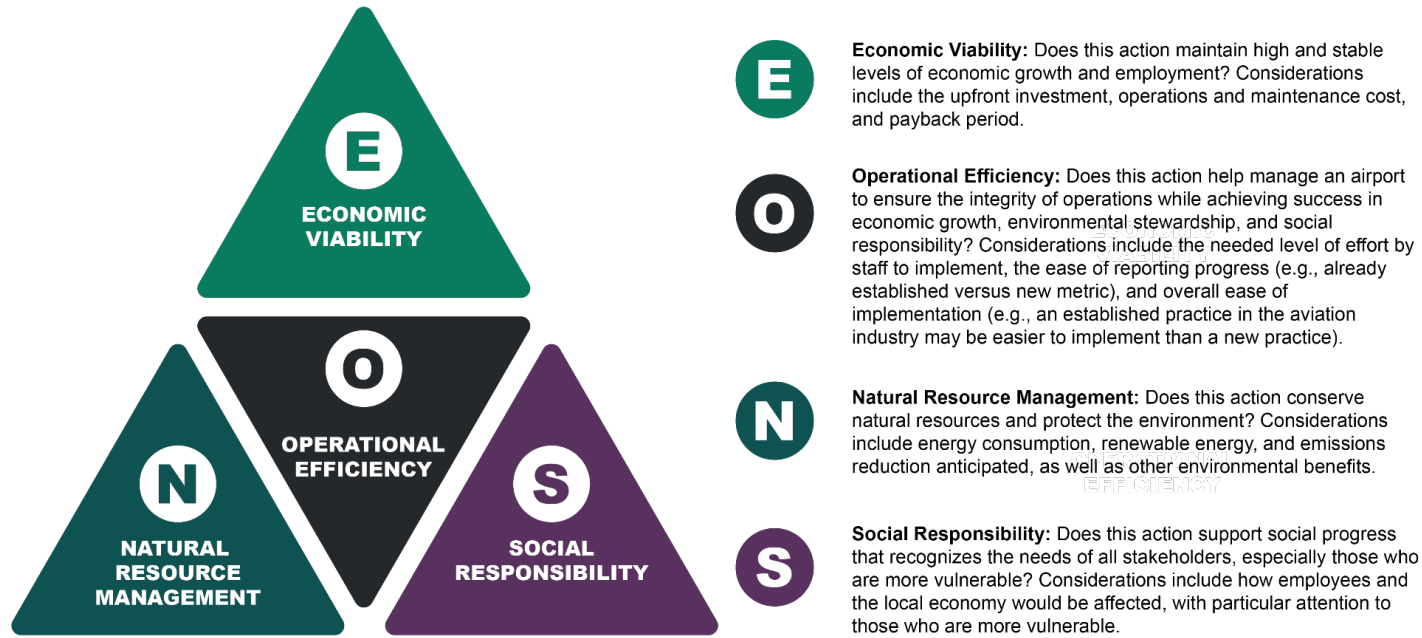


Figure A-2: Operational Areas for Sustainability Planning



Source: Cascadia Consulting Group, 2024

Figure A-3: EONS Framework



Source: Adapted from Airports Council international – North America and SAGA, 2015, by Cascadia Consulting Group, 2024

As discussed in **Section 1.4**, airports may use the EONS framework to assess action alignment with interests, goals, and priorities. The EONS indicators shown for each action in the tables indicate relative alignment with EONS areas, not a comprehensive evaluation. Airports wishing to evaluate actions for their unique circumstances may undergo a more thorough assessment using the above EONS framework.

Airports may also wish to reference the [Washington Department of Health Environmental Health Disparities Map](#) to identify and learn more about areas of higher disparities in the communities in which they are located, especially when considering actions associated with social responsibility.

**Table A-1** provides a comprehensive list of strategies. The number for each strategy in the table corresponds with the numbers shown in the Recommended Strategies section at the top of each of the operational areas, i.e., Administration, Leadership and Workforce, throughout Appendix A. There are 8 operational areas and 11 strategies in total. For each strategy selected, more tactical actions must be identified to implement that strategy. Ideas for actions are listed in the action tables within each operational area.

**Table A-1: Recommended Sustainability Strategies and Applicable Operational Areas**

ID	Strategy Description	Operational Areas
<b>S1</b>	<b>Implement the sustainability plan</b> Like any airport-wide initiative, sustainability requires effective centralized coordination of planning, funding, monitoring, and reporting functions.	<ul style="list-style-type: none"> <li>• Administration, Leadership &amp; Workforce</li> <li>• Tenant Operations</li> </ul>
<b>S2</b>	<b>Build awareness and capacity to implement sustainability plan initiatives</b> Education and outreach activities build general support for sustainability action. Similarly, existing staff may need training in new or upgraded systems or equipment.	<ul style="list-style-type: none"> <li>• Administration, Leadership &amp; Workforce</li> <li>• Community</li> </ul>
<b>S3</b>	<b>Improve efficiency of taxi, takeoff, and landing</b> Adjustments to taxi, takeoff, and landing can reduce emissions, reduce turn-around time, and improve local air quality. This strategy includes activities generally within the airport's control to implement.	<ul style="list-style-type: none"> <li>• Building, Facility &amp; Airside Operations</li> </ul>
<b>S4</b>	<b>Reduce waste to landfill</b> Reusing, recycling, and composting materials and overall sustainable practices reduces emissions from methane and manufacturing. <sup>38</sup> It also reduces disposal costs and supports local environmental health.	<ul style="list-style-type: none"> <li>• Building, Facility &amp; Airside Operations</li> </ul>
<b>S5</b>	<b>Modernize facilities and infrastructure</b> Whether retrofitting an existing building or building new, sustainable construction cuts costs, improves indoor air quality, improves the airport user experience, and may build resilience to climate impacts and natural disasters.	<ul style="list-style-type: none"> <li>• Building, Facility &amp; Airside Operations</li> <li>• Construction &amp; Planning</li> </ul>
<b>S6</b>	<b>Save energy and water</b> Saving energy and water will save money that airports can use for other initiatives and help reduce drought especially in the drier parts of Washington.	<ul style="list-style-type: none"> <li>• Building, Facility &amp; Airside Operations</li> </ul>

<sup>38</sup> Landfill waste generates methane, a short-lived greenhouse gas 28 times more potent than carbon dioxide.

ID	Strategy Description	Operational Areas
S7	<p><b>Transition to clean energy in facilities</b> Airports can purchase clean energy from many local utilities<sup>39</sup> and/or install renewable wind and solar on their land. The latter approach can reduce energy costs and protect against disasters (e.g., damage to power lines, rolling outages).</p>	<ul style="list-style-type: none"> <li>• Building, Facility &amp; Airside Operations</li> </ul>
S8	<p><b>Pursue alternative fuels when modernizing aircraft, fleet/vehicles, and ground service equipment (GSE)</b> Technology is somewhat available today to transition aircraft, vehicles, and GSE to less polluting fuels (electricity, hydrogen, sustainable aviation fuel). Many technologies already are or soon will be cost-competitive, especially on a lifetime basis. As the technology scales, supply will also increase and increase opportunities for airports to pursue.</p>	<ul style="list-style-type: none"> <li>• Building, Facility &amp; Airside Operations</li> <li>• Construction &amp; Planning</li> <li>• Fleet Vehicles &amp; Equipment</li> <li>• Tenant Operations</li> </ul>
S9	<p><b>Improve community safety and wellbeing</b> By addressing airport noise, risk of community displacement, and providing education around human trafficking, this strategy supports community safety and wellbeing.</p>	<ul style="list-style-type: none"> <li>• Community</li> <li>• Construction &amp; Planning</li> </ul>
S10	<p><b>Make driving more efficient and less necessary to get to and from the airport</b> Co-locating ground transportation and shifting drive-alone trips to public transit, fuel-efficient taxis/car hires, and other means helps reduce congestion and emissions.</p>	<ul style="list-style-type: none"> <li>• Ground Transportation &amp; Parking</li> <li>• Tenant Operations</li> </ul>
S11	<p><b>Protect and improve natural ecosystems while minimizing wildlife hazards</b> Reducing soil and water pollution, and minimizing wildlife strikes, helps maintain compliance with existing laws while supporting the overall health of nearby ecosystems and species. In turn, these actions improve local environmental quality and public health.</p>	<ul style="list-style-type: none"> <li>• Wildlife &amp; Open Areas</li> </ul>

Source: Cascadia Consulting Group, 2024

Each section in the following pages defines the **operational area** scope and overarching sustainability goal, as well as recommended strategies. A **strategy** is defined as a group of actions; **actions** describe specific activities that when completed, increase sustainability. Actions are shown in tables within each operational area.

<sup>39</sup> Through Washington's Clean Energy Transformation Act (CETA), all electric utilities serving retail customers are required to be GHG-neutral by 2030 and 100% clean energy by 2045. To meet this goal, green power will become increasingly available.

# Administration, Leadership and Workforce

Includes airport leadership and staff responsible for planning, implementing, monitoring, and reporting on sustainability.



## Overarching Sustainability Goal

Build, advance, monitor, and report on airport sustainability programs and initiatives, including needed staff education, outreach, and training to support implementation. This goal provides the administrative functions for sustainability initiative success, supports employment opportunities and professional development, and helps ensure equal opportunity.





























## Recommended Strategies

















- S1.** Implement the sustainability plan
- S2.** Build awareness and capacity to implement sustainability plan initiatives














## Top Recommended Actions

Actions in the table reflect the planning, funding, monitoring, and reporting functions to support sustainability implementation, as well as the education, outreach, and training activities needed to build awareness and staff capacity. Like any airport-wide initiative, centralized coordination is necessary to successfully implement sustainability initiatives.

KEY				
Level of Effort / Expertise	Economic Viability	Operational Efficiency	Natural Resource Management	Social Responsibility
<b>L</b> = Lower effort / expertise	☪ = Minimal economic benefits	☪ = Minimal efficiency benefits	☪ = Minimal resource savings	☪ = Minimal social value
<b>M</b> = Moderate effort / expertise	☒ = Moderate benefits	☒ = Moderate benefits	☒ = Moderate savings	☒ = Moderate value
<b>H</b> = High effort / expertise	☒ = Significant benefits	☒ = Significant benefits	☒ = Significant savings	☒ = Significant value

ID	Sustainability Action	Effort / Expertise	Economic	Operational	Natural Resources	Social
1	<b>Sustainability Plan Development</b> Progress through a step-by-step plan development process to define sustainability, craft mission and vision, identify goals, engage stakeholders, determine actions, gather data, and assess progress.	L				
2	<b>Funding Allocations for Sustainability</b> Establish financing systems that facilitate investments, emergency funds, and cash-flow availability to develop sustainability initiatives. Develop a proposal to allocate future funding to support sustainability initiatives.	L				
3	<b>Airport Sustainability Vision</b> Craft a sustainability vision based on an assessment of the airport's current approach to sustainability, baseline conditions, research on sustainability policies and practices of peer organizations, and input from partners.	L				
4	<b>Environmental Compliance Program</b> Implement a program to ensure compliance with all environmental and noise rules and regulations.	L				
5	<b>Lead Designation and Implementation Team Formation</b> Designate an overall lead and form an Implementation Team to coordinate activities across the organization, consisting of Sustainability Leads from each division as applicable. Coordinate with internal champion, if different than lead.	L				
6	<b>Performance Tracking System</b> Create a sustainability performance tracking system to compare and monitor sustainability initiatives across the airport. This system may be used solely internally or have some external components. It could be integrated with annual sustainability reporting.	M				
7	<b>Annual Sustainability Reporting</b> Prepare an annual sustainability report that documents the airport's activities and progress. Update the list of sustainability practices as needed. If a sustainability tracking system is available, annual reporting could be integrated into it.	M				

ID	Sustainability Action	Effort / Expertise	Economic	Operational	Natural Resources	Social
8	<b>Regular GHG Inventories</b> Conduct and maintain a Scope 1, 2, & 3 GHG emissions inventory every 3 to 5 years to measure airport emissions and report/monitor results of emission reduction activities.	H				
9	<b>Carbon Offsets Purchases</b> Purchase high-quality, verified carbon offsets using a reputable broker. High-quality offsets meet minimum criteria (real, permanent, additional, not double-counted, and avoid leakage), are within the "supply chain" of the purchaser, provide community benefits where the projects are located, prioritize international projects in least-developed and/or low-income countries (consistent with global climate commitments), are balanced between emissions avoidance and carbon removal/storage, and provide transparent, frequent monitoring and reporting of project status. A simple way to ensure a high-quality offset is to look for projects or programs carrying third-party certification, especially the Voluntary Carbon Markets Integrity Initiative (VCMI) <a href="#">Claim Code</a> (Silver, Gold, or Platinum). Projects with the <a href="#">Gold Standard</a> for the Global Goals certification (search for projects <a href="#">here</a> ), meeting Verra's <a href="#">Climate, Community, and Biodiversity Standards</a> , or meeting Verra's <a href="#">Sustainable Development Verified Impact</a> Standard (see Verra projects <a href="#">here</a> ) are all examples of third-party verification, are more likely to hold the VCMI Claim Code, and have many projects located outside the U.S..	M				
10	<b>Airport Sustainability Accreditation</b> Accelerate and expand energy and emission reduction activities through the <a href="#">Airport Carbon Accreditation</a> (or similar) program. <a href="#">Salt Lake City</a> 's airport has reduced GHG emissions by 25% per passenger since joining program.	H				
11	<b>Employee Sustainability Training(s)</b> Provide education and training with specific sustainability and environmental goals in mind, targeted towards employees that can impact those areas. Goals will vary by their overall sustainability impact and ease of behavior change. Consider choosing 1-3 goals that can build momentum for broader sustainability progress.	M				

ID	Sustainability Action	 Effort / Expertise	 Economic	 Operational	 Natural Resources	 Social
12	<p><b>Sustainability Staff Hiring</b>            Build critical staff capacity to support development and implementation of sustainability initiatives. This includes:</p> <ul style="list-style-type: none"> <li>Evaluate needed staff capacity and, if necessary, hire additional staff to implement sustainability initiatives. A centralized coordinator or team benefits most sustainability efforts significantly.</li> <li>Provide education on airport sustainability initiatives for new hires during onboarding process.</li> </ul>	M				
13	<p><b>Employee and Tenant Engagement</b>            Develop a system to engage primary stakeholders (aircraft operators, employees, tenants, etc.) in advancing and providing feedback on airport sustainability objectives. Opportunities may include surveys, educational events, committees or green teams, and/or periodic volunteer programs. These efforts can integrate with other airport initiatives, such as the Port of Seattle's <a href="#">Airport University</a> that supports lower-income airport workers with education for career advancement.</p>	M				



## Building, Facility and Airside Operations



This includes all existing airport buildings, facilities, and other infrastructure that is owned, maintained, and operated by the airport (e.g., terminal buildings, airport maintenance facilities, airport ramp, fire station). See **Tenant Operations** for buildings and facilities not owned by the airport.

