

Sustainable Aviation Resource Guide

Planning, Implementing and Maintaining a Sustainability Program at Airports

SAGA
Sustainable Aviation Guidance Alliance

A product of the Sustainable Aviation Guidance Alliance (SAGA)



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Foreword

A number of airports in the United States and around the world have undertaken or are in the process of developing sustainability programs. Some of these programs have been initiated voluntarily, while others have been required under state or local ordinances. Overall, there are numerous examples of sustainability guidelines and documents that are specific to certain airports, but to date there is no central repository of this information.

The Sustainable Aviation Guidance Alliance (SAGA) is a broad volunteer coalition of aviation interests formed in 2008 to assist airport operators of all sizes in planning, implementing, and maintaining a sustainability program. SAGA has undertaken an effort to consolidate existing guidelines and practices into a comprehensive, searchable resource that can be tailored to the unique requirements of individual airports of all sizes and in different climates/regions in the United States.

Section 1 of the *Sustainable Aviation Resource Guide* explores various definitions of sustainability and includes information on why sustainability has become a growing trend within the airport community. Sections 2 and 3 lay out a path for an airport operator to plan, implement, and maintain a sustainability program. These sections accompany a comprehensive database compiled by SAGA of existing sustainability practices (also called sustainability measures).

The application or implementation of sustainability practices is constantly evolving. SAGA intends for this document and the database to be a "living resource" that is updated periodically to capture new trends and initiatives. ***Users of this resource are encouraged to provide SAGA[1] with information regarding new practices to help keep this resource up to date.***

[1] Information can be submitted for use in future SAGA initiatives by contacting either the Airports Council International – North America, the American Association of Airport Executives, or the Airports Consultants Council.



Disclaimer

The information contained in this document and accompanying database is intended as a comprehensive resource of options for airport operators to use in evaluating and selecting the sustainable practices that may be applicable within the unique circumstances of each airport. The appropriateness of any individual practice or set of practices at any individual location should be determined by the airport operator. Also, this information is intended to supplement, not replace, existing sustainability measures or guidance that an airport may choose to use, such as the US Green Building Council's Leadership in Energy and Environmental Design (USGBC LEED®) guidance. For further clarification on the successful implementation of the measures captured within this document and future iterations of the document, SAGA suggests that operators contact those airports that are referenced as having implemented that measure.

Acknowledgements

The Sustainable Aviation Guidance Alliance (SAGA) includes a diverse range of airport associations and aviation interests. Participants include representatives from individual airports, the Federal Aviation Administration (FAA), Airports Council International-North America (ACI-NA); the Airport Consultants Council (ACC); the American Association of Airport Executives (AAAE); the Air Transport Association (ATA); and consultants that represent the participating associations.

The Sponsoring Organizations of SAGA would like to specifically acknowledge individuals and firms that offered considerable time and resources developing key portions of this Resource Guide: ***Eugene Peters with Ricondo & Associates*** for developing the SAGA Sustainability Database; ***Kristin Lemaster and Magda Pavlak-Chiaradia of CDM*** for developing Sections 2 & 3 of the Resource Guide and for converting the Sustainability Database into an on-line application; and ***Carol Lurie with Vanesse Hangen Brustlin, Inc.*** for her help in populating and categorizing the Sustainability Database.

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Section 1 – Introduction

I. Why Be Sustainable?

Airport operators across the country and around the world have embraced sustainability and are implementing programs or initiatives at their facilities. Along with benefiting their communities and the environment, airports are finding that sustainability makes good business sense. Airports that have adopted sustainable practices have found substantial benefits including reduced capital asset life cycle costs, reduced operating costs, better customer service and satisfaction, and enhanced relationships with their neighbors.

An airport operator's decision to undertake a sustainability program may be the result of numerous factors. One leading factor is new federal, state and local directives that require public agencies to become more sustainable. These laws and ordinances direct these public agencies, including airports, to develop sustainability programs or incorporate sustainable practices into their development projects and operations.

A number of airport operators have also undertaken sustainability programs because the airport's management simply believes it is the right thing to do. Certainly, airports play a vital role in the movement of passengers and goods, but future growth in airport operations and air travel will have the potential to adversely affect the environment and the surrounding community. While airports are already subject to an array of environmental regulations, operators are going beyond regulatory compliance to proactively improve their environmental performance. Airports are also using sustainability practices to meet economic and/or social goals that will mitigate and perhaps benefit the surrounding community and other stakeholders.

