

APPENDIX C
SUSTAINABILITY INITIATIVES

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1 INTRODUCTION

This addendum to the Manassas Airport Master Plan Update 2022, presents common elements of successful airport sustainability programs and evaluates opportunities for Manassas Regional Airport (HEF, or Airport) to improve its sustainability performance.

FAA document AC 150-5070-6B, "Airport Master Plans" identifies a trend towards a greater focus on sustainability in airport master plans, and lists some common ways that airports seek to make their operations and services more sustainable through the master planning process. These include:

- » Maximizing linkages with public transportation to reduce private vehicle trips to the airport
- » Promoting recycling and waste minimization
- » Increasing energy efficiency
- » Using alternative and renewable energy sources
- » Seeking to reduce airport related emissions (i.e., criteria pollutants and greenhouse gas emissions)
- » Facilitating airport-related community and economic development, and
- » Increasing community engagement in the airport planning and development process.

Increasing public pressure and regulatory trends driven by climate change are creating both challenges and opportunities for airports, which are responding by working to increase the sustainability of their operations, as well as their resilience to climate impacts and other disruptions. The FAA's 2050 Net-Zero Climate Challenge, Airports Council International (ACI)'s net zero by 2050 goal, and Virginia's low emissions vehicle program (HB 1965) requirements to phase out the sale of gas and diesel vehicles by 2035 are examples of factors pushing airports to improve the sustainability of their operations.

Additionally, extreme weather events related to climate change can have the potential to cause power outages, flooding, and other disruptions, requiring resiliency planning to ensure continuity of operations.

1.1 Sustainability Benefits

Sustainability and resilience planning and preparation are gaining traction in the aviation sector. Integrating sustainability efforts, goals, and initiatives into a master plan offers a wide range of benefits to airports' economic, environmental, and social productivity and efficiency. Some of these benefits include increased competitiveness, reduced operating and life-cycle costs, greater utilization of assets, reduced environmental footprint, optimization of new and better technologies, improved benefits to and greater support from the community, and improved recruitment and retention of top talent, among others. Many of these benefits are interconnected, and the implementation of one sustainable practice can lead to multiple cross-sectional improvements.

For example, implementing energy-efficient lighting and HVAC systems can help reduce energy costs, while water-saving measures such as low-flow toilets and faucets can help reduce water bills. Not only do these efforts lead to cost-saving benefits, but they also reduce environmental footprint and can often lead to greater support from the community.

Overall, implementing sustainable practices can help airports reduce costs, improve their public image, comply with regulations, reduce their environmental impact, and improve the health and well-being of the surrounding community.

1.2 Resources and Guidance Documents

There are several resources that provide guidance for airports seeking to become more sustainable.

1.2.1 Airport Cooperative Research Program

The Airport Cooperative Research Program (ACRP) has published several reports related to airport sustainability including ACRP Report 80, “Guidebook for Incorporating Sustainability into Traditional Airport Projects”, ACRP Synthesis 10, “Airport Sustainability Practices”, and ACRP Synthesis 33 “Airport Climate Adaptation and Resilience”.

- » **ACRP’s Report 80, “Guidebook for Incorporating Sustainability into Traditional Airport Projects”** covers the necessary strategies and approaches to successfully incorporate sustainability into traditional airport projects. The report highlights two necessary elements in such efforts—a strong commitment to sustainability and a sustainability plan—before covering the time, budget, scope, and feasibility aspects of incorporating sustainability.
- » **ACRP’s Synthesis 10, “Airport Sustainability Practices”** lists and defines relevant environmental, economic, and social practices as they relate to airports’ operations and projects. This synthesis can be especially useful in the development of an airport’s sustainable practices and implementation, detailing specific and relevant initiatives for each category.
- » **ACRP’s Synthesis 33 “Airport Climate Adaptation and Resilience”** lists adaptation and reliance activities that can be undertaken at airports, outlining the process of Identify, Assess, Develop, Implement, and Monitor relating to risks and system modifications.