### Overarching Sustainability Goal

Modernize airport-owned infrastructure to save energy and water, reduce waste, increase resilience to natural disasters, and reduce operational costs over time. This goal also improves the airport user experience and worker safety by modernizing infrastructure.





### Recommended Strategies





- S3.** Improve efficiency of taxi, takeoff, and landing
- S4.** Reduce waste to landfill
- S5.** Modernize facilities and infrastructure to reduce emissions, build resilience to climate impacts and natural disasters, and improve indoor air quality
- S6.** Save energy and water
- S7.** Transition to clean energy in facilities
- S8.** Pursue alternative fuels, including electrification, for aircraft, fleet, and ground-service equipment









### Top Recommended Actions





Actions in the table support the strategies listed above and defined in the introduction of **Appendix A**. Adjustments to taxi, takeoff, and landing procedures, mostly applicable to large airports with Air Traffic Control (ATC), can reduce jet fuel emissions, reduce turn-around time, and improve local air quality. By transitioning to clean energy—whether purchased or installed and owned by the airport—the operation of any electric aircraft, equipment, lights, HVAC, etc. is automatically more sustainable. Airports with independent clean energy sources will also be more resilient to natural disasters and climate impacts. Finally, upgrading to modern, efficient equipment comes with cost savings that can be used to invest in other activities, as well as other benefits to airport workers and users such as improved air quality.









KEY				
Level of Effort / Expertise	Economic Viability	Operational Efficiency	Natural Resource Management	Social Responsibility
<b>L</b> = Lower effort / expertise	☺ = Minimal economic benefits	☺ = Minimal efficiency benefits	☺ = Minimal resource savings	☺ = Minimal social value
<b>M</b> = Moderate effort / expertise	☹ = Moderate benefits	☹ = Moderate benefits	☹ = Moderate savings	☹ = Moderate value
<b>H</b> = High effort / expertise	☹☹ = Significant benefits	☹☹ = Significant benefits	☹☹ = Significant savings	☹☹ = Significant value

























ID	Sustainability Action	Effort / Expertise	Economic	Operational	Natural Resources	Social
14	<p><b>Reduced Aircraft Taxi Times</b> – <i>mostly applicable to large airports with ATC</i></p> <p>Work with airlines and other operators to integrate efficient airfield procedures and configurations to minimize aircraft taxi times and the use of engines while on the ground. In <a href="#">Salt Lake City</a>, airplane taxi time reductions can reduce carbon emissions by 15,000 tons annually. Possible procedures and configurations include but are not limited to:</p> <ul style="list-style-type: none"> <li>▪ <b>Virtual airport departure queues:</b> New software and hardware tools can generate 15-minute departure blocks, which means aircraft spend more time at the gate and less time taxiing. This reduces surface congestion, as well as fuel use, emissions, and noise.</li> <li>▪ <b>Electric taxiing systems:</b> Electric motors fitted to landing gear can guide the aircraft to the runway without the use of aircraft engines. According to the <a href="#">Waypoint 2050 report</a>, this can cut CO<sub>2</sub> emissions and unburdened hydrocarbons by over 60%, and NO<sub>x</sub> emissions from taxiing by over 50%.</li> <li>▪ <b>Remote taxiing systems:</b> Using a special tug, an electric taxiing system could be managed remotely by the pilot. Only the auxiliary power unit would run during this time, reducing up to 85% of emissions at airports with long taxi distances.</li> <li>▪ <b>Taxi on fewer engines:</b> Some aircraft may be able to taxi on a reduced number of engines, then start the remaining engines near the runway.</li> </ul>	M				





















ID	Sustainability Action	Effort / Expertise	Economic	Operational	Natural Resources	Social
15	<p><b>Flight Operations Efficiencies</b> – <i>mostly applicable to large airports with ATC</i>            In partnership with Air Traffic Control, suggest changes to operational strategies to reduce emissions from takeoff and landing. Strategies include but are not limited to:</p> <ul style="list-style-type: none"> <li>▪ <b>Airport Collaborative Decision Making (A-CDM):</b> A-CDM is an information sharing approach between aircraft, ground handler, and air traffic control that provides more accurate turn-around information for airlines and improves the overall efficiency of airport-based operations. The U.S. is working to implement A-CDM at 27 airports by 2024.</li> <li>▪ <b>Perfect flight principles:</b> "Perfect flight" refers to the practice of using a single commercial flight to set the optimum standard for flight efficiency, then deploying efficiencies into everyday operations to improve overall performance.</li> <li>▪ <b>Continuous descent and climb:</b> Enabled by airspace design and instrument procedure design, air traffic control can facilitate aircraft's ability to follow a flexible, optimum flight path to reduce fuel use, emissions, and noise. At busy airports and during busy periods, air traffic controllers may need to intervene to ensure safe departures and arrivals, which can limit use during busy times.</li> <li>▪ <b>Performance-based navigation (PBN):</b> PBN helps provide precise, efficient flight paths. It can assist with continuous descent by using GPS and satellite technology to enable arrivals to occur in pre-determined arcs, reducing noise, fuel use, and emissions.</li> </ul>	M				

ID	Sustainability Action	Effort / Expertise	Economic	Operational	Natural Resources	Social
15	<p><b>Flight Operations Efficiencies (continued)</b></p> <ul style="list-style-type: none"> <li>▪ <b>Required navigation performance (RNP):</b> RNP builds on PBN to enable aircraft to fly with a high degree of accuracy and integrity on a particular flight path. According to the <a href="#">Waypoint 2050 report</a>, GE Aviation calculated that standardized RNP would save 49,000 tons of fuel and 124,556 tons carbon dioxide (CO<sub>2</sub>) per year if implemented at 46 regional airports in the U.S. Additional assessment is needed to determine if the investment is justified by airport operating conditions. Engagement with nearby communities is also needed if traditional flight paths would shift.</li> <li>▪ <b>Trajectory-based operations (TBO):</b> TBO helps optimize flights from departure to arrival and therefore can improve fuel efficiency. It requires greater data sharing through A-CDM and air traffic flow management to implement.</li> <li>▪ <b>Formation flight:</b> According to flight tests, when aircraft follow another aircraft closely enough, they benefit from the "wake" created, reducing fuel use an estimated 5-10% (and therefore emissions) without sacrificing passenger comfort. Collaboration with air traffic control is needed to implement.</li> <li>▪ <b>Flexible use of military airspace:</b> When the most efficient route, flying directly through military airspace when it is not in use--rather than around it--reduces fuel use and emissions. Significant trust, collaboration, and negotiation is needed, as civil air traffic management would manage the airspace temporarily and confidentiality of military operations would need to be maintained.</li> </ul>	M				
16	<p><b>Pre-Conditioned Air or Ground Power at the Gate</b>            Install and deliver preconditioned air and/or ground power to gates to reduce emissions from aircraft auxiliary fuel burn, improve air quality, reduce energy costs, and increase energy efficient. The <a href="#">Waypoint 2050 report</a> noted that at a major hub airport, over 100,000 tons of CO<sub>2</sub> were reduced per year; aircraft noise was also reduced. <a href="#">Columbus Airport</a> installed pre-conditioned air units at 11 jet bridges utilizing FAA funding, which covered 75% of project costs.</p>	H				

ID	Sustainability Action	Effort / Expertise	Economic	Operational	Natural Resources	Social
17	<p><b>Sustainable Purchasing</b>            Develop responsible procurement policies and practices, assess suppliers in terms of sustainability, and support economic growth of the community through local purchasing. Airports take a variety of approaches to sustainable purchasing:</p> <ul style="list-style-type: none"> <li>▪ <a href="#">Denver</a> emphasizes Green Seal-approved, Energy Star, and locally recyclable and compostable products.</li> <li>▪ <a href="#">Bert Mooney Airport</a> aims to increase their number of environmentally friendly products by 25% with a goal of 75% green products by 2017.</li> <li>▪ <a href="#">Chicago</a> uses a point-based system to incentivize the use of green products and green products purchasing, while <a href="#">Vancouver</a> (Canada) includes sustainability as a weighted component of purchasing decisions.</li> <li>▪ <a href="#">Tampa</a>'s sustainable procurement strategy includes lifecycle cost comparisons, green products purchasing, and general waste reductions as cost-reducing measures.</li> <li>▪ <a href="#">Huntington Tri-State Airport</a> focuses on waste diversion, reduction, and reuse by emphasizing durable products over single-use, environmentally friendly products, reduction in packaging, and reuse and recycling of materials. They also communicate the environmental performance expected in products to manufacturers and suppliers.</li> </ul>	M				

ID	Sustainability Action	Effort / Expertise	Economic	Operational	Natural Resources	Social
18	<p><b>Waste Management Program</b>            Develop an airport waste management program that encourages reducing, reusing, composting, and recycling waste and avoiding single-use materials. This may include:</p> <ul style="list-style-type: none"> <li>▪ <b>Set attainable goals for waste reduction and measure progress:</b> Metrics to consider include overall waste generated, waste diverted, and the number of tenants with recycling programs (see the ABQ Sustainable Master Plan, <a href="#">p. 32</a>).</li> <li>▪ <b>Make it easier for travelers and employees to reduce waste:</b> <a href="#">San Diego</a> has zero waste carts with reusable utensils and service ware for airport staff and large meetings. Both <a href="#">Massport</a> and Seattle-Tacoma International (SEA) use liquid collection stations. Increasing the number of waste collection bins (recycle, trash, and compost) with clear signage also reduces waste.</li> <li>▪ <b>Coordinate with airlines, air cargo operators, and local waste management entities/haulers to reduce waste from flight operations:</b> Combining waste removal and recycling services with other airport tenants may reduce operating costs for all parties. Utilization of local waste management firms and partnerships with various environmental programs are also common. See, for example, <a href="#">Los Angeles</a>'s coordination with waste vendors to track waste and recycling data and Huntington Tri-State Airport (<a href="#">p. 32</a>).</li> <li>▪ <b>Develop and distribute passenger education and information materials on proper recycling:</b> Education and outreach can reduce recycling contamination and produce more efficient recycling practices, thus reducing overall waste. <a href="#">SEA</a> offers a variety of educational resources to help tenants with recycling and composting measures; <a href="#">WA state</a> offers a free "recycle right" partner toolkit.</li> </ul>	M				
19	<p><b>Waste Monitoring</b>            Perform waste composition studies or recycling audits to focus efforts and track the results of airport waste reduction programs. Audits can help determine where to focus waste diversion and reduction efforts; <a href="#">San Diego</a>, <a href="#">Los Angeles</a>, and Huntington Tri-State Airport (<a href="#">p. 30</a>) are examples of airports that conduct waste and recycling audits.</p>	H				

ID	Sustainability Action	Effort / Expertise	Economic	Operational	Natural Resources	Social
20	<b>Water Bottle Refilling Stations</b> Install water bottle refilling stations to reduce single-use plastics and waste to landfill.	L				
21	<b>Airport Air Filtration System Upgrades</b> Upgrade facility air filtration systems to improve indoor air quality and provide better protection against airborne viruses.	M				
22	<b>Refrigerant Replacement</b> Upgrade HVAC and refrigeration systems to high-efficiency, low global warming potential (GWP) systems to reduce refrigerant use. Refrigerants like chlorofluorocarbons (CFCs) and hydrofluorocarbons (HFCs) are short-lived GHGs many times more potent than CO <sub>2</sub> .	H				
23	<b>Energy Efficiency Projects in Buildings</b> Identify and implement energy efficiency projects and power down technologies to reduce facility energy consumption and build resilience to climate risks and natural and other disasters. Alternatives include installing LED lighting, investing in motion sensing lights, solar-powered back-up generators, etc. LEDs, for example, reduce energy use and last longer than traditional bulbs, reducing maintenance costs and saving money (see the <a href="#">Nashville</a> and <a href="#">Juneau</a> airports for examples). Utilities often provide rebates to help cover the upfront installation cost.	M				
24	<b>Energy Auditing</b> Perform energy audits for airport-operated facilities to identify energy saving opportunities and prioritize reduction projects. Complete low-cost or no-cost projects. For example, installing LEDs on runways and taxiways improves visibility, saves energy, and reduces maintenance and lifetime costs. Airports that have implemented LEDs on runways and/or taxiways include Centennial Airport (CO; <a href="#">p. 24</a> ), Riverside Airport (CA; <a href="#">p. 19-20</a> ), <a href="#">Salt Lake City</a> , and <a href="#">Columbus (OH)</a> .	M				
25	<b>Energy Monitoring</b> Implement energy monitoring systems to evaluate and compare changes in energy demand and identify opportunities for improvement. Energy Star's <a href="#">Portfolio Manager</a> is a useful tool. For example, <a href="#">LAWA Airport</a> (p. 19) is increasing metering and sub-metering to help manage energy use.	M				