Overall, specific factors that are driving airport operators to become sustainable include:

- Worldwide awareness and a global economy
- Airline industry financial pressures
- Rising energy costs
- Green and environmental mandates
- Resource conservation
- Aging infrastructure
- Facility lifecycle costs
- Enabling technologies

Although many airports have not undertaken formal sustainability programs, many have existing activities or programs that fall within the sustainability realm. Examples include "Buy Local", "Recycling", or "Stockpile and Reuse Construction Materials". These are common sense activities that fall under a definition of sustainability once they are appropriately documented and tracked. Identifying these existing activities may assist in building the support and buy-in an airport will need to launch a sustainability program.

II. What is Sustainability?

When embarking on a sustainability program, it is critical for each airport to determine its specific definition of sustainability. This is an important step that establishes the groundwork for future planning and implementation.

An airport operator's definition of sustainability should relate to its unique circumstances and role within its community and environment. As such, SAGA encourages airport operators to obtain input and involvement from various stakeholders as it begins to define sustainability. Such involvement creates airport-wide commitment to the mission of the sustainability program and will facilitate the successful development and implementation of sustainable airport practices.

As airports consider their unique definition to sustainability, SAGA recommends that they be transparent in selecting a definition. Deviations from the available definitions which incorporate a local need should be documented.

There are many ways to define sustainability. A broad, generally-accepted definition is one developed in 1983 by the **Brundtland Commission**, which states that sustainability is:

> *"..development that meets the needs of the present without compromising the ability of future generations to meet their own needs."*

The Brundtland Commission, also known as the World Commission on Environment and Development, was convened by the United Nations (UN) to address a growing concern "about the accelerating deterioration of the human environment and natural resources and the consequences of that deterioration for economic and social development." In establishing the commission, the UN General Assembly recognized that environmental problems were global in nature and determined that it was in the common interest of nations to establish policies for sustainable development. The exponential growth in the world's population requires the implementation of global resource management to ensure that resources are available for future generations.

The **Global Reporting Initiative** (GRI) has adopted the Brundtland Commission's definition. GRI has developed protocols for the development of sustainability plans and is currently developing an airport sector specific protocol.

The **Transportation Research Board** (TRB) in its 2005 conference proceedings titled "Integrating Sustainability into the Transportation Planning Process," envisioned sustainability at its most basic level as "one that meets the transportation and other needs of the present without compromising the ability of future generations to meet their needs."

The **Airport Cooperative Research Program** (ACRP) **Synthesis Report** S02-02, Airport Sustainability Practices, defines airport sustainability as "a broad term that encompasses a wide variety of practices applicable to the management of airports." The report refers to practices that ensure:

- *Protection of the environment, including conservation of natural resources*
- *Social progress that recognizes the needs of all stakeholders*
- *Maintenance of high and stable levels of economic growth and employment*

Overall, SAGA recommends that the airport operator should determine what sustainability means to that specific organization or the individual facility, taking into account the unique nature of the airport and its community. That said it is generally accepted that sustainability includes essential elements under the "**Triple Bottom Line**" – Economic Growth, Social Responsibility and Environmental Stewardship. The tenets of the Triple Bottom Line are often incorporated into sustainability definitions and programs.

The Airports Council International-North America's Airport Sustainability Committee takes this approach one step further by incorporating operations. It defines airport sustainability as:

> *"..a holistic approach to managing an airport so as to ensure the integrity of the Economic viability, Operational efficiency, Natural Resource Conservation and Social responsibility (EONS) of the airport."*

EONS is the acronym for the four functional parts completing the whole for holistic airport management by taking the economic, ecological and social components and adding operational efficiency. Whereas the US Green Building Council's Leadership in Energy and Environmental Design (USGBC LEED®) "green" initiatives have, in recent years, typified sustainability for the design and construction of new or rehabilitation of existing facilities, EONS broadens the definition to address the operational aspects of the business.

For some airports, broadening the definition to include the business of managing an airport may be particularly important because while not all

airport operators can or need to build new facilities, all have opportunities within their business models to leverage their operations and maintenance (O&M) dollars in ways that can promote sustainability.

Overall, as airports undertake an effort to define sustainability and initiate a program, the rationale for undertaking this effort must be understood by those responsible for the development and operations activities. Stakeholders should include executive management, airport staff, airport boards, county commissioners, tenants, and the community as a whole.

III. The Benefits of Sustainability

Within the airport context, sustainability has broad implications throughout the entire system, including energy consumption; environmental impacts; and overall facility life-cycle costs.