1.2.2 Virginia Airports Sustainability Management Plan

The 2016 Virginia Airports Sustainability Management Plan (VASMP) provides a framework for Virginia airports that engage in sustainability planning. Funded by FAA, the VASMP’s mission is to “cultivate an advanced and sustainable aviation system that is safe, secure, and provides for economic development, promote aviation awareness and education, and provide the safest and most efficient flight services for the Commonwealth leadership and state agencies”.

The Plan begins by identifying operational, development, and financial trends that may become threats to Virginia’s airports. The operational threats include larger aircraft sizes, aging of airport equipment and infrastructure, and reduced air travel demand for smaller airports. Development threats are listed as limited developable land, lagging demand, and difficulty accessing funding. The only financial threat listed is a decrease in fuel sales and hangar rental revenue. To combat these trends, VASMP identifies five sustainability focus areas for Virginia airports: Economic Performance, Airport Community, Energy and Emissions, Waste, and Natural Resources. The plan also proposes generalized sustainability goals which can be customized by individual airports.

1.2.3 Sustainable Aviation Guidance Alliance Database

The Sustainable Aviation Guidance Alliance (SAGA) Database was founded and led by a broad volunteer coalition of like-minded aviation interests. The mission behind this alliance was to consolidate existing information about sustainability in relation to airports and the aviation industry. It has five main components that make it a valuable tool to parties seeking to implement sustainable efforts into airport practices and projects: Share, Learn, Search, Plan, and Measure.

Share encompasses the addition of sustainable practices to the existing list, the editing of data, and the distributing of documents, links, and case studies. Learn refers to the offered ability to acquire shared materials on the database and find practical applications and methods for implementation. Search allows users to specifically seek sustainable practices that are meaningful and useful to the specific needs of an airport. Plan provides a framework to assist users in starting, implementing, improving, and maintaining sustainable practices. Measure provides guidance on how to measure progress in sustainability.

The SAGA database is particularly valuable for identifying sustainability best management practices (BMPs) that have been utilized by other airports. The BMPs can be a source of ideas for projects and initiatives that could potentially be implemented at HEF to improve its sustainability performance.

2 ELEMENTS OF A SUSTAINABILITY PROGRAM

Successful sustainability programs tend to share common elements that ensure the program has a clear direction and goals, data about the operational characteristics of the organization are available, goals have been formalized, initiatives have been developed to meet the goals, and an implementation plan is in place. These elements include a vision statement, focus areas, baseline data, SMART goals and targets, strategic initiatives, and implementation. This section will explain the meaning of each element and evaluate HEF’s status or performance relative to the element.

2.1 Vision Statement

Vision is the embodiment of what an organization aspires to be and is a catalyst for moving forward. A sustainability vision statement helps define what sustainability means to the airport and establish overall direction for its sustainability program. Once the vision is in place, goals and initiatives can be developed that align with the vision.

Sustainability can be defined in different ways, and the Vision that the Airport develops should be tailored to its needs and priorities. One common definition of sustainability is the Triple Bottom Line concept that shows sustainability at the intersection of environmental, economic, and social responsibility. In the aviation sector, many airports have adopted a modified version of the triple bottom line known as EONS (Economic Vitality, Operational Efficiency, Natural Resources, and Social Responsibility) which emphasizes the importance of efficient operations.

**FIGURE 1
EONS SUSTAINABILITY FRAMEWORK**



Manassas Regional Airport has the following vision statement:

“The Vision of the Manassas Regional Airport is to be a world class, innovative, thriving aviation gateway for the greater Washington, DC area, providing global access and economic opportunity for our customers and our community.”

This statement contains elements that relate to the EONS framework. For example, “global access” and “customers and our community” speak to the Social Responsibility benefits contributed by the airport, while “economic opportunity” speaks to the Economic Vitality aspect of EONS. HEF’s vision statement does not address Natural Resource Conservation or Operational Efficiency.