ID	Sustainability Action	Effort / Expertise	Economic	Operational	Natural Resources	Social
26	<b>High-Efficiency Water Fixtures</b> Install low-flow and high-efficiency fixtures to reduce airport water usage. <a href="#">Fresno Yosemite International Airport</a> noted that if all current fixtures were replaced by high-efficiency fixtures, they could save approximately 293,307 gallons of water annually or 23% of current use.	L				
27	<b>Drought-Tolerant Landscaping</b> Reduce consumption of potable water in landscaping through use of reclaimed/recycled water or rainwater for irrigation. Use drought-adapted landscaping and water less frequently. Livermore Municipal Airport ( <a href="#">p. 28-29</a> ), Riverside Municipal Airport ( <a href="#">p. 19-20</a> ), and Los Angeles World Airports ( <a href="#">p. 37-39</a> ) all plan to reduce water usage and costs; Livermore and Los Angeles plan to use recycled or reclaimed water for landscaping and other non-potable demands.	M				
28	<b>Green Power Purchases</b> Procure greener power through partnerships and programs with local utilities to reduce emissions. Many airports already procure green power, such as <a href="#">Dallas-Fort Worth</a> and <a href="#">Columbus</a> .	L				
29	<b>Renewable Energy Installation</b> Install on-site solar or wind energy projects to reduce long-term costs of purchased electricity. Outcomes of these projects include reduced energy usage, cost savings, and even land-lease revenue for certain airports leasing land to solar contractors. Airports, including GA, have already installed renewable energy on-site. Smyrna/Rutherford County Airport (TN; <a href="#">p. 26</a> ) leased land to a solar contractor, at no cost to the airport and now generates revenue from the installation. Lakeland Linder Regional Airport (FL; <a href="#">p. 25</a> ) took a different approach, using a public-private partnership with the regional utility company, resulting in minimal costs. Dallas Fort Worth ( <a href="#">DFW</a> ) uses renewable energy (wind and solar) to cover 100% of their electricity, some of which is self-generated.	H				
30	<b>Electric Ground Service Equipment</b> Install and/or expand charging stations for tenant GSE to reduce emissions and improve local air quality. Electric ground support options are <a href="#">already available</a> and in use at SEA and other airports across the U.S. The FAA's <a href="#">VALE program</a> funds these upgrades.	M				



# Community

Includes nearby communities, local businesses, and passengers transiting through airport.



## Overarching Sustainability Goal

Reduce the negative impacts from airport operations on the local community and improve positive community outcomes.





























## Recommended Strategies

- S2.** Build awareness and capacity to implement sustainability plan initiatives
- S9.** Improve community safety and wellbeing

### Top Recommended Actions

Actions in the table support the strategies listed above and defined in the introduction of **Appendix A**. By addressing airport noise and providing education around sustainability as well as human trafficking, these actions support community safety and wellbeing and build general support for sustainability action.

KEY				
Level of Effort / Expertise	Economic Viability	Operational Efficiency	Natural Resource Management	Social Responsibility
<b>L</b> = Lower effort / expertise	☹ = Minimal economic benefits	☹ = Minimal efficiency benefits	☹ = Minimal resource savings	☹ = Minimal social value
<b>M</b> = Moderate effort / expertise	☺ = Moderate benefits	☺ = Moderate benefits	☺ = Moderate savings	☺ = Moderate value
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ID	Sustainability Action	Effort / Expertise	Economic	Operational	Natural Resources	Social
31	<b>Passenger Sustainability Education</b> Engage airport users on sustainability efforts occurring at the airport and actions they can take while traveling. Examples of actions airport users can take include packing light, bringing a reusable water bottle and utensils, choosing flights with as few stops as possible, and choosing ground transportation that avoids driving alone.	L				
32	<b>Community Engagement for Sustainability Action</b> Using the information in Step 3, develop and implement a plan to equitably engage community members, businesses, and other stakeholders (e.g., community-based organizations, schools).	M				
33	<b>Human Trafficking Educational Materials</b> Provide educational materials and public signage to inform staff and passengers on how to recognize and respond to concerns related to human trafficking.	L				
34	<b>Noise Abatement Plans</b> Follow FAA guidelines and develop an airport-specific noise abatement plan.	M				
35	<b>Noise Reduction Incentives for Aircraft Operators</b> Create an incentive program (“Fly Quiet”) to engage and encourage aircraft operators to reduce noise during takeoff and landing. Airports such as LAX ( <a href="#">p. 81</a> ), <a href="#">San Diego</a> , and <a href="#">SEA</a> have a Fly Quiet or similar program.	L				
36	<b>Sound Barriers</b> Construct sound barriers to reduce noise disturbance for neighboring communities. The FAA provides grants to help with sound insulation for surrounding neighborhoods (e.g., LAX, <a href="#">p. 81</a> ).	H				
37	<b>Community Engagement on Noise Impacts</b> Work with communities to develop metrics and mitigations from changes to noise and air quality from implementation of sustainability measures. Sustainability actions that reduce emissions or save fuel on aircraft approach and takeoff can result in new, increased, or decreased impacts on communities from changes to noise and air quality.	M				

# Construction and Planning

Long-term planning, construction, and design of airport infrastructure (buildings, roadways, taxiways, etc.).



## Overarching Sustainability Goal

Ensure long-term projects support a modern airport, with design and construction that minimize long-term negative impacts (e.g., emissions, air pollution, waste) and maximize efficiency and resilience.














## Recommended Strategies














- S5.** Modernize facilities and infrastructure to reduce emissions, build resilience to climate impacts and natural disasters, and improve indoor air quality
- S8.** Pursue alternative fuels, including electrification, for aircraft, fleet, and ground-service equipment
- S9.** Improve community safety and wellbeing

## Top Recommended Actions

Actions in the table support the strategies listed above and defined in the introduction of **Appendix A**. Whether retrofitting an existing building or building new, sustainable construction cuts costs, improves indoor air quality, improves the airport user experience, and may build resilience to climate impacts and natural disasters. Planning proactively for sustainable building and infrastructure improvements means the infrastructure will be in place when the airport is ready to invest in new technology (e.g., electric GSE). Proactive planning for airport expansion is also necessary to avoid community displacement and support community safety and wellbeing.

KEY				
Level of Effort / Expertise	Economic Viability	Operational Efficiency	Natural Resource Management	Social Responsibility
<b>L</b> = Lower effort / expertise	☹ = Minimal economic benefits	☹ = Minimal efficiency benefits	☹ = Minimal resource savings	☹ = Minimal social value
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<b>H</b> = High effort / expertise	☺☺ = Significant benefits	☺☺ = Significant benefits	☺☺ = Significant savings	☺☺ = Significant value

ID	Sustainability Action	 Effort / Expertise	 Economic	 Operational	 Natural Resources	 Social
38	<p><b>Resilience Improvements for Existing Infrastructure</b>            Develop infrastructure and operational capacity to handle stronger winds, increased flooding, extreme temperatures, wildfire and wildfire smoke, earthquakes, pandemics, and other disasters to support resiliency and improve safety. Steps include:</p> <ol style="list-style-type: none"> <li>1. Conduct vulnerability and hazard mitigation assessment of existing facilities.</li> <li>2. Conduct feasibility assessments for potential facility improvements.</li> <li>3. Prioritize, fund, and build facility improvements.</li> </ol>	H				
39	<p><b>Sustainable Construction Methods for New Facilities and Major Retrofits</b>            Incorporate sustainability into facility design and construction policies and practices for all new facilities and major retrofits. This includes building for resilience to stronger winds, increased flooding, extreme temperatures, wildfire and wildfire smoke, earthquakes, pandemics, and other disasters. Follow <a href="#">LEED</a>, <a href="#">Envision</a>, or similar green building practices and consider certification of projects. College Park Airport (MD; <a href="#">p. 22</a>) noted increased community goodwill and reduced operational costs through LEED Silver certification. Los Angeles World Airports noted that LEED-certified buildings have an average of 30-40% water savings (<a href="#">p. 37-39</a>). Tampa International Airport (FL) reconfigured ground transportation to remove 3.8 million vehicles from the road each year, remediated two brownfields, and preserved public art to achieve <a href="#">Envision Verified</a>. The expansion of Terminal 2 at San Diego International Airport (CA) earned <a href="#">Envision Platinum</a> for creating 5,000 jobs during construction, preserving greenfields, remediating an old landfill, employing sustainable landscaping, and demonstrating sustainability leadership nationally. <a href="#">Ithaca Tompkins Regional Airport</a> took a different approach: while in need of a new terminal, they noted that the most sustainable option is the option you already have and opted to reconfigure their current terminal space rather than developing a new one.</p>	H				

ID	Sustainability Action	 Effort / Expertise	 Economic	 Operational	 Natural Resources	 Social
40	<p><b>Proactive Infrastructure Planning for Aviation Innovations</b>            In airport expansion plans, plan ahead for the necessary infrastructure for a clean electricity supply, green hydrogen, and battery recharging facilities. This planning should be possible now, in time for the small-scale infrastructure that will be needed soon and the increase in these technologies for regional traffic in the 2030s. Additionally, plan for adaptations to ground infrastructure to accommodate new aircraft design concepts for commercial aircraft (see p. 44 of the <a href="#">Waypoint 2050 report</a>), such as <a href="#">blended wing bodies</a> (e.g., the <a href="#">Bombardier Ecojet</a>) and strut-braced wings.</p>	M				
41	<p><b>Proactive Community Planning for Airport Expansion</b>            Minimize involuntary resettlement of communities and adverse noise effects during airport expansion. Develop and implement a plan for this.</p>	M				



## Fleet Vehicles and Equipment

This includes airport-owned and operated ground fleet and equipment such as maintenance vehicles, buses, interterminal trams, trucks, lawnmowers, snow removal equipment, and other heavy equipment such as tractors.



### Overarching Sustainability Goal

Reduce direct emissions and fuel costs by procuring and operating a modern lower-emission airport vehicle and equipment fleet. By reducing harmful fumes, this goal also supports worker and airport user safety for those operating, using, and maintaining the fleet.

### Recommended Strategies










**S8.** Pursue alternative fuels, including electrification, for aircraft, fleet/vehicles, and ground-service and other equipment

### Top Recommended Actions

Actions in the table support the strategies listed above and defined in the introduction of **Appendix A**. Technology is available today to transition fleet vehicles and equipment to less polluting fuels (electricity, hydrogen, other renewable fuels).<sup>40</sup> Many technologies already are or soon will be cost-competitive, especially on a lifetime basis. As the technology scales further, supply will also increase. However, even as costs decline and supply increases, there may still be barriers to a rapid transition such as insufficient funds to transition an entire fleet in the short-term or a need for training to properly maintain alternative-fueled vehicles and equipment.

KEY				
Level of Effort / Expertise	Economic Viability	Operational Efficiency	Natural Resource Management	Social Responsibility
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<b>H</b> = High effort / expertise	☺ = Significant benefits	☺ = Significant benefits	☺ = Significant savings	☺ = Significant value

<sup>40</sup> See *Building, Facility and Airside Operations, Construction and Planning, and Tenant Operations* for actions related to alternative fuels, including electrification, for aircraft and ground-service and other equipment.

ID	Sustainability Action	 Effort / Expertise	 Economic	 Operational	 Natural Resources	 Social
42	<p><b>Vehicle and Equipment Fleet Sustainability</b>            Invest in lower emission vehicles and equipment for airport-operated vehicle/equipment fleet to improve local air quality. Alternatives to consider include electric, hybrid, and alternative-fueled vehicles and equipment, so long as the lifecycle emissions of the alternative are lower than the conventional fossil fuels being used. For electricity, the local utility will likely be the supplier. In the case of some alternative fuels, the airport may need to confirm fuel availability with current suppliers or secure a new supplier. Examples of equipment include but are not limited to snow removal equipment, lawnmowers, and tractors. SEA uses thermal renewable natural gas from landfill waste to heat the airport terminal and power their bus fleet.</p>	M				



## Ground Transportation and Parking

Includes ground transportation to/from airport, such as: passenger cars, public transportation, hotel shuttles, community shuttles, dedicated carpool and EV charging parking, general parking, rental cars, taxis and hired cars, cyclists, and pedestrians.



### Overarching Sustainability Goal

Reduce vehicle congestion and improve local air quality and airport user experience with low-emission ground transportation strategies.











### Recommended Strategies

- S8.** Pursue alternative fuels, including electrification, for aircraft, fleet/vehicles, and ground-service and other equipment
- S10.** Make driving more efficient and less necessary to get to and from the airport

### Top Recommended Actions

Actions in the table support the strategies listed above and defined in the introduction of **Appendix A**. Co-locating ground transportation and shifting drive-alone trips to public transit, fuel-efficient taxis/car hires, and other means helps reduce congestion and emissions.

