

Reliever & General Aviation — Regional Supplement

VIRGINIA AIRPORTS SUSTAINABILITY MANAGEMENT PLAN



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1. BACKGROUND AND INTRODUCTION

This document provides a sustainability planning framework specific to Reliever (RL) airports and General Aviation - Regional (GR) airports, as defined below and in the Virginia Airports Sustainability Management Plan (SMP) Statewide Framework.

Reliever (RL): Reliever airports are typically located near commercial service airports in metro areas and are intended to reduce congestion at those airports by accommodating General Aviation (GA) demand with adequate landside and airside facilities. Such airports are eligible for air carrier/reliever discretionary funding from the Commonwealth.

General Aviation - Regional (GR): General Aviation – Regional airports serve large market areas and are often owned and operated by multi-jurisdictional agencies due to geographic isolation or the relative scarcity of other airport services and facilities. They provide a full range of aviation facilities and services to the GA community, including aviation fuel (AvGas) and jet fuel, instrument approaches, full-service fixed-base operators (FBOs), corporate hangars, and GA terminal facilities. GA Regional airports are eligible for GA discretionary funding from the Commonwealth.

The accompanying SMP Statewide Framework document presents the overall vision for airport sustainability in the Commonwealth and recommends specific sustainability categories for each airport's consideration. These categories represent operational areas that are integral to short- and long-term success. They create the framework for incorporating sustainability into airport operations. This SMP Supplement, like the supplements provided for the other two airport size tiers shown below, provides additional detail and guidance on specific goals, metrics, targets, and sustainability initiatives relevant to this particular type and size of airport, as shown in Figure 1. The various types and size ranges of airports in Virginia have varying degrees of institutional and financial capacity to plan and implement sustainability initiatives. The purpose of the Supplements is to ensure that airport operators have access to a user-friendly, practical resource to assist with considering and advancing sustainability efforts while minimizing the burden on busy personnel and limited airport resources.

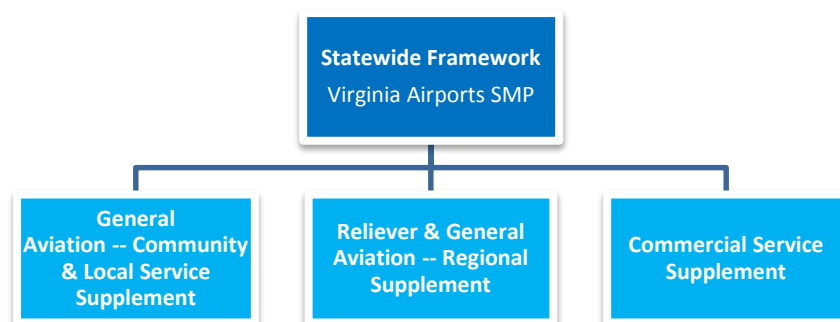


Figure 1: The Virginia Airports Sustainability Management Plan (SMP) Statewide Framework and Supplements

The focus of each Supplement is on implementation and tangible outcomes. This Supplement to the Virginia Airport SMP Statewide Framework begins with a brief introduction to sustainability as it relates to airports, and the role of this document in the Virginia Airports SMP. Section 1 provides an overview of the Supplement. Section 2 contains general resources related to sustainability planning at airports, which can help airport operators navigate the world of sustainability and best make use of Section 3,

which presents a detailed list of sustainability goals, metrics, targets, and initiatives that DOAV has identified as possibly relevant to individual RL and GR airports in Virginia. For more detail on the concept of sustainability, related challenges faced by airports in Virginia and nationwide, and examples of how airports have incorporated sustainability into operations, refer to the Virginia Airports SMP Statewide Framework document.

The recommendations and guidance presented in this document are suggestions, and it is not necessary to address all of them in order to meaningfully incorporate sustainability into airport planning and operational activities. Airport operators need to know how environmental, economic, operational, and development concerns are likely to affect their airport and surrounding communities, as well as how vulnerable the airport systems and community are to future concerns such as shifting economic pressures and climate change. Individual airports can use the information contained here to begin incorporating the concept of sustainability into airport operations and management.

1.1 Summary – Virginia Airports Sustainability Management Plan

Airports in Virginia face an array of sustainability challenges and opportunities. Many existing sustainability-related efforts at airports across the Commonwealth have addressed some of these challenges, while also supporting the initiatives of local, regional, and state entities. The concept of sustainability for an airport, or any business, can be thought of as ensuring resiliency over time; airports that are able to strategically integrate sustainability into their planning and operations stand a better chance of weathering current and future challenges. DOAV has developed a definition for *sustainability*, tailored to the needs, concerns, and priorities of public-use airports in Virginia. DOAV’s sustainability definition is:

“Sustainability” is a strategic approach to airport planning, development, asset management, and resource protection—including financial, environmental, community relations, and other factors—that prioritizes current operational needs while best preparing Virginia’s airports for continued success in the future.

DOAV and the Federal Aviation Administration (FAA) initiated the development of the SMP to support Virginia’s 66 public-use airports in undertaking tailored sustainability planning to meet their local needs and priorities, to the best of their individual abilities, while reflecting each airport’s contribution to economic viability, system efficiency, natural resource conservation, and social responsibility.

1.2 Sustainability Categories

DOAV’s recommended sustainability categories represent *economic, environmental, social, and operational* areas of relevance to Virginia’s airports. The categories and subcategories form the basis of this SMP Supplement for Reliever and General Aviation – Regional airports. In addition, this Supplement includes guidance documents on Funding Opportunities and Stakeholder Engagement (see Appendices), which can help airport operators implement the initiatives suggested in Section 3. Each sustainability category and subcategory is accompanied by a menu of goals, performance targets, metrics, and example initiatives from which airports can choose the most relevant for their facilities and operations. DOAV’s five sustainability categories are:

- 1. Economic Performance**
- 2. Airport Community**
- 3. Energy and Emissions**
- 4. Waste**
- 5. Natural Resources**

Table 1, below, presents the categories and subcategories, and includes a list of recommended sustainability goals within each subcategory. The list of goals (and associated metrics, targets, and initiatives) is not exhaustive, but it does reflect the findings of a thorough benchmarking process that examined and compared other airport SMPs, airport case studies, the latest airport sustainability research and guidance, general sustainability program development best-practice, and specific technical considerations within each subcategory. It is important to note that sustainable planning and operations do not require all of these goals to be met. Airport operators should assess each goal for feasibility in the airport’s unique context, and revise and/or prioritize accordingly.

Table 1: Sustainability categories and subcategories, and associated goals

Category	Subcategory	Goals
Economic Performance	Air service and business development	<ol style="list-style-type: none"> 1. Increase user and tenant retention rates. 2. Reduce costs of airport operations and, where feasible, costs of tenant operations. 3. Attract additional aviation-related, on-airport businesses.
	Non-aeronautical development	<ol style="list-style-type: none"> 1. Increase non-aeronautics-related revenue generation. 2. Attract local businesses with potential ties to airport customers.
	Asset management and resilience	<ol style="list-style-type: none"> 1. Incorporate resilience and adaptation design and construction practices into the development of facilities to mitigate risks to business, system, and community continuity. 2. Integrate standardized sustainability and resilience measures into the airport’s asset management system and everyday operations. 3. Enhance the health, safety, economy, and security of the airport community by testing and reassessing preparedness and disaster recovery plans.
Airport Community	Public outreach	<ol style="list-style-type: none"> 1. Increase public awareness of initiatives undertaken by the airport by engaging the local community/stakeholders. 2. Enrich opportunities and the experience of citizens communicating feedback to the airport on issues of concern. 3. Educate the community about the airport’s value.
	Airport workforce	<ol style="list-style-type: none"> 1. Promote employee satisfaction, retention, and workforce development. 2. Promote Health and Safety of airport workforce. 3. Engage employees in sustainable practices at the airport. 4. Encourage the development of a sustainable airport community by engaging airport tenants and encouraging their use of sustainable practices and products.
Energy and Emissions	Energy efficiency	<ol style="list-style-type: none"> 1. Reduce operating costs by decreasing electricity usage for all airport operating areas. 2. Maximize efficiency of lighting systems. 3. Reduce operating costs by decreasing usage of natural gas and other thermal fuel. 4. Reduce greenhouse gas (GHG) emissions. 5. Reduce light pollution.
	Transportation fuels	<ol style="list-style-type: none"> 1. When feasible, switch to alternatively-powered ground vehicles operated at the airport. 2. Increase customer and staff ridership of high-occupancy transportation to and from the airport, where available. 3. Decrease fuel use by reducing field mowing requirements.

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Category	Subcategory	Goals
	Energy generation	1. Increase portion of airport’s electricity supplied by onsite renewable energy sources.
Waste	Waste management and recycling	1. Reduce Municipal Solid Waste (MSW) sent to landfills. 2. Increase the airport’s diversion rate through recycling and reuse. 3. Increase recycling of construction and demolition waste.
	Chemical and hazardous waste management	1. Find and use substitutes for products with lower environmental, health, and safety risks. 2. Implement a chemical tracking system to improve hazardous materials management. 3. Reduce chemical/oil spills by enhancing spill prevention and control measures. 4. Minimize hazardous waste generation. 5. Use the least number of hazardous waste handlers that meet the criteria for “acceptable” business.
Natural Resources	Stormwater management	1. Reduce water quality and quantity impacts from stormwater runoff. 2. Reduce sediment runoff from construction areas. 3. Reduce water quality risk from de-icing fluid runoff.
	Water efficiency	1. Reduce water use in areas directly under the control of the airport. 2. Encourage tenants, airport users, and employees to use water efficiently.

2. GUIDANCE FOR IMPLEMENTING SUSTAINABILITY

2.1 Introduction to Sustainability Planning

As discussions of airport sustainability planning have become more common in the aviation industry, many resources have been developed to guide airports through the process of conceiving and developing sustainability programs. This section presents a curated set of guidance documents that can assist operators of Reliever and General Aviation-Regional airports in developing sustainability management plans and in identifying and implementing sustainability initiatives. Although this is not a complete collection of resources related to sustainability, it does provide links to significant resources that have been successfully used by other airports across the country in their implementation of sustainability initiatives and plans.

Before embarking on one of the sustainability initiatives listed below, an airport should conduct an initial round of planning to integrate the initiatives with other airport planning documents, such as the Airport Master Plan, Emergency Plan, and Strategic Business Plan. Such a holistic approach to airport planning will avoid costly missteps later on. Given the time scale of many sustainability projects, larger airports should consider appointing a sustainability point of contact to help accumulate and pass down knowledge. Additionally, the initial round of planning is a good opportunity for airports to prioritize projects and identify the “low hanging fruit.” Not only will these easier and/or simpler projects catalyze the airport’s sustainability program, they can possibly generate revenue or cost-savings which can be used for follow-on projects. Lastly, the initial round of planning can help an airport identify upcoming capital investments that could be leveraged to lower costs of sustainability initiatives (e.g., building rooftop solar panels at the same time a new hanger is built).

Incorporating sustainability considerations into airport planning, operations, and development provides airports with opportunities to examine and improve processes in multiple areas beyond traditional approaches. The most direct benefits are typically cost savings from the reductions in energy use, water use, and waste generation. Significant opportunities also exist in organizational improvements, innovative funding, resiliency and risk management, and community partnerships. The Virginia Airports SMP Statewide Framework, which this document accompanies, contains more information on the opportunities and benefits of directly engaging sustainability issues.

2.2 Overall Airport Sustainability Resources and Guidance Documents

Table 2: General resources for sustainability planning

Resource Name and Link	Description	Source
FAA Airport Sustainability Website	This website provides an overview of the Federal Aviation Administration’s (FAA’s) approach to sustainability as well as the Sustainability Master Plan Pilot Program, including a listing of the airports that participated in the pilot and the sustainability plans they developed.	FAA
Airport Sustainability Assessment Tool	This downloadable airport sustainability assessment tool (ASAT) may be used to assist in identifying sustainability initiatives that might be most applicable to an airport project. The tool also uses case studies to illustrate specific strategies and sustainability initiatives that have been implemented at other airports. (From Airport Cooperative Research Program [ACRP] Report 80: Guidebook for Incorporating Sustainability into Traditional Airport Projects - Chapter 5)	ACRP

Resource Name and Link	Description	Source
Sustainable Aviation Guidance Alliance (SAGA) Database	This interactive site allows users to explore and share sustainability information pertinent to airports, including profiles of hundreds of specific sustainability initiatives implemented at specific airport sites. The site's goal is to be a one-stop sustainability resource for the aviation industry.	SAGA
Evaluation Processes and Cost-Benefit Tool	These downloadable files contain spreadsheet tools for evaluating sustainability practices and their costs and benefits for airport operations and maintenance, and an instructional video that demonstrates how to use the tools with data from an example project. (Tool accompanies ACRP Report 110: Evaluating Impacts of Sustainability Practices on Airport Operations and Maintenance)	ACRP
Lessons Learned from Airport Sustainability Plans	This synthesis study presents the findings of an ACRP project analyzing and providing a benchmark for sustainability initiatives at smaller U.S. airports. (ACRP Synthesis 66: Lessons Learned from Airport Sustainability Plans)	ACRP
Airport Sustainability Best Practices	This appendix provides a listing of 937 airport sustainability best practices included in the SAGA database. (From Appendix G of ACRP Report 119: Prototype Airport Sustainability Rating System— Characteristics, Viability, and Implementation Options)	ACRP
Proactive Environmental Stewardship Practices	This is a listing of environmental stewardship practices and their respective characteristics, including anticipated staff effort, staff knowledge, relative cost, and potential for savings. (Appendix A of ACRP Report 43: Guidebook of Practices for Improving Environmental Performance at Small Airports)	ACRP
Sustainable Airport Planning, Design and Construction Guidelines for Implementation on All Airport Projects	These guidelines provide a comprehensive set of airport specific performance standards that focus on sustainability and consider the unique opportunities and obstacles that arise during typical airport projects. They can be used as an accepted model for the airport industry for measuring and comparing improvement in the overall success of a project's sustainability performance. The guidelines are intended to be administered on a project-level basis and do not include performance standards related to organizational or operational processes.	Los Angeles World Airports

2.3 Additional Guidance to Support Sustainability Planning

The goals and initiatives presented in Section 3 of this document constitute possible steps that airports can take to incorporate sustainability into short- and long-term planning, development, and management. Depending on the specific goal, successful implementation may also require identification of specific external financial resources, collection and ongoing tracking of resource-usage data, and engagement of various internal and external stakeholders. Airport managers are encouraged to thoroughly investigate available local, state, and federal financial and technical assistance for sustainability planning, as well as guidance resources for other sectors that may be applicable to airports.

Guidance on Funding Opportunities for Reliever and General Aviation-Regional Airports

Although Reliever and General Aviation-Regional airports are entitled to FAA Airport Improvement Program (AIP) funding, they cannot necessarily rely on this and aviation-related revenue streams alone to fund initiatives and strategies that help an airport prepare for the future. Therefore, this Supplement includes a “Guidance on Funding Opportunities for Reliever and General Aviation-Regional Airports” Appendix that catalogues detailed information on a variety of funding sources for airport sustainability projects, so they can capitalize on opportunities of which they may currently be unaware. These non-traditional funding sources include, but are not limited to: funding for energy-efficient buildings; financial opportunities associated with onsite renewable energy generation; grants for alternative-fuel vehicles, both onsite and for transit purposes; grants for increasing energy efficiency of airport power sources; U.S. Environmental Protection Agency (EPA) grants for specific high-impact environmental initiatives; and others. It also provides guidance to airports on exploring additional non-aviation revenue streams.

Guidance on Stakeholder Engagement

Purposeful engagement of interested individuals and organizations both inside and outside an airport organization—or internal and external “stakeholders”—is important for any successful sustainability program. As such, this SMP Supplement includes an Appendix that provides guidance for stakeholder engagement. The document contains simple and succinct guidance to help airports effectively engage with critical stakeholders when developing and implementing future sustainability initiatives and plans. As a practice, stakeholder engagement can and should begin early so that interested and informed parties can help prioritize and support sustainability initiatives.

Airport management and staff must be involved in the development of goals and the identification of potential initiatives. Input from airport users, tenants, and suppliers is very valuable in creating initiatives that may affect their operations or experience at an airport. Members of the general public, including neighboring community members, must be engaged in identifying areas of social and environmental impact that should be addressed. Some of these stakeholders may require unique engagement strategies to generate actionable information, encourage trust, and secure ongoing participation. Types of stakeholders include: airport personnel across divisions; airport tenants; airport users, including passengers; suppliers; neighboring community members; non-governmental organizations (NGOs) and advocates; local elected officials; and regulatory agencies. These efforts can result in positive relationships between the airport and local community while helping the airport increase sustainable operations and strategies.

Utility Performance Tracker Tool – User Guide

To support Virginia’s airports in implementing and tracking sustainability initiatives, DOAV commissioned the creation of a Utility Performance Tracker Tool. The tool enables airports to easily track electricity, natural gas, and water use on a monthly and annual basis. The intended user is the party or individual who is responsible for sustainability or environmental reporting at the airport, has access to airport utility records, and can update the necessary utility data on a monthly basis. The user guide that accompanies the Excel-based tool is included as an Appendix to this Supplement.

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3. SUSTAINABILITY GOALS, TARGETS, METRICS, AND INITIATIVES

Setting Sustainability Goals

This section presents a list of possible sustainability goals, associated assessment metrics and numerical targets, and some suggested initiatives for pursuing each specific goal. They are meant as suggestions for implementing sustainability at GA Community and Local Service airports, in alignment with the guidance on both overall planning and specific initiatives presented in the resources of Section 2, to meet environmental, economic, operational, and social goals. Airport operators are encouraged to refer to these resources when prioritizing and selecting sustainability goals. For example, the “Funding Opportunities” guidance Appendix may be useful in identifying feasible goals and activities, as the availability of funding is often a barrier to incorporating sustainability initiatives into airport operations.

This Section presents each goal using the following format:

Rationale: This includes background information on the Goal and Target, briefly discusses the benefits of attaining the Goal, and includes guidance on what to consider when selecting Goals and Targets.

Metric: This is the quantitative standard of measurement that airports can use to calculate their performance toward achieving the Goal (i.e., the ‘yardstick’ they can use to measure performance). Often times, multiple metrics are provided in an effort to encourage airports to utilize metrics that make the most sense for their operations.

Suggested Target: This is the finite, quantitative result (sometimes presented as a range of values) to which airports can aim. It determines the desired performance that amounts to achievement of the goal (i.e., ‘point X’ on the ‘yardstick’). Every airport’s situation is unique, but the Suggested Targets are intended to provide context for what a reasonable aspiration might be for a GA Community or Local Service airport.

Initiative: These are concrete, specific, and detailed actions that airports can implement to facilitate the attainment of their Targets and Goals.

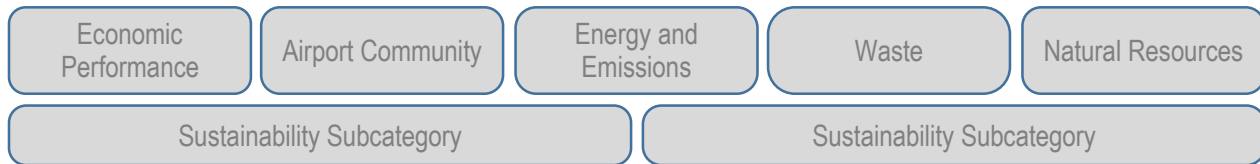
Resources: These include guidance documents, models, software, tools, and calculators that can support airport operators in investigating and implementing sustainability goals, metrics, targets, and initiatives.

The goals presented on the following pages respond to current and projected risks, issues, and needs that can help make GC and LO airports more resilient, by helping operations and facilities be better equipped to prepare for and recover from future issues related to changing economic, political, and environmental pressures. Goals and associated initiatives are also intended to encourage development and planning that offer a range of options, use resources efficiently, address environmental concerns, incorporate risk-based asset management, and engage surrounding communities. It is important to note that an airport’s chosen goals can be revisited at any point, and it is not necessary to implement all sustainability initiatives at the same time.

Airports should treat these goals, metrics, targets, and initiatives as suggestions, not rules, and managers are encouraged to critically assess the metrics, targets, and initiatives to tailor their sustainability activities. For example, GC and LO airports generally face resource limitations that may impact their ability to implement detailed sustainability strategies. Because resources, staffing, opportunities, and needs differ from airport to airport, managers should prioritize goals, select metrics and targets, and implement initiatives that make the most sense for their situation.

How to Use this Section

This section is organized by the sustainability categories and subcategories of the Virginia Airports SMP. Each goal is presented on a separate page, with its accompanying metrics, targets, initiatives, and resources. The following page uses a non-aviation example goal—a person increasing their physical strength—to illustrate how the various pieces fit together in the template that is used to present all of the sustainability goals in this document. It can be used as a reference for how the goals, metrics, targets, initiatives, and resources are organized.



Example Goal 1: Increase upper body strength.

Rationale:

Exercising and building strength can be an important part of a healthy lifestyle. There are numerous metrics that can be used to assess progress, and the selection of a target will depend on the user's background and priorities. A person who has never exercised before may wish to start off with a simple metric, like bicep curls, rather than attempting the more advanced bench press. An individual may also wish to adapt the suggested target, or pick a specific target within the suggested range that is most applicable to them. If a body builder can already bench press 200 pounds, then a 10% increase in one month amounts to an additional 20 pounds, which is an ambitious target. However, for a beginner who can bench press 50 pounds, a 10% increase in one month amounts to a feasible 5-pound increase.

Metrics:

The weight (in pounds) that can be bench-pressed.
OR
The weight (in pounds) held while completing a set of 10 bicep curls.

Suggested Targets:

Increase the number of pounds bench-pressed by 10% within 1 month.
OR
Increase the number of pounds held while completing a set of 10 bicep curls by 15-20% within 3 months.

Suggested Initiatives:

- Increase the amount of weight lifted by 10 pounds every workout.
- Increase the number of repetitions (reps) during a workout by 2-5 reps every three workouts.

Suggested Resource:

Resource Name and Link	Description	Source
Fitness trainer	Provides professional advice to gym members. Can help develop a plan for reaching performance and fitness targets.	The gym

3.1 Economic Performance

Faced with economic uncertainty, Virginia airports have already sought creative ways to expand their revenue bases and enhance their economic performance. One strategy airports use to grow and diversify their revenue streams is purchasing properties or building new facilities anticipated to bring in new revenue sources. In conjunction with finding new ways to generate revenue, airports in Virginia have taken the lead in implementing a variety of measures to save money. Many have implemented energy efficiency measures such as replacing lighting fixtures, upgrading HVAC systems, or replacing aging equipment in order to reduce costs. Economic goals and initiatives are related to broader city, county, and state-level goals such as environmentally conscious tourism and high-performance building. Details on these relationships can be found in the Statewide Framework.

Subcategory: Air Service and Business Development

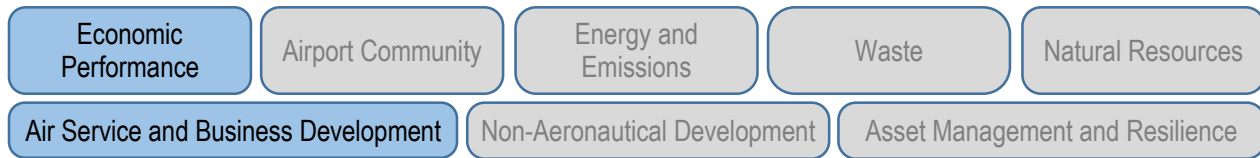
Maintenance of continued aviation revenue is essential for the economic sustainability of every airport. Assisting airports in identifying and implementing best practices for business development and retention will support sustained economic viability for airports and their communities.

Examples include:

- Attracting and retaining tenants.
- Planning for future changes in passenger service patterns.
- Coordinating with local tourism and economic development initiatives.

Sustainability Goals in this subcategory:

1. **Increase user and tenant retention rates.**
2. **Reduce costs of airport operations and, where feasible, tenant operations.**
3. **Attract additional aviation-related, on-airport businesses.**



Goal 1: Increase user and tenant retention rates.

Rationale:

Commercial travelers as well as aircraft owners (personal and corporate) tend to weigh the cost of their airfare, hangar rental, or tie-down/parking costs with the time and distance they must travel from their home or business to their commercial flight or their personal/company aircraft. In addition, ease of ground access and facility amenities play a large role in retaining local travelers. Appealing to local users will help generate not only revenue but also local support for the airport when it comes to budgetary or land use issues.

Metrics:

- The percentage of tenants flying from or basing aircraft within the local service area (measured through surveys).

Suggested Targets:

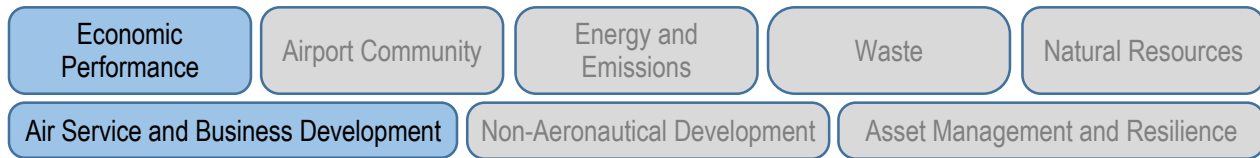
- Increase the percentage of airport tenants or aircraft that utilize airports within their local service areas by 5% over a 3-year period.

Suggested Initiatives:

- Survey aircraft owners in your region utilizing online aircraft owner databases to determine where aircraft owners live and where they base their aircraft.
- Coordinate with local tourism and economic development initiatives to promote awareness, positive mindset, and pride about the airport.
- Support local efforts to develop a sense of community and attract new businesses and community members in target demographics, such as millennials.

Suggested Resources:

Resource Name and Link	Description	Source
Best Practices for Air Service Development	This guide outlines the approaches taken by communities that have been successful with air service development efforts. (Part II of ACRP Report 18: Passenger Air Service Development Techniques)	ACRP
Air Carrier Incentive Program Guidebook	This publication provides guidance to airport sponsors interested in offering promotional incentives to attract and retain new air carrier service at federally obligated facilities.	FAA
Guidebook for Conducting Airport User Surveys	This report provides methods and useful information for conducting effective user surveys at airports. The report covers air passenger surveys, employee surveys, tenant surveys, surveys of area residents, surveys of area businesses, and cargo surveys. (ACRP Report 26)	ACRP



Goal 2: Reduce costs of airport operations and, where feasible, tenant operations.

Rationale:

Cost reductions can benefit an individual airport by increasing its ability to weather economic downturns. Cost reductions can also help prevent the need to increase fees for tenants and in turn, passengers, thus promoting business opportunities for all. Lower tenant fees can, in some cases, attract more and higher quality tenants, as well as spur greater competition among tenants to operate at the airport, all of which facilitate a better passenger experience at the airport. Energy efficiency, a common path to reducing costs, also provides environmental benefits.

Metric:

- Cost to airport per enplaned passenger.

Suggested Target:

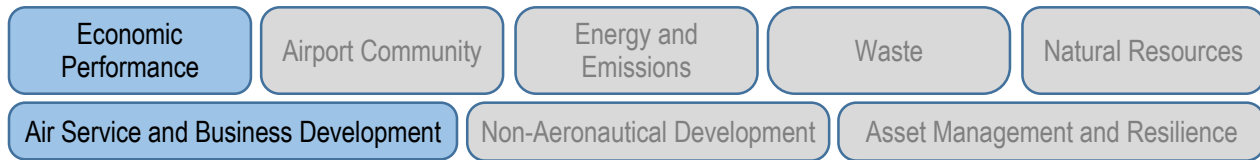
- Reduce cost per enplaned passenger by 3-5% within 2 years.

Suggested Initiatives:

- Maximize resource efficiency (e.g., electricity, water, fuels, waste management) in collaboration with airport tenants where possible, to provide cost savings for both the airport and its tenants. More information on initiatives to streamline resource use can be found in later sections.
- Conduct a rates and charges analysis to establish the Cost Per Enplanement (CPE) breakeven point in order to determine the true cost recovery rate structure.
- Organize a workshop for airport tenants to explore opportunities and initiatives that can both reduce expenses and increase sustainability. Opportunities may include, for example, coordinated bulk purchasing of products and services with other airport tenants, energy conservation initiatives, or working together to promote a positive employee experience to help reduce turnover.
- Tie lease rates or lease escalation clauses to documented sustainability and cost reduction programs implemented by the tenant. For example, if tenant leases include the cost of utilities, a tenant that demonstrates that they have measurably reduced their utility bill costs could qualify for a freeze on future rate increases for a certain period of time.

Suggested Resources:

Resource Name and Link	Description	Source
Airport Energy Efficiency and Cost Reduction	This report documents low-cost and short-payback energy efficiency improvements being implemented at airports across the country. The report was compiled using a survey, interviews, and a literature review. (ACRP Synthesis 21)	ACRP



Goal 3: Attract additional aviation-related, on-airport businesses.

Rationale:

GA airports rely on airport users and businesses for revenue generation. The addition of aviation-related businesses at a GA airport will not only help generate additional airport revenue, it will also help attract additional airport users and based aircraft. For example, the addition of an aircraft maintenance shop at a GA airport can attract additional airport-based aircraft tenants by providing a service on which all aircraft owners rely.

Metric:

- The number of on-airport, aviation-related businesses.

Suggested Target:

- Add one additional aviation-related, on-airport business over a 24-month period.

Suggested Initiatives:

- Survey existing based aircraft owners and tenants to identify specific aviation-related businesses and services that would mutually benefit the airport, current airport users, and/or the surrounding community. Tailor marketing efforts to the types of business that provide the services most frequently cited in the survey. Examples of such business types include: power and airframe maintenance companies, aerial survey companies, aerial spray application companies, banner tow and advertising companies, medivac services, and state and federal agencies (including police, wildlife, and fire services).
- Provide incentives* for start-up aviation related businesses, such as discounted hangar space, apron areas, and auto parking.
- Facilitate and promote the availability of air taxi services.
- Support common marketing efforts for the airport and across all businesses located at the airport to share expenses and generate additional revenue opportunities.

* Note that under AIP grant assurances, federally obligated airports must still charge “prevailing market rates.”

Suggested Resource:

Resource Name and Link	Description	Source
Marketing Tools for Small Airports	This guidance chapter introduces the basic categories of marketing tools and describes the tools airports use most frequently and consider most effective. (Chapter 6 of ACRP Report 28: Marketing Guidebook for Small Airports)	ACRP

Subcategory: Non-Aeronautical Development

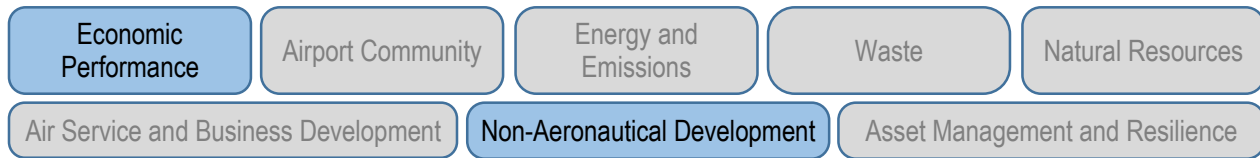
Expansion and diversification of non-aviation revenue streams is an area of priority for many airports, to ensure funding stability and self-sufficiency.

Examples include:

- Development of new alternative revenue streams from real estate rental and development, renewable energy generation, and other sources.
- Enhanced revenue opportunities from concessions and parking fees.
- Coordinating with local tourism and economic development initiatives.

Sustainability goals in this subcategory:

- 1. Increase non-aeronautics-related revenue generation.**
- 2. Attract local businesses with potential ties to airport customers.**



Goal 1: Increase non-aeronautics-related revenue generation.

Rationale:

Unused land owned by the airport with no future aeronautical use may present opportunities for revenue generation. For example, land with road frontage may have a higher market value for a retail or commercial business compared to an airport-related business. In addition to generating revenue from the lease of the land, this can help from a land use standpoint by promoting airport-compatible growth such as new commercial and industrial structures. Aside from changes in land use, a variety of other opportunities may exist for revenue generation that diverge from traditional aeronautical-related revenue sources but can support the financial sustainability of an airport.

Metrics:

- Number of new non-aeronautical businesses attracted to the airport in each calendar year.
- Non-aeronautical revenue at the airport as a percentage of the airport's total revenue each year.

Suggested Targets:

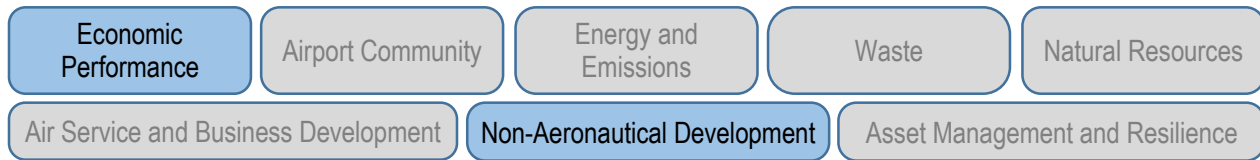
- Attract one new non-aeronautical business to the airport within one year.
- Increase non-aeronautical revenue at the airport by 3-5% of the airport's total revenue each year.

Suggested Initiatives:

- Study existing airport property to identify land that is not necessary for future airport development, could support potential revenue generation opportunities, and is not encumbered by FAA grants and associated obligations.
- Investigate local commercial and industrial development opportunities based on airport land location, characteristics, and accessibility to ground traffic (auto and pedestrian).
- Look at local comprehensive plans to determine future travel routes that may make existing airport land more attractive to non-aeronautical business development.
- Coordinate with local tourism and economic development initiatives to promote awareness, positive public perception, and pride in the airport. For example, networking with the local Chamber of Commerce and running ads in local business publications will help build awareness about opportunities at the airport.
- Explore the possibility of revenue generation from solar energy at the airport (more information is presented in the Energy and Emissions section).
- Target specific non-aeronautical businesses that may be located at airports, including art dealers, restaurants/delis, small retail stores, wireless telephone dealers, and florists.
- Explore opportunities to generate revenue from onsite natural gas production.
- Work to install internet/cable infrastructure for all tenant areas. Share fiber installation costs with tenants.