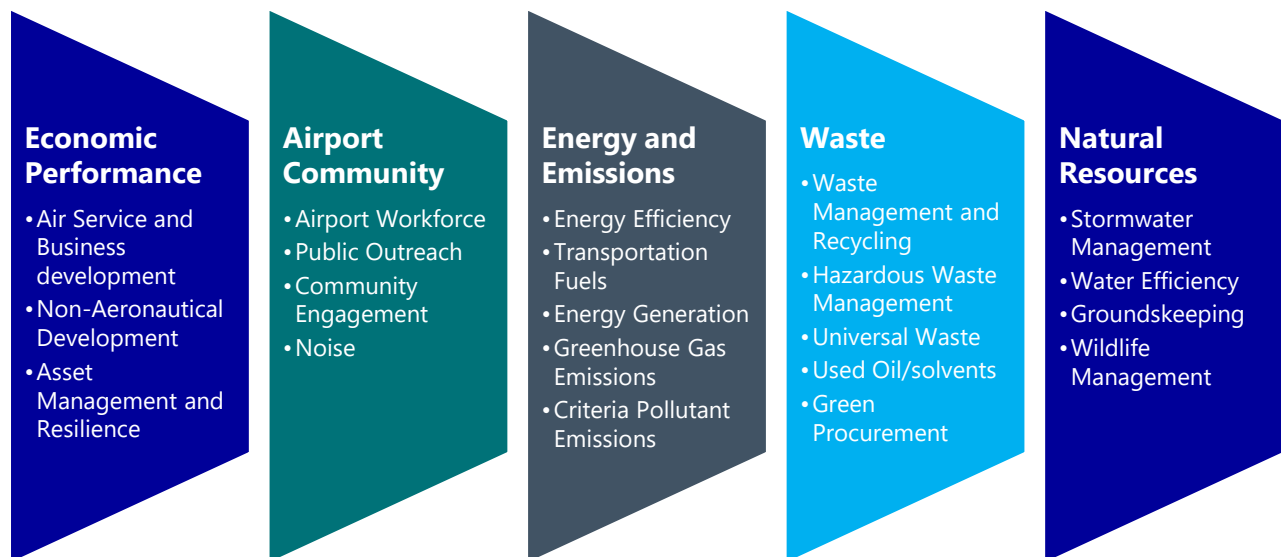
The Airport should consider developing a Sustainability Vision Statement that specifically establishes the direction for its sustainability program. The Sustainability Vision should align with the Airport’s overall vision while focusing on aspirations related to the four pillars of the EONS framework.

2.2 Focus Areas

Sustainability focus areas identify the Airport’s priorities and establish the scope of its efforts. Focus areas guide the development of goals and initiatives throughout an airport sustainability plan, and their selection should reflect an airport’s values. Some examples of focus areas include customer service, resource optimization, operational excellence, and financial stewardship.

The VASMP includes examples of focus areas that could be adopted by the Airport. These are economic performance, airport community, energy and emissions, waste, and natural resources. Each have their associated subcategories, as shown in **Figure 2**. In practice, different airports define focus areas and subcategories to meet their individual needs and priorities.

FIGURE 2
EXAMPLE FOCUS AREAS AND RELEVANT SUB-CATEGORIES



2.3 Baseline

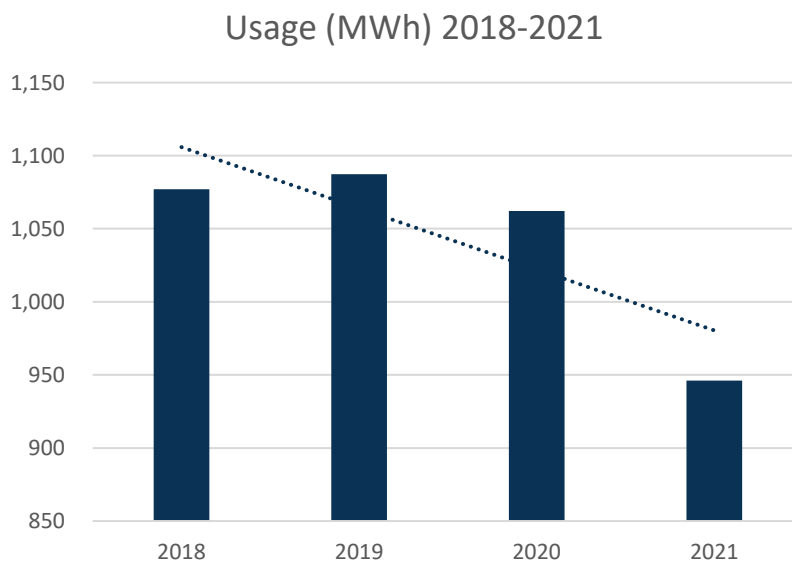
A baseline establishes current sustainability performance and provides a reference point for measuring future efforts. Because many airports' sustainability data is siloed in various departments, developing a baseline is a useful exercise that reveals the current performance of airport operations and provides data to calibrate the goals, develop initiatives, and measure progress against during the implementation phase. The baseline should include relevant operational data related to the airport's chosen focus areas. Typically, it would address energy usage in facilities, fleet fuel usage, and waste minimization as well as economic, social, and natural resources/environmental performance. Often, a sustainability baseline will also include a greenhouse gas (GHG) emissions inventory and/or a climate resilience element. The baseline is usually developed for a recent calendar year. It may also include several years of data in order to establish trends.