Many airports operators understand that initiating and implementing a sustainability program often results in numerous benefits to the airport. These include:

Increased competitiveness through lean operations and reduced operating and life-cycle costs:

- Greater utilization of assets
- Reduced environmental footprint
- Optimization of new and better technologies
- Reduced costs of asset development
- Improved bond ratings
- Improved benefits to and greater support from the community
- Improved work environment for employees leading to higher productivity
- Reduced environmental, health and safety risks

Airport operators have weighed in on the benefits of undertaking sustainability programs at their airports:

"Our successful efforts to incorporate sustainability into every aspect of the O'Hare Modernization Program has proven that going green at airports can be cost effective. Our commitment to sustainability is an important part of our ongoing efforts to reduce the impact of the built environment, while at the same time creating financial and operational benefits for our airports. We need to embrace the best possible environmental, social and fiscally responsible practices to enhance the quality of life now and for future generations."

Rosemarie Andolino, Chicago Department of Aviation Commissioner

"Implementation of a sustainability program can help demonstrate an airport's commitment to minimizing the impact of its operations on the social and built environments. By its very nature, a well developed sustainability program will result in the involvement of stakeholders (including reviewing agencies and the public) in the planning and development process. This early involvement will result in early identification of stakeholder interests, and will help the airport communicate project features designed to minimize impacts."

Roger Johnson, Deputy Executive Director, Los Angeles World Airports

"Through the development and implementation of our Sustainability Plan, we have paid close attention to the aspects of being responsible to the community. It continues to provide great public relations benefits as various groups review and see our efforts in print. We also provide our plan on our Home Page and encourage public comments and constructive input. We get a lot of great recommendations and even proposals for assistance."

Ted Soliday, Executive Director, City of Naples Airport Authority

"Due to our extreme climate, PHX has had preconditioned power and air for decades, but more recent awareness of the 'sustainability' concept has given new momentum to innovation. Increased focus on energy conservation resulted in a 7 percent decrease in energy use at PHX in one year. Our engineers are currently discussing bioclimatic design within the larger use of LEED® standards for new construction. PHX recently received over a quarter million dollars in rebates from the local utility for upgrades to a terminal chiller system and a building designed to reduce solar intrusion. In our industry, it's crucial to gain real improvements by sharing usable mechanical and lighting systems innovations."

Cynthia Parker, Phoenix Sky Harbor International Airport

"Sustainability is a top priority for our community in Dubuque, Iowa. We recognize that there are economic, social and environmental benefits to sustainable programs and operations. This is why we work to implement sustainability in our airport through an energy- and water-efficient design for our new terminal, which will include pervious pavement and other sustainable practices."

Robert Grierson, Director, Dubuque Regional Airport

It is important to isolate specific operations and facilities within the airport management and infrastructure which can benefit from sustainable practices. For example, the ability of an airport operator to control many aspects of the activities and operations conducted by tenants of its facility are often limited. However, the effectiveness of an airport sustainability program can be enhanced through the education, cooperation and engagement of tenants, who can see reduced operation and maintenance costs as a result of these programs. Stakeholder engagement, particularly tenants, is key to the successful implementation and maintenance of an airport's sustainability program. An approach for stakeholder engagement is included in Section 2.

IV. How is Sustainability Measured?

Sustainability can be measured through metrics developed by an airport operator or another party. Such metrics are useful for establishing baselines, identifying trends, predicting problems, assessing options, setting performance goals or targets, and evaluating a particular project or airport organization/enterprise. Today, the most common set of metrics include the rating system developed by USGBC as well as the set of sustainability metrics by the Global Reporting Initiative (GRI). The USGBC's LEED® program is discussed in more detail below.

USGBC's LEED® guidance can be an effective means to measure and certify the effectiveness of certain airport projects in meeting sustainability goals. LEED® is often associated with building vertical structures, and many components can be applied to various design and construction aspects of horizontal construction projects as well. It is important to note that, in the airport context, LEED® is not all inclusive, in that it may not cover the many different types of capital projects at an airport or maintenance activities, nor does it effectively measure sustainable airports operations or administration.

Many airports have adapted the LEED® program and created airport-specific sustainability guidelines and metrics for their particular programs and have made their guidelines available publicly for all airports to utilize. They include Chicago O'Hare International Airport, the Port Authority of New York and New Jersey, Los Angeles World Airports, and Columbus International

Airport. The practices included in these guidelines have been compiled in the database of sustainability measures included in Section 4 of this report.