Suggested Resources:

Resource Name and Link	Description	Source
Examples of Non-Aeronautical Development	A listing of non-aeronautical development activities at airports throughout the country.	ACRP
Developing and Leasing Airport Property Best Practices	A summary of lease and development best practices for airport sponsors with procedures that achieve both the desired development and the necessary sustainability.	ACRP



Goal 2: Attract local businesses with potential ties to airport customers.

Rationale:

Developing partnerships with local businesses, whose potential customers may overlap with users of the airport, can support increased business for all parties involved. In particular, it may be useful to focus on services that travelers or other airport customers will be likely to use. Many local businesses can benefit from exposure to airport visitors. Airports could also sell advertising space in airport facilities to offer additional exposure for businesses.

Metrics:

- Number of new local businesses providing services to travelers or other airport users.

Suggested Targets:

- Attract one new business actively serving travelers or airport users during the next year.

Suggested Initiatives:

- Engage in partnerships with local businesses to promote products and services that add value for airport users.
- Create focus group with local businesses to discuss airport partnerships, or meet on a regular basis with local business owners to discuss ways to market their businesses and the airport together. Consider co-sponsoring civic events or other seasonal activities with local businesses, utilizing DOAV marketing grant funds.

Suggested Resource:

Resource Name and Link	Description	Source
Airport Entrepreneurial Activities	An overview of entrepreneurial activities that provide opportunities for an airport sponsor to achieve additional revenue. (Chapter 4 of ACRP Report 121: Innovative Revenue Strategies—An Airport Guide)	ACRP

Subcategory: Asset Management and Resilience

Managing and protecting airport physical assets present both a key challenge and an opportunity for airport capital planning, maintenance, and operations. Ensuring sufficient resilience and durability of airport facilities reduces the risk of service disruptions and helps ensure business continuity over time. Capital investments that consider the risks associated with more frequent and severe weather events are likely to be more cost-effective and efficient in the long run.

Note that the term “resilience” is generally used to mean the capacity of a system, community, or facility that might be exposed to climatic changes to maintain an acceptable level of function. The term “adaptation” generally refers to a process by which strategies to moderate, cope with, and take advantage of the consequences of climatic events are enhanced, developed, and implemented.

Examples include:

- Infrastructure planning that accounts for possible changes in climate, frequency of extreme weather events, and sea level rise.
- Land use planning that allows for community-endorsed expansion that offers amenities to both airport operators and neighboring communities.
- High-performance facility design and construction (e.g., following LEED guidelines) for reduced resource use (e.g., energy, water, etc.), financial savings, improved staff productivity, and visitor comfort.
- Energy resiliency measures, such as microgrid technology.
- Security initiatives to protect existing facilities/resources.
- Purchasing and other operational programs.

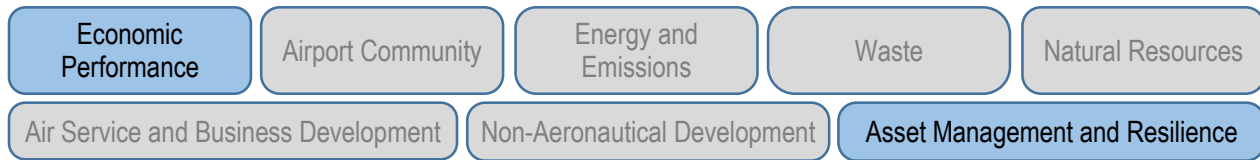
Sustainability goals in this subcategory:

1. **Incorporate resilience and adaptation design and construction practices into the development of facilities to mitigate risks to business, system, and community continuity.**
2. **Integrate standardized sustainability and resilience measures within the airport’s asset management system and everyday operations.**
3. **Enhance the health, safety, economy, and security of the airport community by testing and reassessing preparedness and disaster recovery plans.**

The goals in this subcategory share several suggested resources, shown in the table below. The following pages also list some goal-specific resources.

Resource Name and Link	Description	Source
Climate Change Preparedness and Resiliency Checklist	This checklist can be used to assess development projects in terms of resiliency, preparedness, and mitigation of any identified adverse impacts that may arise under future climate conditions. Developed by the Boston Redevelopment Authority (BRA).	BRA

National Stormwater Calculator	<p>This software tool estimates rainwater and runoff frequency at a site-specific scale. The user can enter LID controls and use the tool to assess how green infrastructure adaptation strategies can help mitigate the effects of stormwater. The tool can be used at a very fine scale to assess how various LID practices affect the resilience of a locality.</p>	<p>EPA</p>
Storm Water Management Model – Climate Adjustment Tool (SWMM-CAT)	<p>This model is used to simulate single-event or long-term runoff quantity and quality in urban systems, with the capability to model runoff through pipes, treatment devices, and other infrastructure. The tool also enables the user to model the hydrologic impact of LID controls related to green infrastructure practices.</p>	<p>EPA</p>
Planning for Operational Recovery at Small Airports	<p>This document aims to provide practical planning tools and routine management practices to help airport operators maintain resilient operational and business capacity during a disruption, regardless of cause. This study is explicitly not about emergency response, but about operational recovery from disruptions.</p>	<p>ACRP</p>
Climate Resilience Toolkit	<p>This toolkit from the National Oceanic and Atmospheric Administration (NOAA) provides resources and a framework for understanding and addressing the climate-related issues that impact people and their communities. It shows the potential effects of climate change on particular transportation assets, including airports.</p>	<p>NOAA</p>
Climate Explorer	<p>This tool was built to support the U.S. Climate Resilience Toolkit and offers interactive visualizations for exploring maps and data related to the toolkit's Taking Action case studies. Base maps (imagery, street maps) come from ESRI Web services. Map layers in the tool represent geographic information available through climate.data.gov and each layer's source and metadata can be accessed through its information icon.</p>	<p>NOAA</p>



Goal 1: Incorporate resilience and adaptation design and construction practices in the development of facilities to mitigate risks to business, system, and community.

Rationale:

Airports in the United States provide one of the safest, most efficient aerospace systems in the world. This mission faces both natural and non-natural risks and weather phenomena that can cause interruptions to continuity of airport operations. Examples of these interruptions include damage to physical property from flooding, high winds, or lightning; security breaches from power outages; staffing shortages; and delays in airport operations or airport closures due to extreme weather events. Enhancing resilience to multiple stressors will put the airport in the best possible position to effectively manage these business risks and prepare the airport for anticipating and responding to events that affect the airport and its community. Incorporating resilience and adaptation design into new and existing buildings can help airports become more efficient, reduce costs, and provide greater and more consistent customer service.

Metrics:

- Number of capital projects that incorporate resilience design and construction standards during development.
- Number of facilities that have incorporated adaptation standards.

Suggested Targets:

- Incorporate resilience design and construction standards during development of all capital projects within 5 years.
- Incorporate and maintain resilience and adaptation design standards in all facility upgrades and new facilities within 5 years.

Suggested Initiatives:

- Incorporate resilience and adaptation planning into the design standards and risk management efforts. Some examples of these efforts include:
 - Design buildings for maximum day-lighting.
 - Design for durability and robustness.
 - Design to accommodate changes in the climate (e.g., sea level rise, higher temperatures, etc.) and common extreme weather events (e.g., flooding, heatwaves, drought, powerful storms, etc.) in the region or locale.
 - Consider developing outside the flood zones or flood hazard areas.
 - Design building systems that can be serviced and maintained with local materials, parts, and labor.
 - Design and plan buildings minimize the need for external energy for ongoing building operations.
- Utilize LEED standards to become LEED Silver certified or higher in airport facilities. LEED standards, while typically associated with efficiency, can indirectly support preemptive resilience, as buildings that are energy efficient and grid-independent will be better able to withstand extreme events.
- Incorporate resilience and adaptation standards from the Institute of Sustainable Infrastructure’s (ISI) Envision™ program and the Insurance Institute for Business & Home Safety.

Suggested Resources:

Resource Name and Link	Description	Source
Climate Change Risk Assessment and Adaptation Planning at Airports	This guidebook will identify potential impacts from climate change, assess related airport risks, provide guidance for managing related uncertainty and developing a prioritized actions plan, and provide instructions on how to implement the actions plan. It will also include a screening tool to help airports determine and evaluate possible impacts and risks.	ACRP

Addressing Significant Weather Impacts on Airports	<p>This toolkit will raise airport operator awareness about vulnerabilities caused by significant weather events; help airports develop more robust contingency and recovery plans, in addition to their airport emergency plans; and describe impact prevention and mitigation strategies. Expected January 2016.</p>	<p>ACRP</p>
Leadership in Energy and Environmental Design (LEED)	<p>LEED is a green building certification program developed and maintained by the U.S. Green Building Council (USGBC). It recognizes best-in-class building strategies and practices, and has been adopted at several airport terminals. To become LEED certified, building projects satisfy prerequisites and earn points to achieve different levels of certification.</p>	<p>USGBC</p>
Table of Potential Climate Change Effects and Illustrative Responses for Airports	<p>This table provides a summary of climate change impacts on airports, and airport responses to these impacts. (Table 1 of ACRP Synthesis 33: Airport Climate Adaptation and Resilience)</p>	<p>ACRP</p>
Envision Sustainable Infrastructure Rating System	<p>Envision is a rating system and framework for evaluating and rating the community, environmental, and economic benefits of all types and sizes of infrastructure projects. It evaluates, grades, and gives recognition to infrastructure projects that use transformational, collaborative approaches to assess the sustainability indicators over the course of the project's life cycle.</p>	<p>Institute for Sustainable Infrastructure (ISI)</p>
Adaptation Strategies	<p>A set of 81 strategies to help a design, construction, and/or operations and maintenance team incorporate adaptation principles into its project. Each strategy includes information about its objective, regional priority, primary/secondary impact, and measured effect. (Appendix C of Green Building and Climate Resilience: Understanding Impacts and Preparing for Changing Conditions)</p>	<p>USGBC</p>
Storm Surge Inundation and Hurricane Strike Frequency Map	<p>This map interface illustrates worst-case scenario coastal storm surge and inundation, as well as hurricane strike frequency. This tool was developed to provide local and state officials with information related to coastal vulnerability to extreme events, and can aid in the development of adaptation plans.</p>	<p>EPA</p>

Economic
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Airport Community

Energy and
Emissions

Waste

Natural Resources

Air Service and Business Development

Non-Aeronautical Development

Asset Management and Resilience

Goal 2: Integrate standardized sustainability and resilience measures within the airport's asset management system and everyday operations.

Rationale:

Asset management programs provide organizations with the ability to coordinate and prioritize the management of assets in a safe, secure, environmentally-friendly, and cost-effective manner. Asset management programs allow airports to be proactive rather than reactive in the decision-making process. Integrating sustainability measures within an asset management system and everyday operations can help to minimize costs and risks associated within the airport, as well as prolong the life of capital investments. When airports undertake asset management and resilience planning that align with, coordinate with, and reinforce community resilience efforts, the effort serves to create a more resilient region as a whole.

Suggested Initiatives: The following initiatives include guidelines for developing and strengthening asset management planning.

- Develop a prioritized asset registry. An asset registry is a database or spreadsheet inventory of all assets within a group or service for which the plan is being developed (i.e., enterprise level or infrastructure category).
- Determine lifecycle and replacement costs. Lifecycle costing includes all costs of owning and operating an asset, from planning through retirement or replacement.
- Set target levels to maintain continuity of operation. Levels of service can be expressed in terms of condition, reliability and availability, and operational parameters.
- Determine business and economic risk by identifying critical assets, which are high-cost, or the failure of which results in detrimental levels of service and significant consequences.
- Determine the best funding strategies that will be viable in the long run.
- Document the asset management plan and provide a standardized approach for re-evaluation at predetermined time intervals.
- Increase alignment of airport resilience efforts with municipal or neighboring organization resilience efforts to the greatest extent possible.
- Revise asset performance standards to support airport resilience efforts, at least as often as major airport planning documents are updated.
- Coordinate with local/regional government, community institutions, and other agencies to reach shared understanding of the role of the airport in the community's long-term planning efforts—including the role in economic resilience, land use, and emergency readiness and response.

The following asset performance metrics and targets are defined through airport planning, a process that differs from airport to airport. The ones below provide more specific examples, but a unique approach may be necessary for each airport's unique planning process and associated documents. Regardless of an airport's process, the inclusion of strong, standardized resilience objectives should be put in place.

Metrics:

- Incorporation of resilience planning or goals in the Airport Master Plan (or other relevant guidance/management document)

Suggested Targets: As mentioned above, these targets will depend on airport-specific planning standards. However, targets should always be monitored at the department level for facilities, systems, or networks to focus appropriate investments.

- Incorporate standardized and significant resilience planning objectives in all relevant airport planning guidance/management documents at time of next major update, or within 5 years, whichever comes first.

Suggested Resources:

Resource Name and Link	Description	Source
Asset and Infrastructure Management for Airports— Guidebook	This guidebook provides guidelines for airport managers on how to assess and drive meaningful improvements to existing asset management initiatives, develop an airport asset management plan, and implement that plan. Interspersed throughout the guidebook are concrete steps for applying the guidelines, as well as case studies from other airports. (Part 2 of ACRP 69: Asset and Infrastructure Management for Airports-Primer and Guidebook)	ACRP
Climate Change Risk Assessment and Adaptation Planning at Airports	This guidebook will identify potential impacts from climate change, assess related airport risks, provide guidance for managing related uncertainty and developing a prioritized actions plan, as well as provide instructions on how to implement the actions plan. There will also be a screening tool included in the guide to help airports determine and evaluate possible impacts and risks.	ACRP
Table of Potential Climate Change Effects and Illustrative Responses for Airports	This table provides a summary of climate change impacts on airports, and airport responses to these impacts. (Table 1 of ACRP Synthesis 33: Airport Climate Adaptation and Resilience)	ACRP
Coastal Adaptation Toolkit	An online toolkit providing a number of resources, from EPA and other agencies, on climate change impacts and adaptation strategies for coastal communities. Some of the resources provided through the toolkit are included separately in this list. However, this toolkit is a valuable, stand-alone information portal for stakeholders.	EPA
Flood Resilience Checklist	A checklist developed in response to Hurricane Irene to assess a community's resilience to large flood events, and to identify specific areas of weakness. The checklist also helps communities identify policy and regulatory tools that may help increase resilience to flood events, with resources and implementation advice for stakeholders.	EPA

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Asset Management and Resilience

Goal 3: Enhance the health, safety, economy, and security of the airport community by testing and reassessing preparedness and disaster recovery plans.

Rationale:

Disaster response and recovery and information security are critical for the safety and security of passengers, airport employees, other airport users, and the community surrounding the airport. As providers of major transportation infrastructure, airports also impact the safety and security of local and regional residents. Since September 11, 2001, heightened security measures across the nation have helped ensure passengers remain safe. Installing regular review of important disaster or hazer (natural and man-made) response and recovery plans and information systems will further enhance the health, safety, and security of the airport community and surrounding region. Airports that conduct these reviews and publicly adopt an ongoing review process will reinforce the confidence of airport passengers, employees, tenants, owners, and especially citizens of the surrounding community.

Suggested Initiatives:

- Establish a task force with relevant and local community. Organizations/groups/agencies to identify potential effects from hazards and the vulnerabilities of the airport and systems upon which it depends (e.g., energy, water, health, etc.).
- If a preparedness and disaster recovery plan does not already exist, develop one in coordination with local emergency management agencies (EMAs).
- Develop and maintain a business continuity plan, in partnership with major airport tenants and key supply chain partners, to be prepared to recover mission-essential functions as quickly as possible after any kind of material or prolonged disruption. Coordinate with local municipalities to consider the airport's role in local Continuity-of-Operations planning.
- Ensure that the disaster recovery plans include resilience to climate change and to stressors likely to be exacerbated by a changing climate.
- Adopt a policy instituting a regular review of critical plans, including disaster response and recovery plans, regional or local comprehensive plans, and critical data systems. Designate roles responsible for coordinating the reviews in this policy as noted above.
- Ensure the disaster response and recovery plan communicates all possible routes to the nearest medical facility as part of the overall health and safety program.
- Develop partnerships and collaborate with neighboring businesses and operations to establish cooperative agreements designed to help mitigate identified risks in the event of a disaster. Integrate priorities and planned actions with existing efforts in the community, so as to avoid duplication.
- Upgrade communication information technology systems to maximize online web presence, transparency, website interface, and alerts.
- Ensure airport staff are aware of available communication channels to the nearest FEMA representative.

Metrics:

- The existence of ongoing coordination and collaboration with the regional and local EMAs.
- Number of annual “desktop” reviews of disaster response and recovery plans, including information technology and data systems.
- Extent of effective execution of all aspects of the disaster response and recovery plan in every disaster occurrence.

Suggested Targets:

- Coordination and collaboration with regional and local EMAs occurs at least once per year.
- Complete a minimum of one annual review of disaster response and recovery plans with the local EMAs, including information technology and data systems.
- Effective implementation of all relevant aspects of the disaster response and recovery plan in 100% of disaster events requiring plan deployment, as assessed by post-event review.

- Each time that a disaster arises that requires an aspect of the disaster response and recovery plan to be implemented, take time afterwards to record what happened, assess adherence to the plan and the results of plan actions, and identify any potential areas for improvement.
- Work with adjacent airports or within the local aviation community to help secure personnel and equipment resources following an emergency and during the recovery period.

Suggested Resources:

Resource Name and Link	Description	Source
Addressing Significant Weather Impacts on Airports	This toolkit will raise airport operator awareness about vulnerabilities caused by significant weather events; help airports develop more robust contingency and recovery plans, in addition to their airport emergency plans; and describe impact prevention and mitigation strategies.	ACRP
Being Prepared for Climate Change: A Workbook for Developing Risk-Based Adaptation Plans	This is a workbook with detailed steps to identify risks related to climate change and adapt to them. These steps include a vulnerability assessment and an action plan, with workflows, checklists, and resources to aid municipalities with the process. The purpose of the workbook is to provide communities with the resources and assistance needed to manage and adapt to climate-related risks.	EPA
Coastal Adaptation Toolkit	This is an online toolkit providing a number of resources, from EPA and other agencies, on climate change impacts and adaptation strategies for coastal communities. Some of the resources provided through the toolkit are included separately in this list. However, this toolkit is a valuable, stand-alone information portal for stakeholders.	EPA
Airport Business Continuity Planning Software Tool	This interactive survey enables users to create a basic, customized Business Continuity Plan quickly by answering a series of detailed questions about their operations. It accompanies a guidebook as part of ACRP Report 93: Operational and Business Continuity Planning for Prolonged Airport Disruptions.	ACRP

3.2 Airport Community

Strong relations between an airport and the surrounding community are crucial for facilitating airport development and operations. To foster positive relationships with the community, many airports host public and private events on site, such as airport open-houses, festivals, or air shows. In addition, community and user outreach conducted through frequent public meetings constitutes an excellent method of stakeholder engagement. Close coordination with local planning departments can help airports actively participate in discussions regarding development and land use around the airport. Goals related to the airport community are also related to other non-aviation goals such as small and disadvantaged business support and vocational workforce development. Detailed guidance on outreach and stakeholder engagement is included later in this document.

Subcategory: Public Outreach

Understanding and actively responding to communities' needs and concerns are important to maintaining public support for an airport's operation and growth. Effective outreach to and engagement with stakeholders are essential to helping airports operate efficiently and grow appropriately while being good neighbors.

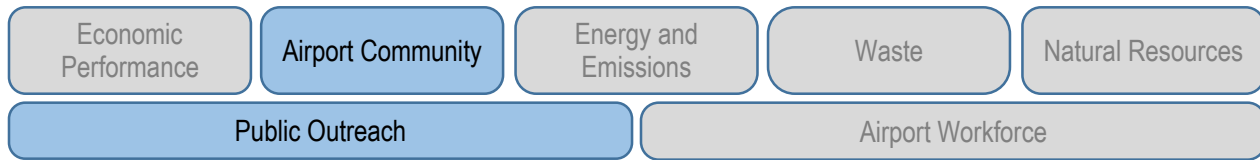
Examples include:

- Overall community relations, engagement, and communication patterns.
- Addressing noise through operational considerations, advocating for airport-compatible development, and communicating effectively with the public about noise issues.
- Building strong local relationships and inviting input on local land use planning.
- Advocating for adequate surface transportation connectivity (including transit and freight).
- Tourism development.
- Conducting health and safety initiatives that affect airport customers and other visitors.

Note: The assumption has been made that Reliever/GA Regional (RL/GR) have part-time or limited marketing staff available to conduct public outreach at the VA airports.

Sustainability goals in this subcategory:

1. **Increase public awareness of initiatives undertaken by the airport, by engaging the local community/stakeholders.**
2. **Enrich opportunities and the experience of citizens communicating feedback to the airport on issues of concern.**
3. **Educate the community about the airport's value.**



Goal 1: Increase public awareness of initiatives undertaken by the airport by engaging the local community and stakeholders.

Rationale:

Education and information about the airport and sustainability builds public awareness and understanding of programs and issues. Being a visible partner with the community—including building and maintaining consistent and effective outreach and communication with stakeholders—is essential to airport goodwill, community image, and building a solid economic future for the airport. In order to maintain public support for the airport’s operation and growth, and to be socially responsible, airports should collect feedback and perspectives from stakeholders, and actively respond to their needs and concerns. These engagement efforts demonstrate the airport’s commitment to incorporating diverse perspectives and help generate community buy-in on the airport’s future plans.

Suggested Initiatives:

- Increase transparency by engaging with various stakeholders to address all applicable and relevant issues around airport operations/sustainability. Airports should strive to include businesses, local residents, airport employees and tenants, passengers/customers, and surrounding communities and community leaders in these activities.
- Increase total communications with the local community about the airport’s sustainability efforts (total across all communication channels including newsletters, email, and social media).
- Establish an Airport Stakeholder Advisory Committee charged with weighing in on sustainability issues such as local land use planning, noise, airport construction, health and safety, and other quality of life issues; performing a SWOT analysis; and communicating results through the Airport Master Plan process.
- Enhance relationships and develop partnerships with stakeholders—such as civic groups and business organizations including business chambers and economic development/tourism offices—through speaking engagements and airport tours, in order to educate the community about the airport and its sustainability program.
- Increase the number of local field trips held to give students and adults and opportunity to learn about the airport and its sustainability efforts each year.
- Create a Sustainability Management Plan. Post this document, along with significant sustainability efforts at the airport, on a sustainability webpage on the website.
- Increase airport transparency and community awareness by allowing a public comment period on the draft Sustainability Management Plan, and host a community meeting to address these comments and propose solutions.
- Highlight sustainability efforts via prominently displayed airport signage and posters in common areas.

Metrics:

- Number of community events held to inform stakeholders about the airport and its sustainability efforts.
- Number of airport-hosted stakeholder engagement sessions.
- Number of downloads per year of the airport’s Sustainability Master Plan.
- Number of “likes” or “follows” for the airport’s presence on social media platforms (e.g., Facebook, Twitter, Instagram, etc.).

Suggested Targets:

- Host two community events per year to present airport initiatives (can be done in conjunction with stakeholder engagement sessions).
- Host two stakeholder engagement sessions per year with diverse stakeholders.
- Increase the number of website downloads per year of the airport’s Sustainability Master Plan.
- Increase the number of “likes” or “follows” for the airport’s presence on social media platforms (e.g., Facebook, Twitter, Instagram, etc.).

- Establish a pilot's association to manage and volunteer for events at the airport.

Suggested Resources:

Resource Name and Link	Description	Source
Stakeholder Engagement Guidance Document (an Appendix to this Supplement)	The document contains simple and succinct guidance to help airports effectively engage with critical stakeholders when developing and implementing future sustainability initiatives and plans.	DOAV
Stakeholder Engagement Techniques Case Examples	These case studies describe the most effective management practices related to stakeholder engagement techniques and reflect a variety of issues at small airports. (Chapter 4 of ACRP Synthesis 65: Practices to Develop Effective Stakeholder Relationships at Smaller Airports)	ACRP
ACRP Marketing Guidebook for Small Airports	This resource guide highlights marketing plan basics with templates including SWOT and an introduction to marketing and public relations tools. (ACRP Report 28)	ACRP
Guidebook for Conducting Airport User Surveys	This report provides methods and useful information for conducting effective user surveys at airports. The report covers air passenger surveys, employee surveys, tenant surveys, surveys of area residents, surveys of area businesses, and cargo surveys. (ACRP Report 26)	ACRP
Checklist for Building Effective Stakeholder Relations	This checklist presents a list of considerations and suggestions for building effective stakeholder relations. The items on the checklist serve as a means to assess organizational readiness, formulate strategies, implement initiatives and programs, and evaluate outcomes. (Appendix C of ACRP Synthesis 65: Practices to Develop Effective Stakeholder Relationships at Smaller Airports)	ACRP

Economic
Performance

Airport Community

Energy and
Emissions

Waste

Natural Resources

Public Outreach

Airport Workforce

Goal 2: Enhance opportunities and the experience of citizens communicating feedback to the airport on issues of concern.

Rationale:

While reaching out to promote the airport's mission is certainly important to the longevity of airport operations, it is equally important that the airport is continuously listening to the feedback of its community. The community ultimately approves business development endeavors and supports the airport in myriad direct and indirect ways. Thus, it is in the airport's own best interest to be attentive and responsive to input from the surrounding communities.

Community members tend to most frequently report complaints about noise. This provides an opportunity for airports to recognize the community's feedback and implement measures to increase community satisfaction with the airport. Additionally, noise abatement measures will promote effective communication with the public and possibly increase community support for airport-compatible development.

Suggested Initiatives:

- Develop and document a standardized procedure for recording, evaluating, potentially acting upon, and responding to citizen feedback. Assign a specific employee to be responsible for the oversight of this procedure.
- Review the feedback reports every 6 months to look for trends and evaluate whether actions to address prior concerns have been timely and successful.
- Create a new page on the website to provide information specifically for noise complainants. This page should have information on the airport's existing efforts and regulations that dictate what noise aspects are actually within the airport's control. This page should provide announcements about anticipated noise issues if possible.
- Incorporate a section of the noise complaint webpage where citizens can report the specific time of day and location of the loud aircraft. This information can then be used in tandem with flight path tracking software to help airports identify plane types that are primarily responsible for noise issues.
- Develop an airport "fly friendly" program that limits the number of touch-and-go operations and flights over noise-sensitive areas.
- Request modified approach procedures from FAA, which can reduce/eliminate the "stepping down" of arriving aircraft by utilizing constant approach glide angles instead.
- Encourage lateral/vertical optimization of takeoff/landing procedures.
- Introduce noise-differentiated landing/take-off fees dependent upon time of day and aircraft type.
- Construct a wall or other noise barriers in order to reflect noise back to the airport.
- Include noise education at Master Plan meetings and other standing airport public meetings.
- Keep decision makers informed of complaints received and efforts made to address issues, for example, through periodic reports to the Commission or Board.

Metrics:

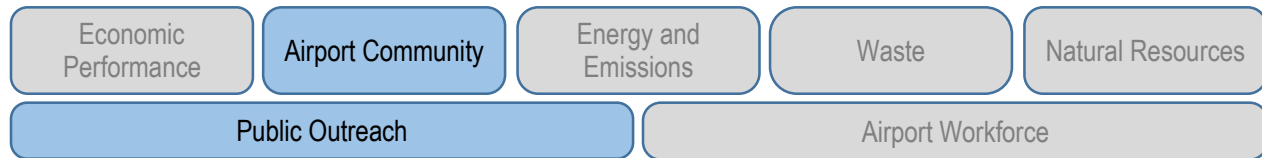
- Existence of standardized procedures for recording, evaluating, potentially acting upon, and responding to citizen feedback.
- The average time (in business days) between receiving citizen feedback and responding and/or acting.
- The frequency of specific themes within feedback/complaints.

Suggested Targets:

- Standardize and document procedures for handling citizen feedback by 2018.
- Reduce average time for feedback responses and applicable actions to 1-2 business days.
- Address feedback with such efficacy that the frequency of complaints about that same topic are reduced to 10% of what they were prior to having been addressed.

Suggested Resources:

Resource Name and Link	Description	Source
Stakeholder Engagement Guidance Document (an Appendix to this Supplement)	This document contains simple and succinct guidance to help airports effectively engage with critical stakeholders when developing and implementing future sustainability initiatives and plans.	DOAV
Aircraft Noise: A Toolkit for Managing Community Expectations	This report on community strategies for managing airport noise contains various tools for public outreach, such as a self-assessment tool, implementation steps matrix, and information on creating outreach materials, as well as technical information and strategies on noise management. (ACRP Report 15)	ACRP
Frequently Asked Questions and General Information on Aircraft Noise	The Noise Office at Philadelphia International Airport (PHL) developed this fact sheet about aircraft noise to help community members better understand the issue. It can serve as an example for other airports looking to address common noise questions and complaints in one place.	PHL



Goal 3: Educate the community about the airport's value.

Rationale:

In order to enhance operations and economic growth, an airport must recognize each stakeholder group and effectively communicate the value the airport brings to the community. This process provides an opportunity for the airport to become an integral part of the community it serves.

Suggested Initiatives:

- Develop an Airport Ambassador Program consisting of community members who are educated and excited about their airport and the role it plays in their community. The ambassadors should be a group of diverse community leaders not affiliated with the airport, but may be local business owners, non-profit community leaders, or proactive community members.
- Appoint an airport staff member who is educated on airport matters, to represent the airport at community events such as city council meetings, civic clubs, and/or community associations.
- Schedule airport ambassadors to attend and participate in public meetings for city council.
- Pursue the appointment of an airport ambassador to local chamber of commerce and economic development boards.
- Have an open door policy that allows the community to tour the airport, discuss specific issues, and talk with airport administrators about specific issues or questions.
- Hold annual events for community members to visit the airport. Examples of events include the following:
 - “Get to Know Us Better” barbecue
 - Air shows
 - Open houses
 - Festivals that involve activities for kids and door prizes
 - Boy Scout and Girl Scout volunteer events
- Educate the public on flight trends to facilitate discussion about unusual noise patterns that airport staff should investigate.
- Provide an airport tour to all new Board or Commission members, and explain the airport's role and benefits to the community.

Metrics:

- Number of airport ambassadors who are educated about the airport's role and are available to the community to facilitate discussion (in settings such as neighborhood associations, city council meetings, civic clubs, etc.).
- Number of community members visiting the airport to speak with ambassadors or airport staff on airport operations.

Suggested Targets:

- Build a team of 4 to 6 airport ambassadors within 2 years.
- Increase the number of community members visiting the airport for more information or tours.

Suggested Resources:

Resource Name and Link	Description	Source
Stakeholder Engagement Guidance Document (an Appendix to this Supplement)	This document contains simple and succinct guidance to help airports effectively engage with critical stakeholders when developing and implementing future sustainability initiatives and plans.	DOAV
ACRP Marketing Guidebook for Small Airports	This resource guide highlights marketing plan basics with templates including SWOT and introduction to marketing and public relations tools. (ACRP Report 28)	ACRP
Checklist for Building Effective Stakeholder Relations	This checklist presents a list of considerations and suggestions for building effective stakeholder relations. The items on the checklist serve as a means to assess organizational readiness, formulate strategies, implement initiatives and programs, and evaluate outcomes. (Appendix C of ACRP Synthesis 65: Practices to Develop Effective Stakeholder Relationships at Smaller Airports)	ACRP

Subcategory: Airport Workforce

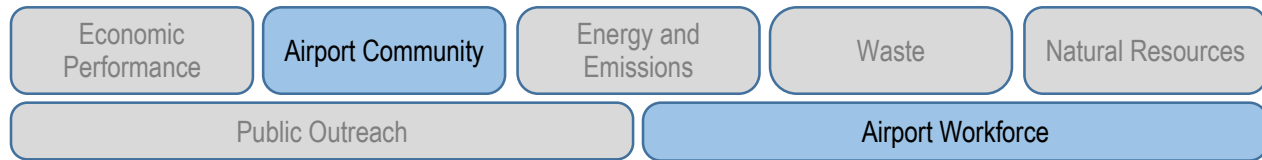
Many airports experience challenges related to workforce development, training, staffing, and retention. Proactive and creative planning around workforce issues is essential for sustained airport viability.

Examples include:

- Health- and safety-related education, training, counseling, prevention and risk control programs, as well as incident management.
- Workforce development through training and skills programs—for current employees and to ensure a sufficient talent pool.
- Transition planning for key airport staff.
- Tenant outreach and engagement to identify operational improvements that cut cost, reduce environmental impact, and generate positive local economic development.
- Diversity, accessibility, and inclusion.
- Collaboration between and among airports.

Sustainability goals in the subcategory:

- 1. Promote employee satisfaction, retention, and workforce development.**
- 2. Promote health and safety of airport workforce.**
- 3. Engage employees in sustainable practices at the airport.**
- 4. Encourage the development of a sustainable airport community by engaging airport tenants and encouraging their use of sustainable practices and products.**



Goal 1: Promote employee satisfaction, retention, and workforce development.

Rationale:

Many airports face challenges related to the development, education, and retention of their workforce. Increased employee satisfaction leads to increased attendance and retention rates. Better employee satisfaction can also decrease the overhead associated with hiring and training new employees. This cost reduction makes new funds available for professional development and training opportunities for existing employees. Increasing diversity, accessibility, and inclusion supports employee satisfaction and benefits the airport and surrounding community.