While extensive sustainability data collection and analysis is outside the scope of the master planning effort, a limited preliminary baseline was developed for operational categories in which data was readily available.

2.3.1 Electricity Usage

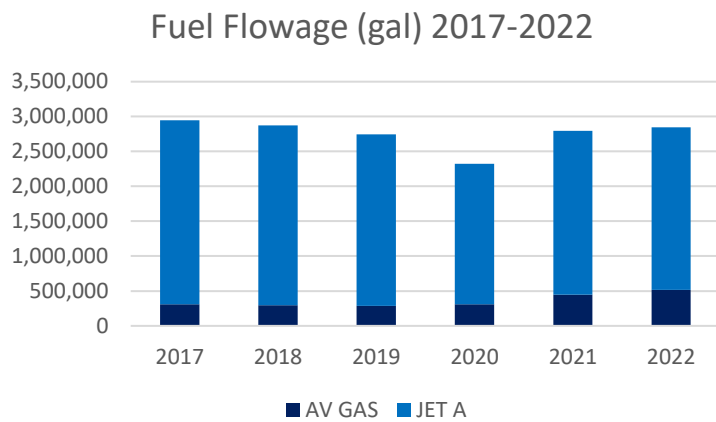
A Baseline for the airport's electricity usage was developed from utility bills provided by the airport. The analysis shows a generally declining trend in electricity consumption at the airport from 1,077 megawatt

FIGURE 3
ELECTRICITY CONSUMPTION AT MANASSAS AIRPORT, 2018-2021



hours (MWh) in 2018 to 946 MWh in 2021. Electricity consumption decreased despite operations increasing from 79,930 in 2018 to 105,617 in 2021. While energy use can vary from year to year due to weather and other factors, this trend may also reflect energy conservation measures and efficiency upgrades at the Airport. At the same time, the average rate the Airport is paying for electricity has increased, so costs increased despite the lower consumption.

FIGURE 4
FUEL FLOWS AT MANASSAS REGIONAL AIRPORT, 2017-2022



2.3.2 Fuel Flowage

Figure 3 reflects fuel flowage data¹ at HEF Regional Airport from the years 2017 to 2022. Totals for 2022 included 2,845,161 gallons of fuel, 82% of which was Jet A fuel and 18% of which was Aviation Gasoline. Data was not available for Gasoline and Diesel fuel used for ground-operated vehicles. From 2017, HEF has experienced a 66% increase in Aviation Gas flowage, and a 12% decrease in Jet A fuel. Overall, the airport experienced a 3% decrease in fuel flowage between the years of 2017 and 2022.