KEY				
Level of Effort / Expertise	Economic Viability	Operational Efficiency	Natural Resource Management	Social Responsibility
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ID	Sustainability Action	 Effort / Expertise	 Economic	 Operational	 Natural Resources	 Social
43	<p><b>Consolidated Facilities for Car Hires and Hotel Shuttles</b>            Consolidate off-airport car hire facilities (e.g., rental cars, ride-hailing services) and hotel shuttle services to reduce congestion and improve local air quality. For example, <a href="#">SEA</a> updated airport contracts to require taxis, ride-hailing services, and shuttle-to-door services serving SEA to be high miles per gallon (MPG) or alternative-fueled vehicles.</p>	M				
44	<p><b>Passenger Ground Transportation Efficiencies</b>            Develop strategies to reduce emissions from passenger transportation to airport to minimize congestion and vehicle emissions. Alternatives may include increased mass transportation, seamless links to public transport, minimum MPG requirements for taxi and/or ride-hailing services, designs and policies that facilitate more efficient movement of passenger vehicles, no-idle policy, and safe access for pedestrians and cyclists. For example, Massport's 2019 <a href="#">sustainability report</a> reported an increase mass transport options to the airport reduced emissions.</p>	M				
45	<p><b>Dedicated EV Charging and Parking</b>            For those who still need to drive to the airport, provide dedicated parking spaces and EV-ready charging equipment to charge EVs. Work with an experienced consultant to determine the anticipated demand and cost for EV charging over time and plan accordingly. Additionally, consider priority parking locations for EVs.</p>	M				

## Tenant Operations

All operational activities occurring on airport property, but not directly controlled by the airport are included. These include aircraft and ground support equipment (GSE) operations on taxiways, runways, and gates; flight operations; concessionaires; rental car companies; and other tenants.



### Overarching Sustainability Goal

Support airside users and tenants in reducing direct emissions and waste from their operations, which may support increased fuel savings, reduced harmful fumes, modernization of equipment, and more efficient airport operations. This goal reduces an airport’s indirect emissions, air pollution, and waste by implementing operational policies and providing infrastructure support to airside users and tenants. As a result, this goal directly supports local air quality and indirectly supports public health of the surrounding community.


















### Recommended Strategies













- S1.** Implement sustainability plan
- S8.** Pursue alternative fuels, including electrification, for aircraft, fleet, and ground-service equipment
- S10.** Make driving more efficient and less necessary to get to and from the airport

### Top Recommended Actions

Actions in the table support the strategies listed above and defined in the introduction of **Appendix A**. Embedding sustainability into tenant lease agreements and supporting more sustainable options for tenant vehicle operations helps mainstream sustainability into the day-to-day business of airport operations. Additional planning is likely needed for most airports to leverage the technology that is available today to transition aircraft, vehicles, and GSE to less polluting fuels (electricity, hydrogen, sustainable aviation fuel). Many technologies already are or soon will be cost-competitive, especially on a lifetime basis.

KEY				
Level of Effort / Expertise	Economic Viability	Operational Efficiency	Natural Resource Management	Social Responsibility
<b>L</b> = Lower effort / expertise	☹ = Minimal economic benefits	☹ = Minimal efficiency benefits	☹ = Minimal resource savings	☹ = Minimal social value
<b>M</b> = Moderate effort / expertise	☺ = Moderate benefits	☺ = Moderate benefits	☺ = Moderate savings	☺ = Moderate value
<b>H</b> = High effort / expertise	☺☺ = Significant benefits	☺☺ = Significant benefits	☺☺ = Significant savings	☺☺ = Significant value

ID	Sustainability Action	 Effort / Expertise	 Economic	 Operational	 Natural Resources	 Social
46	<p><b>Tenant Lease Agreement Opportunities</b>            Embed environmental and sustainability considerations into tenant lease agreements to focus on environmental compliance and liability, and support conformance with airport sustainability goals. Work closely with tenants in lease negotiation and subsequent operations to ensure sustainability actions are implemented. Examples include but are not limited to waste reduction and diversion, sustainable purchasing, energy and water conservation, and low-emissions vehicles and equipment. While the focus is not airports, the Urban Land Institute offers two helpful resources for sustainable leasing: a short <a href="#">step-by-step process</a> for sustainable leasing and a <a href="#">reference guide</a> with ideas to include in leases. As another example, Huntington Tri-State Airport includes waste provisions in lease agreements (<a href="#">p. 29</a>).</p>	M				
47	<p><b>Aircraft Electrification Plan</b>            Work with airlines and operators to develop a plan to electrify suitable routes and/or aircraft, in collaboration with other departments and external partners. Commuter and regional aircraft with &lt;100 seats are prime candidates for electric and hydrogen fuel-cell propulsion; the technology will be ready by 2025 for the smallest planes (9-19 seats, &lt;60-minute flights) and by 2030 for 51-100 seat planes (30-90 min flights). Furthermore, aircraft with hybrid-electric propulsion will become increasingly available: small aircraft (15-20 seats) are expected in the 2020s, regional aircraft (50-100 seats) by the 2030s, and potentially larger aircraft by the 2040s. These aircraft can be used for pilot training and private and commercial flights.</p> <p>Steps include:</p> <ol style="list-style-type: none"> <li>1. Identify suitable routes and/or airlines interested in operating electric aircraft from the airport.</li> <li>2. Determine needed infrastructure and funding to support electric routes/aircraft.</li> <li>3. Invest in and build needed infrastructure.</li> </ol>	M				
48	<p><b>Electric Aircraft Maintenance Trainings</b>            To support effective operations and maintenance of electric aircraft, support training for relevant tenant employees in the operations and maintenance of electric aircraft.</p>	M				

ID	Sustainability Action	Effort / Expertise	Economic	Operational	Natural Resources	Social
49	<p><b>Planning for Sustainable Aviation Fuels</b>            Develop policies and operational capacity to support the delivery and use of sustainable aviation fuels (SAF), which are made from more sustainable sources than fossil fuels. Like conventional jet fuel, SAF is a drop-in fuel that can have up to 90% fewer emissions on a lifetime basis; current SAF averages 40-60% carbon savings on a lifetime basis. The airport's role may include but not be limited to:</p> <ul style="list-style-type: none"> <li>Develop relationships with SAF suppliers and interested airlines</li> <li>Work collaboratively to identify operational or infrastructure changes needed at the airport to smooth the introduction and use of SAF</li> <li>Support development of SAF locally</li> <li>Support government policies that promote SAF and airlines that wish to use SAF</li> </ul>	H				
50	<p><b>Hydrogen Fuels Viability Assessment</b>            Support external partners (e.g., airlines, energy providers) in assessing the viability of hydrogen fuel-celled small aircraft for suitable routes. Commuter and regional aircraft with &lt;100 seats are prime candidates for electric and hydrogen fuel-cell propulsion; the technology will be ready by 2025 for the smallest planes (9-19 seats, &lt;60-minute flights) and by 2030 for 51-100 seat planes (30-90 min flights) (Waypoint 2050 report, p. 54). These aircraft can be used for pilot training as well as private and commercial flights.</p>	H				
51	<p><b>Improved Tenant Vehicle Operations</b>            Implement one or more policies and programs for tenant vehicles to improve local air quality. Work closely with tenants in policy development, program development, and subsequent operations to ensure sustainability actions are implemented. Examples include but are not limited to:</p> <ul style="list-style-type: none"> <li>No idling</li> <li>Electric and hybrid vehicles, including EV charging</li> <li>Increased mass transportation / seamless links to public transport</li> <li>Expanded bicycle and pedestrian infrastructure that provides safe access and seamless connections</li> </ul>	M				



## Wildlife and Open Areas

Includes airport open and natural space and off-airport downstream water bodies.



### Overarching Sustainability Goal

Protect habitats and minimize the impact on local flora and fauna by managing runoff and controlling wildlife hazards. This goal also supports public health in nearby communities, by reducing water and soil pollution.














### Recommended Strategies

**S11.** Protect and improve natural ecosystems while minimizing wildlife hazards










### Top Recommended Actions

Actions in the table support the strategies listed above and defined in the introduction of **Appendix A**. Reducing soil and water pollution, and minimizing wildlife strikes, helps maintain compliance with existing laws while supporting the overall health of nearby ecosystems and species. In turn, these actions improve local environmental quality and public health.

KEY				
Level of Effort / Expertise	Economic Viability	Operational Efficiency	Natural Resource Management	Social Responsibility
<b>L</b> = Lower effort / expertise	☹ = Minimal economic benefits	☹ = Minimal efficiency benefits	☹ = Minimal resource savings	☹ = Minimal social value
<b>M</b> = Moderate effort / expertise	☺ = Moderate benefits	☺ = Moderate benefits	☺ = Moderate savings	☺ = Moderate value
<b>H</b> = High effort / expertise	☹☹ = Significant benefits	☹☹ = Significant benefits	☹☹ = Significant savings	☹☹ = Significant value

ID	Sustainability Action	 Effort / Expertise	 Economic	 Operational	 Natural Resources	 Social
52	<p><b>Habitat and Species Restoration</b>            Maintain or restore natural habitats to enhance and preserve biodiversity of both habitat and species while maintaining operational and safety-related airport lands. This action is focused on the areas surrounding airports that are disrupted by the airport’s location. It is supported by the other actions in this operational area, as well as the stakeholder engagement actions in the Administration, Leadership, &amp; Workforce operational area, as identifying environmental stakeholders can help protect natural systems (Los Angeles World Airports, <a href="#">p. 84</a>). <a href="#">San Diego</a> and Ocean County, NJ (<a href="#">p. 30</a>) are examples of airports with plans for habitat, species, and ecosystem protection, including native species.</p>	M				
53	<p><b>Stormwater Pollution Mitigation</b>            Protect local watercourses and soil from stormwater and hazardous liquid runoff through enhanced stormwater pollution prevention practices. Airports have taken a variety of approaches to comply with or exceed stormwater requirements:</p> <ul style="list-style-type: none"> <li>▪ <a href="#">San Diego International Airport</a> successfully met and surpassed their goal of reducing dissolved copper and zinc concentration in collected stormwater samples, due to frequent sweeps of “hot spots” and expanded stormwater reuse and infiltration efforts.</li> <li>▪ <a href="#">Fresno Yosemite International Airport</a> implemented low-impact development practices to reduce stormwater runoff volume, rate, and duration.</li> <li>▪ Centennial Airport increased tenant awareness and education surrounding best practices.</li> <li>▪ <a href="#">Dallas-Fort Worth</a> provides training for employees whose work may impact stormwater management.</li> <li>▪ Both Snohomish County Airport - <a href="#">Paine Field</a> and SEA are certified <a href="#">Salmon-Safe</a>, an indication of extensive stormwater and run-off management.</li> </ul>	H				



ID	Sustainability Action	 Effort / Expertise	 Economic	 Operational	 Natural Resources	 Social
54	<p><b>Prevention of Wildlife Strikes</b>            Develop systems to quantitatively track wildlife strikes to identify opportunities to maximize safety and consider completing a Wildlife Hazard Assessment or Wildlife Hazard Site Visit to determine if any wildlife mitigation is needed. Enact programs that minimize adverse effects to wildlife such as fencing, bird avoidance tactics, or a comprehensive Wildlife Hazard Management Plan. According to the U.S. Mission to the International Civil Aviation Organization (ICAO), the FAA will make Airport Improvement Program grants to <a href="#">conduct an assessment</a> and implement eligible, recommended wildlife hazard mitigation.</p>	H				



# **Appendix B**

## **Airport Sustainability Plan Examples and Pros and Cons of Plan Types**



## Appendix B: Airport Sustainability Plan Examples and Pros and Cons of Plan Types

**Appendix B** includes examples and additional context for airports deciding on the best pathway for their sustainability planning process. The three main planning pathways described in **Chapter 3** include:

- Standalone Airport Sustainability Plans (**Section 3.1**)
- Sustainability in Airport Master Plans (**Section 3.2**)
- Ad Hoc Airport Sustainability Efforts (**Section 3.3**)

**Table B-1, Table B-2, Table B-3** include examples for each plan type.

**Table B-1: Examples of Airport Sustainability Plans**

Source Document	Airport Type
<a href="#">Fresno Yosemite International Airport Sustainability Management Plan</a>	Joint military-public primary commercial service
<a href="#">Centennial Airport Sustainability Plan</a>	Large general aviation
<a href="#">Florida Airport Sustainability Tracking/Monitoring System</a>	All
<a href="#">Seattle-Tacoma International Airport Sustainable Airport Master Plan (SAMP)</a>	Large commercial
<a href="#">Fremont County Airport Sustainability Plan</a>	General aviation

*Source: Cascadia Consulting Group, 2024*

**Table B-2: Examples of Sustainability in and/or Integrated Throughout Airport Master Plans**

Source Document	Airport Type
<a href="#">Port of Friday Harbor Strategic Plan</a>	General aviation
<a href="#">Bellingham Airport Master Plan</a>	Primary commercial service small-hub
<a href="#">Juneau International Airport Sustainability Master Plan</a>	General aviation
<a href="#">Portland International Jetport Sustainable Airport Master Plan</a>	Primary commercial service small-hub airport

*Source: Cascadia Consulting Group, 2024*

**Table B-3: Examples of Standalone Sustainability Chapter**

Source Document	Airport Type
<a href="#">Ephrata Municipal Airport Master Plan</a>	General aviation