Suggested Initiatives:

- Create a survey that will measure and establish a baseline for employee satisfaction.
- Establish 1-2 new employee satisfaction targets based on the survey responses. Decide on a timeframe for achieving the target(s).
- Include annual training about health- and safety-related education, counseling, prevention, and risk control programs, as well as incident management.
- Conduct professional and personal goal setting on a yearly basis (for example, through an Employee Development Plan) for all employees to communicate their goals, boundaries, and personal life goals.
- Recruit college/high school students to visit and intern at the airport, to learn firsthand about airport administration and job opportunities to attract the next generation of employees.
- Increase internship time by bringing on additional interns or increasing their use in non-summer months.
- Build a diverse airport staff through equal opportunity measures.
- Provide accessibility to support Americans with disabilities.
- Offer work/life balance benefits such as flexible work hours, telecommuting, and health-focused newsletters with cooking and exercise tips.
- Host airport volunteer events for airport staff to give back to the local community. These events could be inspired by an employee survey on local volunteer efforts to which they would like to contribute their time.

Metrics:

- Average percent annual employee retention rate across all labor categories.
- Number of workforce development training sessions on the airport’s goals, sustainability initiatives, incentives, and employees’ role in achieving these goals.
- Employer and employee absenteeism rates.
- Existence of a formal internship program.
- Hours of internship time.

Suggested Targets:

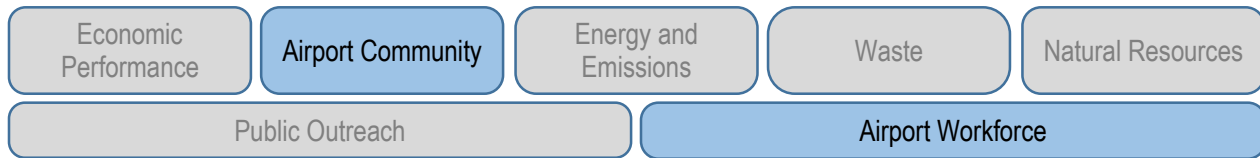
- Increase employee annual retention rate by 10% within 3 years.
- Host one annual workforce development training annually by 2018.
- Decrease employee and employer absenteeism by 10% per year.
- Establish a formal internship program and fill at least one internship position during the summer months.
- Increase hours of internship time by 3% per year.

Suggested Resources:

Resource Name and Link	Description	Source
Aviation Workforce Development Practices	This report provides a summary of airport operating entity jobs and related skill sets needed to perform those jobs. It also identifies opportunities and resources that provide training on the skill sets needed to fulfill airport-related jobs. (ACRP Synthesis 18)	ACRP

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Resource Name and Link	Description	Source
Guidebook for Conducting Airport User Surveys	<p>This report provides methods and useful information for conducting effective user surveys at airports. The report covers air passenger surveys, employee surveys, tenant surveys, surveys of area residents, surveys of area businesses, and cargo surveys. (ACRP Report 26)</p>	ACRP
Helping New Maintenance Hires Adapt to the Airport Operating Environment	<p>This report identifies current training practices for newly hired airport maintenance personnel, primarily at general aviation (GA) airports; documents many of the core training elements and resources used at those airports; and identifies methods to assist new maintenance personnel in comprehending the airport campus and its operating environment. (ACRP Synthesis 49)</p>	ACRP



Goal 2: Promote the health and safety of airport workforce.

Rationale:

Promoting the health and safety of airport workforce decreases the operational risks and hazards associated with the airport, and therefore, the liability of the airport.

Suggested Initiatives:

- Create onsite health and safety trainings that address the cause of each industrial injury type and educate staff on ways to avoid these injuries in the future.
- Conduct a yearly inventory of industrial injuries to identify lost-time injury rate.
- Identify the top 10 critical risk areas of airport operation for employees by using the data provided in the lost-time injury rate.
- Implement a Health and Safety Goal Tracker that shows the number of days of operation without an injury.
- Abide by the requirements set by the Occupational Safety and Health Act (OSHA) that cover the safety and health conditions in airport workplaces throughout the United States.
- Establish a “stop-work policy” which states that anyone who deems a work condition as unsafe has the authority to stop work until the unsafe condition is corrected.

Metrics:

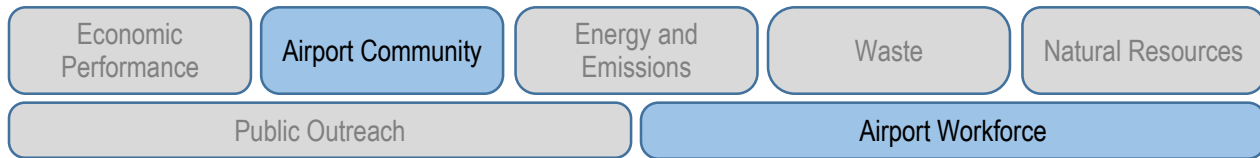
- Number and type of industrial injuries per million working hours.
- Lost-time injury rate including the type of injury, rates of injury, occupational diseases, lost day and absenteeism, total number of work-related fatalities per million working hours.

Suggested Targets:

- Decrease the number of industrial injuries and type per million working hours by 5% by 2019.
- Reduce airport’s lost-time injury rate in top 10 critical risk areas by 5% by 2019.

Suggested Resource:

Resource Name and Link	Description	Source
Helping New Maintenance Hires Adapt to the Airport Operating Environment	This report identifies current training practices for newly hired airport maintenance personnel, primarily at general aviation (GA) airports; documents many of the core training elements and resources used at those airports; and identifies methods to assist new maintenance personnel in comprehending the airport campus and its operating environment. (ACRP Synthesis 49)	ACRP



Goal 3: Engage employees in sustainable practices at the airport.

Rationale:

Airport staff members are a vital source of insights for meaningful actions and effective communication around sustainability-related issues. It is beneficial to airports and their communities to recognize employee suggestions and demonstrate that these are thoughtfully considered by the airport.

Suggested Initiatives:

- Create an employee comment box where employees can provide suggestions for airport sustainability improvements. Create a system for monthly review of these suggestions and consideration for administrative action.
- Hold employee/sustainability education events annually.
- Implement Standard Operating Procedures (SOPs) around sustainability initiatives as a way to pass down accumulated knowledge over time.
- Consider employee incentives to reward airport improvement suggestions, such as special parking space, website recognition, employee lounge or public area recognition signage, thank you letter, newsletter recognition, or award ceremony.
- Establish a Sustainability Awareness Committee—with representation from each department—that champions the sustainability metrics, targets, and initiatives of the airport.
- Include a survey as a component of new hire training and professional development; discuss priorities that contribute to the airport’s sustainability, such as diversity, health/safety, ergonomics, and professional development measures.

Metrics:

- Number of appropriate staff fully engaged in sustainability planning and implementation.
- Number of employees recognized per year for airport sustainability suggestions and actions.
- Number of employee engagement events per year (e.g. stakeholder engagement sessions, community outreach events, and public presentations).

Suggested Targets:

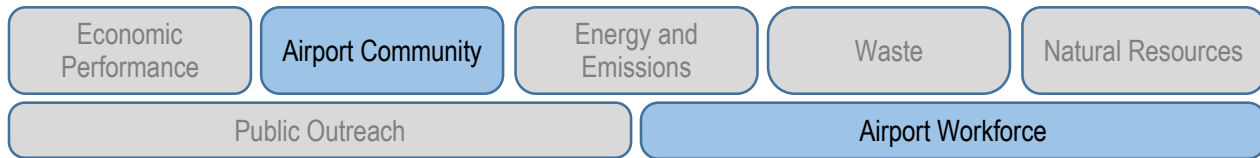
- Ensure all appropriate staff are fully engaged in sustainability planning and implementation (should attempt to include one representative from each key department) by 2018.
- Increase the number of employees recognized per year for airport sustainability suggestions and actions by 5% by 2018.
- Hold two employee engagement events annually by 2018.

Suggested Resources:

Resource Name and Link	Description	Source
Stakeholder Engagement Guidance Document (an Appendix to this Supplement)	This document contains simple and succinct guidance to help airports effectively engage with critical stakeholders when developing and implementing future sustainability initiatives and plans.	DOAV
Instructions to Establish and Implement an Employee Sustainability Training Program	This section of the Sustainable Airport Manual provides guidance on establishing an employee training program that incorporates sustainability and provides two case studies of organizations that have implemented such programs. (Section 8.2 of the Sustainable Airport Manual produced by the Chicago Department of Aviation [CDA].)	CDA
Guidebook for Conducting Airport User Surveys	This report provides methods and useful information for conducting effective user surveys at airports. The report covers air passenger surveys, employee	ACRP

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Resource Name and Link	Description	Source
	surveys, tenant surveys, surveys of area residents, surveys of area businesses, and cargo surveys. (ACRP Report 26)	



Goal 4: Encourage the development of a sustainable airport community by engaging airport tenants and encouraging their use of sustainable practices and products.

Rationale:

Listening to and involving tenants in addressing airport and sustainability issues improves and expands the overall sustainability program, encourages integration of sustainable principles, and increases support for initiatives. Providing education around the airport's sustainability goals and targets will strengthen tenant support and involvement.

Suggested Initiatives:

- Perform an annual tenant engagement survey to identify operational improvements that cut costs, reduce environmental impact, and generate positive local economic development.
- Host tenant involvement activities to increase opportunities for engagement, such as meetings and committees on airport and sustainability issues to generate dialogue and ideas.
- Host tenant appreciation activities.
- Develop a policy that requests tenants use environmentally preferable products when purchasing supplies and cleaning products.
- Identify and apply for national, state, and local grants to support sustainability initiatives.
- Coordinate sustainability awareness training programs, presentations, and/or meetings for tenants and contractors.
- Post the Sustainability Mission Statement at strategic locations throughout the airport, including administration buildings and common areas.

Metrics:

- Percent of tenants participating in airport and sustainability engagement initiatives, events, and meetings.
- Percent of tenants participating in airport sustainable practices and using environmentally preferred products.

Suggested Targets:

- Increase the airport's tenant involvement in airport initiatives by 5-10% measured through tenant survey results by 2018.
- Increase tenant use of environmentally preferred products by 25% over 3 years.

Suggested Resource:

Resource Name and Link	Description	Source
Integrating Environmental Sustainability into Airport Contracts	This report explores examples of how airports can help drive environmental sustainability performance improvements at their facilities by integrating environmental sustainability concepts into contracts with contractors, suppliers, and vendors. (ACRP Synthesis 42)	ACRP

3.3 Energy and Emissions

As mentioned above, airports in Virginia have implemented a variety of energy efficiency projects, with the dual benefit of cutting costs to increase economic performance while also reducing emissions and benefiting the environment. Some airports have pushed beyond energy efficiency and into alternative fuels and energy sources, which can be used for things like transportation and maintenance operations, or onsite electricity generation. In addition, certain regions of Virginia are at risk of disruptions caused by climate change. Sustainable energy and emissions plans can help mitigate the effects of climate change by reducing GHG emissions, and also result in better local air quality.

Subcategory: Energy Efficiency

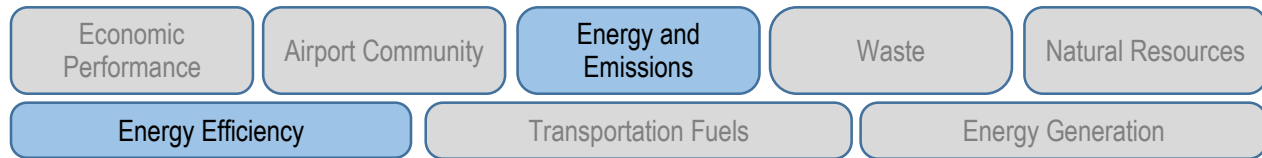
Energy efficiency benefits both environmental conservation and economic vitality. Airport managers face competing priorities and tight budgets when deciding among maintenance and operations projects. Implementing energy efficiency improvements allows for low-cost, high-impact sustainability benefits, such as lower electricity expenditures, reduced emissions, and decreased maintenance time. Energy efficiency efforts focus on reducing electricity and natural gas, which account for a company's Scope 1 (onsite combustion—in this case, natural gas) and Scope 2 (purchased electricity) emissions.

Examples include:

- Replacing current lighting fixtures with LEDs.
- Installing light timers.
- Installing window tinting.
- Fine-tuning building systems and upgrading to high-efficiency HVAC equipment.

Sustainability goals in this subcategory:

1. **Reduce operating costs by decreasing electricity usage for all airport operating areas.**
2. **Maximize efficiency of lighting systems.**
3. **Reduce operating costs by decreasing usage of natural gas and other thermal fuel.**
4. **Reduce greenhouse gas (GHG) emissions.**
5. **Reduce light pollution.**



Goal 1: Reduce operating costs by decreasing electricity usage for all airport operating areas.

Rationale:

Electricity can be one of the largest expenses for airports, and reducing electricity intensity is one of the most cost-effective ways to reduce expenses, particularly through energy efficiency. Investing in energy efficiency can reduce overhead and increase profit margins. Furthermore, energy efficiency can have a rapid return on investment and allow funds to be allocated to other airport improvements. An additional benefit of energy efficiency is improving facility-level resilience to variability in energy supply.

Suggested Initiatives:

General energy efficiency initiatives include the following:

- Monitor and track energy use. This can be completed by metering or submetering to calculate building energy baselines and track usage. Enter energy usage information into the Utility Performance Tracking Tool to track usage over time and see the impact of energy efficiency initiatives.
- Develop an Energy Management Plan including a review of airport operations to establish appropriate energy consumption metrics.
- Integrate sustainability language into airport contracts with tenants through restructuring or amending existing contracts. All contract types can be leveraged by airport operators to improve compliance with environmental law, fulfill permit requirements, drive innovative sustainable improvements, and minimize and manage environmental impacts.
- Conduct an energy assessment of airport activities and building systems to identify low-hanging fruit.
- Optimize equipment operating schedules and setpoints to match the current needs of the facility and to avoid higher electricity rates if the airport purchases electricity under a time of use (TOU) pricing structure.
- Investigate energy rate negotiation through the Virginia Energy Purchasing Governmental Association (<http://www.vepga.org>).
- Conduct a retrocommissioning project to optimize building system performance.
- Identify and implement passive heating, cooling, and natural lighting.
- Pursue LEED certification.
- Incorporate energy efficiency strategies into new construction and renovation projects.
- Initiate incentives for meeting goals or key check points (keep track internally and provide incentives for meeting goals).
- Education and training (post signs, assemble an internal committee, or host lectures).
- Become a part of the “Virginia Green” campaign to promote environmentally friendly practices of Virginia’s tourism

Metrics:

In order to determine baselines, set reduction targets, and track results from activities, electricity consumption can be tracked through the following metrics:

- Total onsite electricity consumption measured in kWh.
- Intensity of electricity consumption measured in kWh/sqft.
- Intensity of electricity consumption measured in kWh/aircraft movement.

In addition to these metrics, airports may want to use metrics that capture the energy usage specific to other airport activities. Common metrics to capture CS and RL/GS airport activities include:

- Intensity of electricity consumption measured in kWh/full time equivalent employees.
- Intensity of electricity consumption measured in kWh/freight weight handled.

Suggested Targets:

- Reduce total onsite electricity consumption by 10% by 2020.
- Reduce intensity of electricity consumption by 2-20% per intensity measure (e.g., square foot, aircraft movement, passengers, employees, or freight) by 2020.

industry.

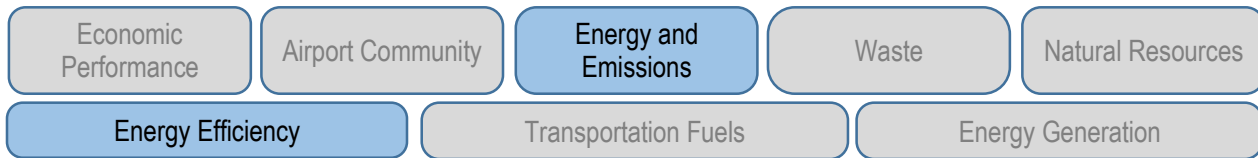
- Incentivize behavioral modifications that help the airport achieve sustainability goals or key check points (keep track internally and provide incentives for meeting goals).

Energy-related efforts specific to decreasing electricity usage include:

- Install energy-efficient lighting (such as LED runway and taxiway lights, where approved).
- Install occupancy sensors and lighting controls, such as timers.
- Install or upgrade building control systems.
- Install power strips in office spaces to reduce electricity consumption from equipment in standby mode (also known as leaking electricity or vampire power).

Suggested Resources:

Resource Name and Link	Description	Source
Virginia Airports Utility Performance Tracker Tool	A utility performance tracking tool designed for Virginia airports to track electricity, natural gas, and water usage on a monthly and annual basis.	DOAV
List of ENERGY STAR rated products	This resource is a database of energy-efficient consumer equipment and appliances, as well as commercial food service appliances.	EPA
Database of State Incentives for Renewables & Efficiency	The DSIRE database, funded by the U.S. Department of Energy (DOE), is the most comprehensive source of information on incentives and policies that support renewables and energy efficiency in the United States.	DSIRE
Benchmarking and Profiling Airport Terminal Energy End Uses	This publication (and any associated tools) will help airports make informed business decisions regarding energy efficiency improvements by creating initial energy use intensity (EUI) benchmarks for airport passenger terminals.	ACRP



Goal 2: Maximize efficiency of lighting systems.

Rationale:

Lighting costs can make up a significant portion of an airport's operating costs. Many older fixtures can be replaced using newer technology that provides the same or greater lighting levels with minimal upfront cost and quick payback. In particular, Compact Fluorescent Lightbulbs (CFLs) and Light-Emitting Diodes (LED) lights are two important lighting technologies that will help airports in this regard.

Suggested Initiatives:

General energy efficiency initiatives include the following:

- Conduct a lighting audit that identifies how long each light fixture is turned on each month and estimates its energy consumption. Based on the results, create a lighting replacement plan that prioritizes lighting fixtures that have short payback period.
- Replace light bulbs with ENERGY STAR certified light bulbs.
- Downsize or remove underutilized fixtures.
- Increase the use of natural lighting by adding windows or skylights.
- Incorporate energy-efficient lighting into new construction and renovation projects.
- Install energy-efficient lighting (such as LED runway and taxiway lights, where approved). The simple payback period of these lighting systems can be calculated as follows:
 - Step 1: Estimate the kilowatt hour (kWh) consumption for the existing light bulb.
 - Step 2: Estimate the kWh consumption for the new, more efficient light bulb.
 - Step 3: Subtract the existing bulb consumption (Step 1) from the new bulb consumption (Step 2).
 - Step 4: Multiply the difference found in Step 3 by the electricity rate (usually in \$ per kWh) to get total operational savings per month.
 - Step 5: Estimate the difference in the upfront costs of both bulbs (including the purchase cost and the installation cost).
 - Step 6: Calculate the simple payback period by dividing the difference in the upfront cost (Step 5) by the difference in operating costs (Step 4).
- Install occupancy sensors and lighting controls, such as timers.

Metrics:

- Percentage of total light fixtures with CFL or LED lights
- Percentage of light bulbs that are ENERGY STAR certified.
- Lighting energy consumption per year (kWh).

Suggested Targets:

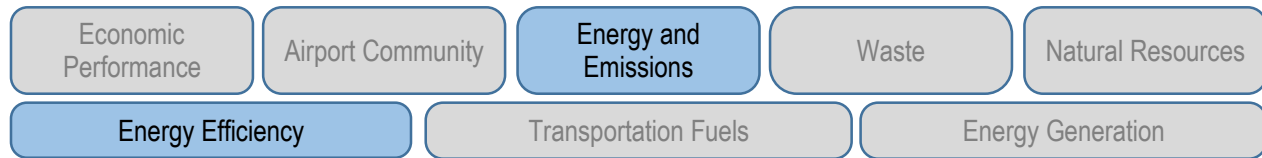
- Out of light bulbs installed at the airport that can be replaced with CFL and LED lights, 75 percent of them are CFL or LED within three years.
- Out of light bulbs installed at the airport that are eligible for ENERGY STAR certification, 75 percent of them are ENERGY STAR certified within three years.
- Decrease energy consumption from all lights at airport by 10 percent per year.

Suggested Resources:

Resource Name and Link	Description	Source
Virginia Airports Utility Performance Tracker Tool	A utility performance tracking tool designed for Virginia airports to track electricity, natural gas, and water usage on a monthly and annual basis.	DOAV

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Resource Name and Link	Description	Source
List of ENERGY STAR rated products	This resource is a database of energy-efficient consumer equipment and appliances, as well as commercial food service appliances.	EPA
ENERGY STAR Building Upgrade Manual	This manual is a practical guide that helps users plan and achieve profitable energy efficiency improvements to their building.	EPA
Database of State Incentives for Renewables & Efficiency (DSIRE)	The DSIRE database, funded by the U.S. Department of Energy (DOE), is the most comprehensive source of information on incentives and policies that support renewables and energy efficiency in the United States.	DSIRE
Benchmarking and Profiling Airport Terminal Energy End Uses	This publication (and its associated tools) helps airport managers make informed business decisions regarding energy efficiency improvements by creating initial energy use intensity (EUI) benchmarks for airport passenger terminals.	ACRP



Goal 3: Reduce operating costs by decreasing usage of natural gas and other thermal fuel.

Rationale:

Natural gas and other thermal fuels can be a significant expense for airports, and reducing fuel intensity is one of the most cost-effective ways to reduce expenses, particularly through energy efficiency. Investing in energy efficiency can reduce operating costs and increase profit margins. Furthermore, implementing energy efficiency measures can have a rapid return on investment, and can save funds for other airport improvements.

Suggested Initiatives:

General energy efficiency initiatives include the following:

- Refer to the general energy efficiency initiatives listed under Goal #1 Suggested Initiatives.
- Replace existing HVAC equipment with high efficiency models, when feasible.
- Improve weatherization of buildings.

Metrics:

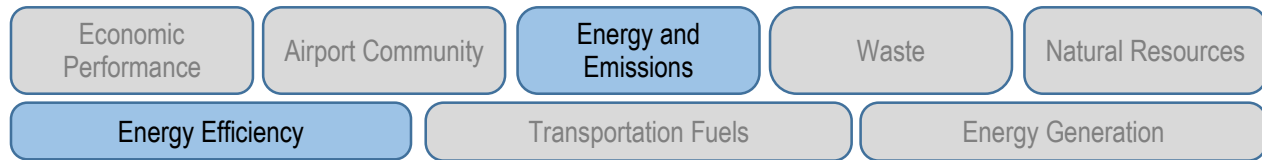
- Total natural gas usage in Ccf or therms.
- Total natural gas usage in Ccf or therms/sqft.
- Intensity of natural gas usage in Ccf or therms/aircraft movement.
- Intensity of natural gas usage in Ccf or therms/full-time equivalent employees.

Suggested Targets:

- Reduce total natural gas usage by 5% by 2020.
- Reduce intensity of natural gas usage by 2-20% per intensity measure (e.g., per square foot, aircraft movement, passengers, employees) by 2020.

Suggested Resources:

Resource Name and Link	Description	Source
Virginia Airports Utility Performance Tracker Tool	A utility performance tracking tool designed for Virginia airports to track electricity, natural gas, and water usage on a monthly and annual basis.	DOAV
Database of State Incentives for Renewables & Efficiency	The DSIRE database, funded by the U.S. Department of Energy (DOE), is the most comprehensive source of information on incentives and policies that support renewables and energy efficiency in the United States.	DSIRE
Handbook for Considering Practical Greenhouse Gas Emission Reduction Strategies for Airports	This handbook provides guidance to assist airport operators in identifying, evaluating, prioritizing, and implementing practical, low-cost strategies to reduce and manage greenhouse gas emissions.	ACRP
Climate Registry Reporting Tools	These protocols, developed by the California Climate Action Registry (CCAR), are meant to assist members and verifiers in the process of calculating, reporting and verifying an emissions inventory.	CCAR
Greenhouse Gas Protocol Calculation tools	A set of tools that reflect best practice methods that have been extensively tested by industry experts. Every tool is comprised of an Excel workbook and a PDF guidance document providing step-by-step instructions, which should be consulted first.	GHG Protocol



Goal 4: Reduce greenhouse gas (GHG) emissions.

Rationale:

The Virginia Commission on Climate Change established a goal of reducing statewide emissions by 30% compared to business-as-usual projected emissions by 2025. One of the most cost-effective ways of reducing GHG emissions is through energy efficiency, or reducing the demand for electricity and natural gas (see related goals). This not only reduces an airport’s impact on the global climate, it also saves money and enhances the airport’s reputation. Further, airports that reduce GHG emissions through energy efficiency will support the environmentally conscious tourism goal of the Virginia Green Travel Alliance.

Suggested Initiatives:

- Refer to the general energy efficiency initiatives listed under Goal #1 Suggested Initiatives.

Metrics:

- Total GHG emissions measured in mt CO₂e.
- GHG emissions measured in mt CO₂e/sqft.
- GHG emissions measured in mt CO₂e/full-time equivalent employees.

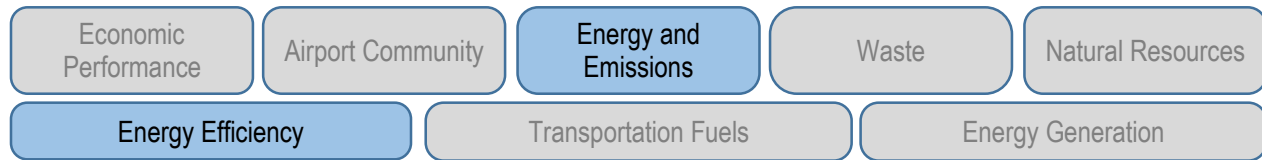
Suggested Targets:

- Reduce Scope 1 and Scope 2 combined total GHG emissions by 20% by 2020.
- Reduce Scope 1 and Scope 2 combined total GHG emissions by 5% per square foot by 2020.
- Reduce Scope 1 and Scope 2 combined total GHG emissions by 2-20% per full-time equivalent employee.

Suggested Resources:

Resource Name and Link	Description	Source
Database of State Incentives for Renewables & Efficiency	The DSIRE database, funded by the U.S. Department of Energy (DOE), is the most comprehensive source of information on incentives and policies that support renewables and energy efficiency in the United States.	DSIRE
Handbook for Considering Practical Greenhouse Gas Emission Reduction Strategies for Airports	This handbook provides guidance to assist airport operators in identifying, evaluating, prioritizing, and implementing practical, low-cost strategies to reduce and manage greenhouse gas emissions.	ACRP
Climate Registry Reporting Tools	These protocols, developed by the California Climate Action Registry, are meant to assist members and verifiers in calculating, reporting, and verifying an emissions inventory.	CCAR
Greenhouse Gas Protocol Calculation tools	Each of the tools on this website reflects best practice methods that have been extensively tested by industry experts. Every tool is comprised of an Excel workbook and a PDF guidance document. Each PDF provides step-by-step guidance on the use of a tool and should be consulted first.	GHG Protocol
Methods for Calculating GHG Emissions of Airports	This document provides mechanisms for airports to calculate their GHG emissions. (From Appendix C of ACRP Report 11: Guidebook on Preparing Airport GHG Emissions Inventories)	ACRP
EPA Climate Leaders Guide to Greenhouse Gas Management for Small Business & Low Emitters	A step-by-step guide to greenhouse gas management for small business and other organizations with emissions less than 10,000 tons per year.	EPA

Resource Name and Link	Description	Source
AirportGEAR	AirportGEAR is an interactive decision support tool that considers a range of greenhouse gas reduction strategies that can be implemented by all types of airports—regardless of size, geography, or resources—either directly or in partnership with airport stakeholders, including airlines, airport tenants, and host communities. (Tool accompanies ACRP Report 56: Handbook for Considering Practical Greenhouse Gas Emission Reduction Strategies for Airports)	ACRP



Goal 5: Reduce light pollution.

Rationale:

Light pollution occurs when lighting illuminates the night sky rather than the surfaces and areas where lighting is needed to perform tasks for airport operations. Reducing light pollution has a direct impact on reducing urban sky glow and light trespass into adjoining properties, thus improving neighborhood property values and community satisfaction. In addition, reducing light pollution often results in eliminating energy waste, which also reduces costs. The 2014 Virginia Annual report on the Environment estimates that at least 30% of outdoor lighting is wasted.

Metrics:

- Airport Operating Areas lumens/sqft, also known as footcandles.

Suggested Targets:

- Ensure exterior light levels meet the recommendations of the Illuminating Engineering Society and local ordinances.

Suggested Initiatives:

- Refer to the general energy efficiency initiatives listed under Goal #1 Suggested Initiatives.
- Develop an exterior lighting plan, using the “Guidelines for Good Exterior Lighting Plans” prepared by the Dark Skies Initiative as a reference.
- Install light hoods to direct light at target and avoid light scatter.
- Emulate existing programs such as the Dark Skies Initiative.
- Replace airport flood/parking lot lighting with LED fixtures which can be adjusted to focus light on a given area.

Suggested Resource:

Resource Name and Link	Description	Source
Guidelines for Good Exterior Lighting Plans	These guidelines were developed to help communities control light pollution and preserve the night sky.	The Dark Sky Society

Subcategory: Transportation Fuels

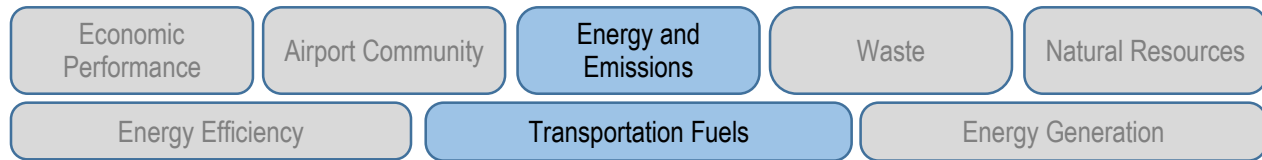
Transportation fuels are an integral part of an airport's operations. Faced with unpredictable fuel costs, airports stand to benefit from utilizing alternative sources of fuel for ground support equipment (GSE) as well as implementing strategies to reduce fuel use as a whole. Managing transportation fuels also offers an opportunity to improve local air quality for airport employees and surrounding communities, and to reduce greenhouse gas emissions.

Examples include:

- Alternative fuels for GSE and other vehicles, such as electric tractors and compressed natural gas (CNG) shuttles.
- Appropriately sized ground transit and maintenance vehicles.
- Optimized travel patterns.
- Utilizing vehicles for multiple uses.
- Vegetation management to reduce mowing and maintenance needs.

Sustainability goals in this subcategory:

- 1. Switch to alternatively-powered ground vehicles operated at the airport when feasible.**
- 2. Increase customer and staff ridership of high-occupancy transportation to and from the airport, where available.**
- 3. Decrease fuel use by reducing field mowing requirements.**



Goal 1: Switch to alternatively powered ground vehicles* operated at the airport when feasible.

Rationale:

Relative to petroleum-based fuels, alternative fuels can provide long-term cost savings, resilience to price spikes, and reduced onsite emissions. Retrofit options and new alternative fuel vehicles (AFVs) are becoming more readily available. Range anxiety, often cited as a downside to non-gasoline powered vehicles, is a non-issue for airport vehicles that rarely leave the premises and are re-fueled onsite. Airport tenants can help switch to AFVs by splitting costs on fueling/charging stations and providing bulk buying power, potentially shifting the economies of scale to make an alternatively-powered fleet financially doable.

Suggested Initiatives:

- Determine the location of the nearest Compressed Natural Gas (CNG) filling station or feasibility of installing airport owned/operated filling infrastructure. Coordination with other municipal agencies and/or tenants may be beneficial. Plan capital expenditures to replace airport-owned ground vehicles with CNG-powered options if deemed feasible. Encourage and incentivize the replacement of tenant-owned ground vehicles with CNG-powered options.
- Plan capital expenditures to replace airport-owned ground vehicles with electric vehicles (EVs) and hybrid electric vehicles (HEVs) where feasible. Encourage and incentivize the replacement of tenant-owned ground vehicles with EVs and HEVs. Installation of charging infrastructure may be required.
- Determine the feasibility of other alternative fuel options for airport-owned ground vehicles. Consider fuel source location and determine the potential for installing a fueling station on airport property. For airports with tenants, explore partnership possibilities with tenants to share planning, installation, and maintenance costs of new fueling/charging infrastructure to serve both airport-owned and tenant-owned ground vehicles.
- In addition to pursuing AFVs, ensure that vehicle fuel efficiency (including fuel costs over the lifecycle of a vehicle) is a factor of consideration when purchasing ground operations vehicles.
- Encourage surface transportation providers (e.g., taxi fleets, shuttle services) to use hybrid vehicles, alternative fuel vehicles, and higher efficiency vehicles, for example, through lower cost permits for these types of vehicles.

Metrics:

- Percentage of airport-owned ground vehicles that are powered by electricity or alternative fuels (such as natural gas or biodiesel, among others).

Suggested Targets:

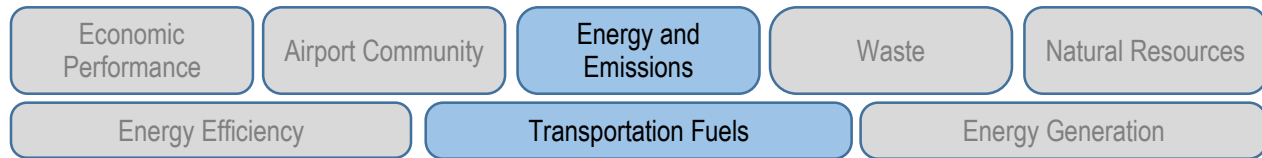
While a wide range of alternatively powered ground vehicle options are now available—meaning that vehicles for all airport tiers’ respective needs can likely be obtained—transitioning to alternatives can be inhibited by cost and airport-specific attributes. Specific targets for alternatively powered vehicle adoption will depend on airport size/tier, vehicle usage requirements, and the extent to which vehicles are owned by airport tenants versus an airport itself. To help determine feasibility, Virginia airports can consult the provided Tools, Resources, and Guidance Materials. Below is a suggested target range reflecting this wide potential for feasibility based on airport specifics:

- Increase percentage of airport-owned ground vehicles using electricity or alternative fuels to 25-75%, within eight years.