2.3.3 Waste Management

The management and disposal of waste at an airport has considerable impacts on finances, operations, environmental well-being, and the airport’s relationship with the community. Its significance was identified by the FAA in the FAA Modernization and Reform Act of 2012. Section 133 of the Act requires airports undertaking a master plan to also complete a recycling plan that includes and addresses the following:

- » Minimization of solid waste generation
- » Operational and maintenance requirements of the waste management program
- » Review of waste management contracts
- » A solid waste audit
- » Feasibility of solid waste recycling
- » Potential cost savings from changes or revenue generation

In 2013, the FAA prepared and published Recycling, Reuse and Waste Reduction at Airports: A Synthesis Document to assist airports in the development of these recycling programs. This document outlines types and sources of airport waste and provides guidance on establishing a comprehensive waste reduction and recycling program. The full Recycling, Reuse and Waste Reduction Plan for HEF can be found in Appendix X. The plan recommends HEF perform a waste audit as a first step to improving its waste diversion and provides a list of actions that could be implemented at the Airport.

Currently, Manassas Regional Airport has four 8-yard dumpsters, and each tenant at the airport has their own dumpster. Trash generated at the facility is collected once weekly. Hazardous material, such as batteries, are properly disposed of by the city. Each department/division at the airport manages their own waste, as there is no designated official in charge of overseeing waste management. There is currently no

¹ Fuel Flowage and Aircraft Operations January 2023 Update, Accessed May 2023 at <https://legistarweb-production.s3.amazonaws.com/uploads/attachment/pdf/1739651/FuelOperations - Fiscal - January 2023 Update.pdf>

recycling program in place at the Airport, as the previous recycling program was suspended due to lack of optimization.

2.4 Goals and Targets

Goals translate the Airport’s vision into well-defined, tangible objectives for improving sustainability performance in each of the focus areas. The VASMP distinguishes between goals, which are more qualitative and general, and targets, which have specific metrics and timelines associated with them. Goals are introduced in the requirements section of the Manassas Regional Airport Masterplan. This section explains how the Airport can translate its goals into actionable targets.

Targets should be Specific, Measurable, Achievable, Relevant, and Timely (SMART). The SMART criteria for targets are defined as follows:

- » **Specific** - the target is clearly defined and unambiguous
- » **Measurable** – it is possible to measure performance against the goal (either quantitatively by using an appropriate metric, or by qualitatively assessing whether the goal has or has not been met)
- » **Achievable** – the target is aspirational, but also has a realistic possibility of being met
- » **Relevant** – the target is clearly related to the Airport’s vision, focus areas and priorities
- » **Timely** – the target includes a future date at which progress will be evaluated

A few of the goals identified in the Requirements section of the Master Plan are shown below in **Table 1** beside drafted examples of how they can be adjusted to be SMART. The target percentages and timeframes are for demonstration only; HEF should consider calibrating its own SMART goals based on alignment with Federal, State and Local sustainability targets, what is considered feasible in light of the baseline analysis, and the Airport’s priorities and level of ambition. **Error! Reference source not found.** shows examples of potential SMART Targets for the Airport’s consideration and refinement.

TABLE 1
EXAMPLES OF SMART TARGETS FOR HEF

Focus Area	Goal	Example SMART Target
Economic Performance	Increase user and tenant retention rates	Increase user and tenant retention rates by 10% relative to a 2021 baseline by 2030.
	Reduce cost of airport operations	Reduce airport operational costs by 5% relative to a 2021 baseline by the year 2030.
Airport Community	Increase public awareness of initiatives	Develop a community engagement plan for sustainability at the Airport by 2025 and begin reporting about sustainability initiatives on the Airport website by 2030.
	Promote health and Safety of Airport workforce	Develop an employee wellness program and provide incentives for employees to participate by 2025.

Focus Area	Goal	Example SMART Target
Energy and Emissions	Reduce Greenhouse Gas Emissions	Join the ACA Carbon Accreditation program, develop a GHG emissions inventory, and set goals for GHG emissions reduction by 2025. Recommend aligning with the City of Manassas and regional GHG emissions reduction goal of 50% GHG reduction by 2030 and 80% reduction by 2050. ²
	Switch to alternatively powered ground vehicles operated at the airport	Conduct a fleet and equipment study to determine opportunities to switch ground vehicles to alternative fuels by 2025.
Waste	Reduce municipal solid waste sent to landfills	Conduct a waste audit to identify recycling opportunities and set waste reduction targets by 2025.
	Minimize hazardous waste generation	Set targets to reduce hazardous waste generation and identify safer alternatives to commonly used hazardous products by 2025.
Natural Resources	Reduce sediment runoff from construction areas	Require all construction projects to be appropriately permitted for stormwater and erosion control under federal and Virginia law and have a site-specific Stormwater Pollution prevention plan (SWPPP) in place for each project by 2025.
	Reduce water use in areas directly under the control of the airport	Reduce indoor water consumption by 5% by the year 2030.