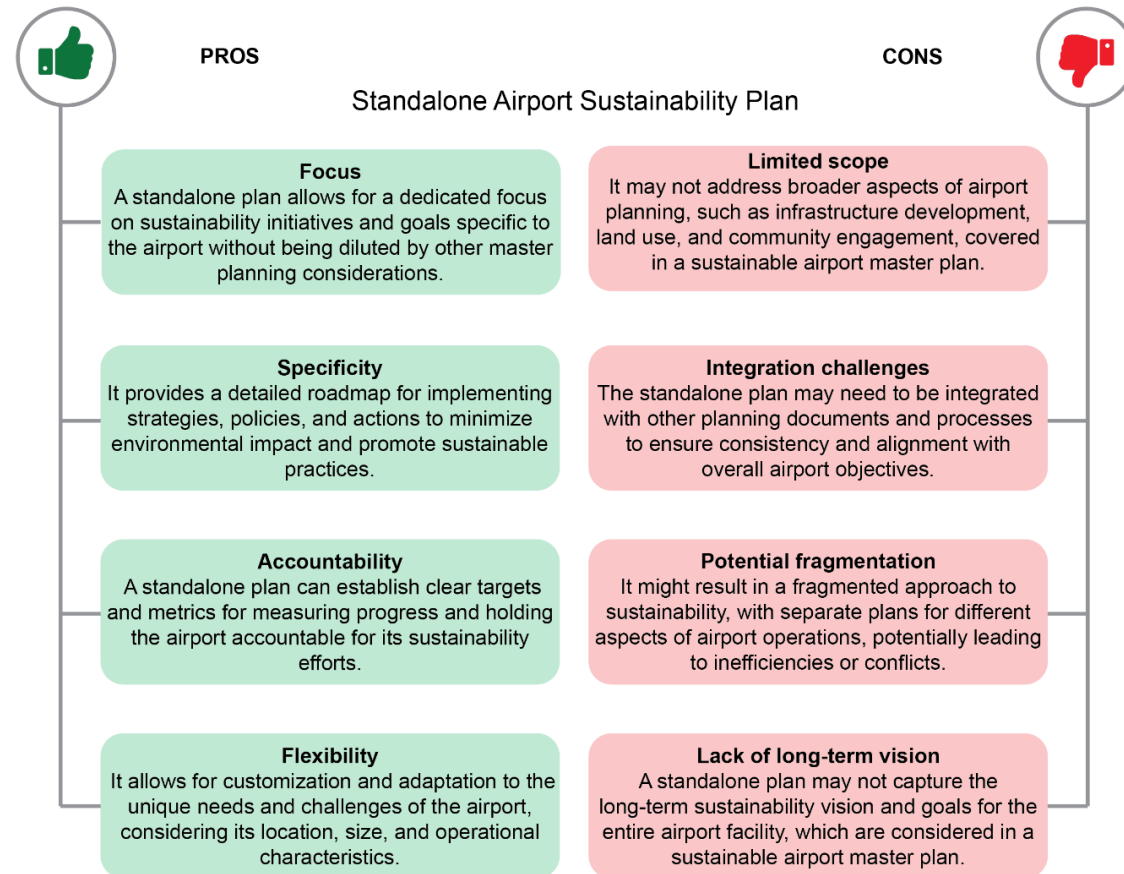
*Source: Cascadia Consulting Group, 2024*

The following show advantages and disadvantages of each type of planning process.

## Standalone Airport Sustainability Plans

Airport Sustainability Plans, also called Sustainable Management Plans, are standalone documents focused on sustainability measures for an airport. **Figure B-1** shows the pros and cons of standalone airport sustainability plans.

**Figure B-1: Pros and Cons of Standalone Airport Sustainability Plans**



Source: Federal Aviation Administration, Report on the Sustainable Master Plan Pilot Program and Lessons Learned, 2012

## Sustainable Airport Master Plan

Airport master plans that incorporate sustainability may be called Sustainable Airport Master Plans or Sustainable Master Plans. Such plans represent a comprehensive approach to planning for the near-term, intermediate, and long-term aviation demands and needs of an airport, users, and community. **Figure B-2** shows the pros and cons of sustainable airport master plans.

**Figure B-2: Pros and Cons of Sustainable Airport Master Plans**



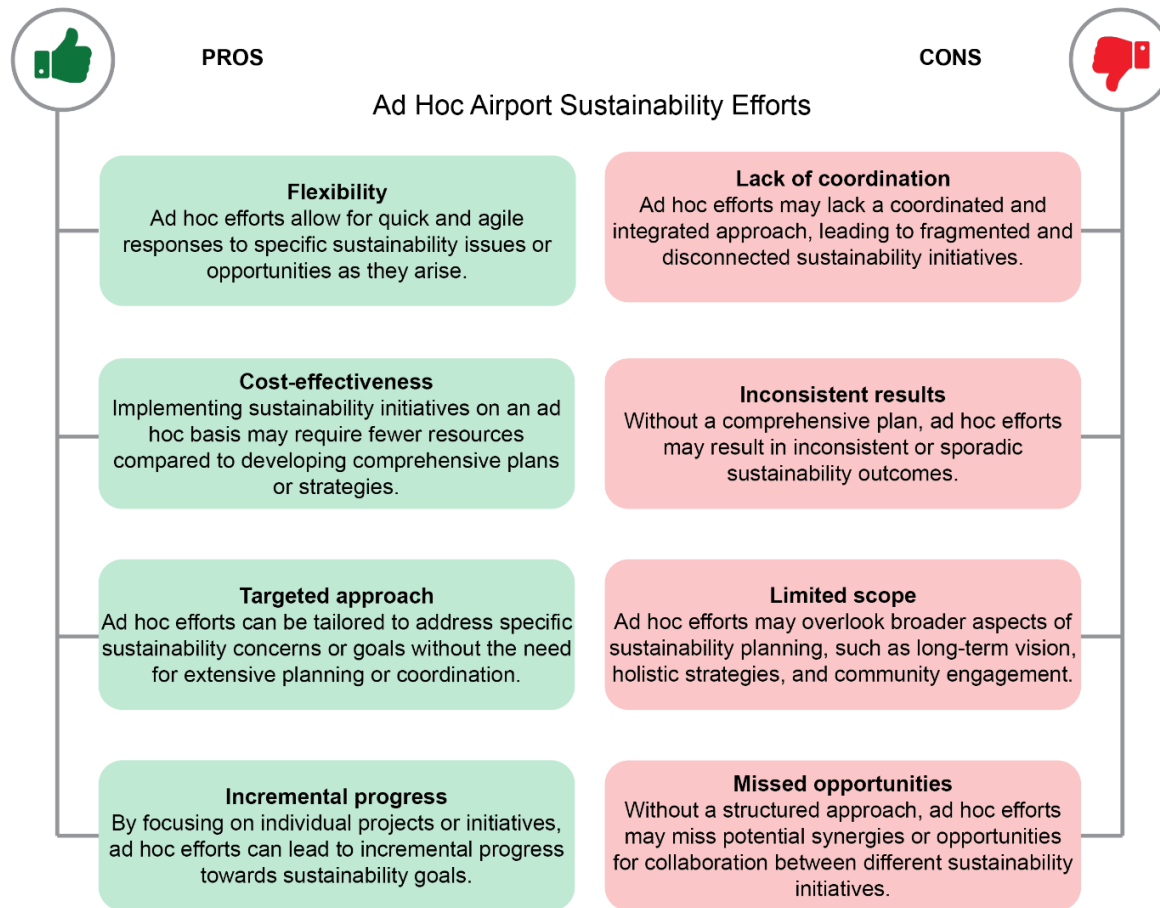
Source: Federal Aviation Administration, Report on the Sustainable Master Plan Pilot Program and Lessons Learned, 2012



## Ad Hoc Airport Sustainability Efforts

Ad hoc sustainability efforts include initiatives that are conducted as needed, on a case-by-case basis, or as opportunities arise during other airport activities. **Figure B-3** shows the pros and cons of ad hoc airport sustainability efforts.

**Figure B-3: Pros and Cons of Ad Hoc Airport Sustainability Efforts**



Source: Federal Aviation Administration, Report on the Sustainable Master Plan Pilot Program and Lessons Learned, 2012



# **Appendix C**

## **Recommended Planning and Implementation Resources**



## Appendix C: Recommended Planning and Implementation Resources

**Appendix C** provides airports with resources to complete the sustainability planning steps. Resources may include examples from other airports, more detailed step-by-step guides (e.g., to complete a GHG emissions inventory), short educational websites or documents, and sample templates and exercises to complete some sustainability steps. **Table C-1** lists resources organized by their corresponding sustainability planning step.

**Table C-1: Recommended Sustainability Planning Resources**

Recommended Resources	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
<p><b>How to create a mission statement</b></p> <p>Walks through 1–2-hour exercise.</p> <p><a href="#">nonprofithub-missionstatement.pdf (alliancems.org)</a></p>	✓						
<p><b>Colorado Department of Transportation General Aviation Airport Sustainability Tool Kit</b></p> <p>Example toolkit from Colorado, published in 2016. Many strong examples to draw from.</p> <p><a href="#">SustainabilityManual.pdf - Google Drive</a></p>	✓	✓				✓	✓
<p><b>Colorado Airport Sustainability Program</b></p> <p>Broader information on sustainability in CO, including case studies and FAQs, primarily GA-focused.</p> <p><a href="#">Colorado Airport Sustainability Program – Colorado Department of Transportation (codot.gov)</a></p>	✓	✓				✓	✓

Recommended Resources	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
<p><b>Sustainable Aviation Guidance Alliance (SAGA)</b></p> <p>Extensive database of sustainability principles, nearly 1,000 potential actions, and planning and monitoring guidance (much of which is already incorporated in this Plan). Good resource if airport is looking for action ideas beyond those included in this Plan.</p> <p><a href="http://airportsustainability.org">SAGA HOMEPAGE (airportsustainability.org)</a></p>		✓					✓
<p><b>Creating SMART Goals and Objectives</b></p> <ul style="list-style-type: none"> <li>Clearly distinguishes between outcomes, goals, objectives, and metrics.</li> <li>Provides exercise to define inputs needed to achieve outcomes.</li> </ul> <p><a href="#">EvaluationTips SMARTGoalsObjectives.pdf (firstnations.org)</a></p>		✓					✓
<p><b>Waypoint 2050 Report</b></p> <p>Explores three scenarios for the aviation industry to reach net-zero by 2050. Includes deep dives and action ideas for aircraft technology, airport operations and infrastructure, sustainable aviation fuel, and offsets. Excellent resource for deeper education.</p> <p><a href="http://aviationbenefits.org">Waypoint 2050: Aviation: Benefits Beyond Borders (aviationbenefits.org)</a></p>		✓	✓				✓

Recommended Resources	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
<p><b>Airport Sustainability Practices: Drives and Outcomes for Small Commercial and GA Airports</b></p> <p>Explores drivers and outcomes of sustainability initiatives, including specific examples from GA airports. From Airport Cooperative Research Program (2016).</p> <p><a href="#">Airport Sustainability Practices—Drivers and Outcomes for Small Commercial and General Aviation Airports   The National Academies Press</a></p>			✓		✓	✓	✓
<p><b>WA Environmental Health Disparities Map</b></p> <p>Interactive map of health disparities from exposure to ozone, particulate matter, and other pollutants. Maps 19 indicators across census tracts. Use to understand local airport pollution, identify communities to engage, inform which sustainability actions to pursue, and inform which KPIs to track over time.</p> <p><a href="#">Washington Environmental Health Disparities Map   Washington State Department of Health</a></p>			✓			✓	✓
<p><b>Liberating Structures</b></p> <p>A toolbox of 33 engagement exercises that can be used for virtually any situation where input is needed.</p> <p><a href="#">Liberating Structures – Introduction</a></p>	✓	✓	✓	✓	✓		✓

Recommended Resources	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
<p><b>IAP2 Core Values, Ethics, and Spectrum</b></p> <p>Provides context and sample goals for engagement from the key professional society for public engagement.</p> <p><a href="https://iap2.org">Core Values, Ethics, Spectrum – The 3 Pillars of Public Participation – International Association for Public Participation (iap2.org)</a></p>	✓	✓	✓	✓	✓		✓
<p><b>San Diego Airport 2022-2023 Sustainability Plan</b></p> <p>Extensive list of stakeholders and summary of their materiality assessment process and results (p. 57-60).</p> <p><a href="https://san.org">Sustainability (san.org)</a></p>			✓				
<p><b>How to conduct a materiality assessment (general)</b></p> <p>3-minute overview.</p> <p><a href="#">How and Where to Start a Materiality Assessment - YouTube</a></p>			✓	✓	✓	✓	✓
<p><b>How to conduct a materiality assessment (detail)</b></p> <p>1-hour presentation on how two Wisconsin companies completed their materiality assessments.</p> <p><a href="https://youtube.com">How to Conduct a Materiality Assessment (youtube.com)</a></p>			✓	✓	✓	✓	✓
<p><b>A Practical Guide to Sustainability Reporting Using Global Reporting Initiative (GRI) and Sustainability Accounting Standards Board (SASB) Standards</b></p> <p>Examples of stakeholders and how they are engaged (p. 15-18). Also good for broader reporting information.</p> <p><a href="https://globalreporting.org">gri-sasb-joint-publication-april-2021.pdf (globalreporting.org)</a></p>			✓	✓	✓	✓	✓



Recommended Resources	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
<p><b>GHG Protocol Corporate Standard, Guidance, and Tools</b></p> <p>Recommended for conducting airport GHG inventories. Includes:</p> <ul style="list-style-type: none"> <li>Standard (<a href="#">Corporate Standard   GHG Protocol</a>): Step-by-step instructions for completing GHG inventory</li> <li>Guidance (<a href="#">Guidance   GHG Protocol</a>): Additional guidance on key topics. Scope 3 guidance is likely the most relevant.</li> <li>Tools (<a href="#">Calculation Tools and Guidance   GHG Protocol</a>): Downloadable tools to complete a GHG inventory. Use the cross-sector tools.</li> </ul>						✓	
<p><b>U.S. EPA GHG Inventory Tools</b></p> <p>Simpler approach to conduct a GHG inventory. Includes both a community and local government tool. Download both using the same link. Review each to determine best fit for airport. Can use “additional emissions sources” tabs to fill gaps.</p> <p><a href="#">Local Greenhouse Gas Inventory Tool   US EPA</a></p>						✓	
<p><b>Types of Electric GSE</b></p> <p>Brief overview of common GSE available as electric equipment. Reviews benefits.</p> <p><a href="#">Types Of Electric Airport Ground Support Equipment (fluxpower.com)</a></p>							✓