* “ground vehicles” includes Ground Support Equipment (GSE) and general ground operations vehicles.

Suggested Resources:

Resource Name and Link	Description	Source
Ground Support Equipment (GSE) Tutorial	This tutorial contains three modules, which cover GSE basics, emissions reduction approaches and case studies, and converting to cleaner GSE. This tool accompanies ACRP Report 78: Airport Ground Support Equipment: Emission Reduction Strategies, Inventory, and Tutorial.	ACRP
Alternative Fuels Data Center Tools	This website provides a collection of calculators, interactive maps, and data searches that can assist fleets, fuel providers, and other transportation decision makers in their efforts to reduce petroleum use.	DOE
The Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation Model (GREET)	GREET provides the user with an easy-to-use and fully graphical toolbox to quickly perform life cycle analysis simulations of alternative transportation fuels and vehicle technologies.	Argonne National Laboratory
FuelEconomy.gov	This website is the official U.S. government source for fuel economy information.	DOE
MOVES (Motor Vehicle Emission Simulator)	This emission modeling system estimates emissions for mobile sources covering a broad range of pollutants and allows multiple scale analysis.	EPA
Vehicle and Equipment Tracking Worksheets	FAA's Voluntary Airport Low Emissions Program (VALE) program enables airport sponsors to use Airport Improvement Program (AIP) funds and Passenger Facility Charges (PFCs) to finance low-emission vehicles, refueling and recharging stations, gate electrification, and other airport air quality improvements. These tracking worksheets help sponsors monitor their alternative fuel vehicle fleet and low-emissions infrastructure.	FAA
eGSE Cost Benefit Analysis Modeling Tool	This modeling tool supports the analysis of deploying eGSE versus internal combustion engine (ICE) GSE at airports.	Idaho National Laboratory
Virginia Resources for Alternative Fuel Vehicles	This resource provides a listing of incentives, laws, and regulations related to alternative fuels and advanced vehicles for Virginia.	DOE
Diesel Emissions Quantifier (DEQ)	The DEQ is an interactive tool that evaluates clean diesel projects and options for medium- and heavy- duty diesel vehicles by estimating emission reductions, cost effectiveness, and health benefits.	EPA



Goal 2: Increase customer and staff ridership of high-occupancy transportation to and from the airport, where available.

Rationale:

By increasing accessibility and enabling more airport visitors to utilize mass transit (i.e., any high-occupancy mode of transportation, including buses and light rail as well as private shuttle services, etc.), airports can attain higher visitor numbers in tandem with fewer emissions from fuel usage. Reduced traffic congestion helps reduce wasted fuel while vehicles idle in queue. Increased transportation options make the airport more accessible and potentially more attractive to passengers, and can increase customer satisfaction. This goal will need to be examined in each airport’s context to evaluate the revenue impacts of balancing transit service and provision of parking spaces.

Metrics:

- Number of customers arriving and departing via high-occupancy transit.
- Number of staff commuting via high-occupancy transit.

Suggested Targets:

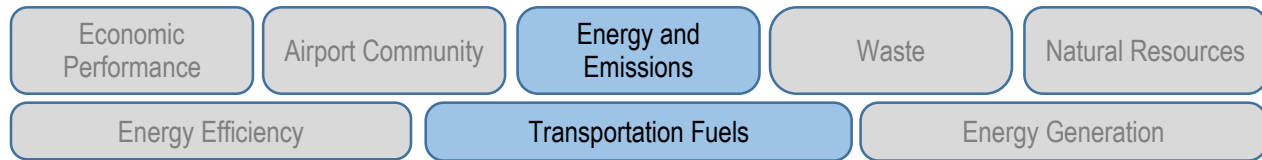
- Increase the number of customers arriving and departing via high-occupancy, mass transit in a 12-month period by 10-15% within five years.
- Increase the number of staff commuting via high-occupancy, mass transit in a 12-month period by 10-15% within five years.

Suggested Initiatives:

- Provide education and resources to airport employees on available mass transit options.
- Offer mass transit passes or discounts to airport employees, where options exist.
- Encourage airport tenants to offer mass transit passes or discounts to their employees, potentially including them in any price negotiations with transit operators to receive lower, bulk pricing.
- Collect, track and report data on alternative transit usage to and from the airport. This data can often be obtained from a transit operator.
- Ensure signs and schedules for transit options are accessible and located in high-trafficked areas to facilitate mass-transit use for those not familiar with the airport. Work with transit operators to share costs of signage and promotional materials to ensure visitors are informed about the full range of airport transit options.
- Work with transit operators to identify and implement ways to increase transit ridership. If appropriate, consider sharing a transit operator’s costs to provide more frequent service and/or increase transit access to the airport, for the benefit of improving customer access and increasing visitors to the airport. Note that this includes private shuttle services in addition to public transit options.

Suggested Resources:

Resource Name and Link	Description	Source
Virginia Transit Links	This website provides a listing of all public transit options in the state of Virginia, broken down by county and city. Statewide, intercity, and regional transit options are also shown.	American Public Transit Association
Six Steps in a Market-Based Strategy for Improving Airport Ground Access	This guide provides a shortened summary of the key elements necessary in the creation of a market-based strategy for improving the quality of public mode services at U.S. airports. (Chapter 1 of ACRP Report 4: Ground Access to Major Airports by Public Transportation)	ACRP



Goal 3: Decrease fuel use by reducing field mowing requirements.

Rationale:

An airport can reduce field mowing-related fuel usage and labor costs (or costs of mowing services) by reducing the number of times per year that airport fields must be mowed. These reductions can happen through strategically selecting grasses that require less maintenance, or by re-assessing mowing frequency required to meet safety and other needs. Low-lying, native, slow-growth grasses allow airports to reduce landscaping costs (because they generally do not require upkeep, herbicides, etc.) in addition to realizing local emissions reductions from the reduction in fuel use. Furthermore, low-lying, native plant species can be a natural and low-effort way to minimize wildlife interference on the runway, keep groundcover consistent, and optimize water absorption.

Metrics:

- Number of times per growing season that airport fields require mowing.

Suggested Targets:

Determining a target for mowing reductions is highly airport-dependent. The feasibility of targets will be determined by an airport's size, climate, and the species of grasses involved. Some airports have even reduced mowing frequency to as low as once per growing season.

- Reduce the number of times airport fields are mowed by 20% or more, within five years.

Suggested Initiatives:

- Re-seed airport fields with low-mow, native grasses. Airports should consider whether the existing grass needs to be pulled up, or if seed can be spread directly over it. This will depend on the existing and new grass species. Airports should also consult the provided guidance and resources to determine grass species with the desired characteristics that are native or appropriate to their region and climate. *Note: Although chemical growth inhibitors could also reduce the speed of vegetation growth, their use may present additional challenges related to stormwater management and hazardous waste management.*
- When mowing is required, consider the use of alternative fuel commercial lawn equipment.

Suggested Resource:

Resource Name and Link	Description	Source
Currently Available Plant Growth Retardants	This site provides a listing of plant growth retardants, the types of grasses they're appropriate for, and application instructions.	University of Georgia, Clemson, and NC State University

Subcategory: Energy Generation

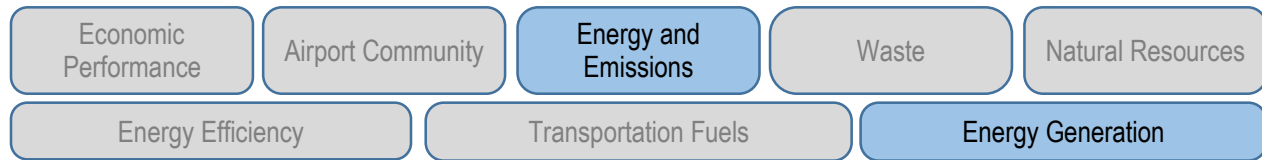
Similar to energy efficiency, onsite energy generation serves as a bridge between resource conservation and economic vitality. By producing electricity from renewable resources, airports can reduce costs and access a compelling non-aviation revenue stream, shelter themselves from fluctuations in utility energy prices, and reduce their greenhouse gas emissions. Through Virginia’s net-metering rule, commercial energy systems up to 1 MW in size can offset grid electricity consumption at retail rates. By first implementing energy efficiency measures, airports can appropriately size and price their onsite energy generation needs.

Examples include:

- Onsite solar photovoltaic systems on rooftops or unused airport land.
- Onsite small-scale wind turbines.
- Onsite biomass energy generation.
- Geothermal energy systems.
- Onsite production of natural gas.

Sustainability goals in this subcategory:

- 1. Increase portion of airport’s electricity supplied by onsite renewable energy sources.**



Goal 1: Increase portion of airport's electricity supplied by onsite renewable energy sources.

Rationale:

Implementing renewable energy generation on site has many benefits including long-term cost savings from reduced electric consumption of utility grid power; positive publicity from local residents and airline passengers; support for environmental stewardship and green airport practices; eligibility for federal and state financial incentives; and increased resiliency from non-grid sourced power.

Solar PV System characteristics to meet 10% target for varying consumption levels

Average Consumption (kWh/mo.)	System Capacity (kW) to Achieve Target	Space Required (sqft)
> 1,400,000	1000	80,000
1,400,000	1000	80,000
700,000	500	40,000
350,000	250	20,000
175,000	125	10,000
87,500	68	5,000
50,000	40	2,500
20,000	17	1,250
10,000	8	625

Metrics:

- Percentage of annual electricity consumption derived from onsite renewable energy sources.

Most airports will closely track electricity consumption, which is billed on a regular basis. Similarly, the output of common renewable energy systems designed to generate electricity can be easily metered, making it simple to calculate progress towards this metric on an ongoing basis.

Suggested Targets:

- Supply at least 10% of electricity needs from onsite renewable energy sources, such as a solar photovoltaic (PV) system.

The above target is a suggestion, since individual targets will vary by airport size, type, and the amount of renewable energy that is economically feasible to integrate into the facility. Since electricity consumption at airports can vary widely, the table at left provides examples of system size (in both system capacity in kW and space required in square feet) that would meet the suggested 10% target.

Suggested Initiatives:

- Install an onsite solar PV system, sized based upon the above table.
 - Key considerations include:
 - Is there sufficient space available for a PV system?
 - Is PV economically attractive?
 - Will solar glare be a challenge for the available installation location?
 - Can other upcoming capital improvement projects be leveraged to reduce the system cost of solar (e.g., installing a rooftop PV system at the same time a new terminal building is constructed)?
 - The table below shows suggestions for evaluation criteria that airport staff may want to consider during the solar bid evaluation process. Note: This table applies to ground-mounted solar PV projects that are leased by an airport. For solar PV projects that are either roof-mounted, carport-mounted, or directly owned by the airport, additional criteria will apply.

Solar bid evaluation considerations.

Category	Unacceptable	Not Advantageous	Advantageous	Highly Advantageous
Solar PV Qualifications and Availability	No evidence of previous experience installing PV systems on airport properties and no professional training in PV system installations.	Limited number of project team members with experience installing PV on airport properties and some professional training in PV system installations.	Project team experience installing, operating, and maintaining PV on Virginia and/or airport properties, and 5+ years of experience of team professional training and experience in PV system installation in general.	Significant project team experience installing, operating, and maintaining PV on Virginia airport properties, and 10+ years of experience of team professional training and experience in PV system installation in general. Understands glare issues at airports.
Permitting	No experience with or understanding of applicable permits.	Limited experience with applicable permitting requirements.	Successfully completed airport solar PV projects that required FAA or similar permitting.	Documented experience with airport and FAA permitting and a clear understanding of permitting requirements, including application and approval processes.
Financing Capabilities	No evidence of firm's ability to finance the PV system.	Some evidence of firm's ability to finance the PV system.	Significant evidence of firm's ability to finance the PV system.	Significant evidence of firm's ability to finance the PV system with extensive track record of providing financing for similar projects.

Category	Unacceptable	Not Advantageous	Advantageous	Highly Advantageous
Approach, Schedule, and Experience with Airports	Approach to work and timeline not provided.	Limited approach to work and timeline provided, but does not demonstrate significant understanding of the project and airport construction.	Adequate approach to work and timeline that demonstrates reasonable understanding of the project, and a plan to minimize airport activities.	Exceptional approach to work and timeline that provides an exemplary understanding of the project, measures to expedite the period and eliminate interference with airport activities, and assurances to reinforce compliance with the timeline.
Monitoring, Operations, and Maintenance	No operations, maintenance, and monitoring plan provided.	Limited operations, maintenance, and monitoring plan provided.	Adequate operations, maintenance, and monitoring plan provided, but more details could be beneficial	Exceptional, detailed operations, maintenance, and monitoring plan provided.
Fiscal Benefit to the Landowner	Proposed project will result in a negative financial impact on the landowner.	Limited operations, maintenance, and monitoring plan provided. Financial benefit is minimal over the project term, or returns decline over the years.	Adequate operations, maintenance, and monitoring plan provided, but more details could be beneficial. Financial benefit is satisfactory, but financial return increases less than 2% per year.	Exceptional, detailed operations, maintenance, and monitoring plan provided. Fair and modest financial benefit over the life of the project. Returns increase slightly over the life of the project.

- Purchase Renewable Energy Certificates (RECs). RECs represent the environmental attributes of relatively clean renewable energy generation and are often used to meet emissions reduction or renewable energy purchase goals. Though RECs generally do not provide a direct financial benefit, they do provide a simple way to gain many of the same marketing benefits of installing onsite renewables at a lower cost. When purchasing RECs, it is important to look for Green-e certification, or a similar certification, which indicates that REC revenue is supporting new clean renewable energy technologies. Some RECs are offered at a lower cost because they include a mix of sources, whereas RECs for new solar and wind generation may have a price premium in exchange for offering more traceable benefits and a cleaner generation mix.
- Install other forms of renewable energy, as determined by examination of site specific needs and considerations. Other options are outlined in the table below:

Technology options

Technology	Fuel Offset	Key Considerations
Solar Hot Water	Natural Gas	There are currently minimal incentives available for solar hot water and relatively low gas prices. This may make the economic case for solar hot water challenging.
Solar Space Heating	Natural Gas	The lack of available incentives and modest heating load may make the economics of solar space heating projects challenging.
Wind (Tower Mounted)	Electricity	FAA regulations make installation of tall structures in the vicinity of airports challenging or impossible. Shorter towers are unlikely to reach sufficient wind resource to provide an attractive economic benefit.
Wind (Building Mounted)	Electricity	Building mounted wind turbines have not been commercially proven and typically generate substantially less electricity than expected. In order to be viable, the site must have an exceptional wind resource and ideal conditions.
Biomass	Natural Gas/Electricity	Biomass for electricity generation requires a substantial and regular feedstock and substantial permitting expertise. This may pose a challenge to implementation but could be suitable for large airports with a substantial wastewater stream. For heating, most biomass facilities will require either an onsite feedstock (e.g., a forest) and/or substantial storage facilities for wood pellets/shavings. The complexities of these systems may not be feasible given Virginia's relatively short heating season.
Energy Storage	N/A	Though battery technology has advanced rapidly in recent years, Virginia does not yet have mechanisms in place to capture the various revenue streams possible with grid-connected battery systems. Until these policies are in place, batteries are only useful as backup or emergency power, with minimal economic benefit during regular airport operations.

Suggested Resources:

Resource Name and Link	Description	Source
Renewable Energy Decision-Making Checklist	A checklist of 15 items critical to evaluating a renewable energy project and the corresponding action steps necessary for collecting the required information. The information in the checklist is required regardless of the eventual renewable energy technology selected. (Table 2-5 in ACRP Report 141: Renewable Energy as an Airport Revenue Source)	ACRP
Database of State Incentives for Renewables & Efficiency	The DSIRE database, funded by the U.S. Department of Energy (DOE), is the most comprehensive source of information on incentives and policies that support renewables and energy efficiency in the United States.	DSIRE
Technical Guidance for Evaluating Selected Solar Technologies on Airports	This report provides a checklist of FAA procedures to ensure that proposed photovoltaic or solar thermal hot water systems are safe and pose no risk to pilots, air traffic controllers, or airport operations. Case studies of operating airport solar facilities are provided, including Denver International, Fresno Yosemite International, and Albuquerque International Sunport.	FAA
Solar Glare Hazard Analysis Tool	This tool determines when and where solar glare can occur throughout the year from a user-specified PV array as viewed from user-prescribed observation points. Configurations can be quickly modified (e.g., tilt, orientation, shape, location) to identify a design that mitigates glare while maximizing energy production. This tool is required by the FAA for glare hazard analyses near airports.	Sandia National Laboratory

Resource Name and Link	Description	Source
Sample RFPs for Renewable Energy Projects at Airports	This document features the complete text of the RFPs the Indianapolis Airport Authority and City of Santa Barbara put out for the construction of solar PV systems and the RFP that the Metropolitan Nashville Airport Authority put out for a geothermal system. (Appendix from ACRP Report 141: Renewable Energy as an Airport Revenue Source)	ACRP
Renewable Energy Process Flow Charts	These flow charts aid with renewable energy project development and are available in two types. The first flow chart provides guidance for evaluating appropriate renewable energy technologies, including solar, wind, geothermal, and biomass. The second flow chart provides guidance on exploring project structure and funding. (Figures 2-20 to 2-31 from ACRP Report 141: Renewable Energy as an Airport Revenue Source)	ACRP
Renewable Energy Evaluation Factors Matrix	This matrix helps airport managers evaluate various renewable energy sources based on several factors such as compatibility/aviation safety; ease of operation and maintenance; and installed cost of electricity. (Table 2-3 and 2-4 from ACRP Report 141: Renewable Energy as an Airport Revenue Source)	ACRP
PVWatts Calculator	This calculator estimates the energy production and cost of energy of grid-connected photovoltaic (PV) energy systems after the user inputs an address. The user can also alter system inputs, such as system size and array type.	National Renewable Energy Laboratory

3.4 Waste

In an airport environment, there are numerous hazardous and nonhazardous materials to track, contain, manage, and dispose of. Compliance with federal and state regulations may require airports to develop waste management plans, which should include sustainable practices for both hazardous and nonhazardous waste. Proper tracking, disposal, and spill prevention is integral to protecting the environment, decreasing the economic costs of wasted materials, and ensuring community support, which could decrease as a result of poor waste management.

Subcategory: Waste Management and Recycling

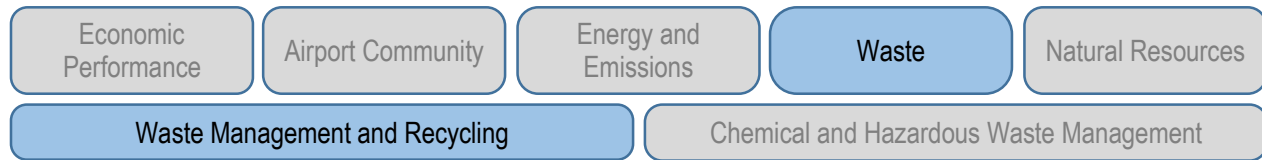
Like all commercial facilities, airports purchase, consume, and dispose of materials. Optimizing the management of these processes provides an opportunity to streamline operations by eliminating unnecessary waste and reducing costs. In addition to traditional materials, such as paper, cardboard, and plastic, airports also have the opportunity to improve handling of organic materials as well as construction and demolition waste.

Examples include:

- Implementing clearly labeled and consistent waste management infrastructure.
- Coordinating with local public/private recycling organizations.
- Utilizing environmentally preferable purchasing, favoring items with minimal and recyclable packaging.
- Implementing a composting program (large airports).
- Using waste materials as a revenue stream.
- Reviewing waste management contracts.

Sustainability goals in this subcategory:

- 1. Reduce Municipal Solid Waste (MSW) sent to landfills.**
- 2. Increase the airport's diversion rate through recycling and reuse.**
- 3. Increase recycling of construction and demolition waste.**



Goal 1: Reduce Municipal Solid Waste (MSW) sent to landfills.

Rationale:

Reducing solid waste sent to landfills helps to reduce the production of methane, a greenhouse gas, which affects global warming 25 times more than carbon dioxide. Landfills can negatively affect the surrounding communities and leak contaminants into groundwater. Airports that are charged by waste management contractors for waste pickup by weight and/or frequency can benefit from reduced monthly costs.

Suggested Initiatives:

- Develop a waste reduction plan. The plan should be explicitly designed to meet the adopted MSW diversion target and to serve as a roadmap of long- and short-term strategies for reducing waste from the largest waste-generating operational functions.
- Conduct a municipal solid waste audit to determine contents of MSW, including the portion of the waste stream sent to landfills and the portion recycled (if applicable). This audit provides baseline data for establishing targets, developing accurate waste hauling contracts, and verifying the accuracy of existing and historical MSW volume reporting.
- Adopt waste hauling contracts that specifically require tracking and reporting of MSW volumes annually at a minimum. Revise existing contracts if needed. Provide incentives for accurate reporting. Leverage the airport's position as a major generator to encourage vendors to improve waste reporting across the industry.
- Adopt waste removal contracts that provide for recycling and composting services. Structure the contracts to provide specificity in the type of bins provided, visibility, location, number, destination, and reporting requirements.
- Create an internal task force dedicated to reducing the volume of waste the airport generates; the responsibilities of this task force may overlap with other related goals and initiatives.

Metrics:

MSW is defined as the total output of waste, not including hazardous waste or construction and demolition debris, produced by the airport.

- Pounds of MSW sent to landfill per year (i.e. not recycled or reused).

Suggested Targets:

MSW generation and disposal volumes will vary between airports as a result of airport size, differing tenant waste removal agreements, and waste disposal contract structure and reporting requirements; target values for volume of MSW generated may vary accordingly.

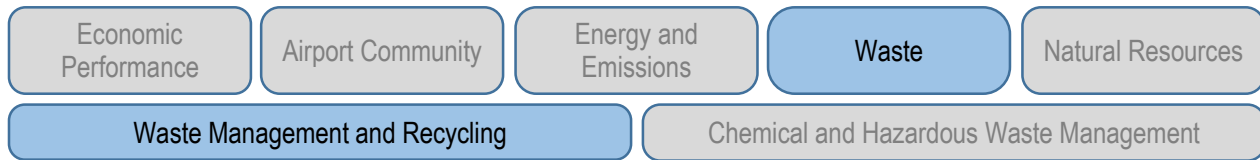
- Decrease pounds of MSW sent to landfills by 15-30% of baseline year within eight years.

Suggested Resources:

Resource Name and Link	Description	Source
How to Start a Recycling Program at Your Airport	This document has guidance on setting up and maintain an airport recycling program, with a questionnaire and case studies.	EPA
Developing and Implementing an Airport Recycling Program	This guide provides a best practices overview regarding establishment of a recycling/waste minimization program at an airport as well as an overview of wastes typically generated at airports.	EPA
Waste Reduction Model (WARM)	The Waste Reduction Model (WARM) helps organizations track and voluntarily report greenhouse gas (GHG) emissions reductions from several different waste management practices. WARM is available both as web-based calculator and as a Microsoft Excel spreadsheet.	EPA

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Resource Name and Link	Description	Source
Reducing the Impact of Wasted Food by Feeding the Soil and Composting	An overview of compost, including how it is created, its benefits, considerations to take into account when starting to compost, and composting success stories.	EPA
Mid-Atlantic Composting Directory	This directory provides contact information for composting service and equipment suppliers, along with sources for information and education.	Virginia Polytechnic Institute and State University
Virginia Green Suppliers Network Member Directory	A listing of green product and service providers in Virginia, including composting and recycling providers.	Virginia DEQ



Goal 2: Increase the airport’s diversion rate through recycling and reuse.

Rationale:

Recycling and reusing waste materials reduces the overall volume of material that is sent to landfills (and associated cost), the release of GHGs from landfills, and the volume of raw resources used in creating new products by utilizing recycled materials instead, which in turn reduces the energy used to manufacture new products. Airports may identify opportunities to reuse, repurpose, or otherwise divert many kinds of waste material, from soda cans to used oil to construction debris.

Metrics:

- Annual diversion rate (calculated as a percentage and obtained by dividing the total amount of MSW recycled or reused in a given year by the total amount of MSW generated.)

Suggested Targets:

- Achieve a minimum diversion rate of 20% within five years.

Suggested Initiatives:

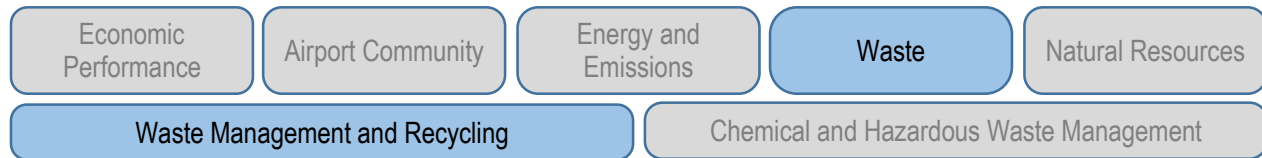
- Identify local partner organizations for the delivery, hauling, or reuse of waste materials or compost.
- Hold training sessions for employees and tenants to learn opportunities for recycling, material reuse, composting, and repurposing at the airport.
- Integrate sustainability language into airport contracts with tenants, through restructuring or amending the contract. All contract types can be leveraged by airport operators to improve compliance with environmental law, fulfill permit requirements, drive innovative sustainable improvements, and minimize and manage environmental impacts.
- If there is a restaurant on-site, work with a vendor to recycle any waste grease produced by the restaurant and keep track of quantities recycled.
- Improve internal tracking mechanisms for accounting of diverted material and record keeping.
- Create an internal task force dedicated to improving recycling and material reuse; the responsibilities of this task force may overlap with other related goals and initiatives.
- Promote recycling at the airport through recycling posters and signs directed toward airport users, airport tenants, or airport employees.

Suggested Resources:

Resource Name and Link	Description	Source
How to Start a Recycling Program at Your Airport	This document has guidance on setting up and maintain an airport recycling program, with a questionnaire and case studies.	EPA
Developing and Implementing an Airport Recycling Program	This guide provides a best practices overview regarding establishment of a recycling/waste minimization program at an airport as well as an overview of wastes typically generated at airports.	EPA
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Reducing the Impact of Wasted Food by Feeding the Soil and Composting	An overview of compost, including how it is created, its benefits, considerations to take into account when starting to compost, and composting success stories.	EPA
Mid-Atlantic Composting Directory	This directory is provides contact information for composting service and equipment suppliers, along with sources for information and education.	Virginia Polytechnic Institute and State University
Virginia Green Suppliers Network Member Directory	A listing of green product and service providers in Virginia, including for composting and recycling.	Virginia DEQ



Goal 3: Increase recycling of construction and demolition waste.

Rationale:

The recycling of no-hazardous construction and demolition materials can provide airports with cost savings, environmental benefits including the reduction of materials sent to landfills, reduction of impacts to airport operations, and social benefits including the reduction of traffic due to decreased off-site hauling. The volume and type of construction waste from airports can vary significantly from year to year and are strongly related to airports' capital expenditures, the range and types of construction projects, and the unique operating circumstances. Debris from construction or demolition can include concrete, asphalt, wood, metals, drywall, carpet, plastic, rocks, pipes, cardboard, and many other materials that can be reused on airport property. Contractors are often contractually responsible for recycling construction debris and waste.

Metrics:

- Percentage of construction and demolition material (by weight or volume) recycled or otherwise diverted from landfill or incinerator, per project.

Suggested Targets:

- Divert 70% of construction or demolition waste (by weight or volume) from landfills or incinerators.

Suggested Initiatives:

- Adopt construction waste reuse policy establishing administrative processes for the reporting and tracking of construction waste.
- Establish contractual clauses in construction contracts that require contractors to report the weight or volume of material diverted from landfills or incinerators. Furthermore, stipulate in construction contracts that contractors use recycled materials and recycle construction waste with targets aligned with the airport's target reduction rate.
- Identify and specify local suppliers of recycled construction materials and local recyclers of used construction waste.
- Develop or enhance an existing record-keeping system of construction activities and identify construction projects for which construction debris reuse and recycling procedures were implemented.
- Reuse materials that are being demolished wherever possible (e.g., asphalt millings).

Suggested Resources:

Resource Name and Link	Description	Source
Construction Waste Management Database	A searchable database listing companies that haul, collect, and process recyclable debris from construction projects, searchable by zip code and by material(s) recycled.	National Institute of Building Sciences
Waste Reduction Model (WARM)	The Waste Reduction Model (WARM) helps organizations track and voluntarily report greenhouse gas (GHG) emissions reductions from several different waste management practices. WARM is available both as web-based calculator and as a Microsoft Excel spreadsheet.	EPA

Subcategory: Chemical and Hazardous Waste Management

Due to the nature of airport operations, managing chemical and hazardous waste is an unavoidable responsibility and an area for potential operational improvements. Inherently tied to stormwater management, effectively managing chemical and hazardous waste positions airports to comply with regulations, avoid toxic environmental exposures, and foster positive community relations.

Examples include:

- Alternative or improved de-icing and snow removal methods.
- Infrastructure and process improvements for spill containment.
- Appropriate storage and proper labeling.
- Employee training on proper containment and disposal.
- Vegetation management for reduced chemical use.

Sustainability goals in this subcategory:

- 1. Find and use substitutes for products with lower environmental, health, and safety risks.**
- 2. Implement a chemical tracking system to improve hazardous materials management.**
- 3. Reduce chemical/oil spills by enhancing spill prevention and control measures.**
- 4. Minimize hazardous waste generation.**
- 5. Use the least number of hazardous waste handlers that meet the criteria for “acceptable” business.**

Economic
Performance

Airport Community

Energy and
Emissions

Waste

Natural Resources

Waste Management and Recycling

Chemical and Hazardous Waste Management

Goal 1: Find and use substitutes for products with lower environmental, health, and safety risks.

Rationale:

Many substances used in airport operations come with associated health, safety, or environmental risks. These substances include pesticides, firefighting foams, deicing fluid, solvents, and others. When possible, replacing these chemicals and materials with environmentally-preferred alternatives will have a positive impact on safety, environmental performance, and/or waste reduction. Safety and health improvements, besides their direct benefits, can have a positive impact on employee morale and could reduce insurance costs. Improvements in environmental performance will minimize liabilities associated with potential soil or water contamination and improve public perception of the airport. Any reduction in waste generation will reduce operating costs and minimize liabilities associated with future issues from off-site disposal sites.

Suggested Initiatives:

- Develop and implement an environmentally-preferred purchasing program (EPP) that builds on lessons learned from the above activities and also includes integrating environmentally-preferred purchasing of “green” products into subcontracts with vendors who are using chemicals on site.
- Adopt a vegetation management program that displaces the use of fertilizers and herbicides and that may reduce the need for mowing and other maintenance.
- When purchasing chemicals, airports should consider the life-cycle of the chemicals. In order to incorporate the true costs of the chemicals being purchased, airports should consider the life-cycle of such chemicals. Therefore, airports should not focus exclusively on the initial price; rather, they should calculate and compare total cost over the life cycle of the item. This calculation would include the initial cost along with maintenance, operation, insurance, disposal, replacement, and potential liability costs. Examining life-cycle costs will save money by ensuring the total cost of ownership is quantified.
- Develop a risk-based system that identifies plausible candidates for product substitution. Such a system may follow this general outline:
 - Identify chemicals/materials used in the largest quantities at the airport (start with top ten).
 - Determine the flammability, health risk, and instability/reactivity per the [“National Fire Protection Association \(NFPA\) 704: Standard System for the Identification of the Hazards of Materials for Emergency Response”](#) for these chemicals/materials.
 - If the facility generates hazardous waste in quantities exceeding one 55-gallon drum/month, determine what chemical(s)/material(s) is responsible for the waste being defined as a hazardous waste.
 - For those chemicals/materials with NFPA scores of 2 or more in one or more categories, and for those chemicals/materials identified as responsible for hazardous waste, discuss chemical/material options with the department using the items as well as the producer to identify alternatives.
 - Evaluate the alternatives to determine if they perform as well as the chemical/material; for example reformulated de-icing solutions (see related information in the Stormwater Management subcategory), aqueous-based products,

Metrics:

- Annual throughput of chemicals and materials that present a safety, environmental, or waste concern. Annual throughput may be monitored through purchasing records (i.e., dollars spent) or inventory stock (e.g., pounds or gallons). Materials of concern may be identified through an approach such as that described in the Suggested Initiatives for this Goal.
- Percent of chemical and material procurement budget spent on environmentally-preferred alternatives.

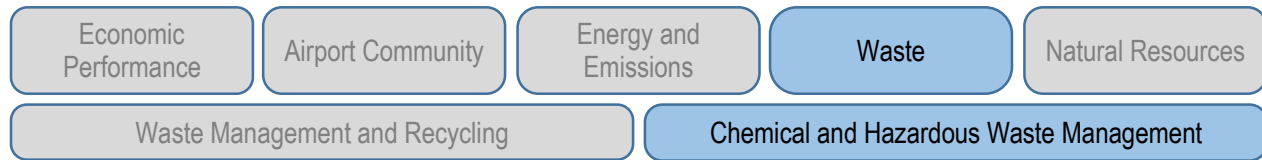
Suggested Targets:

- For high-risk chemicals and materials, reduce annual throughput by 5-30% in the coming year.
- Allocate 5-10% of chemical and material procurement budget spent on environmentally-preferred alternatives annually.

citrus-based cleaners.