2.5 Initiatives

Once goals are in place, the next step is to develop specific initiatives to improve the airport’s sustainability performance and achieve the established goals and targets. Sustainability initiatives may take many forms and could include planning documents, policies, training, communications and engagement efforts, incentives, and capital projects. Listed below are recommended sustainable initiatives for HEF. Because the Airport is in the early stages of developing a sustainability program, the recommended initiatives at this point are primarily planning documents and studies.

» **Airport Sustainability Plan**

Development of a standalone Airport Sustainability Plan would involve collaborative workshops and engagement with airport staff, who would contribute their expertise and become invested in the success of the plan. Typically, the plan would include a detailed baseline to quantify the airport’s usage of electricity, fuels, water, and other resources as well as waste generation and recycling data, building characteristics etc. Once the baseline is established, airport staff would revisit and expand the limited goals recommended in the Master Plan and tie them to the baseline data. Goals would be established in each focus area and would become the guides for project development. Projects would also be distributed among focus areas and would be designed to collectively meet the goals.

² City of Manassas Phase 1 Sustainability Plan webpage, Accessed May 2023 at https://www.manassasva.gov/community_development/planning_and_zoning/phase_one.php

» **Vulnerability Assessment and Adaptation Plan**

A Vulnerability Assessment and Adaptation Plan (VAAP) is useful for airports in several ways. First, it helps to identify potential vulnerabilities that may affect airport operations and the safety of passengers and staff. By conducting a vulnerability assessment, an airport can develop strategies to mitigate these vulnerabilities and reduce the impact of potential hazards. Second, an adaptation plan can help an airport to prepare for future challenges and uncertainties. With the changing climate and increasing frequency and intensity of extreme weather events, it is important for airports to plan and prepare for the potential impacts of these hazards. A VAAP evaluates an airport's susceptibility to various hazards, such as extreme weather events, natural disasters, or security threats. It involves identifying the airport's critical assets, evaluating the risks associated with potential hazards, determining the exposure and sensitivity of the assets to the threats, evaluating the assets or operations adaptive capacity, and identifying potential measures to minimize the impact of these hazards on the airport's operations.

» **Electrification Study**

As society moves towards the increasing electrification of transportation, with a state mandate for all new cars sold in Virginia to be electric by 2035, there is a need to forecast and understand the growth of electric vehicles (EVs) at the airport including the electrical supply capacity and EVSE that will be needed to support them. The types of EVs that could potentially be involved include personal vehicles, ground support equipment (GSE), and cargo delivery vehicles, as well as electric vertical takeoff and landing aircraft (eVTOLs). The power demands to charge some of these vehicle types can be significant and could require updating utility electric service to the airport as well as switchboards, transformers, and other equipment. Space for additional switchgear and EVSE could also be an issue when building out the infrastructure needed to support greater numbers of EVs. An electrification study would involve surveying airport stakeholders (rental car companies, aviation companies, cargo companies, power utility, VADOT, etc.) about their plans for EV expansion and developing a forecast of the number of vehicles the Airport should plan to support and the electrical demand that will be required. The study would result in a prioritized list of initiatives to design and install needed upgrades to support expected EV charging demand. It would also identify funding sources to support their design and construction.

» **GHG Inventory and ACA Certification**

A GHG Inventory establishes an organization's carbon footprint by identifying sources of greenhouse gas emissions associated with its operations and quantifying the amounts released in a given year. Completing a GHG Inventory is the first step to managing carbon emissions and allows future emissions reductions to be measured by comparing them to the emissions in the baseline year. The Airport Carbon Accreditation (ACA) program, administered by Airports Council International (ACI) provides a framework for airports to gain public recognition, enhance energy efficiency, and increase awareness through measurement, management, reduction, and offset of greenhouse gas (GHG) emissions. Level 1 accreditation under the ACA program requires mapping an airport's carbon footprint (i.e., conducting a GHG Inventory). Completing a GHG Inventory in accordance with ACA guidance would allow HEF to enter the ACA program, receive recognition for its sustainability

commitment and efforts, and develop the information needed to measure and reduce GHG emissions going forward.