Recommended Resources	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
<p><b>Comparing LEED and Living Building Certifications</b></p> <p>Overview of the key features, including cost, of two common green building certifications. Since requirements evolve over time, it's recommended to confirm current features and requirements before making a decision.</p> <p><a href="#">Navigating net-zero energy and net-zero carbon building certifications   GreenBiz</a></p>							✓
<p><b>Sample Key Performance Indicators (KPIs) for airports</b></p> <p>Common KPIs from six well-regarded sustainability frameworks (compiled by SAGA). Includes example.</p> <p><a href="https://view.officeapps.live.com/op/view.aspx?src=http%3A%2F%2Fwww.airportsustainability.org%2FSAGA_Indicators.xlsx&amp;wdOrigin=BROWSELINK">https://view.officeapps.live.com/op/view.aspx?src=http%3A%2F%2Fwww.airportsustainability.org%2FSAGA_Indicators.xlsx&amp;wdOrigin=BR OWSELINK</a></p>							✓
<p><b>Sample Monitoring Template</b></p> <p>Basic monitoring template. See Appendix F for alternatives.</p> <p><a href="#">SAGA Action and Monitoring Plan Template.xls (live.com)</a></p>							✓

Source: Cascadia Consulting Group, 2024

# **Appendix D**

## **KPIs to Measure Progress on Airport Sustainability**



## Appendix D: KPIs to Measure Progress on Airport Sustainability

There are hundreds of different key performance indicators (KPIs) to measure airport sustainability performance. It may require years to build up a strong foundation for accurately defining, measuring, and monitoring KPIs. However, a few key measurements (shown in **Table D-1**) are widely used, accepted, and should be considered in the airport's baseline assessment, performance monitoring, and communications (see Step 7). For additional ideas, SAGA compiled sample KPIs from six well-regarded sustainability frameworks ([view them here](#)), and options organized by EONS pillar are summarized in **Section 4.7.1**. Airports should begin by measuring and establishing a baseline, then track percent change on a regular basis, such as annually, and evaluate and share progress. See Step 5 for additional guidance.

**Table D-1: Airport Sustainability Key Performance Indicators (KPIs)**

Focus Area	KPI	Units*
<b>Energy Consumption</b>		MJ or BTUs
	Electricity consumed	kWh or MWh
	Electricity cost	\$ USD
	Natural gas or heating fuel	therm or gallons
	Vehicle fuel (by type)	gallons or liters
	vehicle fuel cost	\$ USD
	Renewable energy used/generated	kWh or MWh
<b>Water Management</b>		
	Potable water consumed	gallons or CCF
	Potable water cost	\$ USD
	Stormwater exceedances	#
	Aircraft & pavement deicing & anti-icing fluid used	
<b>Solid Waste</b>		cubic yards or tons
	Solid waste to landfill	cubic yards or tons
	Solid waste recycled and/or composted	cubic yards or tons
	Solid waste disposal costs	\$ USD
<b>Other</b>		
	Noise complaints	#
	Wildlife strikes per 10,000 aircraft movements	#

**KEY to acronyms** MJ = megajoule | BTUs = British thermal units | kWh = kilowatt hour | MWh = megawatt hour | USD = U.S. Dollar | CCF = centum cubic feet

Source: Cascadia Consulting Group, 2024

# **Appendix E**

## **Blank Planning Templates**





## Appendix E: Blank Planning Templates

### Template 1: Action Selection Template

**Instructions:** The tables include all actions from Appendix A. Delete the rows for the actions you do *not* want to include. See **Table A-1** for a description of strategies.

#### Administration, Leadership and Workforce

Action ID	Action Description	Applicable Strategy
1	<b>Sustainability Plan Development</b> Progress through a step-by-step plan development process to define sustainability, craft mission and vision, identify goals, engage stakeholders, determine actions, gather data, and assess progress.	S1
2	<b>Funding Allocations for Sustainability</b> Establish financing systems that facilitate investments, emergency funds, and cash-flow availability to develop sustainability initiatives. Develop a proposal to allocate future funding to support sustainability initiatives.	S1
3	<b>Airport Sustainability Vision</b> Craft a sustainability vision based on an assessment of the airport's current approach to sustainability, baseline conditions, research on sustainability policies and practices of peer organizations, and input from partners.	S1
4	<b>Environmental Compliance Program</b> Implement a program to ensure compliance with all environmental and noise rules and regulations.	S1
5	<b>Lead Designation and Implementation Team Formation</b> Designate an overall lead and form an Implementation Team to coordinate activities across the organization, consisting of Sustainability Leads from each division as applicable. Coordinate with internal champion, if different than lead.	S1
6	<b>Performance Tracking System</b> Create a sustainability performance tracking system to compare and monitor sustainability initiatives across the airport. This system may be used solely internally or have some external components. It could be integrated with annual sustainability reporting.	S1
7	<b>Annual Sustainability Reporting</b> Prepare an annual sustainability report that documents the airport's activities and progress. Update the list of sustainability practices as needed. If a sustainability tracking system is available, annual reporting could be integrated into it.	S1
8	<b>Regular GHG Inventories</b> Conduct and maintain a Scope 1, 2, & 3 GHG emissions inventory every 3 to 5 years to measure airport emissions and report/monitor results of emission reduction activities.	S1

Action ID	Action Description	Applicable Strategy
9	<p><b>Carbon Offsets Purchases</b>            Purchase high-quality, verified carbon offsets using a reputable broker. High-quality offsets meet minimum criteria (real, permanent, additional, not double-counted, and avoid leakage), are within the "supply chain" of the purchaser, provide community benefits where the projects are located, prioritize international projects in least-developed and/or low-income countries (consistent with global climate commitments), are balanced between emissions avoidance and carbon removal/storage, and provide transparent, frequent monitoring and reporting of project status. A simple way to ensure a high-quality offset is to look for projects or programs carrying third-party certification, especially the Voluntary Carbon Markets Integrity Initiative (VCMI) <a href="#">Claim Code</a> (Silver, Gold, or Platinum). Projects with the <a href="#">Gold Standard</a> for the Global Goals certification (search for projects <a href="#">here</a>), meeting Verra's <a href="#">Climate, Community, and Biodiversity Standards</a>, or meeting Verra's <a href="#">Sustainable Development Verified Impact Standard</a> (see Verra projects <a href="#">here</a>) are all examples of third-party verification, are more likely to hold the VCMI Claim Code, and have many projects located outside the U.S..</p>	S1
10	<p><b>Airport Sustainability Accreditation</b>            Accelerate and expand energy and emission reduction activities through the <a href="#">Airport Carbon Accreditation</a> (or similar) program. <a href="#">Salt Lake City's</a> airport has reduced GHG emissions by 25% per passenger since joining program.</p>	S1
11	<p><b>Employee Sustainability Training(s)</b>            Provide education and training with specific sustainability and environmental goals in mind, targeted towards employees that can impact those areas. Goals will vary by their overall sustainability impact and ease of behavior change. Consider choosing 1-3 goals that can build momentum for broader sustainability progress.</p>	S2
12	<p><b>Sustainability Staff Hiring</b>            Build critical staff capacity to support development and implementation of sustainability initiatives. This includes:</p> <ul style="list-style-type: none"> <li>▪ Evaluate needed staff capacity and, if necessary, hire additional staff to implement sustainability initiatives. A centralized coordinator or team benefits most sustainability efforts significantly.</li> <li>▪ Provide education on airport sustainability initiatives for new hires during onboarding process.</li> </ul>	S2

Action ID	Action Description	Applicable Strategy
13	<p><b>Employee and Tenant Engagement</b>            Develop a system to engage primary stakeholders (aircraft operators, employees, tenants, etc.) in advancing and providing feedback on airport sustainability objectives. Opportunities may include surveys, educational events, committees or green teams, and/or periodic volunteer programs. These efforts can integrate with other airport initiatives, such as the Port of Seattle’s <a href="#">Airport University</a> that supports lower-income airport workers with education for career advancement.</p>	S2

### Building, Facility and Airside Operations

Action ID	Action Description	Applicable Strategy
14	<p><b>Reduced Aircraft Taxi Times – mostly applicable to large airports with ATC</b>            Work with airlines and other operators to integrate efficient airfield procedures and configurations to minimize aircraft taxi times and the use of engines while on the ground. In <a href="#">Salt Lake City</a>, airplane taxi time reductions can reduce carbon emissions by 15,000 tons annually. Possible procedures and configurations include but are not limited to:</p> <ul style="list-style-type: none"> <li>▪ <b>Virtual airport departure queues:</b> New software and hardware tools can generate 15-minute departure blocks, which means aircraft spend more time at the gate and less time taxiing. This reduces surface congestion, as well as fuel use, emissions, and noise.</li> <li>▪ <b>Electric taxiing systems:</b> Electric motors fitted to landing gear can guide the aircraft to the runway without the use of aircraft engines. According to the <a href="#">Waypoint 2050 report</a>, this can cut CO<sub>2</sub> emissions and unburdened hydrocarbons by over 60%, and NO<sub>x</sub> emissions from taxiing by over 50%.</li> <li>▪ <b>Remote taxiing systems:</b> Using a special tug, an electric taxiing system could be managed remotely by the pilot. Only the auxiliary power unit would run during this time, reducing up to 85% of emissions at airports with long taxi distances.</li> <li>▪ <b>Taxi on fewer engines:</b> Some aircraft may be able to taxi on a reduced number of engines, then start the remaining engines near the runway.</li> </ul>	S3

Action ID	Action Description	Applicable Strategy
15	<p><b>Flight Operations Efficiencies</b> – <i>mostly applicable to large airports with ATC</i></p> <p>In partnership with Air Traffic Control, suggest changes to operational strategies to reduce emissions from takeoff and landing. Strategies include but are not limited to:</p> <ul style="list-style-type: none"> <li>▪ <b>Airport Collaborative Decision Making (A-CDM):</b> A-CDM is an information sharing approach between aircraft, ground handler, and air traffic control that provides more accurate turn-around information for airlines and improves the overall efficiency of airport-based operations. The U.S. is working to implement A-CDM at 27 airports by 2024.</li> <li>▪ <b>Perfect flight principles:</b> "Perfect flight" refers to the practice of using a single commercial flight to set the optimum standard for flight efficiency, then deploying efficiencies into everyday operations to improve overall performance.</li> <li>▪ <b>Continuous descent and climb:</b> Enabled by airspace design and instrument procedure design, air traffic control can facilitate aircraft's ability to follow a flexible, optimum flight path to reduce fuel use, emissions, and noise. At busy airports and during busy periods, air traffic controllers may need to intervene to ensure safe departures and arrivals, which can limit use during busy times.</li> <li>▪ <b>Performance-based navigation (PBN):</b> PBN helps provide precise, efficient flight paths. It can assist with continuous descent by using GPS and satellite technology to enable arrivals to occur in pre-determined arcs, reducing noise, fuel use, and emissions.</li> </ul>	S3

Action ID	Action Description	Applicable Strategy
15	<p><b>Flight Operations Efficiencies (continued)</b></p> <ul style="list-style-type: none"> <li>▪ <b>Required navigation performance (RNP):</b> RNP builds on PBN to enable aircraft to fly with a high degree of accuracy and integrity on a particular flight path. According to the <a href="#">Waypoint 2050 report</a>, GE Aviation calculated that standardized RNP would save 49,000 tons of fuel and 124,556 tons carbon dioxide (CO<sub>2</sub>) per year if implemented at 46 regional airports in the U.S. Additional assessment is needed to determine if the investment is justified by airport operating conditions. Engagement with nearby communities is also needed if traditional flight paths would shift.</li> <li>▪ <b>Trajectory-based operations (TBO):</b> TBO helps optimize flights from departure to arrival and therefore can improve fuel efficiency. It requires greater data sharing through A-CDM and air traffic flow management to implement.</li> <li>▪ <b>Formation flight:</b> According to flight tests, when aircraft follow another aircraft closely enough, they benefit from the "wake" created, reducing fuel use an estimated 5-10% (and therefore emissions) without sacrificing passenger comfort. Collaboration with air traffic control is needed to implement.</li> <li>▪ <b>Flexible use of military airspace:</b> When the most efficient route, flying directly through military airspace when it is not in use--rather than around it--reduces fuel use and emissions. Significant trust, collaboration, and negotiation is needed, as civil air traffic management would manage the airspace temporarily and confidentiality of military operations would need to be maintained.</li> </ul>	S3
16	<p><b>Pre-Conditioned Air or Ground Power at the Gate</b></p> <p>Install and deliver preconditioned air and/or ground power to gates to reduce emissions from aircraft auxiliary fuel burn, improve air quality, reduce energy costs, and increase energy efficient. The <a href="#">Waypoint 2050 report</a> noted that at a major hub airport, over 100,000 tons of CO<sub>2</sub> were reduced per year; aircraft noise was also reduced. <a href="#">Columbus Airport</a> installed pre-conditioned air units at 11 jet bridges utilizing FAA funding, which covered 75% of project costs.</p>	S3