Suggested Resources:

Resource Name and Link	Description	Source
Hazardous Waste Self Inspection Checklist	A listing of hazard characteristics of wastes and questions to be answered regarding proper storage and disposal of hazardous waste. While this checklist was created for schools, it can be applied to airports as well.	National Institute for Occupational Safety and Health
Hazardous Waste Regulations: User-Friendly Reference Documents	These reference documents discuss all aspects of hazardous waste management.	EPA
Advisory Circular 150/5320-15a	This document presents basic information on the characteristics, management, and regulations of industrial wastes generated at airports and guidance for the development of a Stormwater Pollution Prevention Plan.	FAA



Goal 2: Implement a chemical tracking system to improve hazardous materials management.

Rationale:

The ability to track the stock and shelf life of chemicals/materials improves inventory management by reducing waste and improving emergency response. Waste reduction is accomplished by improving the ability to assess chemicals/materials stock prior to making additional purchases, thus reducing the risk of disposing products with expired shelf life. Additionally, the tracking system is conducive to improved emergency preparedness by recording the location, quantity, and hazardous characteristics of chemicals stored onsite as well as preventing overstocking of materials exhibiting serious hazardous properties. The tracking system could be an extension of an existing hazardous materials inventory required under Emergency Planning and Community Right-to-Know Act (EPCRA) Section 211-213 reporting. Alternatively, the chemical tracking system can take the form of a spreadsheet and focus on selected high-risk and/or high-cost materials.

Suggested Initiatives:

- Leverage existing environmental compliance reporting and/or material safety data sheet (MSDS)/safety data sheet (SDS) system to develop tracking system to determine volume of hazardous materials purchased.
- Review storage locations of chemicals/materials with the objective of minimizing the number of locations and ensuring safe storage and labeling (store incompatibles in separate cabinets, use flammable safety cabinets for smaller-volume containers of flammable solvents and/or aviation fuels, and proper secondary containment when appropriate).
- Review the airport’s approved chemical list and identify opportunities to replace the most hazardous materials with less hazardous alternatives. This initiative goes in tandem with Goal #1.

This goal can be tailored to the specific risks and resources of each airport. While commercial airports may develop a comprehensive chemical tracking system, general aviation airports may focus on those hazardous materials that pose the highest risk due to storage volume, days of storage onsite, and hazardous characteristics. Typically, high-risk chemicals include flammable aviation fuels and solvents, toxic substances (e.g., de-icing fluids, herbicides), and combustible products (e.g., lubricating oils).

Metrics:

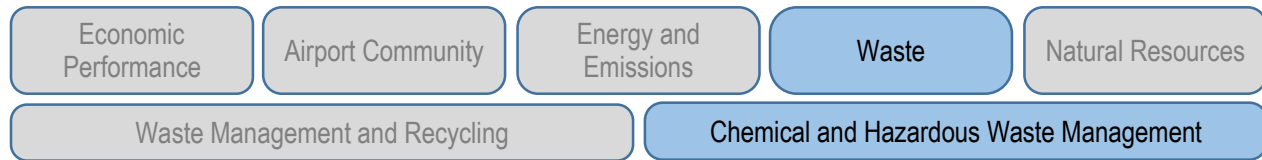
- The presence of a chemical tracking system and the effectiveness of the system, which can be evaluated by checking for the existence and quantity of chemicals reported in the system.

Suggested Targets:

- Within one year, develop and maintain a tracking system (updated every 45 days) that can accurately locate all containers of a specific chemical with at least 90% accuracy.

Suggested Resources:

Resource Name and Link	Description	Source
Hazardous Waste Regulations: User-Friendly Reference Documents	These reference documents discuss all aspects of hazardous waste management.	EPA
Advisory Circular 150/5320-15a	This document presents basic information on the characteristics, management, and regulation of industrial wastes generated at airports and guidance for the development of a Stormwater Pollution Prevention Plan.	FAA



Goal 3: Reduce chemical/oil spills by enhancing spill prevention and control measures.

Rationale:

Employing a number of best practices can help to reduce the number and severity of chemical/oil spills. Minimizing and eliminating spills through excellent chemical management helps reduce potential negative impacts to the environment, avoid lost product, decrease employee exposure to uncontrolled chemical releases and avoid the risk of additional costs associated with abating spill events and possible decontamination.

Metrics:

- Number of spill events per year.
- Annual amount (e.g., pounds or gallons) of spilled materials by product or hazard category.

Suggested Targets:

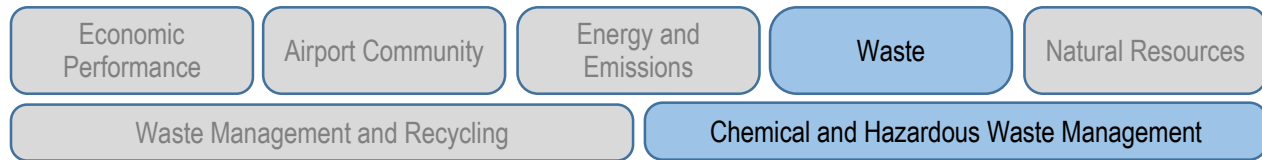
- Reduce the number and amount of spills on a year-over-year basis. May include specific number or percentage reductions based on previous year results.

Suggested Initiatives:

- Determine whether spill prevention control and countermeasure (SPCC) and stormwater pollution prevention program (SWPPP) plans are required. If so, ensure the SPCC and SWPPP plans are comprehensive and current (including the SPCC plan being approved by a Professional Engineer). Request and file copies of all SPCC plans from tenants that are required to have them. See related information in the Stormwater Management subcategory.
- Review secondary containment to assure sufficient volume and integrity.
- Review compatibility of chemical/material with storage material to assure storage integrity.
- Evaluate loading and unloading operations to identify practices that could minimize spillage.
- Limit the number of storage devices in use at any one time.
- Inspect chemical products upon delivery.
- Utilize overpack containers for drums during maintenance activities.
- Ensure proper training for airport employees on securing drainage, outlets or valves, maintenance of equipment, general facility operations.
- Confirm that sufficient containment and clean up supplies are available to respond to a spill.
- Inspect and maintain the functionality of oil-water separators in storm drain catch basins.
- For catch basins that do not contain an oil-water separator, consider drop-in catch basin inserts that capture fuels, oils, sediment and other pollutants.

Suggested Resources:

Resource Name and Link	Description	Source
Hazardous Waste Regulations: User-Friendly Reference Documents	These reference documents discuss all aspects of hazardous waste management.	EPA
Advisory Circular 150/5320-15a	This document presents basic information on the characteristics, management, and regulations of industrial wastes generated at airports and guidance for the development of a Stormwater Pollution Prevention Plan.	FAA



Goal 4: Minimize hazardous waste generation.

Rationale:

This action will reduce off-site management costs and liabilities as well as the potential for onsite contamination if there is a release/spill of the waste. This goal can be built upon RCRA's hazardous waste management program if already in place at the airport.

Suggested Initiatives:

- Categorize the types and volumes/weights of hazardous waste generated and research ability to reduce generation of each waste stream.
- Implement treatment/recycling options that are cost-effective.
- Adopt a pest management program to reduce the use of pesticides.
- Identify which hazardous waste could be used as a raw material by another company.
- Use of electrostatic painting techniques to reduce paint waste.
- Increase capture of deicing fluid for subsequent recycling or treatment facility. This approach saves the airport in disposal costs (glycol recovery).

Metrics:

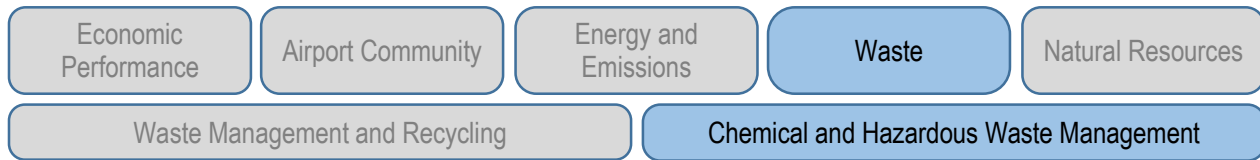
- Volume (e.g., gallons) or weight (e.g., pounds) of hazardous waste generated.

Suggested Targets:

- Reduce hazardous waste generation by 5-30% within five years.

Suggested Resources:

Resource Name and Link	Description	Source
How to Prepare a Source Reduction Evaluation Review and Plan	This resource provides a step-wise process for developing a site-specific hazardous waste minimization plan and is best suited for large generators, who may benefit from a root cause analysis of their waste generation.	California Department of Toxic Substances Control (DTSC)
Compliance Checklist for Complying with the Hazardous Waste Source Reduction Management Review Act of 1989	This checklist provides a questionnaire intended to help smaller generators think systematically about hazardous waste minimization opportunities without a formal root cause analysis.	California DTSC
Hazardous Waste Regulations: User-Friendly Reference Documents	These reference documents discuss all aspects of hazardous waste management.	EPA



Goal 5: Use the least number of hazardous waste handlers that meet the criteria for “acceptable” business.

Rationale:

By the nature of their operation, hazardous waste management facilities are exposed to multiple risks, including regulatory compliance liability, common law liability and citizen suits. Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), any entity who arranged for disposal of hazardous substances at a facility may be liable for all costs of removal and remedial action. For that reason, it is a good practice to audit waste haulers and treatment, disposal, and storage facilities for any violations of environmental regulations or history of litigation for nuisance, trespass, or negligence under common law. This action will minimize potential liabilities arising from any of the off-site hazardous waste management facilities becoming Superfund sites. The selection of acceptable hazardous waste handlers can be conducted against a national list of hazardous waste facilities and transporters with a history of violations such the Resource Conservation and Recovery Act Information System (RCRIS). A complimentary strategy is to request hazardous waste handlers to disclose their history of citations and violations annually or upon contract renewal.

Metrics:

- Number of “acceptable” hazardous waste handlers contracted to transport, store, treat, or dispose of the airport’s hazardous waste.

Suggested Targets:

- If multiple hazardous waste management handlers are used, reduce the number by one/year until the minimum number of primary and back-up handlers are available for each waste type. These handlers must meet or exceed the “acceptable” criteria established by the airport.

Suggested Initiatives:

- Develop evaluation criteria for offsite waste management facilities.
- Prepare list of facilities that accept waste types generated at the airport.
- Evaluate facilities capable of handling a certain waste type (including waste deicing fluids), against evaluation criteria.
- Develop contracts with a primary and back-up facility to address all waste types.
- Keep a vetted waste management contract list.

Suggested Resources:

Resource Name and Link	Description	Source
Resource Conservation and Recovery Act Information System (RCRIS)	RCRIS is a database used to identify hazardous waste facilities and transporters with a history of violations. It provides an objective base for evaluating a hazardous waste handler’s record on environmental compliance with RCRA.	The Right-to-Know Network
Hazardous Waste Regulations: User-Friendly Reference Documents	These reference documents discuss all aspects of hazardous waste management.	EPA

3.5 Natural Resources

Virginia is host to a wealth of natural resources, and airports in the Commonwealth have a crucial responsibility in preserving these resources. One way Virginia’s public use airports commonly interact with their surrounding natural resources is through stormwater management. In conjunction with navigating and complying with existing stormwater runoff regulations, airports can implement other effective strategies to protect the environment around them. All of these goals are focused on water quality and conservation, as clean, accessible water is integral to many industries and essential to individual Virginians. The efforts of airports to reduce their own water consumption and avoid pollution of water sources play a key role in maintaining safe water supplies for the future. For airports, water quality support is primarily in the form of stormwater management. As airports and other relevant businesses comply with DEQ Stormwater Regulations, they will reduce environmental damage from runoff and the amount of work and time required for cleanup, thus saving significant amounts of money for the government, and ultimately themselves, while supporting environmental sustainability.

Subcategory: Stormwater Management

Stormwater management is the largest environmental concern for many Virginia airports. Given recently enhanced regulations concerning stormwater quality, airport stakeholders should be proactive about complying with regulations, and adapting to future changes.

As authorized under the State Water Control Law and the federal Clean Water Act, the [Virginia Pollutant Discharge Elimination System \(VPDES\)](#) permitting program regulates point source pollutants associated with stormwater discharges, including industrial discharges and construction activity discharges associated with airports. Industrial discharges associated with stormwater discharge require an industrial stormwater permit. Stormwater discharges associated with the industrial activity from air transportation facilities including airports, airport terminal services, air transportation (schedule and nonscheduled), air courier serves, and establishments engaged in operating and maintaining airports, and servicing, repairing or maintaining aircraft, vehicle maintenance shops, material handling facilities, equipment cleaning operations, as well as airport or aircraft deicing or anti-icing. During construction activities, airports are required to obtain a permit for erosion and sediment control, which are issued by localities as part of their erosion and sediment control programs authorized by the Virginia Stormwater Management Act. Given the state regulatory context, we have proposed several proposed goals that build off of the regulations and aim to help airports go beyond compliance to create more holistic stormwater management programs.

Examples include:

- Preventative maintenance and spill prevention technologies.
- Erosion control.
- Natural treatment systems.
- Facility designs to reduce potential for runoff contamination.
- Enhanced wildlife management.

Sustainability goals in this subcategory:

1. **Reduce water quality and quantity impacts from stormwater runoff.**
2. **Reduce sediment runoff from construction areas.**
3. **Reduce water quality risk from de-icing fluid runoff.**

Economic
Performance

Airport Community

Energy and
Emissions

Waste

Natural Resources

Stormwater Management

Water Efficiency

Goal 1: Reduce water quality and quantity impacts from stormwater runoff.

Rationale:

Stormwater runoff can transport debris, sediment, and chemical and microbial contaminants to receiving waters (e.g., lake, stream, river, coastal water) via direct runoff or storm sewers. Runoff may also be conveyed to combined sewer systems. Storm sewer systems discharge into bodies of water used for fishing, swimming, drinking water, and food production, generally without treatment of the runoff. Examples of sources of pollutants in stormwater include deicing products, construction areas, pesticides, fuel spills, wash racks, buildings (e.g., metals from roofs and gutters) and areas that receive vehicle traffic (hydrocarbons, metals). Implementing stormwater management and setting goals will reduce the risk to water quality in these receiving waters. Preventing contamination can help avoid the costs of treating contaminated stormwater with BMPs.

Suggested Initiatives:

- Apply for coverage under a VPDES stormwater permit for the discharges from the airport's areas of operation. Airport management and tenants of the airport can apply as co-permittees under a permit and can work together to develop and implement a stormwater pollution prevent plan (Industrial Stormwater Factsheet for Sector S, EPA Office of Water).
- Develop a stormwater pollution prevention plan (SWPPP), implement control measures, and submit a Notice of Intent (NOI). An SWPPP is a written assessment of potential sources of pollutants in stormwater runoff and control measures that will be implemented at the facility to minimize the discharge of these pollutants in runoff from the site. These control measures include site-specific best management practices (BMPs), maintenance plans, inspections, employee training, and reporting. The procedures detailed in the SWPPP must be implemented by the facility and updated as necessary, with a copy of the SWPPP kept onsite. The industrial stormwater permit also requires collection of visual, analytical, and/or compliance monitoring data to determine the effectiveness of implemented BMPs. Additionally, consider making key tenants a co-permittee on SWPPP, with the airport covering costs as long as tenants comply.
- Install structural stormwater BMPs onsite that can provide water quality improvement and reduce total runoff and peak flows. In particular, evaluate the feasibility of implementing green infrastructure BMPs, which are intended to intercept runoff close to the source without creating a wildlife attractant.
- Reduce discharge of pollutant-bearing runoff by treating and reusing stormwater through installation of an on-airport stormwater collection and rain harvest system.
- Conduct on-going water quality monitoring program at receiving waters and outfall locations.
- Ensure that the site has an accurate measurement of runoff total volume and peak flow for selected design storms.
- Implement stormwater capture and reuse systems, including use for irrigation.
- Work to reduce impervious area by installing permeable pavement in appropriate areas.
- Retrofit stormwater BMPs onsite that can promote infiltration (appropriately sited depending upon type of surface being drained) or evapotranspiration (e.g., green roofs).

Metrics:

- The number of Virginia Pollutant Discharge Elimination System (VPDES) exceedances per year.
- Total runoff and peak flow from total airport property.
- Reduced loadings of constituents of concern to receiving waters not included in VPDES permit.

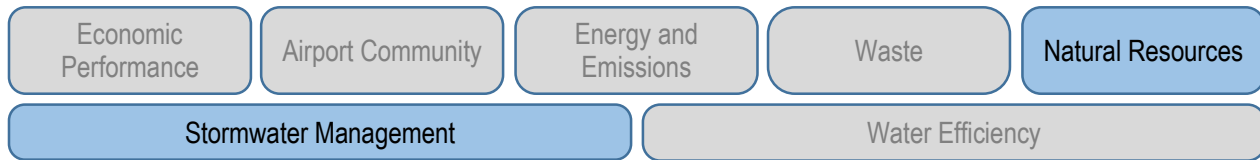
Suggested Targets:

- Reduce number of annual VPDES exceedances to zero, within five years.
- Reduce total runoff from the airport property and reduce peak flows with the goal of restoring pre-development hydrograph to the greatest degree practicable. May include specific number or percentage reductions based on previous year results.
- Reduction in concentrations and loadings of pollutants not in VPDES requirements. Specific constituents of concern and target reductions to be determined on a case by case basis.

Suggested Resources:

Resource Name and Link	Description	Source
National Green Values Calculator	The National Green Values Calculator is a tool for quickly comparing the performance, costs, and benefits of Green Infrastructure, or Low Impact Development (LID), to conventional stormwater practices. The GVC is designed to take the user step-by-step through a process of determining the average precipitation at their site, choosing a stormwater runoff volume reduction goal, defining the impervious areas of the site under a conventional development scheme, and then choosing from a range of Green Infrastructure Best Management Practices (BMPs) to find the combination that meets the necessary runoff volume reduction goal in a cost-effective way.	Center for Neighborhood Technology
Storm Water Management Model (SWMM)	SWMM is a dynamic hydrology-hydraulic water quality simulation model. It is used for single event or long-term (continuous) simulation of runoff quantity and quality from primarily urban areas.	EPA
International Stormwater Best Management Practices (BMP) Database	This database summarizes the findings of more than 500 BMP studies, and includes four green infrastructure controls: constructed wetlands, bioretention, swales, and porous pavement. Users of this website can perform custom queries or download technical papers summarizing performance results. A joint project of the American Society of Civil Engineers (ASCE), the U.S. EPA, and other organizations.	ASCE, EPA, and others
Guidance for Usage of Pervious Pavement at Airports	This report will provide practical guidance to educate airport practitioners on the advantages and disadvantages of the use of pervious pavement at a variety of types and sizes of airports.	ACRP
Airport Stormwater Management Electronic Resource Library and Training Materials	While the research for this project is currently underway, it will result in a searchable Airport Stormwater Management Electronic Resource Library containing all airport-related stormwater management products, factsheets summarizing federal and state stormwater regulations, training modules, and a train the trainer syllabus.	ACRP
National Stormwater Calculator	EPA's National Stormwater Calculator (SWC) is a desktop application that estimates the annual amount of rainwater and frequency of runoff from a specific site anywhere in the United States. Estimates are based on local soil conditions, land cover, and historic rainfall records.	EPA
A Handbook for Addressing Water Resource Issues Affecting Airport Development Planning	This handbook contains several worksheets to help airports create and manage a water resource plan.	ACRP
Discharge Mapping Tool	The Discharge Mapping Tool is designed to help users determine the receiving waters to which they discharge, and to determine whether the waterbodies to which users discharge are considered "impaired" under Section 303(d) of the Clean Water Act.	EPA
Low Impact Development Center (LIDC) Publications	This website provides a library of brochures, manuals, fact sheets, and other resources related to Low Impact Development.	LIDC

Resource Name and Link	Description	Source
New Jersey Stormwater Best Management Practices Manual. Chapter 5: Computing Stormwater Runoff Rates and Volumes	<p>This chapter discusses the fundamentals of computing stormwater runoff rates and volumes from rainfall through the use of various mathematical methods.</p>	<p>New Jersey Department of Environmental Protection (NJDEP)</p>



Goal 2: Reduce sediment runoff from construction areas.

Rationale:

Construction sites, including those at airports, may contribute large amounts of sediment to runoff if proper practices are not implemented. The excess sediment in runoff can adversely affect receiving waters by increasing sedimentation.

Suggested Initiatives:

- Incorporate appropriate Best Management Practices (BMPs) during construction or expansion at the airport. These can include erosion control BMPs such as seeding, mulching, and sodding to prevent soil from becoming dislodged, or sediment control BMPs such as silt fences, sediment ponds, and stabilized entrances that can trap sediment following erosion.
- Complete erosion control efforts incorporated in compliance with the *Virginia Erosion and Sediment Control Handbook*.

Metrics:

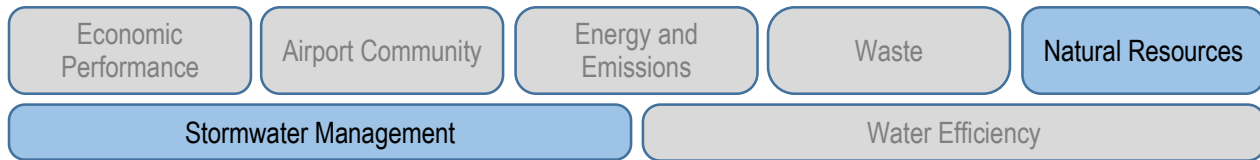
- Compliance with applicable erosion control measures during construction activities.
- Extent of the use of relevant BMPs to control sediment runoff during construction.

Suggested Targets:

- Comply with all applicable erosion control measures during construction activities.
- Employ 100% of relevant BMPs during construction activities and until resurfacing or vegetation is completed.

Suggested Resources:

Resource Name and Link	Description	Source
International Stormwater Best Management Practices (BMP) Database	This database summarizes the findings of more than 500 BMP studies, and includes four green infrastructure controls: constructed wetlands, bioretention, swales, and porous pavement. Users of this website can perform custom queries or download technical papers summarizing performance results. A joint project of the American Society of Civil Engineers (ASCE), the U.S. EPA, and other organizations.	ASCE, EPA, and others
SWPPP Template	The SWPPP template is designed to help construction operators develop a SWPPP that is compliant with the minimum requirements of EPA's 2012 Construction General Permit.	EPA
A Handbook for Addressing Water Resource Issues Affecting Airport Development Planning	This handbook contains several worksheets to help airports create and manage a water resource plan.	ACRP
EPA Example Construction SWPPP	Intended for a small commercial construction site (less than five acres), this example SWPPP includes marked-up edits to pages and copies of records such as inspection reports.	EPA
Low Impact Development Center Publications	This website provides a library of brochures, manuals, fact sheets, and other resources related to Low Impact Development (LID).	LIDC
New Jersey Stormwater Best Management Practices Manual. Chapter 5: Computing Stormwater Runoff Rates and Volumes	This chapter discusses the fundamentals of computing stormwater runoff rates and volumes from rainfall through the use of various mathematical methods.	NJDEP



Goal 3: Reduce water quality risk from deicing fluid runoff.

Rationale:

Deicing fluids used on aircrafts during the winter season contain harmful chemicals such as propylene glycol or ethylene glycol. These chemicals can be toxic to aquatic organisms at high concentrations and can encourage the growth of unwanted bacteria. Collection, or replacement, of deicing fluids is needed to minimize incorporation into runoff and therefore minimize risk to receiving water quality, but many airports do not know how much deicing agent-contaminated stormwater is generated. Dependent on location, collected deicing fluids may be sold for recycling.

Metrics:

- Percentage of de-icing fluid containing regulated chemicals.

Suggested Targets:

- Transition all de-icing fluids to environmentally friendly substitutes.

Suggested Initiatives:

- Block storm drains during deicing/anti-icing operations to prevent contamination of stormwater runoff.
- Clear snow accumulation from aircraft deicing areas prior to deicing operations to prevent contamination.
- Clearly designate aircraft deicer/anti-icer storage and transfer areas.
- Dispose deicer-laden stormwater to publicly-owned off-site treatment works that use biological processes to break down glycols and other organic constituents of deicing runoff.
- Keep deicing/anti-icing spill response equipment in locations easily accessible to and near areas where spills may occur.
- Perform initial deicing using hot water at a temperature of at least 60 degrees Celsius or 140 degrees Fahrenheit; an anti-icing fluid is then applied before the water freezes.
- Track the volume of aircraft deicers and anti-icers used to identify procedures to improve, help analyze and design deicing management systems, and enhance compliance with regulatory requirements.
- Train employees on deicing fluid storage and handling, deicing procedures, spill response and prevention, and stormwater pollution prevention.
- Use recovered glycol as a “feedstock” for reformulated aircraft deicing fluid (after meeting SAE AMS 1424 specifications), vehicle anti-freeze, aircraft lavatory fluid, coolants, coatings, paints.

Suggested Resources:

Resource Name and Link	Description	Source
De/anti-icing Optimization Technologies and Procedures	A list of 18 procedures and technologies designed to help reduce the use of aircraft deicing and anti-icing fluids (ADAF) while maintaining safe aircraft operations across a wide range of winter weather conditions. (Page 6 of ACRP Report 45: Optimizing the Use of Aircraft Deicing and Anti-Icing Fluids)	ACRP
A Handbook for Addressing Water Resource Issues Affecting Airport Development Planning	This handbook contains several worksheets to help airports create and manage a water resource plan.	ACRP
Deicing Fact Sheets	These fact sheets describe an array of practices designed to provide for the practical, cost-effective control of runoff from aircraft and airfield deicing, and anti-icing operations. (Fact sheets accompany ACRP Report 14: Deicing Planning Guidelines and Practices for Stormwater Management Systems)	ACRP

Resource Name and Link	Description	Source
Deicer Treatment Technologies Fact Sheets	<p>These fact sheets cover eleven deicer treatment technologies: activated sludge, aerated gravel beds, aerated lagoons, anaerobic fluidized bed reactors, distillation, mechanical vapor recompression, moving bed biofilm reactors, passive facultative treatment systems, public wastewater treatment systems, private recycling systems, and reverse osmosis. (Fact sheets accompany ACRP Report 99: Guidance for Treatment of Airport Stormwater Containing Deicers)</p>	<p>ACRP</p>

Subcategory: Water Efficiency

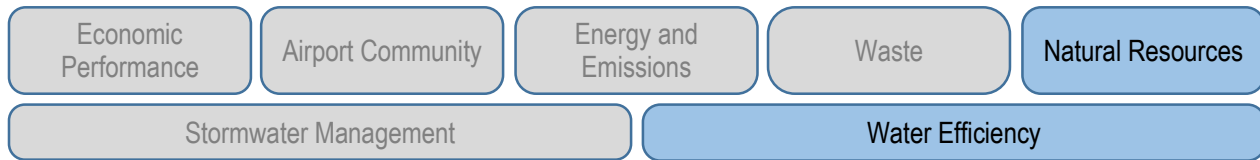
Optimizing water use represents a potential cost saving opportunity for Virginia’s airports. Although water efficiency is not typically a top priority for airport managers, guidance on how to approach water savings would facilitate water conservation and free up financial resources for other priorities.

Examples include:

- Low-flow fixtures.
- Eliminating leaks.
- Weather responsive irrigation systems.
- Irrigation-free landscaping.
- Rainwater capture.

Sustainability goals in this subcategory:

- 1. Reduce water use in areas directly under the control of the airport.**
- 2. Encourage tenants, airport users, and employees to use water efficiently.**



Goal 1: Reduce water use in areas directly under the control of the airport.

Rationale:

Secure and dependable water resources are essential to the successful operation of any airport, and airports from Phoenix, to Minneapolis, to Boston are exploring ways to reduce water use. Water efficiency efforts are becoming more important, even in parts of the country that were historically “water rich,” due to climatic changes increasing the probability of variations in water availability from year to year; increasingly complex regulations affecting the availability and cost of potable water; and the continued growth and expansion of urban centers.

Metrics:

- Total volume of water used by the airport (water footprint), per year.

Suggested Targets:

- Reduce total volume of water use per year by 20-25% by 2020.

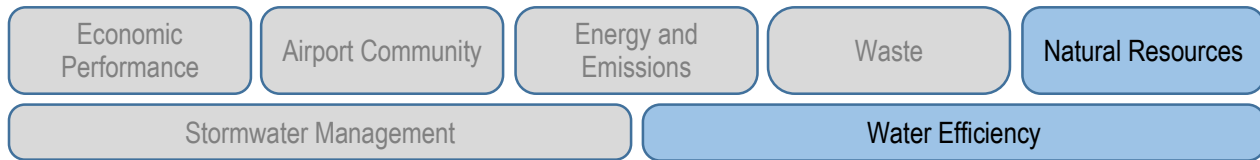
Suggested Initiatives:

- Conduct an assessment of current use to establish a baseline of water use and to identify areas of potential water savings.
- Install water-efficient fixtures in airport bathrooms.
- Install water-efficient pre-rinse spray valves, faucets, dishwashers, and ice machines in flight kitchens and terminal food service kitchens.
- Tune cooling towers to optimize water and energy efficiency.
- Install valves in fire suppression systems.
- Recycle wastewater onsite.
- Install drought resistant native plants and/or high efficiency irrigation.
- Modify building operations to reduce water use. For example, the airport can reduce water use by washing airport vehicles less frequently, and can explore ways to capture water flushed from pipes to maintain water quality.

Suggested Resources:

Resource Name and Link	Description	Source
Virginia Airports Utility Performance Tracker Tool	A utility performance tracking tool designed for Virginia airports to track electricity, natural gas, and water usage on a monthly and annual basis.	DOAV
EPA WaterSense Program for Commercial Business	This website provides strategies, tips, and a simple web-based calculator for businesses to support reduced water use.	EPA
Water Efficiency Management Strategies for Airports	This guidebook and accompanying tools are currently being developed and will allow airport operators to design and institute a water efficiency management program specific to their facility.	ACRP

Resource Name and Link	Description	Source
EDF-GEMI WaterMAPP	<p>WaterMAPP is an Excel-based spreadsheet with three tools: 1) a scorecard to assess water efficiency and which can be used to create visibility for water performance at facilities; 2) a calculator that estimates water and financial savings from cooling tower or free-air cooling improvements; and 3) an estimator that takes information about an organization's water quality and estimates the recommended maximum Cycles of Concentration (COC) when using chemicals to treat the water. This tool also helps identify appropriate non-chemical water treatment options to increase the potential COC. Developed by the Global Environmental Management Initiative (GEMI) and the Environmental Defense Fund (EDF).</p>	<p>GEMI and EDF</p>
Sample Water Audit Templates	<p>These sample water audit templates help commercial building managers define the unique water profile of their building(s).</p>	<p>EDF</p>
WaterSense Rebate Finder	<p>This website provides a searchable database of existing rebates on water-efficient products.</p>	<p>EPA</p>
Facility Manager's Guide to Water Management	<p>This guidebook was developed as a resource to assist in identifying areas where commercial, industrial, and institutional facilities can improve their water use efficiency within reasonable economic parameters. Created by the Arizona Municipal Water Users Association (AMWUA).</p>	<p>AMWUA</p>
Virginia Native Plant Finder	<p>This tool is a searchable database of Virginia native plants based on geographical region, maintained by the Virginia Department of Conservation and Recreation (VADCR).</p>	<p>VADCR</p>



Goal 2: Encourage tenants, airport users, and employees to use water efficiently.

Rationale:

To be most effective, water efficiency efforts need to reach a broad array of water users, including tenants and sub-tenants who pay utilities directly for water and waste water services (including airlines, vendors, rental car companies, and hotels); airport users such as passengers, pilots, and flight crews; and airport employees. Employees must be trained to identify potential problems (for example, reporting leaking faucets). Changes in behavior can also reduce water use — e.g., by not running taps, changing the way landscape is watered, and so on. Tenants and airport users can change behavior and be more conscientious of water use. They can also help identify water-related problems in bathrooms, restaurants, and other public spaces.

Suggested Initiatives:

- Conduct an assessment of current water use by tenants and sub-tenants to establish a baseline and identify areas of potential water savings, or encourage tenants and sub-tenants to conduct the assessment.
- Develop and distribute outreach materials to tenants, sub-tenants, and other airport users describing the airport’s water efficiency goals and means of achieving those goals. Materials can include posters, brochures, mailers, as well as websites and social media content.
- Implement employee training on water use efficiency, or incorporate water efficiency material into existing training. Include information about new technology, leak detection, and possible water-saving measures that can be adopted. The training sessions also can provide information about the overall goals of the program and the changes needed to make the airport sustainable in general and to reduce airport water use specifically.
- Implement infrastructure changes and signage at water use locations where opportunities for water use reduction exist.

Metrics:

- Number of tenants and sub-tenants provided with specific outreach materials and messages.
- Number of water efficiency training events hosted by the airport for tenants and sub-tenants.
- Number of airport users reached by water efficiency outreach materials (estimated through in-person or post-visit surveys, number of visits to water efficiency website, number of brochures or other printed materials distributed, or number of tweets or other social media messages distributed).
- Percent of employees trained on water efficiency.

Suggested Targets:

- Provide water efficiency educational materials to every tenant and sub-tenant.
- Host two or more water efficiency training events for airport tenants and sub-tenants per year.
- Reach at least 50 percent of airport users with water efficiency outreach materials.
- Train 100% of airport employees on water efficiency by 2020.

Suggested Resource:

Resource Name and Link	Description	Source
EPA WaterSense Program for Commercial Business	This website provides strategies, tips, and a simple web-based calculator for businesses to support reduced water use.	EPA

4. APPENDICES

The goals and initiatives in this guidebook can help airports proactively address future economic, environmental, and climatic risks to operations in ways that generate both short- and long-term benefits. As outlined earlier in the Supplement, the goals, initiatives, and guidance presented in this document are suggestions, and it is not necessary to address all of them in order to significantly incorporate sustainability into airport planning and operational activities. Incorporating sustainability initiatives into airport operations requires comprehensive knowledge of the environmental, economic, operational, and development concerns that are likely to affect an individual airport and surrounding communities, as well as how vulnerable the airport systems and community are to future concerns such as shifting economic pressures and climate change. Successful implementation may also require identification of specific external financial resources, collection and ongoing tracking of resource-usage data, and engagement of various internal and external stakeholders.