2.6 Implementation

A sustainability implementation plan details processes and tools to help facilitate the integration of sustainability into planning, design, construction, and operations, as well as capture sustainability outcomes and track key performance indicators (KPIs).

Implementation requires managing, budgeting, scheduling, and securing funding to realize planned sustainability projects. It also involves tracking project metrics to ensure they perform as expected and reporting on results. This section describes common elements of an implementation strategy for sustainability projects, including management, budget, schedule, funding, metrics, and reporting. Successful implementation of sustainability projects often requires overcoming internal and external barriers. These may stem from resistance to change; organizational protocols or operating procedures; conflicting interests and priorities; a lack of training, education, or awareness; insufficient funding, or regulatory obstacles.

Managing project implementation requires identifying roles and responsibilities for project managers and other individuals involved in the project.

A schedule should be developed to guide project implementation, funding, tracking, and reporting. The schedule will allow the airport to plan investments and sequence projects to take advantage of funding opportunities and extend investments, while prioritizing returns.

To support implementation, KPIs should be established for the sustainability program. KPIs should be chosen to be relevant to focus areas and planned projects. The airport should track and internally report the KPIs annually as projects are implemented and adjust project execution as needed if they show desired performance is not being achieved.

3 FUNDING SOURCES

Sustainable efforts and trends have become increasingly prevalent in the aviation industry over recent decades, with federal, state, and local funding opportunities presenting themselves for airports to partake in sustainable culture. These funding sources provide airports with the opportunity to adopt sustainable practices and their benefits.

The FAA administers grant programs that could potentially fund several of the recommended initiatives and sustainability measures, in addition to necessary infrastructure upgrades. Please note that the discussed FAA funding is for the year 2023, and grant programs could either undergo changes or not be reauthorized in the following years. However, the Bipartisan Infrastructure Law (BIL) allocates funding through 2026, and it is probable that comparable programs will be accessible in 2024 and the years that follow.

In compliance with statutory criteria and Executive Order 14008, "Tackling the Climate Crisis at Home and Abroad" (86 FR 7619), the FAA intends to finance initiatives that are consistent with the President's greenhouse gas emissions goals, enhance energy efficiency, encourage financially responsible land utilization and efficient transportation planning, promote the development of terminals that are compatible with the use of sustainable aviation fuels and technologies, boost climate resilience, use sustainable and less emission-intensive pavement and building materials as much as possible, and reduce pollution. **Table 2** shows FAA funding opportunities and applicable initiatives recommended in this section.

TABLE 2
POTENTIAL FAA FUNDING OPPORTUNITIES

FAA Funding Opportunities	Description	Applicable Initiatives
Zero Emission Vehicle (ZEV) Program	Provides grants for any National Plan of Integrated Airport Systems (NPIAS) airport to replace or convert on-road vehicles for zero emission vehicles.	Electrification Study and SMP Implementation / EVSE
Sustainability Program	Provides funding for developing sustainability plans as stand-alone documents or for inclusion in airport Master Plans	Airport Sustainability Plan Development; GHG Inventory if completed as part of Plan
Energy Supply, Redundancy, and Microgrids Program	Provides grants to improve reliability and efficiency of the power supply, prevent power disruptions, acquire and install electrical generators, separate the main power supply, and construct or modify facilities to install a microgrid.	VAAP project implementation (redundant utility service, generator upgrade, etc.)
Energy Efficiency Program	Provides two sequential funding types: <ol style="list-style-type: none"> 1. Energy assessments to identify measures to reduce energy consumption across airport operations. 2. Eligible projects to acquire or construct equipment, including hydrogen equipment and related infrastructure, that will increase energy efficiency at the airport. 	Airport Sustainability Plan Project Implementation for energy efficiency projects