Action ID	Action Description	Applicable Strategy
17	<p><b>Sustainable Purchasing</b>            Develop responsible procurement policies and practices, assess suppliers in terms of sustainability, and support economic growth of the community through local purchasing. Airports take a variety of approaches to sustainable purchasing:</p> <ul style="list-style-type: none"> <li>▪ <a href="#">Denver</a> emphasizes Green Seal-approved, Energy Star, and locally recyclable and compostable products.</li> <li>▪ <a href="#">Bert Mooney Airport</a> aims to increase their number of environmentally friendly products by 25% with a goal of 75% green products by 2017.</li> <li>▪ <a href="#">Chicago</a> uses a point-based system to incentivize the use of green products and green products purchasing, while <a href="#">Vancouver</a> (Canada) includes sustainability as a weighted component of purchasing decisions.</li> <li>▪ <a href="#">Tampa</a>'s sustainable procurement strategy includes lifecycle cost comparisons, green products purchasing, and general waste reductions as cost-reducing measures.</li> <li>▪ <a href="#">Huntington Tri-State Airport</a> focuses on waste diversion, reduction, and reuse by emphasizing durable products over single-use, environmentally friendly products, reduction in packaging, and reuse and recycling of materials. They also communicate the environmental performance expected in products to manufacturers and suppliers.</li> </ul>	S4

Action ID	Action Description	Applicable Strategy
18	<p><b>Waste Management Program</b>            Develop an airport waste management program that encourages reducing, reusing, composting, and recycling waste and avoiding single-use materials. This may include:</p> <ul style="list-style-type: none"> <li>▪ <b>Set attainable goals for waste reduction and measure progress:</b> Metrics to consider include overall waste generated, waste diverted, and the number of tenants with recycling programs (see the ABQ Sustainable Master Plan, <a href="#">p. 32</a>).</li> <li>▪ <b>Make it easier for travelers and employees to reduce waste:</b> <a href="#">San Diego</a> has zero waste carts with reusable utensils and service ware for airport staff and large meetings. Both <a href="#">Massport</a> and Seattle-Tacoma International (SEA) use liquid collection stations. Increasing the number of waste collection bins (recycle, trash, and compost) with clear signage also reduces waste.</li> <li>▪ <b>Coordinate with airlines, air cargo operators, and local waste management entities/haulers to reduce waste from flight operations:</b> Combining waste removal and recycling services with other airport tenants may reduce operating costs for all parties. Utilization of local waste management firms and partnerships with various environmental programs are also common. See, for example, <a href="#">Los Angeles</a>'s coordination with waste vendors to track waste and recycling data and Huntington Tri-State Airport (<a href="#">p. 32</a>).</li> <li>▪ <b>Develop and distribute passenger education and information materials on proper recycling:</b> Education and outreach can reduce recycling contamination and produce more efficient recycling practices, thus reducing overall waste. <a href="#">SEA</a> offers a variety of educational resources to help tenants with recycling and composting measures; <a href="#">WA state</a> offers a free "recycle right" partner toolkit.</li> </ul>	S4
19	<p><b>Waste Monitoring</b>            Perform waste composition studies or recycling audits to focus efforts and track the results of airport waste reduction programs. Audits can help determine where to focus waste diversion and reduction efforts; <a href="#">San Diego</a>, <a href="#">Los Angeles</a>, and Huntington Tri-State Airport (<a href="#">p. 30</a>) are examples of airports that conduct waste and recycling audits.</p>	S4
20	<p><b>Water Bottle Refilling Stations</b>            Install water bottle refilling stations to reduce single-use plastics and waste to landfill.</p>	S4
21	<p><b>Airport Air Filtration System Upgrades</b>            Upgrade facility air filtration systems to improve indoor air quality and provide better protection against airborne viruses.</p>	S5

Action ID	Action Description	Applicable Strategy
22	<p><b>Refrigerant Replacement</b> Upgrade HVAC and refrigeration systems to high-efficiency, low global warming potential (GWP) systems to reduce refrigerant use. Refrigerants like chlorofluorocarbons (CFCs) and hydrofluorocarbons (HFCs) are short-lived GHGs many times more potent than CO<sub>2</sub>.</p>	S5
23	<p><b>Energy Efficiency Projects in Buildings</b> Identify and implement energy efficiency projects and power down technologies to reduce facility energy consumption and build resilience to climate risks and natural and other disasters. Alternatives include installing LED lighting, investing in motion sensing lights, solar-powered back-up generators, etc. LEDs, for example, reduce energy use and last longer than traditional bulbs, reducing maintenance costs and saving money (see the <a href="#">Nashville</a> and <a href="#">Juneau</a> airports for examples). Utilities often provide rebates to help cover the upfront installation cost.</p>	S6
24	<p><b>Energy Auditing</b> Perform energy audits for airport-operated facilities to identify energy saving opportunities and prioritize reduction projects. Complete low-cost or no-cost projects. For example, installing LEDs on runways and taxiways improves visibility, saves energy, and reduces maintenance and lifetime costs. Airports that have implemented LEDs on runways and/or taxiways include Centennial Airport (CO; <a href="#">p. 24</a>), Riverside Airport (CA; <a href="#">p. 19-20</a>), <a href="#">Salt Lake City</a>, and <a href="#">Columbus</a> (OH).</p>	S6
25	<p><b>Energy Monitoring</b> Implement energy monitoring systems to evaluate and compare changes in energy demand and identify opportunities for improvement. Energy Star's <a href="#">Portfolio Manager</a> is a useful tool. For example, <a href="#">LAWA Airport</a> (p. 19) is increasing metering and sub-metering to help manage energy use.</p>	S6
26	<p><b>High-Efficiency Water Fixtures</b> Install low-flow and high-efficiency fixtures to reduce airport water usage. <a href="#">Fresno Yosemite International Airport</a> noted that if all current fixtures were replaced by high-efficiency fixtures, they could save approximately 293,307 gallons of water annually or 23% of current use.</p>	S6
27	<p><b>Drought-Tolerant Landscaping</b> Reduce consumption of potable water in landscaping through use of reclaimed/recycled water or rainwater for irrigation. Use drought-adapted landscaping and water less frequently. Livermore Municipal Airport (<a href="#">p. 28-29</a>), Riverside Municipal Airport (<a href="#">p. 19-20</a>), and Los Angeles World Airports (<a href="#">p. 37-39</a>) all plan to reduce water usage and costs; Livermore and Los Angeles plan to use recycled or reclaimed water for landscaping and other non-potable demands.</p>	S6



Action ID	Action Description	Applicable Strategy
28	<p><b>Green Power Purchases</b> Procure greener power through partnerships and programs with local utilities to reduce emissions. Many airports already procure green power, such as <a href="#">Dallas-Fort Worth</a> and <a href="#">Columbus</a>.</p>	S7
29	<p><b>Renewable Energy Installation</b> Install on-site solar or wind energy projects to reduce long-term costs of purchased electricity. Outcomes of these projects include reduced energy usage, cost savings, and even land-lease revenue for certain airports leasing land to solar contractors. Airports, including GA, have already installed renewable energy on-site. Smyrna/Rutherford County Airport (TN; <a href="#">p. 26</a>) leased land to a solar contractor, at no cost to the airport and now generates revenue from the installation. Lakeland Linder Regional Airport (FL; <a href="#">p. 25</a>) took a different approach, using a public-private partnership with the regional utility company, resulting in minimal costs. Dallas Fort Worth (<a href="#">DFW</a>) uses renewable energy (wind and solar) to cover 100% of their electricity, some of which is self-generated.</p>	S7
30	<p><b>Electric Ground Service Equipment</b> Install and/or expand charging stations for tenant GSE to reduce emissions and improve local air quality. Electric ground support options are <a href="#">already available</a> and in use at SEA and other airports across the U.S. The FAA's <a href="#">VALE program</a> funds these upgrades.</p>	S8

## Community

Action ID	Action Description	Applicable Strategy
31	<p><b>Passenger Sustainability Education</b> Engage airport users on sustainability efforts occurring at the airport and actions they can take while traveling. Examples of actions airport users can take include packing light, bringing a reusable water bottle and utensils, choosing flights with as few stops as possible, and choosing ground transportation that avoids driving alone.</p>	S2
32	<p><b>Community Engagement for Sustainability Action</b> Using the information in Step 3, develop and implement a plan to equitably engage community members, businesses, and other stakeholders (e.g., community-based organizations, schools).</p>	S2
33	<p><b>Human Trafficking Educational Materials</b> Provide educational materials and public signage to inform staff and passengers on how to recognize and respond to concerns related to human trafficking.</p>	S9
34	<p><b>Noise Abatement Plans</b> Follow FAA guidelines and develop an airport-specific noise abatement plan.</p>	S9

Action ID	Action Description	Applicable Strategy
35	<p><b>Noise Reduction Incentives for Aircraft Operators</b>            Create an incentive program (“Fly Quiet”) to engage and encourage aircraft operators to reduce noise during takeoff and landing. Airports such as LAX (p. 81), San Diego, and SEA have a Fly Quiet or similar program.</p>	S9
36	<p><b>Sound Barriers</b>            Construct sound barriers to reduce noise disturbance for neighboring communities. The FAA provides grants to help with sound insulation for surrounding neighborhoods (e.g., LAX, p. 81).</p>	S9
37	<p><b>Community Engagement on Noise Impacts</b>            Work with communities to develop metrics and mitigations from changes to noise and air quality from implementation of sustainability measures. Sustainability actions that reduce emissions or save fuel on aircraft approach and takeoff can result in new, increased, or decreased impacts on communities from changes to noise and air quality.</p>	S9

## Construction and Planning

Action ID	Action Description	Applicable Strategy
38	<p><b>Resilience Improvements for Existing Infrastructure</b>            Develop infrastructure and operational capacity to handle stronger winds, increased flooding, extreme temperatures, wildfire and wildfire smoke, earthquakes, pandemics, and other disasters to support resiliency and improve safety. Steps include:</p> <ol style="list-style-type: none"> <li>1. Conduct vulnerability and hazard mitigation assessment of existing facilities.</li> <li>2. Conduct feasibility assessments for potential facility improvements.</li> <li>3. Prioritize, fund, and build facility improvements.</li> </ol>	S5
39	<p><b>Sustainable Construction Methods for New Facilities and Major Retrofits</b>            Incorporate sustainability into facility design and construction policies and practices for all new facilities and major retrofits. This includes building for resilience to stronger winds, increased flooding, extreme temperatures, wildfire and wildfire smoke, earthquakes, pandemics, and other disasters. Follow <a href="#">LEED</a>, <a href="#">Envision</a>, or similar green building practices and consider certification of projects. College Park Airport (MD; <a href="#">p. 22</a>) noted increased community goodwill and reduced operational costs though LEED Silver certification. Los Angeles World Airports noted that LEED-certified buildings have an average of 30-40% water savings (<a href="#">p. 37-39</a>). Tampa International Airport (FL) reconfigured ground transportation to remove 3.8 million vehicles from the road each year, remediated two brownfields, and preserved public art to achieve <a href="#">Envision Verified</a>. The expansion of Terminal 2 at San Diego International Airport (CA) earned <a href="#">Envision Platinum</a> for creating 5,000 jobs during construction, preserving greenfields, remediating an old landfill, employing sustainable landscaping, and demonstrating sustainability leadership nationally. <a href="#">Ithaca Tompkins Regional Airport</a> took a different approach: while in need of a new terminal, they noted that the most sustainable option is the option you already have and opted to reconfigure their current terminal space rather than developing a new one.</p>	S5
40	<p><b>Proactive Infrastructure Planning for Aviation Innovations</b>            In airport expansion plans, plan ahead for the necessary infrastructure for a clean electricity supply, green hydrogen, and battery recharging facilities. This planning should be possible now, in time for the small-scale infrastructure that will be needed soon and the increase in these technologies for regional traffic in the 2030s. Additionally, plan for adaptations to ground infrastructure to accommodate new aircraft design concepts for commercial aircraft (see p. 44 of the <a href="#">Waypoint 2050 report</a>), such as <a href="#">blended wing bodies</a> (e.g., the <a href="#">Bombardier Ecojet</a>) and strut-braced wings.</p>	S8
41	<p><b>Proactive Community Planning for Airport Expansion</b>            Minimize involuntary resettlement of communities and adverse noise effects during airport expansion. Develop and implement a plan for this.</p>	S9

## Fleet Vehicle & Equipment

Action ID	Action Description	Applicable Strategy
42	<p><b>Vehicle and Equipment Fleet Sustainability</b> Invest in lower emission vehicles and equipment for airport-operated vehicle/equipment fleet to improve local air quality. Alternatives to consider include electric, hybrid, and alternative-fueled vehicles and equipment, so long as the lifecycle emissions of the alternative are lower than the conventional fossil fuels being used. For electricity, the local utility will likely be the supplier. In the case of some alternative fuels, the airport may need to confirm fuel availability with current suppliers or secure a new supplier. Examples of equipment include but are not limited to snow removal equipment, lawnmowers, and tractors. SEA uses thermal renewable natural gas from landfill waste to heat the airport terminal and power their bus fleet.</p>	S8

## Ground Transportation & Parking

Action ID	Action Description	Applicable Strategy
43	<p><b>Consolidated Facilities for Car Hires and Hotel Shuttles</b> Consolidate off-airport car hire facilities (e.g., rental cars, ride-hailing services) and hotel shuttle services to reduce congestion and improve local air quality. For example, <a href="#">SEA</a> updated airport contracts to require taxis, ride-hailing services, and shuttle-to-door services serving SEA to be high MPG or alternative-fueled vehicles.</p>	S10
44	<p><b>Passenger Ground Transportation Efficiencies</b> Develop strategies to reduce emissions from passenger transportation to airport to minimize congestion and vehicle emissions. Alternatives may include increased mass transportation, seamless links to public transport, minimum MPG requirements for taxi and/or ride-hailing services, terminal free-flowing forecourt design, no-idle policy, and safe access for pedestrians and cyclists. For example, Massport's 2019 <a href="#">sustainability report</a> reported that increase mass transport options to the airport reduced emissions.</p>	S10
45	<p><b>Dedicated EV Charging and Parking</b> For those who still need to drive to the airport, provide dedicated parking spaces and EV-ready charging equipment to charge EVs. Work with an experienced consultant to determine the anticipated demand and cost for EV charging over time and plan accordingly. Additionally, consider priority parking locations for EVs.</p>	S8