This section contains guidance documents (described in Section 2.) related to Funding Opportunities and Stakeholder Engagement, as well as a User Guide for the Utility Performance Tracker Tool developed to assist airport operators in assessing energy and water efficiency. Airport managers are encouraged to investigate additional local, state, and federal financial and technical assistance for sustainability planning.

List of Appendices

- Appendix A: Guidance on Funding Opportunities for Reliever and General Aviation—Regional Airports
- Appendix B: Guidance on Stakeholder Engagement
- Appendix C: Utility Performance Tracking Tool — User Guide

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Appendix A:
Guidance on Funding Opportunities
for Reliever and General Aviation-Regional Airports



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INTRODUCTION

Airports in Virginia have access to a suite of traditional and non-traditional sources of funding to support the implementation of sustainability-related projects. The first two places for airports to turn are the Virginia Department of Aviation (DOAV) and Federal Aviation Administration (FAA). DOAV's [Airport Program Manual](#) details funding programs for a wide range of initiatives, including airport planning and promotion. These funding programs have been developed to support the continued growth and operation of Virginia's aviation system, thus DOAV serves as a strong and dedicated partner when it comes to connecting airports to funding. In addition, FAA grants, including those made available through FAA's Airport Improvement Program (AIP),¹ Airport Noise Compatibility Planning Program (14 CRF part 150),² Voluntary Airport Low Emissions Program (VALE),³ and other programs, are key funding sources for sustainability initiatives. This guidance document presents these and other potential funding opportunities.

Funding opportunities originate from a variety of sources, including local governments, state and federal agencies, nongovernmental organizations, and entities within the private sector such as utility companies. Regardless of source, all external funding opportunities, whether loans, grants, tax credits, or subsidies, have specific eligibility criteria that must be met in order for an airport to apply. In addition, it is important to remember that there are key steps such as feasibility studies and environmental reviews that may be prerequisites to the acquisition of funding.

While the main intent of this guidance is to provide airports with information about specific funding programs (e.g., eligibility and applicability to sustainability initiatives), airports are also encouraged to explore partnerships with local governments, businesses, and other non-governmental organizations. Example ideas for funding-related partnerships at airports include:

- **Solar Photovoltaics:** The Indianapolis Airport Authority (IAA) partnered with the City of Indianapolis, Indianapolis Power & Light Company (IPL), General Energy Solutions (GES), and Cenergy Power, as well as two Indianapolis-based companies—Telamon Corporation and Johnson Melloh Solutions—to maximize unused land at Indianapolis International Airport and create a 162-acre solar farm. The project is expected to generate \$4.3 million for the airport from the lease of the land over 15 years.
- **Internships:** Clinton National Airport in Little Rock, Arkansas and Orlando Melbourne International Airport in Melbourne, Florida are among airports that have forged partnerships with universities to create a pipeline of interns from the universities to the airport. With high-quality educational institutions located across the Commonwealth, internship programs offer Virginia airports a cost-effective means to secure help with implementing sustainability initiatives.
- **Economic Development Grants:** Through the Virginia Economic Development Partnership (VEDP), several economic development grants are available to companies that want to relocate onto or near airport property. While these incentives are not directed at airports themselves, airports are strongly encouraged to coordinate with VEDP and become familiar with its resources, to ensure that available airport land is being advertised to interested companies and developers.

¹ FAA Order 5100.38D, *Airport Improvement Program Handbook*, September 30, 2014.

² FAA Advisory Circular 150/5020-1, *Noise Control and Compatibility Planning for Airports*, August 5, 1983.

³ FAA VALE Program Technical Report, Version 7, December 2, 2010.

Summary of Funding Opportunities

The table below provides a summary of funding opportunities that may support airport sustainability projects at Reliever (RL) and General Aviation - Regional (GR) airports, organized by the sustainability subcategories of the Virginia Airports Sustainability Management Plan (SMP). Ten federal, one regional, ten state, one nonprofit, and six utility programs have been identified as potential sources of funding. These programs provide funding through a variety of mechanisms, including loans, grants, incentives, and rebates. They also reflect the rich diversity of goals and initiatives with the SMP, providing funds for projects from brownfield redevelopment to noise mitigation to the installation of energy efficient lighting.

Further details about each funding opportunity, including eligibility criteria, types of eligible projects, and form of funding, are provided within the *Detailed Table of Funding Opportunities* section of this document.

Please note that the funding opportunities and resources presented here are provided as guidance and are not intended to be an exhaustive list of all funding opportunities available for airport sustainability projects. This guidance is a representation of opportunities available at the time of this report, and there may be resources available only in your immediate locality that are not included. Please contact program administrators directly to learn whether your airport is eligible for funds made available through any of the programs listed here.

Table A - 1: Summary of funding opportunities

Program Name	Funder
General Resources for Funding Sustainability Initiatives	
Airport Capital Program	Virginia Department of Aviation (DOAV)
Virginia Airports Revolving Fund	Virginia Resources Authority (VRA)
Virginia Pooled Financing Program	Virginia Resources Authority (VRA)
FAA Airport Improvement Program (AIP)	Federal Aviation Administration (FAA)
Rural Business Development Grants	U.S. Department of Agriculture (USDA)
Brownfields & Land Revitalization Grants	U.S. Environmental Protection Agency (EPA)
ARC Project Grants	Appalachian Regional Commission (ARC)
Air Service and Business Development	
Economic Development Assistance Program	Economic Development Administration (EDA)
Non-Aeronautical Development	
Please refer to the <i>General Resources for Funding Sustainability Initiatives</i> as well as the <i>Funding Airport Sustainability Initiatives by Increasing Revenue</i> section for funding strategies to support initiatives in this subcategory.	
Asset Management and Resilience	
Community Facilities Grants	U.S. Department of Agriculture (USDA)
Public Outreach	
FAA Noise Compatibility Program	Federal Aviation Administration (FAA) Airport Improvement Program (AIP)
Airport Workforce	
Economic Development Assistance Program	Economic Development Administration (EDA)
Energy Efficiency	
VirginiaSAVES Green Community Program	Virginia Department of Mines, Minerals and Energy (DMME)
Property Assessed Clean Energy (PACE) Financing	Virginia Department of Mines, Minerals, and Energy (DMME)

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Program Name	Funder
Dominion Virginia Power - Non-Residential Energy Efficiency Programs	Dominion Virginia Power
TVA - Energy Right Solutions for Business	Tennessee Valley Authority (TVA)
FAA's Energy Efficiency of Airport Power Sources Program	Funded through the Airport Improvement Program (AIP) entitlements and discretionary grants.
Utility rebates for energy efficient products	Local energy utility companies
Transportation Fuels	
VirginiaSAVES Green Community Program	Virginia Department of Mines, Minerals and Energy (DMME)
Congestion Mitigation and Air Quality Improvement (CMAQ) Program	Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA). Funds are distributed locally through metropolitan planning organizations.
Department of Energy, Office of Energy Efficiency and Renewable Energy (EERE), Vehicle Technologies Program, Clean Cities	U.S. Department of Energy (DOE)
Diesel Vehicle Fuel Refunds	Virginia Department of Motor Vehicles (DMV)
FAA's Energy Efficiency of Airport Power Sources Program	Funded through the Airport Improvement Program (AIP) entitlements and discretionary grants.
Energy Generation	
VirginiaSAVES Green Community Program	Virginia Department of Mines, Minerals and Energy (DMME)
Commercial Solar Property Tax Exemption	Virginia Department of Mines, Minerals and Energy (DMME)
Dominion Virginia Power Solar Purchase Program	Dominion Virginia Power
Business Energy Investment Tax Credit (ITC)	Internal Revenue Service (IRS)
TVA Green Power Providers	Tennessee Valley Authority (TVA)
FAA's Energy Efficiency of Airport Power Sources Program	Funded through the AIP entitlements and discretionary grants.
Waste Management and Recycling	
Coca-Cola/Keep America Beautiful Recycling Bin Grant Program	Coca-Cola/Keep America Beautiful
Department of Environmental Quality (DEQ) Litter Control and Recycling Grant Program	Virginia Department of Environmental Quality (DEQ)
Chemical and Hazardous Waste Management	
DEQ Petroleum Storage Tank Fund	Virginia Department of Environmental Quality (DEQ)
Source Reduction Assistance Grant Program	U.S. Environmental Protection Agency (EPA)
Stormwater Management	
FWS Endangered Species Candidate Conservation Action Funds	U.S. Fish and Wildlife Service (FWS)
Stormwater Local Assistance Fund (SLAF)	Virginia Department of Environmental Quality (DEQ)
Virginia Clean Water Revolving Loan Fund Stormwater Loan Program	Virginia Department of Environmental Quality (DEQ)
Water Efficiency	
Utility rebates for water-efficient products	Local water utility companies

HOW TO USE THIS DOCUMENT

This document is divided into two main sections: *Funding Airport Sustainability Initiatives by Increasing Revenue*, followed by the *Detailed Table of Funding Opportunities*. The first section contains resources and guidance that provide direction on increasing airport revenue, to afford airports better flexibility when allocating funds for improvement projects focused on sustainability.

The *Detailed Table of Funding Opportunities* provides a table listing specific funding programs that may be used to support airport sustainability initiatives at Reliever (RL) and General Aviation - Regional (GR) airports. If your airport is interested in pursuing funding for a sustainability initiative, check the appropriate subcategory of the table below, and verify with the program point of contact whether funding is available and applicable to the project you intend to pursue. An explanation of each column header found within the table is provided below:

Program Name: Name of the program under which the funding opportunity is made available.

Funder: Entity that provides or manages the funding.

Eligibility Criteria: Requirements that must be met in order to apply for funding.

Types of Eligible Projects: Examples of specific project types for which the funding may be used.

Form of Funding and Amount Range: The method by which the funding is delivered— e.g., by grant, loan, refund, or other method —and the general funding amount provided by the program.

Link and Contact Info: A link to the website of the funding program and point of contact information, when available.

FUNDING AIRPORT SUSTAINABILITY INITIATIVES BY INCREASING REVENUE

Implementing strategies to increase and diversify revenue streams is crucial in order for airports to be flexible and resilient in the face of a shifting financial landscape and other regulatory and environmental changes. The ideas and suggestions provided in the resources listed below are an extension of the broader list of initiatives presented in the Air Service and Business Development and the Non-Aeronautical Development subcategories in the Virginia Airports SMP.

Traditional sources of funding for airports in this type/size tier include bond proceeds, grants (primarily issued by FAA and DOAV), and internally generated capital from rental fees and other charges to airport supporting services.⁴ While the dollar amounts from these sources may fluctuate, airports can implement strategies dedicated to increasing airport revenue to fund, or supplement existing funding, for airport improvements and other projects. The Airport Cooperative Research Program (ACRP) —a program of the Transportation Research Board (TRB) of the United States National Academies of Sciences—has conducted multiple studies to identify and catalog best-practice and innovative approaches to airport revenue generation, and issued publications including case studies from airports that have successfully implemented these techniques. Three key publications include [ACRP Synthesis 1: Innovative Finance and Alternative Sources of Revenue for Airports](#), [ACRP Synthesis 19: Airport Revenue Diversification](#), and [ACRP Report 121: Innovative Revenue Strategies – An Airport Guide](#). Exploring the

⁴ ACRP, *ACRP Synthesis 1: Innovative Finance and Alternative Sources of Revenue for Airports*, 2007. http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_001.pdf

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strategies outlined within these reports may help airports identify funding opportunities previously overlooked or not fully considered. The findings of these reports are summarized below, in order of general applicability to Reliever and GA Regional airports in Virginia.

As your airport works to identify various strategies to increase revenue, it is worth considering the strategies your airport has already undertaken and whether there are areas that have not yet been explored, or areas that have been initially considered but require further effort. For example, are there opportunities to capture additional value from existing businesses and services that benefit from the presence of the airport? Or could parking improvements boost parking-related revenue? An airport operator can use these resources to evaluate and select funding strategies based on feasibility and applicability to a specific airport.

[ACRP Synthesis 1: Innovative Finance and Alternative Sources of Revenue for Airports](#)

ACRP Synthesis 1 draws upon financing mechanisms, revenue sources, and business strategies to inform airport operators, stakeholders, and policymakers about the alternative funding strategies that are available. As operating and construction costs increase, airport operators are looking for alternative revenue sources, such as the ones discussed in this resource. The first section, “Financing Mechanisms,” explores airport access to credit, types of airport bonds, leveraging future grants, and other forms of airport funding. The second section, “Revenue Sources,” discusses airport parking, rental cars, concessions, advertising, commercial development, and land use as possible areas of economic growth for airports. Finally, the document considers partial and full privatization as alternative business strategies. Airport operators interested in diversifying their revenue through any of these innovative strategies may benefit from this synthesis.

[ACRP Synthesis 19: Airport Revenue Diversification](#)

This three-part synthesis reassesses the current state of airport business models and the role of federal government in their activities; discusses how alternative revenue development fits into the airport planning process and identifies specific strategies for achieving it; and provides examples of successfully implemented revenue diversification programs at various airports. ACRP Synthesis 19 breaks revenue diversification projects into three main categories: aviation services, non-aeronautical development, and ancillary land use. This synthesis may be particularly useful for airports in the early planning stages of evaluating innovative areas in which to potentially invest.

[ACRP Report 121: Innovative Revenue Strategies – An Airport Guide](#)

This ACRP report compiles various strategies and case studies to assist airports in achieving their own revenue generation goals through innovation. The report centers around five main strategies:

1. Focus on airport customer needs and wants;
2. Airport-provided services, facilities, and equipment;
3. Revenue participation in real estate and natural resource development;
4. Value capture and other innovative financing; and
5. Improvements to existing to airport businesses.

Within the five areas, the report identifies 96 specific techniques that can be used to generate revenue, and can be utilized in unique combinations to meet the needs of individual airports. Case studies on six airports across the country demonstrate the applicability of the revenue generation strategies proposed, and offer diverse accounts of how airports have worked with sponsors and local governments to pursue revenue growth while complying with grants, ordinances, and local laws.

DETAILED TABLE OF FUNDING OPPORTUNITIES

Information on the programs with names denoted by an asterisk (*) below is also compiled in Airport Cooperative Research Program (ACRP) Synthesis 24: Strategies and Financing Opportunities for Airport Environmental Programs.

Table A - 2: Detailed table of funding opportunities

Program Name	Funder	Eligibility Criteria	Types of Eligible Projects	Form of Funding and Amount Range	Link and Contact Info
Resources for Overall Sustainability					
Airport Capital Program (ACP)	Virginia Department of Aviation (DOAV)	Airport sponsors must have a current six-year Airport Capital Improvement Plan (ACIP) on file with DOAV in order to be eligible to receive state discretionary funds. "Green initiatives" projects are eligible for ACP funding under the following conditions: Projects at General Aviation (GA) airports are vetted by DOAV staff and recommended for discretionary funding to the Virginia Aviation Board (VAB).	Examples of eligible projects include planning studies, environmental studies, land acquisition projects, the design and construction of airside and landside facilities, and design and construction of terminal buildings. Other "green initiatives" are also eligible on a case-by-case basis.	Varies.	Virginia Airport Program Manual http://www.doav.virginia.gov/Downloads/Airport_Grant_Program/Airport%20Program%20Manual/2013%20Airport%20Program%20Manual/500%20DOAVAS%2020131121%20DOAV%20Airport%20Program%20Manual%20bookmarked.pdf
Virginia Airports Revolving Fund	Virginia Resources Authority (VRA)	Any public-use, publicly owned airport in the Commonwealth.	Capital improvement plans. Eligible projects include: - any airport related capital project on an airport's approved layout plan including revenue producing projects - local matching share of projects eligible for funding through other federal and state sources - debt refinancing	Below market interest rate loans.	http://www.virginiareources.org/airports.shtml

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Program Name	Funder	Eligibility Criteria	Types of Eligible Projects	Form of Funding and Amount Range	Link and Contact Info
Virginia Pooled Financing Program	Virginia Resources Authority (VRA)	Any county, city, town, municipal corporation, authority, district, commission, or political subdivision created by the General Assembly or pursuant to the Constitution and laws of the Commonwealth of Virginia.	Capital projects, including at airports.	Loan. Recommended minimum loan size is \$750,000. Project financing is available for up to 30 years through the VFPF, based on the useful life of the asset(s) being financed.	http://www.virginiaresources.org/pooledfinancing.shtml
FAA Airport Improvement Program (AIP) environmental projects*	Federal Aviation Administration (FAA)	<p>Public-use airports included in FAA's National Plan of Integrated Airport Systems</p> <p>Project formulation complete at least 2 years before planned award of grant request for funds.</p> <p>Submit funding request to FAA by Feb. preceding the fiscal year when funds are desired; e.g., Feb. 2016 for FY 2017 grants.</p> <p>Bid project by 2nd quarter of fiscal year when funds are desired (e.g., March 2016 for FY 2016 grants).</p>	In general, projects eligible for AIP funding include airport planning (including sustainability planning), airport development, noise compatibility planning, and noise compatibility projects. Specifically, projects to ensure compliance with requirements of the Clean Air Act or the Safe Water Drinking Act; projects for drainage storage, or treatment of aircraft deicing fluid; and environmental mitigation projects required in NEPA documents are also eligible.	<p>Grant.</p> <p>Local match—75% large and medium hub commercial service airports.</p> <p>Local match—90% all other airports.</p> <p>Application submitted to FAA's Washington Airports District Office.</p>	http://www.faa.gov/airports/aip/
Rural Business Development Grant	U.S. Department of Agriculture (USDA)	<p>Rural public entities may apply, including, but not limited to towns, communities, state agencies, authorities, non-profit corporations, institutions of higher education, federally-recognized tribes, and rural cooperatives.</p> <p>Projects must benefit rural areas or towns outside the urbanized periphery</p>	<p>Enterprise type grant funds must be used on projects to benefit small and emerging businesses in rural areas. Uses may include:</p> <ul style="list-style-type: none"> • Training and technical assistance • Acquisition or development of land 	Grant. The general range is from \$10,000 up to \$500,000.	<p>http://www.rd.usda.gov/programs-services/rural-business-development-grants</p> <p>Basil I. Gooden, PHD, State Director Culpeper Building, Suite 238 1606 Santa Rosa Road Richmond, VA 23229 (804) 287-1550</p>

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Program Name	Funder	Eligibility Criteria	Types of Eligible Projects	Form of Funding and Amount Range	Link and Contact Info
		<p>of any city with a population of 50,000 or more.</p>	<ul style="list-style-type: none"> • Pollution control and abatement • Capitalization of revolving loan funds • Distance adult learning • Rural transportation improvement • Community economic development • Technology-based economic development • Feasibility studies and business plans • Leadership and entrepreneur training • Rural business incubators • Long-term business strategic planning <p>Opportunity type grant funding must be used for projects in rural areas and they can be used for:</p> <ul style="list-style-type: none"> • Community economic development • Technology-based economic development • Feasibility studies and business plans • Leadership and entrepreneur training • Rural business incubators • Long-term business strategic planning 		

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Program Name	Funder	Eligibility Criteria	Types of Eligible Projects	Form of Funding and Amount Range	Link and Contact Info
Brownfields & Land Revitalization Grants	U.S. Environmental Protection Agency (EPA)	Varies by type of grant. See http://www2.epa.gov/brownfields/types-brownfields-grant-funding for more information about each type of grant.	Assistance related to the cleanup and revitalization of brownfield sites. Specific projects vary by grant.	Assessment Grants; Revolving Loan Fund Grants; Cleanup Grants; Area-Wide Planning Grants; Environmental Workforce Development and Job Training Grants; Multi-Purpose Pilot Grants; and Training, Research, and Technical Assistance Grants.	http://www2.epa.gov/brownfields/brownfields-and-land-revitalization-delaware-maryland-pennsylvania-virginia-west
ARC Project Grants	Appalachian Regional Commission (ARC)	Program grants are awarded to state and local agencies and governmental entities, local governing boards, and nonprofit organizations.	Business development and entrepreneurship projects such as: <ul style="list-style-type: none"> • Industrial site development; business incubators; • Special technical assistance and training; and • Expansion of domestic and foreign markets. Other eligible projects include education and training, basic infrastructure, and leadership development projects.	Grant. \$5,000-\$1,000,000	http://www.arc.gov/funding/ARCProjectGrants.asp Tamarah Holmes, Associate Director Policy and Strategic Development Virginia Department of Housing and Community Development Main Street Center 600 East Main Street, Suite 300 Richmond, VA 23219 804.371.7056 tamarah.holmes@dhcd.virginia.gov
Air Service and Business Development					
Economic Development Assistance Program	Economic Development Administration (EDA)	Eligible applicants include: <ul style="list-style-type: none"> • State governments • Special district governments • County governments • City or township governments • Others such as nonprofits and institutions of higher education 	Projects that help to fulfill regional economic development strategies designed to accelerate innovation and entrepreneurship, advance regional competitiveness,	Cooperative Agreement Grant, with award ceiling of \$3,000,000	http://www.eda.gov/funding-opportunities/ Bob Gittler Philadelphia Regional Office

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Program Name	Funder	Eligibility Criteria	Types of Eligible Projects	Form of Funding and Amount Range	Link and Contact Info
			<p>create higher-skill, living-wage jobs, generate private investment, and fortify and grow industry clusters.</p> <p>Examples of previous projects EDA has supported include water and sewer system improvements, industrial parks, high-tech shipping and logistics facilities, workforce training facilities, business incubators and accelerators and brownfield development.</p>		<p>The Curtis Center 601 Walnut Street, Suite 140 South Philadelphia, PA 19106-3323 215-597-4360 bgittler@eda.gov</p>

Non-Aeronautical Development

Please refer to the *General Resources for Funding Sustainability Initiatives* as well as the *Funding Airport Sustainability Initiatives by Increasing Revenue* section for funding strategies to support initiatives in this subcategory.

Asset Management and Resilience

Community Facilities Grants	U.S. Department of Agriculture (USDA)	<p>Grants are available to public entities such as municipalities, counties, and special-purpose districts, as well as non-profit corporations and tribal governments.</p> <p>Grants are provided to assist in the development of essential community facilities in rural areas and towns of up to 20,000 in population.</p>	<p>Grant funds may be used to assist in the development of essential community facilities. Grant funds can be used to construct, enlarge, or improve community facilities for health care, public safety, and community and public services. Essential community facilities include public facilities such as airport hangars.</p>	Direct loan or grant assistance.	http://www.rd.usda.gov/programs-services/community-facilities-direct-loan-grant-program
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Public Outreach

FAA Noise Compatibility	Federal Aviation	Eligible applicants: Owners/operators of an AIP eligible airport or	1. Development of airport noise exposure maps.	Grants. Local Match—75-80% for large and medium hub airports,	http://www.faa.gov/airports/environmental/airport_noise/
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Program Name	Funder	Eligibility Criteria	Types of Eligible Projects	Form of Funding and Amount Range	Link and Contact Info
Program (Part 150)*	Administration (FAA)	<p>communities adjacent to a large or medium hub airport.</p> <p>Start noise exposure map and noise compatibility process by 2 years before planned award of grant.</p> <p>Submit NEM and NCP to FAA for approval 180 days before request for funds.</p> <p>Submit funding request to FAA by Feb. preceding the fiscal year when funds are desired; e.g., Feb. 2016 for FY 2017 grants.</p> <p>Bid project by 2nd quarter of fiscal year when funds are desired (e.g., March 2016 for FY 2016 grants).</p>	<p>2. Development of airport noise compatibility programs.</p> <p>3. Implementation of noise compatibility measures, including sound insulation and acquisition of residential property for noise impacted facilities including schools, medical facilities, and churches.</p>	90% for all other airports.	<p>www.faa.gov/airports/aip (for general AIP information applicable to environmental grants)</p>
Airport Workforce					
Economic Development Assistance Program	Economic Development Administration (EDA)	<p>Eligible applicants include:</p> <ul style="list-style-type: none"> • State governments • Special district governments • County governments • City or township governments • Others such as nonprofits and institutions of higher education 	<p>Projects that help to fulfill regional economic development strategies designed to accelerate innovation and entrepreneurship, advance regional competitiveness, create higher-skill, living-wage jobs, generate private investment, and fortify and grow industry clusters.</p> <p>Examples of previous projects EDA has supported include water and sewer system improvements, industrial parks, high-tech shipping and</p>	Cooperative Agreement Grant, with award ceiling of \$3,000,000	<p>http://www.eda.gov/funding-opportunities/</p> <p>Bob Gittler Philadelphia Regional Office The Curtis Center 601 Walnut Street, Suite 140 South Philadelphia, PA 19106-3323 215-597-4360 bgittler@eda.gov</p>

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Program Name	Funder	Eligibility Criteria	Types of Eligible Projects	Form of Funding and Amount Range	Link and Contact Info
			logistics facilities, workforce training facilities, business incubators and accelerators and brownfield development.		
Energy Efficiency					
VirginiaSAVES Green Community Program	Virginia Department of Mines, Minerals and Energy (DMME)	Recipients must be local governmental, non-profit institutional, or commercial or industrial businesses. Recipients must have sufficient credit to support financing through the program.	Energy efficiency, renewable energy, alternative fuel vehicles.	Loan. Minimum of \$500,000 to \$1,000,000 and maximum of \$5,000,000. Competitive projects will have a proposed payback of 10 years or less.	http://www.vasavesgcp.com/ Greg Montgomery, CleanSource Capital gmontgomery@abundantpower.com 704.271.9889 (office) 704.674.7005 (mobile) Bill Greenleaf, Virginia Community Capital bgreenleaf@vccva.org 804.939.6165 (office) 804.229.2210 (mobile)
PACE Financing	Virginia Department of Mines, Minerals, and Energy (DMME)	Must be a part of a locality that has established a PACE Financing program.	Photovoltaic installations, energy improvements. Local government specifies its own eligible projects	Federal Housing Finance Agency loans. Local government establishes its own funding sources as well as loan terms.	http://programs.dsireusa.org/system/program/detail/3531
Dominion Virginia Power - Non-Residential Energy Efficiency Programs	Dominion Virginia Power	Eligible applicants: Nonresidential Dominion customers.	Energy Audit, Duct Testing and Sealing, Lighting Systems and Controls, Heating and Cooling Efficiency, Window Film, Distributed Generation	Energy efficiency audit and testing services, Rebates.	https://www.dom.com/business/dominion-virginia-power/ways-to-save/energy-conservation-programs

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Program Name	Funder	Eligibility Criteria	Types of Eligible Projects	Form of Funding and Amount Range	Link and Contact Info
TVA - Energy Right Solutions for Business	Tennessee Valley Authority (TVA)	<p>Eligible applicants: Customers of participating local power companies in partnership with TVA (Appalachian Power Co, Bristol Virginia Utilities, Powell Valley Electric Coop).</p>	<p>Incentives are available for certain energy-efficiency measures that involve an upgrade or one-for-one replacement of an existing piece of equipment with a more energy-efficient piece of equipment.</p> <p>To qualify for eligible incentives, all projects must receive written approval before purchasing or installing the equipment.</p> <p>Equipment includes: Refrigerators/Freezers, Lighting, Heat pumps, Air conditioners, Energy Mgmt. Systems/Building Controls, Windows, Doors, Motors, Custom/Others pending approval, Food Service Equipment, LED Lighting, Commercial Refrigeration Equipment.</p>	<p>Incentives vary by equipment. Incentive payments are capped at 70% of the project's actual material costs. Labor and tax costs are not included in total project cost. The minimum incentive allowed per site is \$500. Multiple energy efficiency measures can be combined to reach the \$500 minimum.</p>	<p>https://www.energyright.com/For-Business-%2B-Industry/Incentives</p>
FAA's Energy Efficiency of Airport Power Sources Program	Federal Aviation Administration (FAA) through the AIP entitlements and discretionary grants.	<p>Prerequisite activities must be conducted:</p> <ul style="list-style-type: none"> • An energy assessment/audit. • For solar, a glint/glare analysis. <p>All other traditional AIP rules apply.</p> <p>Project formulation complete at least 2 years before planned award of grant request for funds.</p>	<p>On-airport power generation for electricity and heating/cooling, stand-alone energy efficiency upgrades in an AIP-eligible airport facility, replacement of stationary GSE, replacement of airport-owned vehicles.</p>	<p>For large and medium primary hub airports, the grant covers 75-80% of eligible costs. For small primary, reliever, and general aviation airports, the grant covers 90-% of eligible costs, based on statutory requirements.</p>	<p>http://www.faa.gov/airports/aip http://www.airport-energy.org/presentations/FAA-Funding Energy Programs at Your Airport by Patrick Magnotta.pdf</p>

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Program Name	Funder	Eligibility Criteria	Types of Eligible Projects	Form of Funding and Amount Range	Link and Contact Info
		Submit funding request to FAA by Feb. preceding the fiscal year when funds are desired; e.g., Feb. 2016 for FY 2017 grants. Bid project by 2nd quarter of fiscal funds are desired (e.g., March 2016 for FY 2016 grants).	There are additional funding limitations beyond those for all AIP grants.		
Utility rebates for energy efficient products	Local energy utility company	Typically, recipient must be a customer in good standing with the utility company, and must submit a rebate form after the purchase of an energy-efficient product, detailing product and cost information.	Examples include water heaters, HVAC components, boiler controls, and programmable thermostats.	Typically, a rebate on the purchase price of the product.	Your utility company will have the most up to date information on which rebates are currently available.
Transportation Fuels					
VirginiaSAVES Green Community Program	Virginia Department of Mines, Minerals and Energy (DMME)	Eligible applicants: Local governmental, non-profit institutional, and commercial and industrial businesses with sufficient credit to support financing through the program.	Energy efficiency, renewable energy, alternative fuel vehicles.	Loan, minimum of \$500,000 to \$1,000,000 and maximum of \$5,000,000. Competitive projects will have a proposed payback of 10 years or less.	http://www.vasavesgcp.com/ Greg Montgomery, CleanSource Capital gmontgomery@abundantpower.com 704.271.9889 (office) 704.674.7005 (mobile) Bill Greenleaf, Virginia Community Capital bgreenleaf@vccva.org 804.939.6165 (office) 804.229.2210 (mobile)
Congestion Mitigation and Air Quality Improvement	Federal Highway Administration (FHWA) and the Federal	Each CMAQ project must meet three basic criteria: it must be a transportation project, it must generate an emissions reduction, and it must be located in or benefit a	Diesel Engine Retrofits & Other Advanced Truck Technologies, Idle Reduction, Congestion Reduction & Traffic Flow Improvements,		http://www.fhwa.dot.gov/environment/air_quality/cmaq/policy_and_guidance/

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Program Name	Funder	Eligibility Criteria	Types of Eligible Projects	Form of Funding and Amount Range	Link and Contact Info
(CMAQ) Program	Transit Administration (FTA) Funds are distributed locally through metropolitan planning organizations.	nonattainment or maintenance area. Localities in Virginia with airports and that fall under this category include: Arlington County, Fairfax County, Loudon County, Prince William County, City of Manassas. Must complete all NEPA requirements and basic eligibility. Must be included in the MPO's current transportation plan and Transportation Improvement Program (TIP) (or the current Statewide Transportation Improvement Program (STIP) in areas without an MPO).	Freight/Intermodal, Transportation Control Measures (TCM), Transit Improvements, Bicycle and Pedestrian Facilities and Programs, Travel Demand Management, Public Education and Outreach Activities, Transportation Management Associations, Carpooling and Vanpooling, Carsharing, Extreme Low-Temperature Cold Start Programs, Training, Inspection/Maintenance (I&M) Programs, Innovative Projects, Alternative Fuels and Vehicles.		
Department of Energy, Office of Energy Efficiency and Renewable Energy (EERE), Vehicle Technologies Program, Clean Cities*	U.S. Department of Energy (DOE)	Eligible applicants: Designated Clean Cities coalitions and coalition members. Airport must work through a Certified Coalition. No specific deadlines for submitting requests. However, generally, the program has two funding cycles each year—once in the spring and once in the fall.	Funding to support reduction of dependence on imported petroleum through education, outreach and other support promoting the use of the following alternative vehicle technologies: Alternative Fuel Vehicles (AFV) & Infrastructure, Idle Reduction Technologies, Fuel Blends, Hybrid Vehicles, Fuel Efficiency Technologies.	No specific funding mechanism or local matching requirements are listed, however funding for vehicles is generally limited to incremental costs of green technology. Check with contact information sources for specific requirements.	Clean Cities Home Page http://www1.eere.energy.gov/clean_cities/ Clean Cities Designation Guide http://www1.eere.energy.gov/clean_cities/pdfs/43181.pdf
Diesel Vehicle Fuel Refunds	Virginia Department of Motor Vehicles (DMV)	A refund of the Virginia fuels tax paid on purchases of fuel in quantities of five gallons or more shall be granted to any person who establishes that they	Diesel fuel purchased in Virginia for use in a qualifying vehicle may be eligible for a refund. Qualifying vehicles include diesel passenger cars,	Refund. The refund amount is the difference between the tax rate on diesel and the tax rate on gasoline in place at	https://www.dmv.virginia.gov/apps/ftro/ftro/ftrhome.aspx

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Program Name	Funder	Eligibility Criteria	Types of Eligible Projects	Form of Funding and Amount Range	Link and Contact Info
		<p>have paid the fuels tax and such fuel was for an Eligible Use.</p> <p>Applicants will need:</p> <ul style="list-style-type: none"> • License plate number; • Last four digits of the vehicle identification number (VIN); • Current odometer reading at time of refund submission; • Itemized fuel disbursement list, if applicable (refer to Bulk Storage section below); • Fuel Receipts/Invoices (proof of purchase): Total the gallons on your receipts for each six-month period (January–June and July–December). The receipts cannot exceed 12 months from the date that the refund application is submitted; and • A copy of your vehicle registration, if registered outside of Virginia. 	<p>pickup or panel trucks, and trucks with a gross vehicle weight rating of 10,000 pounds or less.</p>	<p>the time of the fuel purchase(s).</p>	
<p>FAA’s Energy Efficiency of Airport Power Sources Program</p>	<p>Federal Aviation Administration (FAA) through the AIP entitlements and discretionary grants.</p>	<p>Prerequisite activities must be conducted:</p> <ul style="list-style-type: none"> • An energy assessment/audit. • For solar, a glint/glare analysis. <p>All other traditional AIP rules apply.</p> <p>Project formulation complete at least 2 years before planned award of grant request for funds.</p> <p>Submit funding request to FAA by Feb. preceding the fiscal year when funds</p>	<p>On-airport power generation for electricity and heating/cooling, stand-alone energy efficiency upgrades in an AIP-eligible airport facility, replacement of stationary GSE, replacement of airport-owned vehicles.</p> <p>There are additional funding limitations beyond those for all AIP grants.</p>	<p>For large and medium primary hub airports, the grant covers 75-80% of eligible costs. For small primary, reliever, and general aviation airports, the grant covers 90% of eligible costs, based on statutory requirements.</p>	<p>http://www.faa.gov/airports/aip http://www.airport-energy.org/presentations/FAA-Funding_Energy_Programs_at_Your_Airport_by_Patrick_Magnotta.pdf</p>

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Program Name	Funder	Eligibility Criteria	Types of Eligible Projects	Form of Funding and Amount Range	Link and Contact Info
		are desired; e.g., Feb. 2016 for FY 2017 grants. Bid project by 2nd quarter of fiscal funds are desired (e.g., March 2016 for FY 2016 grants).			
Energy Generation					
VirginiaSAVES Green Community Program	Virginia Department of Mines, Minerals and Energy (DMME)	Eligible applicants: Local governmental, non-profit institutional, and commercial and industrial businesses with sufficient credit to support financing through the program.	Energy efficiency, renewable energy, alternative fuel vehicles.	Loan, minimum of \$500,000 to \$1,000,000 and maximum of \$5,000,000. Competitive projects will have a proposed payback of 10 years or less.	http://www.vasavesgcp.com/ Greg Montgomery, CleanSource Capital gmontgomery@abundantpower.com 704.271.9889 (office) 704.674.7005 (mobile) Bill Greenleaf, Virginia Community Capital bgreenleaf@vccva.org 804.939.6165 (office) 804.229.2210 (mobile)
Commercial Solar Property Tax Exemption	Virginia Department of Mines, Minerals and Energy (DMME)	Eligible applicants: Tax-paying entities within Virginia localities that offer the exemption and with installed solar equipment of less than 20MW AC. Cities and counties currently offering a solar energy equipment and facilities exemption include: Albemarle, Alexandria, Charlottesville, Chesterfield, Hampton, Hanover, Harrisonburg, Henrico, Isle of Wight, King and Queen, Lexington, Loudoun, Lynchburg, Prince William, Pulaski, Roanoke, Spotsylvania, Warren, Winchester and Wise.	Solar - Passive, Solar Water Heat, Solar Space Heat, Solar Thermal Electric, Solar Photovoltaics, Solar Pool Heating.	Property Tax Incentive.	http://programs.dsireusa.org/system/program/detail/5503

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Program Name	Funder	Eligibility Criteria	Types of Eligible Projects	Form of Funding and Amount Range	Link and Contact Info
		All commercial solar facilities must be certified with either a local building authority or the Department of Environmental Quality in order to be exempt from state and local taxes.			
Dominion Virginia Power Solar Purchase Program	Dominion Virginia Power	Eligible applicants: Dominion Virginia Power customers. There are up to six months to complete the system installation once you submit your completed paperwork and are accepted into the program.	Solar Photovoltaic systems.	Participating customers install and own the solar generation system located on their property, but sell the electricity and solar Renewable Energy Certificates (RECs) back to Dominion at a premium rate of 15 cents per kilowatt-hour, if there is available space in the program at the time the online reservation form is completed.	https://www.dom.com/residential/dominion-virginia-power/ways-to-save/renewable-energy-programs/solar-purchase-program
Business Energy Investment Tax Credit (ITC)	Internal Revenue Service (IRS)	Eligible applicants: Commercial properties installing solar systems.	Solar Photovoltaic and thermal systems.	Federal tax credit, 30 percent. Set to drop to 10 percent in 2016. The company that installs, develops or finances the project uses the credit.	http://www.seia.org/policy/finance-tax/solar-investment-tax-credit
TVA - Green Power Providers	Tennessee Valley Authority (TVA)	Eligible applicants: Businesses installing renewable generation systems and currently using participating power distributors of TVA power (Appalachian Power Co, Bristol Virginia Utilities, Powell Valley Electric Coop).	Solar Photovoltaics, Wind (All), Biomass, Wind (Small), Hydroelectric (Small).	The Green Power Providers program contract term is 20 years. For years 1–10, TVA will purchase 100% of the output from qualifying systems at a	http://www.tva.com/greenpowerswitch/providers

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Program Name	Funder	Eligibility Criteria	Types of Eligible Projects	Form of Funding and Amount Range	Link and Contact Info
		<p>The system must comply with environmental regulations and national standards, be certified by a licensed electrician, and comply with all applicable codes.</p> <p>Solar and wind installations approved by TVA must be installed by a renewable energy professional with entry-level NABCEP certification.</p>		<p>premium on top of the retail electricity rate. Participants will be paid only the applicable retail rate for years 11–20 of the contract. All new participants in the Generation Power Providers program will receive a \$1,000 incentive to offset the upfront cost.</p>	
FAA's Energy Efficiency of Airport Power Sources Program	Federal Aviation Administration (FAA) through the AIP entitlements and discretionary grants.	<p>Prerequisite activities must be conducted:</p> <ul style="list-style-type: none"> • An energy assessment/audit. • For solar, a glint/glare analysis. <p>All other traditional AIP rules apply.</p> <p>Project formulation complete at least 2 years before planned award of grant request for funds.</p> <p>Submit funding request to FAA by Feb. preceding the fiscal year when funds are desired; e.g., Feb. 2016 for FY 2017 grants.</p> <p>Bid project by 2nd quarter of fiscal funds are desired (e.g., March 2016 for FY 2016 grants).</p>	<p>On-airport power generation for electricity and heating/cooling, stand-alone energy efficiency upgrades in an AIP-eligible airport facility, replacement of stationary GSE, replacement of airport-owned vehicles.</p> <p>There are additional funding limitations beyond those for all AIP grants.</p>	<p>For large and medium primary hub airports, the grant covers 75-80% of eligible costs. For small primary, reliever, and general aviation airports, the grant covers 90-% of eligible costs, based on statutory requirements.</p>	<p>http://www.faa.gov/airports/aip http://www.airport-energy.org/presentations/FAA-Funding Energy Programs at Your Airport by Patrick Magnotta.pdf</p>
Waste Management and Recycling					
Coca-Cola/Keep America Beautiful	Coca-Cola/Keep America Beautiful	<p>Open to non-profit organizations, government agencies, schools and religious organizations. For profit businesses are not eligible to directly</p>	<p>Installation of recycling bins.</p>	<p>Grant, in the form of recycling bins. No money is awarded.</p>	<p>http://bingrant.org/ Alec Cooley Keep America Beautiful</p>

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Program Name	Funder	Eligibility Criteria	Types of Eligible Projects	Form of Funding and Amount Range	Link and Contact Info
Recycling Bin Grant Program		receive grants. They may however partner with otherwise eligible organizations on proposals submitted in the eligible organization's name. Applicants can apply online; each year's applications become available around the February timeframe			acooley@kab.org 843-278-7686
Department of Environmental Quality (DEQ) Litter Control and Recycling Grant Program	Virginia Department of Environmental Quality (DEQ)	Eligible applicants: Cities, counties, incorporated towns. Could apply on behalf of an airport. Applicant must have an eligible litter prevention or recycling program. Annual application process.	Funds to support litter reduction and encourage recycling.	Grants.	http://www.deq.virginia.gov/Programs/LandProtectionRevitalization/RecyclingandLitterPreventionPrograms/LitterPreventionandRecyclingGrantPrograms.aspx Steve Coe (804) 698-4029 steve.coe@deq.virginia.gov
<i>Chemical and Hazardous Waste Management</i>					
DEQ Petroleum Storage Tank Fund	Virginia Department of Environmental Quality (DEQ)	Eligible applicants: Owners and operators of tanks. Corrective action plan must be approved before eligible expenses are incurred.	Reimbursement of costs of cleanup of petroleum releases and third party liability.	Reimbursement Deductible (Financial responsibility)—\$5,000 to \$50,000 depending on volume of throughput. Maximum payment— \$1 million.	http://www.deq.state.va.us/Programs/LandProtectionRevitalization/PetroleumProgram/GuidanceRegulations.aspx
Source Reduction Assistance Grant Program	U.S. Environmental Protection Agency (EPA)	Eligible applicants include any of the fifty states and city or township governments. Proposals need to demonstrate pollution prevention (P2)/source reduction through surveys, studies, research, investigation,	Projects must support the P2 Program's National Emphasis Areas: 1) Climate Change Mitigation/Prevention of Greenhouse Gas Emissions, 2) Food Manufacturing and 3) State or Community	Grant funding. In 2015, EPA Region 3 limited awards to a maximum for \$75,000.	http://www2.epa.gov/p2/fy-2015-request-proposals-source-reduction-assistance-grant-program

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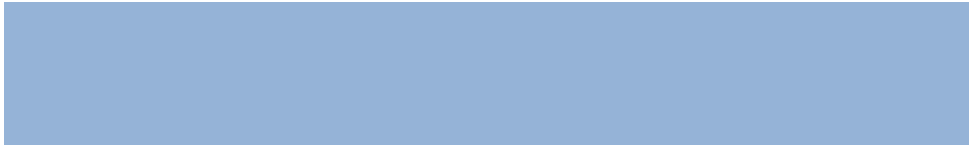
Program Name	Funder	Eligibility Criteria	Types of Eligible Projects	Form of Funding and Amount Range	Link and Contact Info
		experimentation, education, training and/or innovative practices. Proposals that principally support recycling, clean-up, treatment, disposal and/or energy recovery efforts are not considered for funding.	Approaches to Hazardous Materials Source Reduction. Region 3, which VA is a part of, additionally promotes projects that: <ul style="list-style-type: none"> • Support Economy, Energy and Environment projects for any manufacturing sector to achieve measurable source reduction results. Support technical assistance to businesses in implementing the remanufacturing exclusion in the 2014 Definition of Solid Waste Rule to achieve measurable source reduction results.		
Stormwater Management					
FWS Endangered Species Candidate Conservation Action Funds*	U.S. Fish and Wildlife Service (FWS)	Eligible applicants: State and local governments, landowners, educators, others. Note: In some states, application process may be subject to EO 12372, Intergovernmental review of Federal Programs. Spring timeframe—Solicitation issued. Mid-summer timeframe—Applications due.	Endangered Species conservation, ecosystem preservation, and habitat restoration. Projects are limited to actions listed in Candidate Species Assessment. Actions regarding wildlife must be consistent with FAA policies on wildlife hazards.	Grant, cooperative agreement, project agreement, direct payment. Local match—not required, but recommended.	http://www.fws.gov/endangered/grants/grant-programs.html http://www.fws.gov/endangered/wh-at-we-do/candidate-conservation-process.html (for information on Candidate Species Assessment) https://www.cfd.gov/downloads/CFDA_writing.pdf (information on writing grant proposals)
Stormwater Local	Virginia Department of	Eligible recipients are local governments, meaning any county,	Stormwater projects including:	Grants, in the amount of 50% of the eligible costs	http://www.deq.virginia.gov/Programs/Water/CleanWaterFinancingAssis

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Program Name	Funder	Eligibility Criteria	Types of Eligible Projects	Form of Funding and Amount Range	Link and Contact Info
Assistance Fund (SLAF)	Environmental Quality (DEQ)	city, town, municipal corporation, authority, district, commission, or political subdivision created by the General Assembly or pursuant to the Constitution or laws of the Commonwealth.	<ul style="list-style-type: none"> • New stormwater best management practices; • Stormwater best management practice retrofits; • Stream restoration; • Low-impact development projects; • Buffer restorations; • Pond retrofits; and • Wetlands restoration. 	<p>of planning, design, and installation of stormwater best management practices. The recipient must be able to demonstrate the availability of a 50% local funding match.</p> <p>For local government, the minimum grant amount is \$100,000 and the maximum is \$5,000,000.</p> <p>The Virginia Clean Water Revolving Loan Fund can be used as a source for the local match.</p> <p>Applications for SLAF grants will be solicited once each year that a state appropriation is provided.</p>	<p>http://www.deq.state.va.us/Programs/StormwaterFundingPrograms/StormwaterLocalAssistanceFund(SLAF).aspx</p> <p>Mr. Walter Gills, CWFAP Program Manager Department of Environmental Quality 629 East Main Street - Front Desk Richmond, Virginia 23219 (804) 698-4133 walter.gills@deq.virginia.gov</p>
Virginia Clean Water Revolving Loan Fund Stormwater Loan Program	Virginia Department of Environmental Quality (DEQ)	Eligible applicants: Virginia county, city and town governments, and Virginia municipal public service authorities.	Construction of facilities or structures or implementation of best management practices that reduce or prevent pollution of state waters caused by stormwater runoff from impervious surfaces.	<p>Loans of \$50,000+, to cover “reasonable and necessary costs,” including planning and design costs.</p> <p>Rate ceiling is 1% below municipal bond market rates. Lower rates are considered where a financial hardship situation exists and where the project is</p>	<p>http://www.deq.state.va.us/Programs/Water/CleanWaterFinancingAssistance/StormwaterFundingPrograms/StormwaterLoans.aspx</p>

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Program Name	Funder	Eligibility Criteria	Types of Eligible Projects	Form of Funding and Amount Range	Link and Contact Info
				necessary to resolve documented water quality problems. Applications accepted once per year.	
<i>Water Efficiency</i>					
Utility rebates for water efficient products	Local water utility company	Typically, recipient must be a customer in good standing with the utility company.	Examples include water efficient toilets, sink aerators, rain barrels, and irrigation controllers.	Typically, a rebate on the purchase price of the product.	Some water efficient product rebates are included in the WaterSense database: http://www3.epa.gov/watersense/rebate_finder_saving_money_water.html



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Appendix B:
Guidance on Stakeholder Engagement



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Guidance on Engaging Airport Stakeholders

Introduction

Stakeholder engagement is a key element of a sustainability program. It is an opportunity for airports and their communities to engage in a dialog with the objective of each understanding the others' perspective and determining a collaborative plan to move forward. Stakeholder engagement is often mistakenly thought of as messaging from the airport outwards. Instead, it should be a true collaboration and a reciprocal process, and should enable the airport and the community to investigate mutual benefits and challenges and create a process and space for those discussions.

It is important for airports to develop and conduct an ongoing public and stakeholder engagement program, and not just when conducting planning and development projects, such as Master Plan updates or Environmental Impact Statements. An ongoing program can reduce public confusion about project development and assist in public and stakeholder support of projects.

Figure B - 1, on the following page, provides an illustration of the key steps that should be included in an airport stakeholder engagement process.

OBJECTIVE: To engage stakeholders as part of an airport's sustainability program.

This diagram illustrates best practice steps in the stakeholder engagement process. Airports can refer to this guidance as they see fit, and draw on the best practices and references in the guidance according to their specific type/size considerations and resources. Airports do not have to follow every detail of every step in order to have a successful stakeholder engagement effort.

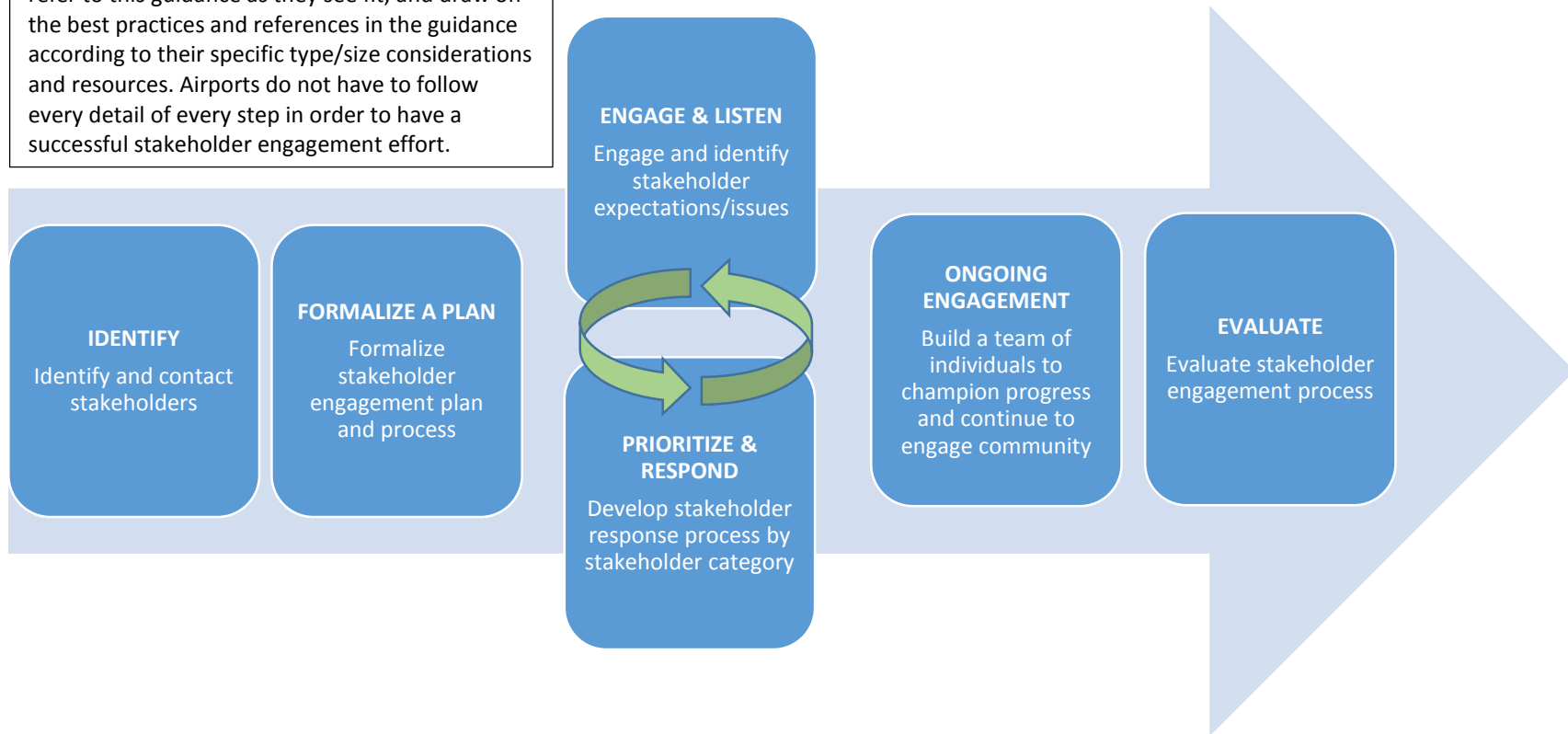


Figure B - 1: Stakeholder engagement process flow

Document Organization

This document is a best practice overview and reference for airports initiating stakeholder engagement as a part of a sustainability program. It provides step-by-step guidance in the following areas, as shown in the preceding stakeholder engagement process flow diagram:

- Identify stakeholders;
- Formalize a plan;
- Engage and listen;
- Prioritize and respond;
- Conduct ongoing community engagement; and
- Evaluate.

This document also includes an addendum listing additional tools and techniques for stakeholder engagement, as well as guidance on social media outreach planning. Airports can refer to this guidance as they see fit, and draw on the best practices and references in the guidance according to their specific type/size considerations and resources. Airports do not have to follow every detail of every step in order to have a successful stakeholder engagement effort.

Identify Stakeholders

Stakeholder engagement is important when implementing a successful sustainability management plan process, as it enables the airport to engage with its community around key areas of interest for all parties. The stakeholder engagement process:

- Generates stakeholder buy-in for airport decisions, by educating and including the community in these decisions to the degree possible;
- Enables the airport to gather other perspectives regarding its impact in the community, see key issues from multiple lenses, and consider issues of which it might be otherwise unaware;
- Encourages collaboration between the community and the airport; and
- Facilitate a smoother airport development process. As stated in interviews with airport directors, “the key to successful development of an airport is to have the backing and support of all stakeholder groups. This is done through communication and education.”

Identifying Stakeholders: Where to Start?

To initiate the stakeholder engagement process, one must identify internal and external stakeholders (see Figure B - 2 below). To ensure that your airport is casting a wide enough net for stakeholder

engagement, and to align with best practices around stakeholder inclusiveness, begin identifying and documenting all stakeholders who:¹

- Have influence or decision-making power;
- Interact most frequently with the airport;
- Depend financially on the airport’s operations and activities;
- Can legitimately claim to represent a constituency;
- Are groups to whom the airport has legal or financial responsibilities; and
- Are the intended audience of the airport’s policies and value statements.



Figure B - 2: Potential internal and external relevant airport stakeholders

¹ <http://www.ceres.org/resources/reports/facility-reporting-project-guide-to-stakeholder-engagement>

Develop a List of Potential Stakeholder Issues

Before engaging stakeholders, there are several important factors to consider, such as:

- Characteristics of key stakeholders;
- Ways in which key stakeholders may affect or be affected by current operations and future development;
- Relationships between stakeholders—specifically any potential for conflicts among competing interests and expectations;
- Capacity of stakeholders to participate in airport development; and
- Appropriate method(s) of engagement for each stakeholder.

Some issues that may be of interest to each particular group can be found in Table B - 1, which was modified from Stakeholder Engagement: A Mechanism for Sustainable Aviation (full citation below).

Table B - 1: Stakeholder groups and potential interests

Stakeholder Group	Potential Interest Categories
National/state/ regional/local government	Policy formulation, regional development, funding, safety, social and economic development, environmental regulations, contribution to local economy, safety and health regulations (OSHA, types of materials used and disposed of), adherence to policy and law
Airport	Growth, development, maintenance, operations, safety, workforce, financial stability
Airport employees	Employment, opportunity, growth, retention, airport initiatives, treatment of employees, benefits, trainings, safety, benefits/coverage, diversity
Airport service partners/airport tenants/vendors/ airlines	Commercial development, operations, policies, accessibility, parking, business traffic, security, health and safety code adherence, opportunities for economic development
Airport users	Airport services/route development, accessibility, cost, safety, operations and policies, parking
Communities near airport operations	Potential environmental impacts from airport operations, employment opportunities, access to aviation, opportunities for local business development, noise, air quality, airport development, traffic, parking, safety, accessibility, investment
NGOs (e.g., environmental groups)	Global, regional, and local environmental impacts, human rights, access to facility for meetings, philanthropy, communication
Airport suppliers	Growth of market, accessibility, ability to maintain airport and airline contracts
Providers of other local transport services	Growth and integration of services, accessibility, costs

These resources, among others, provide additional detail on how to initiate a successful stakeholder engagement process:

- *Facility Reporting Project Guide to Stakeholder Engagement*, Ceres and EPA.
<http://www.ceres.org/resources/reports/facility-reporting-project-guide-to-stakeholder-engagement>
- *Stakeholder Engagement: A Mechanism for Sustainable Aviation*, Amaeshi & Crane.
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=763464
- *ACRP (Airport Cooperative Research Program) Synthesis 65. Practices to Develop Effective Stakeholder Relationships at Smaller Airports*, sponsored by the Federal Aviation Administration.
http://onlinepubs.trb.org/Onlinepubs/acrp/acrp_syn_065.pdf

Formalize a Plan

Formalize a plan to engage stakeholders and determine how the airport will manage this aspect of community relations (both internal and external) in the long term. Airports may include a stakeholder engagement process in leasing policies with tenants; mention stakeholder engagement in the airport's mission statement; or develop a formal community outreach program.

For example, in 2000 the Dallas/Fort Worth International Airport (DFW) incorporated stakeholder engagement into its new Strategic Plan. The DFW Board of Directors began promoting pollution prevention, source reduction, and waste minimization through a comprehensive community outreach program involving educational events and initiatives within the community. One of these initiatives sought to educate airport users and the general public about how wildlife can endanger air traffic, through printed materials and online content on the airport website, as well as an online forum where members of the public could pose questions or file complaints related to wildlife.² DFW is a large hub airport, but its programs are based upon principles that can help airports of all sizes improve stakeholder engagement.

Alternately, an airport may include an overall sustainability goal in its long-term planning with inclusion of a stakeholder engagement process. For example, an airport may include a goal of maintaining or reducing overall impact on the community despite growth, and achieve this goal by incorporating sustainability strategies such as energy efficiency, water efficiency, and waste minimization into its daily operations and including stakeholders in the planning for and implementation of this goal.

Plan for Stakeholder Engagement by Category

Formalizing an effective plan for stakeholder engagement requires determining engagement activities appropriate for each stakeholder category identified in the previous step, "Identify Stakeholders." It is important to gear specific topics and activities toward individual stakeholder groups or categories, and focus only on the elements relevant to each group. For example, if stormwater experts are the target stakeholder for a discussion, that engagement should be focused around topics that might be applicable to that category such as runoff, stormwater management processes and performance, incorporation of

² *ACRP Synthesis 65*. Accessed at http://onlinepubs.trb.org/Onlinepubs/acrp/acrp_syn_065.pdf

living roofs, etc., unless the stakeholders raise additional concerns. Some common types of engagement methods are:

- Surveys and interviews (online, mailed postcards, phone, or “leave behinds”);
- Town hall meetings and open houses;
- Focus groups or workshops;
- Online discussion forums;
- Comment boxes throughout the airport;
- Meetings with local, state, and federal officials and FAA personnel;
- Working groups on specific topics such as economic development; and
- Airport tours (for schools, communities, businesses, etc.).

The Addendum to this document includes a complete list from *ACRP Synthesis 65: Practices to Develop Effective Stakeholder Relationships at Smaller Airports*.

Engage & Listen

Airport staff should convene stakeholders based on interests and stakeholder category. For example, airport tenants may comprise a stakeholder category based on similar interests regarding the airport. One appropriate method for engaging this group may be an invitation to a quarterly meeting with airport management, to discuss key topics—with a specific request for tenant feedback on these and any additional topics of interest.

This step should: build upon stakeholder issues and verify their concerns; accurately document the perspectives given in regard to the concerns; and support additional feedback regarding other concerns that may arise throughout the stakeholder process.

To help guide this process, here are some sample questions to ask stakeholders:³

- Describe your interest in our airport.
- What topics or areas are the most important to you and why?
- What is your expectation from your relationship with our airport?
- What could the airport do to better support the community (can be internal or external)?
- What opportunities for collaboration exist between the airport and your organization?
- What is your current opinion of our airport?
- What are general industry challenges or potential future challenges?
- Where are opportunities for stakeholder engagement with the airport?
- What engagement activities would you like to see?

³ Stakeholder Engagement: A Mechanism for Sustainable Aviation (2005).

http://papers.ssrn.com/sol3/papers.cfm?abstract_id=763464

Prioritize & Respond

Once stakeholders have been convened by category, is it important to examine and prioritize the issues they raised. The following questions may help in the prioritization process:

- How important is this issue to the viability of the airport and its operations?
- How important is this issue to the internal stakeholders/external stakeholders?
 - If the issue is critically important to either internal or external stakeholders, it should be prioritized—especially if it is critically important to both. An example might be the economic viability of the airport, which affects both parties.
- Is this issue important to the airport sector in general?
- Could this issue impact the airport in a significant way if not properly managed?
 - What are the potential risks and opportunities associated with this issue?

Examining and prioritizing stakeholder issues in this way is known as a best practice called “materiality.” An airport’s materiality process is basically a determination of what issues are the most relevant to both internal and external stakeholders.⁴ An example of an element that may be material to airports is economic performance of the airport, which is highly important to internal stakeholders because it keeps the airport operational, but which may also be highly important to external stakeholders, such as the local community, because the airport contributes to the economic development of the town. Thus, economic performance is material for an airport.

Once the prioritization of stakeholder issues has taken place, those critically important to the airport should be integrated into airport planning and processes. Those that are not critically important—or are not at this time—should be documented, but perhaps not included in airport planning and processes. Regardless of the category into which each stakeholder issue falls, best practice dictates responding to the stakeholders concerned about the issue. Methods for responding vary by stakeholder type and may include letters, emails, phone calls, town hall meetings, newsletters, or other methods depending on the issue and stakeholder.

Readers can consult the following sources to learn more about materiality and prioritization of issues.

- *Defining Materiality What Matters to Reporters and Investors.* <https://www.globalreporting.org/resourcelibrary/Defining-Materiality-What-Matters-to-Reporters-and-Investors.pdf>
- Airport Operators Sector *Supplement.* <https://www.globalreporting.org/resourcelibrary/GRI-G4-Airport-Operators-Sector-Disclosures.pdf>

Ongoing Community Engagement

Once the stakeholder groups have been convened, and issue areas have been identified, it is important to create a group responsible for continuing this community engagement. This group can be as formal as a leadership team or as informal as a few volunteers who engage the community a few times each year.

⁴ <https://g4.globalreporting.org/how-you-should-report/reporting-principles/principles-for-defining-report-content/materiality/Pages/default.aspx>

The ideal scenario is creation of a system for periodically assessing stakeholder concerns and ideas, and responding to them or incorporating them into airport processes, while also serving as ambassadors in the community. The community engagement team should be responsible for periodically going into the community to provide information about the latest activities, plans, achievements, and challenges the airport is facing. The team should also be responsible for ensuring that stakeholder feedback is collected throughout the year and addressed in a timely manner.

Further, airports should engage volunteers (e.g., county leaders, business people, and community members) who attend meetings in the community quarterly, such as chamber of commerce meetings, neighborhood association meetings, small business meetings, and other forums to serve as airport ambassadors, relaying important airport news to the community and capturing community feedback on those activities. Oftentimes, community members are interested in meaningful volunteer opportunities. The airport should take this valuable opportunity to strengthen communication between the airport and the community, while also giving community members a chance to be recognized for their efforts.

Some examples of these responsibilities are as follows:

- One airport included in ACRP’s Synthesis 65 “indicated that it has an ‘Ambassador Go-Team’ consisting of 10–12 business leaders available on-call to assist with new business leaders’ understanding of an airport’s value and/or to dispel myths or negative perceptions.”⁵
- Manchester International Airport has a similar group. “The airport has [Community Champions] who act as a contact point and part of a wider group, able to co-ordinate and facilitate its community involvement. Each champion is appointed by their peers and representatives are drawn from each department. In addition, the airport has a Consultative Committee set up in 1969 as the formal interface between Manchester Airport and its neighboring communities. The Committee today comprises 33 members representing local authorities affected by the airport’s operation, amenity groups and user groups. The Consultative Committee meets on a quarterly basis, in public, with the press in attendance; and requests reports from the Airport Company on current issues of interest to the Community, such as: (a) Results of environmental monitoring, particularly aircraft noise and track keeping, (b) Analysis of community complaints, (c) Development proposals, (d) Progress reports on environmental management initiatives, and (e) Traffic statistics.”⁶

Evaluate

It is important to periodically review stakeholder engagement activities, types of participants engaged, and progress, on at least an annual basis, to identify areas for improvement and opportunities to streamline the process, and to cast a wider net. It is also important to report public and stakeholder engagement statistics as part of your sustainability program. Goals, metrics, targets, and initiatives relevant to each airport type/size tier are provided in the SMP Supplements.

⁵ http://onlinepubs.trb.org/Onlinepubs/acrp/acrp_syn_065.pdf, page 2.

⁶ http://papers.ssrn.com/sol3/papers.cfm?abstract_id=763464

Addendum

Tools and Techniques for Stakeholder Engagement by Category⁷

Users

- Outreach to pilots: seek to meet their needs while encouraging them to “fly friendly” and minimize the impact on airport neighbors.
- Ask pilots for input on how to minimize noise impacts.
- Ask pilots for feedback on customer service.
- Do not overlook the importance of engaging unique users, such as “snowbirds,” or seasonal users, such as those who visit resort-area airports.
- Promote a Fly Safe, Fly Quiet program.

Policymakers

- Make sure policymakers and the public and/or airport neighbors are kept informed, especially if an issue arises that will impact or has impacted their constituency.
- Maintain a positive and proactive relationship with Congressional representatives.

Tenants

- Practice open communication and seek input early in the process, so the group is “brought in” to the outcome.
- Open communication is critical to a positive relationship.
- Hold quarterly meetings to understand the tenant’s and user’s perspectives, and to help prioritize capital improvements.
- An opportunity exists at small airports for ongoing communication between tenants and the airport manager.
 - Tenants can provide a pulse-check regarding proposed policies.
- Communicating plans for construction and temporary airport conditions is very important.

Economic Development Agencies

- Partner to bring events to the community that promote the area or region through air travel.
- Demonstrate the airport’s positive economic benefits and potential for job creation.
- Embrace the airport’s role in developing business.
- Use focus groups with an aviation cross section for marketing purposes.
- Participate in local business groups.
- Serve as an officer with the Chamber of Commerce.
- Work directly with the Chamber of Commerce and economic development organization to accomplish specific goals and target corporations.
- Establish a relationship and communicate with local bankers.
- Invite the Chamber of Commerce and business leaders on a tour of the airport.