## Tenant Operations

Action ID	Action Description	Applicable Strategy
46	<p><b>Tenant Lease Agreement Opportunities</b>            Embed environmental and sustainability considerations into tenant lease agreements to focus on environmental compliance and liability, and support conformance with airport sustainability goals. Work closely with tenants in lease negotiation and subsequent operations to ensure sustainability actions are implemented. Examples include but are not limited to waste reduction and diversion, sustainable purchasing, energy and water conservation, and low-emissions vehicles and equipment. While the focus is not airports, the Urban Land Institute offers two helpful resources for sustainable leasing: a short <a href="#">step-by-step process</a> for sustainable leasing and a <a href="#">reference guide</a> with ideas to include in leases. As another example, Huntington Tri-State Airport includes waste provisions in lease agreements (<a href="#">p. 29</a>).</p>	S1
47	<p><b>Aircraft Electrification Plan</b>            Work with airlines and operators to develop a plan to electrify suitable routes and/or aircraft, in collaboration with other departments and external partners. Commuter and regional aircraft with &lt;100 seats are prime candidates for electric and hydrogen fuel-cell propulsion; the technology will be ready by 2025 for the smallest planes (9-19 seats, &lt;60-minute flights) and by 2030 for 51-100 seat planes (30-90 min flights). Furthermore, aircraft with hybrid-electric propulsion will become increasingly available: small aircraft (15-20 seats) are expected in the 2020s, regional aircraft (50-100 seats) by the 2030s, and potentially larger aircraft by the 2040s. These aircraft can be used for pilot training and private and commercial flights.</p> <p>Steps include:</p> <ol style="list-style-type: none"> <li>1. Identify suitable routes and/or airlines interested in operating electric aircraft from the airport.</li> <li>2. Determine needed infrastructure and funding to support electric routes/aircraft.</li> <li>3. Invest in and build needed infrastructure.</li> </ol>	S8
48	<p><b>Electric Aircraft Maintenance Trainings</b>            To support effective operations and maintenance of electric aircraft, support training for relevant tenant employees in the operations and maintenance of electric aircraft.</p>	S8

Action ID	Action Description	Applicable Strategy
49	<p><b>Planning for Sustainable Aviation Fuels</b>            Develop policies and operational capacity to support the delivery and use of sustainable aviation fuels (SAF), which are made from more sustainable sources than fossil fuels. Like conventional jet fuel, SAF is a drop-in fuel that can have up to 90% fewer emissions on a lifetime basis; current SAF averages 40-60% carbon savings on a lifetime basis. The airport's role may include but not be limited to:</p> <ul style="list-style-type: none"> <li>▪ Develop relationships with SAF suppliers and interested airlines</li> <li>▪ Work collaboratively to identify operational or infrastructure changes needed at the airport to smooth the introduction and use of SAF</li> <li>▪ Support development of SAF locally that promote SAF and airlines that wish to use SAF</li> </ul>	S8
50	<p><b>Hydrogen Fuels Viability Assessment</b>            Support external partners (e.g., airlines, energy providers) in assessing the viability of hydrogen fuel-celled small aircraft for suitable routes. Commuter and regional aircraft with &lt;100 seats are prime candidates for electric and hydrogen fuel-cell propulsion; the technology will be ready by 2025 for the smallest planes (9-19 seats, &lt;60-minute flights) and by 2030 for 51-100 seat planes (30-90 min flights) (Waypoint 2050 report, p. 54). These aircraft can be used for pilot training as well as private and commercial flights.</p>	S8
51	<p><b>Improved Tenant Vehicle Operations</b>            Implement one or more policies and programs for tenant vehicles to improve local air quality. Work closely with tenants in policy development, program development, and subsequent operations to ensure sustainability actions are implemented. Examples include but are not limited to:</p> <ul style="list-style-type: none"> <li>▪ No idling</li> <li>▪ Electric and hybrid vehicles, including EV charging</li> <li>▪ Increased mass transportation / seamless links to public transport</li> <li>▪ Expanded bicycle and pedestrian infrastructure that provides safe access and seamless connections</li> </ul>	S10

## Wildlife and Open Areas

Action ID	Action Description	Applicable Strategy
52	<p><b>Habitat and Species Restoration</b></p> <p>Maintain or restore natural habitats to enhance and preserve biodiversity of both habitat and species while maintaining operational and safety-related airport lands. This action is focused on the areas surrounding airports that are disrupted by the airport's location. It is supported by the other actions in this operational area, as well as the stakeholder engagement actions in the Administration, Leadership, &amp; Workforce operational area, as identifying environmental stakeholders can help protect natural systems (Los Angeles World Airports, <a href="#">p. 84</a>). <a href="#">San Diego</a> and Ocean County, NJ (<a href="#">p. 30</a>) are examples of airports with plans for habitat, species, and ecosystem protection, including native species.</p>	S11
53	<p><b>Stormwater Pollution Mitigation</b></p> <p>Protect local watercourses and soil from stormwater and hazardous liquid runoff through enhanced stormwater pollution prevention practices. Airports have taken a variety of approaches to comply with or exceed stormwater requirements:</p> <ul style="list-style-type: none"> <li>▪ <a href="#">San Diego International Airport</a> successfully met and surpassed their goal of reducing dissolved copper and zinc concentration in collected stormwater samples, due to frequent sweeps of "hot spots" and expanded stormwater reuse and infiltration efforts.</li> <li>▪ <a href="#">Fresno Yosemite International Airport</a> implemented low-impact development practices to reduce stormwater runoff volume, rate, and duration.</li> <li>▪ Centennial Airport increased tenant awareness and education surrounding best practices.</li> <li>▪ <a href="#">Dallas-Fort Worth</a> provides training for employees whose work may impact stormwater management.</li> <li>▪ Both Snohomish County Airport - <a href="#">Paine Field</a> and SEA are certified <a href="#">Salmon-Safe</a>, an indication of extensive stormwater and run-off management.</li> </ul>	S11
54	<p><b>Prevention of Wildlife Strikes</b></p> <p>Develop systems to quantitatively track wildlife strikes to identify opportunities to maximize safety and consider completing a Wildlife Hazard Assessment or Wildlife Hazard Site Visit to determine if any wildlife mitigation is needed. Enact programs that minimize adverse effects to wildlife such as fencing, bird avoidance tactics, or a comprehensive Wildlife Hazard Management Plan. According to the U.S. Mission to the International Civil Aviation Organization (ICAO), the FAA will make Airport Improvement Program grants to <a href="#">conduct an assessment</a> and implement eligible, recommended wildlife hazard mitigation.</p>	S11

## Template 2: Monitoring Template

**Instructions:** If using **Appendix A** to identify actions, fill in the Operational Area, Action ID, and Action with the selected actions. Over the course of implementation, update the items to reflect ongoing work:

- **Funding Strategy:** Can be simple or detailed based on the preferences of decision makers. A simple approach may be “grants and operating budget.” A detailed approach might list every funding source by name with the amounts to be funded. A middle ground might list “grants (50%), operating budget (10%), cost savings from other activities (20%), low-interest loans (20%).”
- **Key Next Steps:** Briefly list 1-3 key next steps. For example, “prepare funding proposal” or “develop RFP for external support” or “install new fixtures.”
- **Status:** Typical options include Not Started, In Progress/On Time, Delayed, Canceled, Postponed, and Complete. Consider color-coding for easy navigation.
- **Status Update:** If relevant, provide a bit more information on how the work is going.

This template can be shared as-is with decision makers or used as an input when creating other memos, materials, etc. This template can also be combined with or shared along with the subsequent KPI Reporting Template.

### Monitoring Summary: [insert relevant Operational Area]

Action ID	Action	Funding Strategy	Key Next Steps	Status	Status Update
			<ul style="list-style-type: none"> <li>• [Placeholder]</li> <li>• [Placeholder]</li> </ul>		
			<ul style="list-style-type: none"> <li>• [Placeholder]</li> <li>• [Placeholder]</li> </ul>		
			<ul style="list-style-type: none"> <li>• [Placeholder]</li> <li>• [Placeholder]</li> </ul>		
			<ul style="list-style-type: none"> <li>• [Placeholder]</li> <li>• [Placeholder]</li> </ul>		
			<ul style="list-style-type: none"> <li>• [Placeholder]</li> <li>• [Placeholder]</li> </ul>		
			<ul style="list-style-type: none"> <li>• [Placeholder]</li> <li>• [Placeholder]</li> </ul>		
			<ul style="list-style-type: none"> <li>• [Placeholder]</li> <li>• [Placeholder]</li> </ul>		
			<ul style="list-style-type: none"> <li>• [Placeholder]</li> <li>• [Placeholder]</li> </ul>		



### Template 3: Key Performance Indicator (KPI) Reporting Template

**Instructions:** In the following table, update the years to reflect the desired reporting timeframe. If using **Appendix A** to identify actions, fill in the Operational Area. Also, fill in the selected KPIs. These may be KPIs the airport is already tracking that support sustainability. They may also be new KPIs specific to sustainability (see SAGA’s comprehensive list [here](#)). If there is comfort working in Microsoft Excel or a similar spreadsheet tool (e.g., Google Sheets), it is recommended to copy-paste the information into a spreadsheet for data analysis and reporting (e.g., preparing charts and graphs for reporting). See **Figure E-1** for an example for how KPI reporting can look in a spreadsheet.

**KPI Reporting: [insert relevant Operational Area]**

KPI ID	KPI	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
1.1													
1.2													
1.3													
2.1													
2.2													
2.3													
3.1													
3.2													
3.3													

Figure E-1: Example KPI Reporting Template in Excel

Key Performance Indicators														
<a href="#">Return to Read Me tab</a>														
<b>Energy</b>														
<b>KPI 2:</b>	<b>Energy consumption (electricity, natural gas and propane) per building square foot.</b>	<b>2017</b>	<b>2019</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>	
	Measured Value	0.122	0.105	0.083	0.084	0.084	0.084	0.084	0.084	0.084	0.085	0.085	0.085	MMBTU/sq. ft
	% Change since prior year		-13%	-21%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	% Change since inventory baseline (2021)				0%	0%	1%	1%	1%	1%	2%	2%	2%	
<b>KPI #:</b>	<b>Additional KPIs</b>	<b>2017</b>	<b>2019</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>	
	Measured Value													units
	% Change since prior year		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
	% Change since inventory baseline (2021)				#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
<b>Vehicles</b>														
<b>KPI 1:</b>	<b>Number of on-road, off-road and transit vehicles in County fleet.</b>	<b>2017</b>	<b>2019</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>	
	Measured Value													# of vehicles
	% Change since prior year		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
	% Change since inventory baseline (2021)				#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
<b>KPI 2:</b>	<b>Total mileage from fleet vehicles</b>	<b>2017</b>	<b>2019</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>	
	Measured Value	7,789,660	7,456,751	6,935,365	6,950,641	6,965,917	6,981,193	6,996,470	7,011,746	7,027,022	7,042,298	7,057,574	7,072,850	miles
	% Change since prior year		-4%	-7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	% Change since inventory baseline (2021)				0%	0%	1%	1%	1%	1%	2%	2%	2%	
<b>KPI 3.1:</b>	<b>Total gasoline consumption by fleet vehicles and equipment</b>	<b>2017</b>	<b>2019</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>	
	Measured Value	479,683	24,591	13,401	13,431	13,460	13,490	13,519	13,549	13,578	13,608	13,637	13,667	gallons
	% Change since prior year		-95%	-46%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	% Change since inventory baseline (2021)				0%	0%	1%	1%	1%	1%	2%	2%	2%	
<b>KPI 3.2:</b>	<b>Total diesel consumption by fleet vehicles and equipment</b>	<b>2017</b>	<b>2019</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>	
	Measured Value	96,438	86,626	73,465	73,627	73,789	73,951	74,113	74,274	74,436	74,598	74,760	74,922	gallons
	% Change since prior year		-10%	-15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	% Change since inventory baseline (2021)				0%	0%	1%	1%	1%	1%	2%	2%	2%	
<b>KPI 3.3:</b>	<b>Total electricity consumption by fleet vehicles and equipment</b>	<b>2017</b>	<b>2019</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>	
	Measured Value	268	5,166	7,544	7,561	7,578	7,594	7,611	7,627	7,644	7,661	7,677	7,694	kwh
	% Change since prior year		1828%	46%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	% Change since inventory baseline (2021)				0%	0%	1%	1%	1%	1%	2%	2%	2%	
<b>KPI 3.4:</b>	<b>Total jet fuel consumption by fleet vehicles and equipment</b>	<b>2017</b>	<b>2019</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>	
	Measured Value	16,115	21,650	15,274	15,308	15,341	15,375	15,409	15,442	15,476	15,510	15,543	15,577	gallons
	% Change since prior year		34%	-29%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	% Change since inventory baseline (2021)				0%	0%	1%	1%	1%	1%	2%	2%	2%	
<b>KPI #:</b>	<b>Additional KPIs</b>	<b>2017</b>	<b>2019</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>	
	Measured Value													units
	% Change since prior year		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
	% Change since inventory baseline (2021)				#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

Source: Cascadia Consulting Group, 2024