⁷ Modified from *ACRP Synthesis 65*. Accessed at http://onlinepubs.trb.org/Onlinepubs/acrp/acrp_syn_065.pdf

- Include an economic development organization member on the Airport Advisory Council or Airport Board.

Government/Regulators

- For air traffic control, develop a culture of service and partnership, so that customer service for pilots is top-notch while minimizing the impact on neighbors; for example, specifying a departure route that avoids flight over noise-sensitive areas.
- Maintain open communications with regulators, have a consistent capital improvement plan, and deliver projects on time for efficient grant closure.
- Work together with FAA, the state, and other government offices as partners for a mutually beneficial outcome.
- Have regular face-to-face meetings with FAA and the state aviation agency. Do not forget the various FAA offices such as Airports, Civil Rights, Air Traffic, and Facilities.
- Maintain a good relationship with Congressional and state and local representatives.

Public and Airport Neighbors (Airport Community)

- Education and outreach to groups ensures issues are addressed.
- Personal visits to homeowners are effective.
- Airport management should participate in professional and civic organizations.
- Conduct events at the airport such as Santa Claus fly-in, aviation art contest, aerobatic competitions, Sky School for kids, and Boy Scout and Civil Air Patrol events.
- Engage the community on its turf, and invite them to yours (the airport).
- Give to the community; for example, right-of-way for a sidewalk.
- For master plans, noise studies, and environmental assessments, go beyond the minimal requirements to ensure there is active engagement with the community.
- As part of the master plan process, visit and brief every nearby homeowners association.
- Canvass the neighborhood with postcard invitations to public workshops.
- Provide follow-up to noise complaints, and mail letters to pilots who are not following “fly friendly” recommendations.
- Visit the site of a noise complaint and hear what neighbors are hearing.
- Get information out to the public about an issue before the detractors have a chance to put out their story.
- Get realtors on board to prevent problems when home buyers are not familiar with the airport.
- Educate the public about the airport’s value.
- Explain safety and geometric standards to the public and neighbors.
- Use PowerPoint and handouts when talking with the public.

Service Providers

- Develop a relationship that ensures that high-quality services are provided by law enforcement and fire protection.
- Treat the airport’s day-to-day service providers as if they are part of the airport family.
- High-quality consultants add credibility to the airport and are critical when dealing with airport neighbors.
- Contractors are truly extensions of staff. Show them they are valuable and keep them informed.

- The relationship with some service providers is contractual and is to be managed accordingly.
- Ensure volunteer and other airport service providers have the proper training, especially when they work on the airport.

Social Media Outreach Plan

Social media has unquestionably changed the way people communicate. Social media provides an airport with a direct line to connect with customers, stakeholders, partners and the local community. It provides an opportunity for two-way communication in real time, allows an airport to monitor what others are saying about you, and helps keep the airport up to date with industry happenings. Because of this, besides just being used for general communications and marketing, social media is also an effective crisis communication tool. Therefore, a social media strategy should be part of the airport's plans to respond to an accident or major incident.

A high-quality social media presence requires tools, staff, and paid media. However, an effective social media presence can be created with a much lower level of effort. Nevertheless, effective use of social media requires more than just posting regularly; it demands regular monitoring and interaction with the online community. This guide provides recommendations to help airports start to build a brand using social media.

Step 1: Identify the Right Social Media Channel

There are a wide variety of social media channels. Determining the right one for an airport is critical and should be based on three considerations: time, resources, and intended audience. Facebook and Twitter are the most common social media outlets for businesses.

- Facebook is a multi-purpose social networking platform, allowing users to chat; post photos, videos, and notes; find and share news; and join common-interest groups and pages. According to Facebook, on average, there are over 1.59 billion active monthly users.
- Twitter is built around the posting of short 140-character tweets (messages), which can also include images, videos, and links to outside webpages. Twitter has over 320 million active monthly users.

Step 2: Establish Goals and Prioritize Objectives

As an airport ventures into effective use of social media, establish goals and objectives that ensure the airport's time is well spent and the airport's effort provides measureable results. Setting goals and objectives allows the airport to check that each of its social media posts supports a strategic goal. Figure B - 3 provides basic goals and objectives for consideration.



Figure B - 3: Sample social media goals and objectives

Step 3: Establish Online Presence

In order to establish the airport online, an airport needs to set a foundation. Start by optimizing the airport’s cover photo and name, as this will be the first thing people see when they visit the airport’s Facebook page. The language and photos on the Facebook home page – i.e. “cover page” – are an opportunity to convince people the airport is a great location for basing aircrafts, learning to fly, etc.

Integrate Facebook into the airport’s website by adding a Facebook icon to the airport website that drives internet users to the Facebook page. This is easily done using a free plugin. The Facebook support page has information about how to do this [here](#).

Next, update the “About Section” on the airport’s Facebook page. This is an important step to set Facebook follower expectations. In order to use this section to its greatest potential, update the following sections:

1. **Topics:** choose three words to describe the airport’s page.
2. **Long description:** provide deeper insight into the airport’s offerings, events, partnerships.
3. **General information:** consider adding the airport operation hours. As the number of users for the airport’s site grows, it is also important to develop “rules of the road” and be transparent about the privacy policy and terms and conditions. This allows the airport to clearly state the purpose of the airport’s Facebook page and identify any inappropriate content that can be removed.
4. **Mission:** add mission language.

Step 4: Create a Content Plan and Editorial Calendar

Great content is essential to succeeding at social media, i.e., increasing the number of followers and keeping them engaged. Consistently creating relevant and entertaining content that appeals to the

needs of the airport’s audience will get more interaction and shares. Consumers follow companies to get to know the company – don’t be afraid to show the airport’s “personality.” Aim to keep each post fairly short, ideally one to two sentences. It’s proven that people are more likely to respond to photos and videos shared through Facebook than text alone. Use pictures in posts to attract the reader’s eye; then include informational or clever, compelling content to keep them engaged. Content curation is also an important part of the process – follow other industry-related pages, government pages, local pages, and partner pages, and share their content on the airport Facebook page when appropriate. This can be done by simply hitting the “share” button. Content curation is that act of leveraging other content found on Facebook from relevant pages and then sharing it with the airport audience.

Other content curation recommendations are as follows:

1. **Facebook features:** Create a Facebook “event” on the airport’s page when hosting a local gathering or community event. This allows the airport to include the date and time, a description, image, and type of event (community, activity, etc.). Facebook allows users to choose a post to “pin” to the top of your Facebook page. By utilizing this feature, users can focus attention on a specific post. It will be the first post people see when arriving at your page. Consider pinning Facebook posts with a strong call to action (join an event, sign up for flight school) to the top of the page for a couple of days to help drive results.
2. **Visuals:** Create buzz by sharing interesting content. Focus on visuals to generate word of mouth and interaction with posts. For example, consider sharing images of planes, the runway, the facility, new sustainable lighting upgrades. Users should also consider celebrating aviation milestones, holidays, or the seasons – share aviation facts, tips, ask trivia questions, etc.
3. **Time-sensitive information:** Share local aviation-related, community, or weather news. This will shape your platform as an informative page that provides local value. Consider sharing local storm information or closures, or link to articles or sites that are relevant.
4. **Industry and partner content:** Engage with partners and promote local or aviation-related businesses by sharing their content. Tag them in posts, and share infographics, images, holiday-themed posts, and videos.

Step 5: Monitor, Respond, and Test

Facebook gives the airport an image and connects it with the community. It is also an opportunity to learn about an airport’s community members. Through comments and posts an airport can get direct feedback and have conversations with its audience. Respond promptly and address issues publicly, but if a particular matter requires more personal help, have followers send a “direct message” or email with their concerns. Social media analytics tools like [Facebook Page Insights](#) will assemble metrics about followers and when the content has the highest level of engagement. Using both the airport’s own data and industry best practices (see this [guide](#) as an example), refine the posting practices over time. To monitor other mentions in media, set up Google alerts to receive email updates of the latest relevant Google results based on keywords.

Additional social media resources are provided below:

- The following are recommended links for crisis planning:
 - <https://www.iata.org/publications/Documents/social-media-crisis-guidelines.pdf>
 - <http://www.instituteforpr.org/crisis-management-and-communications/>

- The most important aspect of social media planning is that it is constantly evolving. New platform updates are announced regularly. Follow Facebook's [newsroom](#) to keep updated. Growing an engaged Facebook community takes time. Use Facebook analytics to determine what's working and continually adjust the airport social media strategy.
 - www.facebook.com/help
 - www.support.twitter.com
 - www.socialmediaexaminer.com

Appendix C:

Utility Performance Tracking Tool – User Guide

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INTRODUCTION

This document provides step-by-step guidance to accompany Cadmus’ Utility Performance Tracking Tool designed for Virginia airports. The tool enables airports to easily track electricity, natural gas, and water use on a monthly and annual basis. In addition to tracking, the tool contains a “Goal Log” where the user can provide narrative around the usage, goals set by the airport, and progress toward achieving those goals.

The intended user is the party or individual responsible for sustainability or environmental reporting at the airport, who has access to airport utility records, and can update the necessary utility data on a monthly basis. The tool also contains normalizing metrics, to ensure that the information remains relevant as airport operations and facilities change over time—in terms of new building additions, changes in occupancy, and other variables—and so that airports can compare their data to others (such comparison must occur outside of the tool).

This tool serves airport of various types and sizes. If an airport does not have access to data for a particular field, or if the data are irrelevant (such as number of passengers for a Local Service airport), the user should leave the tool field blank.

The tool is compatible with Microsoft Excel 2007 through present versions.

FIRST TIME SETUP PATHWAY

When the user initially downloads and opens the Excel-based tool, a security prompt will appear at the top of the window. In order to enter data into the tool, the user must click “Enable Content” (Figure C - 1).

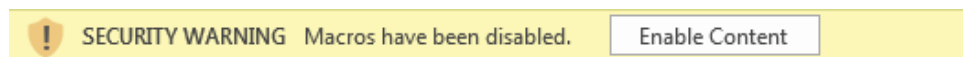


Figure C - 1: “Enable Content” prompt

Once the user has enabled content, the home screen (shown in Figure C - 2) will become active and display a “First Time Setup” button and a “Continue Using Tracker” button.

The Cadmus Group, Inc.

Welcome to the Utility Performance Tracker

The Utility Performance Tracker is a tool for you to use for the purpose of tracking your organization's usage of energy and water usage. Using this tool, you will be able to track your usage, specify energy and water use reduction goals, and monitor your progress towards those goals.

NOTE

This workbook requires Excel Macros to be enabled.

First Time Setup

Continue Using
Tracker

Click here to
restore default
Excel

Version 2
Developed by The Cadmus Group, Inc.
Version Date 5/9/2016

Figure C - 2: Utility performance tracking tool home

First-time users should select the “First Time Setup” button and follow the steps provided in Option 1: “First Time Setup”. Those who have used the tool before should select the “Continue Using Tracker” button and follow the steps beginning in Continue Using Tracker section.

Note that once the user has selected a tool option, they can click the “Return to Start Page” button illustrated in Figure C - 3 and be redirected back to the home screen.

Return to
Start Page

This button is on every page and gives the user an easy way to return to the home screen at any time.

Figure C - 3: Return to start page

Airport & Facility Information

After the user selects the “First Time Setup” button, they will be directed to the “Facility Info” tab and should enter the required information for the intended facility record, as presented in Figure C - 4.

The Cadmus Group, Inc.

Airport & Facility Info

Usage Info

Passenger Info

Aircraft Movt Info

Freight Info

Return to Start Page

Please enter information about your airport and all of its facilities. Enter the airport once, then enter each facility and its usage types one at a time. If your utility does not appear in the list, you can type it in.

Airport Code:

City:

Airport:

Number of Full Time Employees:

Facility Name:

Utility Usage Type:

Utility Provider (optional):

Meter ID (optional):

Square Footage (optional):

Figure C - 4: Airport & facility information page

The information requested in each of the tool fields in the “Facility Tab” are described in Table C - 1.

Table C - 1: Description of fields provided in facility information tab

Tool Field	Description
<i>Airport Code</i>	The code associated with the user’s airport. For example, if the user was inputting data for the Newport News/Williamsburg International Airport they would populate the tool field with PHF.
<i>City</i>	These fields will automatically populate once the user designates the airport code.
<i>Airport</i>	
<i>Number of Full-Time Employees (FTEs)</i>	Airports typically report "full time equivalent" based on the hours worked by airport employees that equate to full-time employees. Therefore, if the airport has two part time employees their hours could be equivalent to one full-time employee.

Tool Field	Description
Facility Name	Name of the facility (this helps the user stay organized and keep each facility separate). Facilities could include: buildings, parking structures, hangars— anything with electricity, natural gas, or water data. If an airport facility is metered separately (i.e. it has its own electricity, natural gas, or water meters), the user should record each meter usage as its own record, but with the common facility name to keep the usage meters and data tied to that specific facility. For example, if the employee parking lot has both a natural gas and an electricity meter, the user should identify the Employee Parking Lot as the Facility Name, and include each of the usage meters tied to that specific lot (the facility).
Usage Type	Usage Type refers to the type of resource being provided by the utility and includes electricity, natural gas, and water as dropdown menu items.
Utility Provider (optional)	The energy or water company (also referred to as a vendor) from which the airport purchases its energy or water.
Meter ID (optional)	This will be attached to the airport’s utility bill and is an option for facilities that have multiple meters.
Square Footage (optional)	The square footage of the facility the user is inputting data for.

Once the user has entered the facility information, several options are available. These options and their descriptions are as follows:

- **Add Another Utility To This Facility:** If the user has an additional “Usage Type” to add to the facility—such as water or natural gas—the user will click “Add Another Utility To This Facility.” The fields “Utility Usage Type,” “Utility Provider,” and “Meter,” will be cleared and ready for the user to add a new “Usage Type” to the existing Facility. Once the user has input data for this additional “Type,” they will click “Add This Utility/Facility” to store the data in the tool.
 - Airports may want to include several “Usage Types” per facility depending on the airport’s structure of electricity, natural gas, and water billing. For example, an airport may only have natural gas information for one facility, but another facility may meter electricity, natural gas, and water. Another example of why the user might want to add multiple “Usage Types” to a facility is if there are meters hosted by different companies in the same facility—such as a parking structure where electricity meter A is provided by Utility X and water meter B is provided by Utility Y.
 - Note that if a utility type needs to be added to an existing facility after the initial setup has already been completed, it must be done through the “Add a new facility” button on the “Continue Using Tracker” page (see Section 2 of this document). Users must add a new facility with the new utility type even if it is a facility that was already added previously.
- **Add This Utility/Facility:** This button allows the user to associate the utility and facility information the user has entered with the airport, and add additional utilities or facilities to the tool. The user should enter the data they want to record and then click “Add This Utility/Facility.” Once clicked, the data will be stored in the tool and the field will become blank.

If the user does not click “Add This Utility/Facility” after entering the relevant data, the data will be deleted.

- Facilities could include: buildings, parking structures, hangars—anything with electricity, natural gas, or water data.
- **Clear Form:** This button clears the existing form of all information, but does not delete prior stored inputs. For example, if the user adds data to the “Airport & Facility Info” tab for a parking structure and then clicks “Add This Utility/Facility,” those data will be stored in the tool. If the user incorrectly enters data prior to clicking “Add This Utility/Facility” and wants to clear the information on this tab only, then the user should click the “Clear Form” button.
- **Done:** This button takes the user to the next screen – in this case, “Usage Info.”

Usage Information

In this section, shown in Figure C - 5, the user enters usage information, which includes:

- **Facility:** Dropdown menu showing each of the facilities the user added to the tool in “Airport and Facility Info” tab.
 - Once a facility is selected, the dropdown menus below will populate with the information entered about the selected facility in the “Facility Info” tab.
- **Type:** Dropdown menu with the following options: electricity, natural gas, or water.
- **Utility:** Dropdown menu with the name of the Utility Providers for the selected facility.
- **Meter ID:** Dropdown menu showing each of the meter ID’s the user added to the tool in the “Facility Info” tab.
- **Start Date:** Populate this field in the following format, mm-dd-yyyy, with the “Start Date” found on the utility bill.
- **End Date:** Populate this field in the following format, mm-dd-yyyy, with the “End Date” found on the utility bill.
- **Volume:** Field used to input the usage for the “Start Date” and “End Date” billing period. This field should only be populated with numbers.
 - For electricity, the user should populate the “Volume” tool field with the total kWh used during the billing period being reported on.
 - For natural gas, the user should populate the “Volume” tool field with the total Mcf consumed during the billing period being reported on (guidance on converting natural gas units to Mcf is included in Table C - 2).
 - For water, the user should populate the “Volume” tool field with the total KGals consumed during the billing period being reported on.
- **Cost:** Field used to input the cost of the usage data being added to the tool. This field should only be populated with numbers, no “\$” or other special characters.

Table C - 2: Conversion factors for natural gas units of measurement

Natural Gas Units of Measurement	Conversion Factor (per 1 Mcf)
ccf	10 ccf
cf	1,000 cf
therms	10 therms
mmBtu	1 mmBtu
Btu	1,000,000 Btu
Bcf	0.000001 Bcf

For the user’s convenience, Table C - 3 provides the most common electricity units of measurement and their corresponding kWh conversion factors.

Table C - 3: Conversion factors for electricity units of measurement

Electricity Units of Measurement	Conversion Factor (per 1 kWh)
watts	1,000 watts
MWh	.001 MWh

For the user’s convenience, Table C - 4 provides the most common water usage units of measurement and their corresponding KGals conversion factors.

Table C - 4: Conversion factors for water units of measurement

Water Units of Measurement	Conversion Factor (per 1 KGals)
Ccf	748,000 Ccf
Gallon	1,000 gallons
Cgal	100 Cgal

Passenger Information

In this section, shown in Figure C - 6, the user enters the number of passengers within a given timeframe established by the airport such as per quarter, per month, or any other airport-determined time period. For example, if the user wants to record passenger information every quarter, they would use the first day of the quarter they are reporting on for the “Start Date” field and the last day of the quarter for the “End Date” field. The passenger information section contains the following fields:

- **Start Date:** The beginning of the time period established by the airport, such as the first day of the month or the first day of the quarter. Use the following format to input the “Start Date,” mm-dd-yyyy.

Freight Information

In this section, shown in Figure C - 8, the user enters information about the tons of freight loaded onto aircraft within the timeframe established by the airport. For example, if the airport wanted to track freight information monthly, the user would input the first day of the month they are reporting on for the “Start Date” field and the last day of the month for the “End Date” field. The freight information section contains the following fields:

- **Start Date:** This is the beginning of the time period established by the airport, such as the first day of the month or first day of the quarter. Use the following format to input the “Start Date,” mm-dd-yyyy.
- **End Date:** This is the end of the time period established by the airport, such as the last day of the month or last day of the quarter. Use the following format to input the “End Date,” mm-dd-yyyy.
- **Freight Weight:** This is the tons of freight loaded onto aircraft on airport grounds. This information can be found in the shipping manifest.

The Cadmus Group, Inc.

Airport and Facility Info

Usage Info

Passenger Info

Aircraft Movt Info

Freight Info

Please enter start and end dates, and the freight transported for each time period.

Start Date	End Date	Weight (tons)

Most recent data entered:

No data entered yet

Add Info

Clear Form

Return to Start Page

Return to Previous Page

Figure C - 8: Freight weight information

Once the user has entered data into the above fields they should click the “Add Info” button. Once this button is clicked all data fields will clear, but the values entered will be stored and available for viewing under Continue Using Tracker.

Continue Using Tracker

Users that have already populated the tool with data will click the “Continue Using Tracker” button. Figure C - 9 illustrates the options that become available.

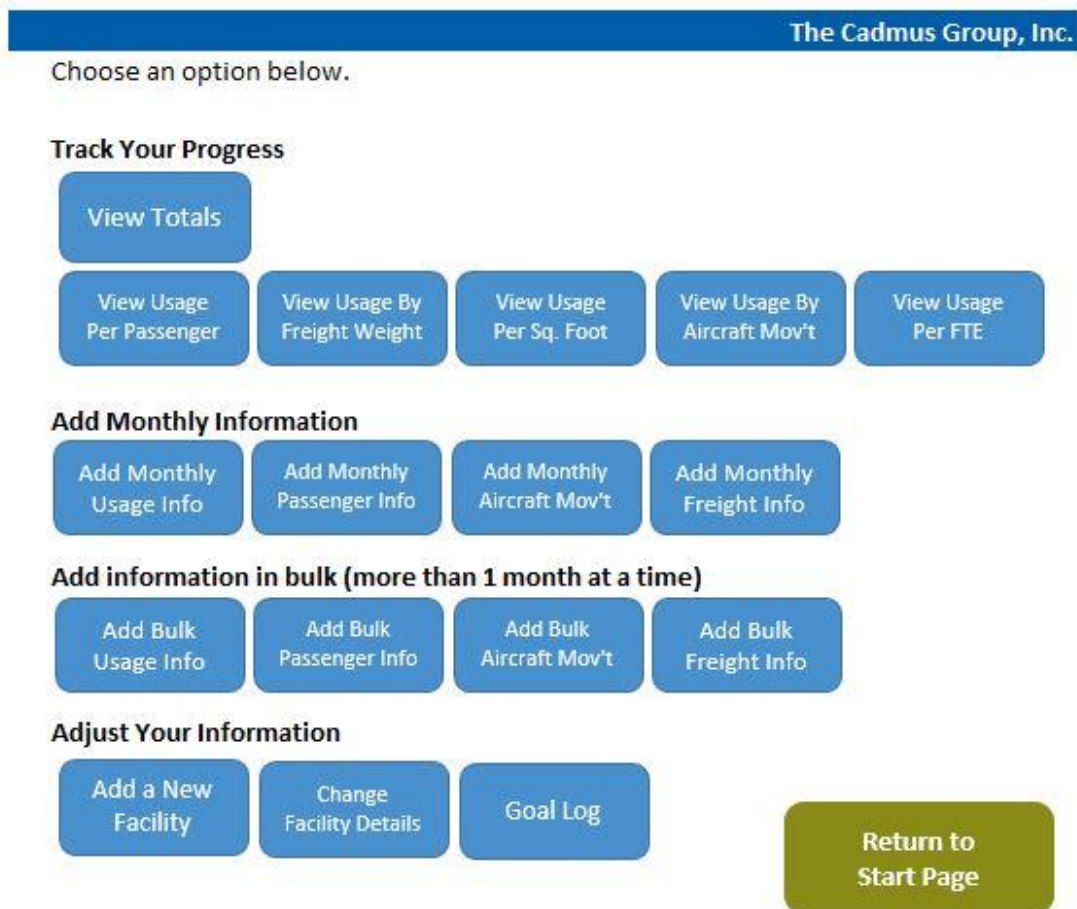


Figure C - 9: Continue using tracker

Track Your Progress

In the “Track Your Progress” section, the user can track progress of energy or water usage over time. In addition, the user can track usage according to the normalizing metrics included in the tool, such as passenger or square footage data. This allows the usage data to be normalized according to a growth metric. For example, if the airport’s square footage increased as well as the energy usage, the “View Usage per Square Foot” would normalize the energy usage by the square footage of the facility. This allows the user to track the intensity of the airport’s usage per square foot in addition to the total usage. The tool provides the following options for the user to track progress:

- View Totals

- View Usage per Passenger
- View Usage by Freight Weight
- View Usage per Square Foot
- View Usage by Aircraft Movement
- View Usage per Full-Time Employees

Below in Figure C - 10 is an example of the “View Usage per Passenger” output graph, for a facility with electric and natural gas usage, and no water usage.

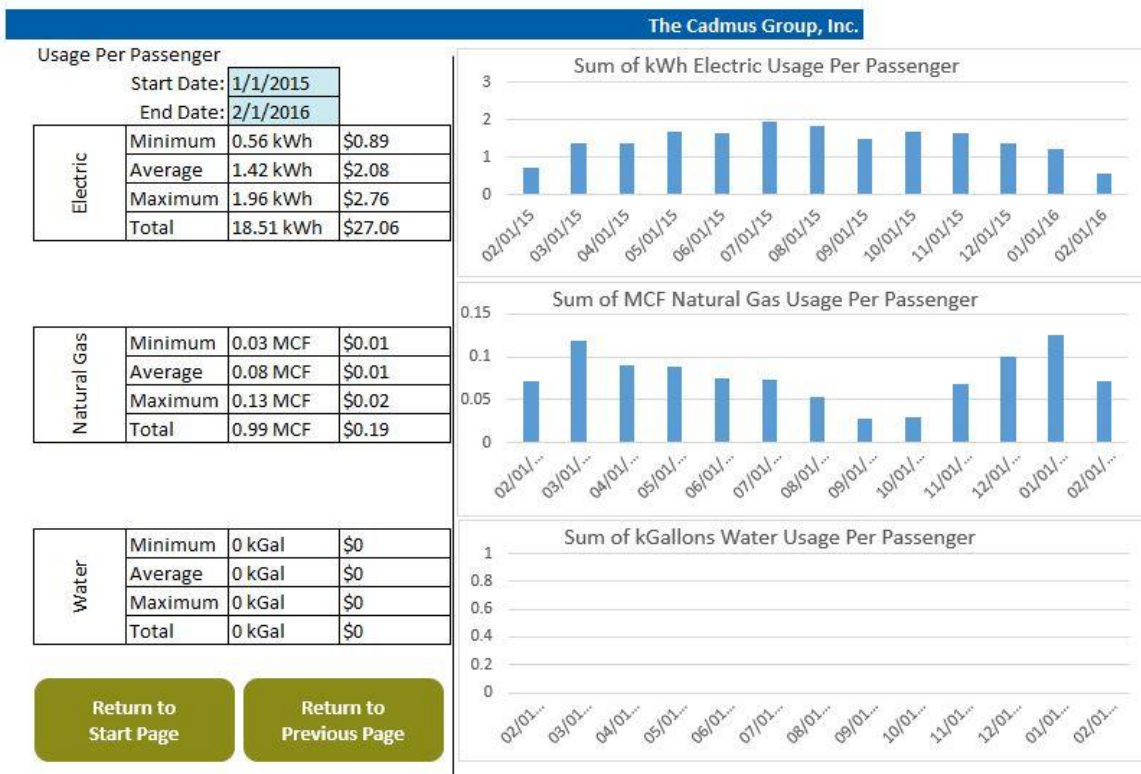


Figure C - 10: View usage per passenger

Add Monthly Information

In the “Add Monthly Information” section, the user can add or update various types of airport-specific information including monthly usage, passenger information, aircraft movement information, and monthly freight weight information. If the user does not have access to any of the “Add Monthly Info” options mentioned previously, the user can leave the tool fields blank.

Add Information in Bulk (more than 1 month at a time)

In the “Add Information in Bulk” section, the user can add or update large amounts of airport-specific information at one time. Similar to the “Add Monthly Information” section, the user can add usage information, passenger information, aircraft movement information, and freight weight information, but in this case for multiple months at a time. If the user does not have access to any of the “Add Information in Bulk” options mentioned previously, the user can leave the tool fields blank. Note that usage information can be entered in any order, and will still display in a chronological order when viewed through any of the options in the “Track Your Progress” section.

Adjust Your Information

In the “Adjust Your Information” section, the user can add a new facility or change facility details. In addition, the tool provides a “Goal Log” where the user can provide narrative around the airport’s energy consumption and various metrics (such as, FTE, aircraft movement, etc.) to set goals and evaluate progress towards achieving those goals.

DOAV has developed a Sustainability Management Plan for Virginia airports. Within this guidance are supplements that provide relevant goals, metrics, targets, and initiatives for three airport size tiers. The supplement tiers and titles are as follows:

- *SMP Commercial Service Supplement*
- *SMP Reliever/General Aviation-Regional Supplement*
- *SMP General Aviation-Community/Local Service Supplement*

In addition, this tab can be used to provide context around trends in the data. For example, “the natural gas usage increased by 25% due to an extended period of below average temperatures in the local area” or “November and December saw record high passenger numbers due to holiday travel.”

When reviewing consumption information, make sure to account for seasonal and temperature fluctuations. This can be done by looking at data such as average mean monthly temperature or average monthly heating/cooling days from a local weather station located at or near the airport. Having this data on-hand while reviewing the results from the tool can help inform any year-to-year changes in energy consumption.

Restore Default Excel (Advanced Option)

This is an option for an advanced excel user and can be accessed by clicking the grey “Restore Default Excel” button on the home page, as shown in Figure C - 11.

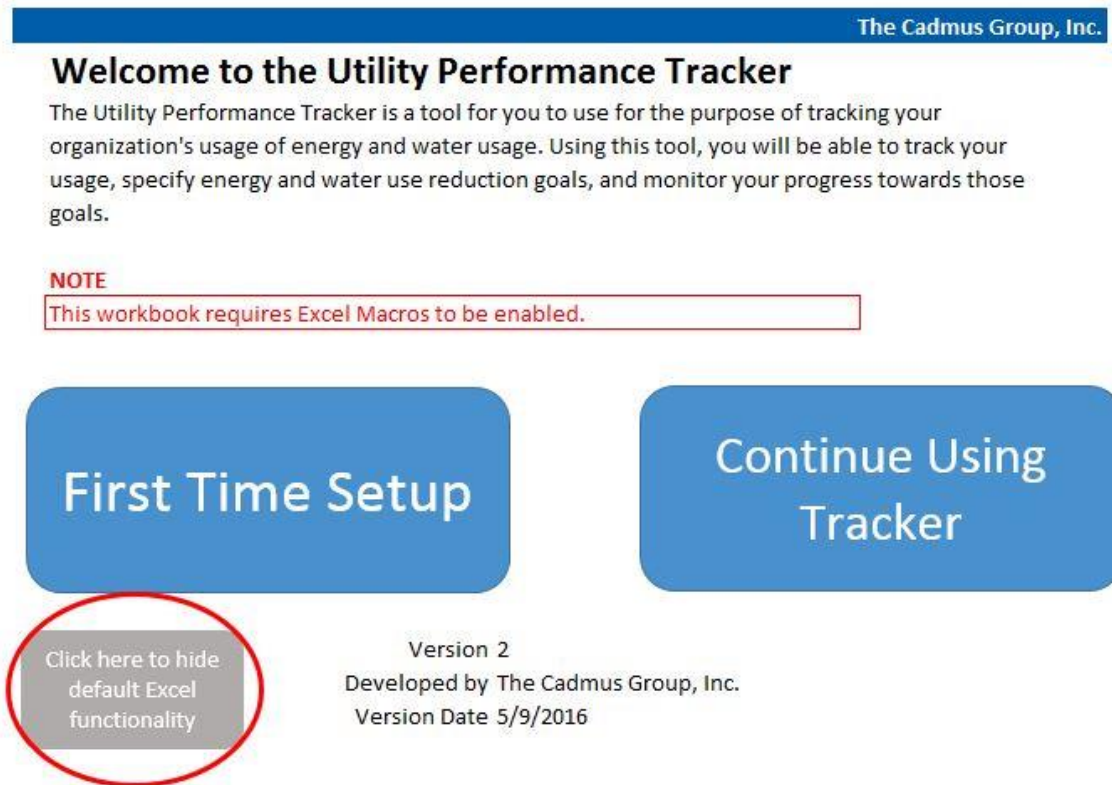


Figure C - 11: Advanced user pathway

This button unlocks the tool, resulting in all hidden tabs in the Excel workbook becoming visible along the bottom of the window. This should only be done if the user wants to input large quantities of data at one time, or further customize the tool. The user should save a version of the tool prior to manipulating the various Excel tabs, to prevent irreversible data loss in case manipulating the tabs does not go as planned.

If the user would like to go back to a normal Excel interface they should click the “Click here to hide default Excel functionality” button. Every time the user opens the tool it will open in simple mode, instead of the advanced option.

Annual Reporting

The Utility Performance Tracker Tool can serve as a data collection template for annual electricity, natural gas, and water usage and can roll up to performance reporting, depending on the airport’s reporting requirements. Typically, tools used for annual reporting collect key information such as resource usage data, financial performance data, key performance indicators, number of full-time

employees, aircraft movement activity, and other statistics—that inform the development of performance metrics.

This tool includes fields for collecting energy and water usage, FTE, square footage, aircraft movements, freight weight, and narrative around future goals and energy and water usage changes.

Determine a Baseline Inventory

An airport looking to establish a baseline inventory of energy and water usage can use this tool to gather the inventory information for each facility on a monthly basis. Baseline measurements are typically used as a means of comparison to evaluate performance over time and often as a starting place to set goals.

In addition, an airport can create a greenhouse gas (GHG) emissions baseline inventory using the electricity and natural gas data collected in this tool, in combination with the methodologies provided in the Transportation Research Board’s Airport Cooperative Research Program (ACRP) Report 11, *Guidebook on Preparing Airport Greenhouse Gas Emissions Inventories*.

Additional information on emissions factors and methodologies are available in these best practice resources and tools from the World Resources Institute and the World Business Council for Sustainable Development¹:

- Greenhouse Gas Protocol’s *Emissions Factors from Cross-Sector Tools*
- Greenhouse Gas Protocol’s *GHG emissions from purchased electricity*
- Greenhouse Gas Protocol’s *GHG emissions from stationary combustion*
- Greenhouse Gas Protocol’s *Global Warming Potential Values*
- Greenhouse Gas Protocol’s *Uncertainty Calculation Tool*
- Greenhouse Gas Protocol’s *A Corporate Accounting and Reporting Standard*

¹ All of these tools can be accessed here: <http://www.ghgprotocol.org/calculation-tools/all-tools>

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The Cadmus logo consists of the word "CADMUS" in white, uppercase, sans-serif font, centered within a solid blue rectangular box.

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