The SAGA Resource Guide identifies practices that may possibly have LEED® applicability, but should not be used to create a LEED® checklist. Also note that the Resource Guide does not weigh the benefits of the individual sustainability practices, nor does it identify metrics or indicators to measure the effectiveness of the practices. SAGA may undertake an effort in the future to develop metrics or indicators for individual sustainability practices, and there are other initiatives underway to accomplish the same goal.

Section 2 - Planning, Implementing, Improving and/or Maintaining a Sustainability Program

I. Building an Approach

As described in Section 1, airports of all sizes and geographies can realize many environmental, economic and social benefits through implementation of a sustainability program. This section outlines a scalable approach for planning, implementing, improving and/or maintaining a sustainability program. Although this approach is described in detail here, SAGA emphasizes that every sustainability program will be unique and that an airport operator should modify and scale this approach based on its specific operating environment and resources.

It was discussed in Section 1 that adopting a consensus-based definition of sustainability is an important first step. Even if a sustainability program is already underway, it is important to take action that to establish a common understanding of what sustainability means to the airport. Once a definition of sustainability has been adopted, the airport operator should also make sure that the drivers and rationale for pursuing a sustainability program are understood and embraced throughout all levels of the organization. Following, efforts can then turn toward developing an approach for planning, implementing, improving, and maintaining a sustainability program.

A successful approach to sustainability planning includes engaging stakeholders to identify short-term and long-term goals, prioritizing and selecting actions to achieve those goals, and establishing processes for measuring, evaluating and communicating progress. A sustainability program should also address the interconnections between an airport's sustainability practices and other sustainability initiatives at the local, regional, and worldwide level. As a result, sustainability practices will be integrated into the day-to-day management activities of the airport, the overall business model, and thus influence the impacts of the airport on our dynamic world.

The importance of approaching sustainability in an organized manner cannot be overstated. As sustainability becomes a larger part of our global business landscape, one emerging trend is that many organizations are setting sustainability goals and targets without a coordinated approach or a system to measure and report on their successes. SAGA notes that an airport operator's sustainability program will achieve greater success through a consensus-based approach that is carefully planned and where metrics are identified and used to gauge progress.

This section provides one approach that may be used or modified by an airport operator to create a successful sustainability program. The discussion includes:

- The importance of building a *diverse sustainability team*
- An outline of specific *steps for action*
- Integrating an airport's sustainability approach into the *larger community*

Two theoretical examples that walk through a step-by-step application of the sustainability approach are included in Section 3. One example showcases a pilot project for sustainability and the second presents a comprehensive sustainability program.

Additional Resources

Several airport operators have established successful sustainability programs and have published resources that can serve as guidance for developing and implementing a sustainability program. The SAGA Sustainability Spreadsheet (Section 4 of this document) summarizes a variety of the initiatives currently implemented at airports around the world. Additional resources on many of these successful sustainability programs are available through the SAGA Airport Sustainability webpage or directly from the airports. They include, but are not limited to, airports located in the following cities:

- **Vancouver, BC, Canada**
- **San Francisco , CA**
- **Los Angeles, CA**
- **Boston, MA**
- **Fort Lauderdale, FL**
- **Salt Lake City, UT**
- **Chicago, IL**
- **Oakland, CA**
- **San Diego, CA**
- **Portland, OR**
- **Seattle, WA**
- **Burbank, CA**
- **Columbus, OH**
- **New York City, NY**
- **Denver, CO**
- **Dallas-Fort Worth, TX**
- **Philadelphia, PA**
- **Sacramento, CA**

In addition, several projects have been completed or are underway through the TRB's Airport Cooperative Research Program (ACRP), including S02-02

(Sustainable Facilities and Practices), 02-13 (Guidebook for Improving Environmental Performance at Small Airports) and 08-01 (Sustainable Airport Construction Practices).

Applicability to Smaller Airports

Although it may appear that only large airports will have the resources to implement a sustainability program, it is the consensus of SAGA (based on the experience of its members) that some portion, if not all, of the recommendations included in this document are within the capability of small airports, as well as large. The difference among airports may be the breadth at which initial programs are implemented (i.e. the scale). The overall approach and many of the practices presented in this document are scalable so that each airport can apply them based on specific conditions and resources.

Airport operators are encouraged to view sustainability as a process and not an end goal. To be sustainable, the sustainability plan or program itself should be a living document/program that is tweaked and improved as understanding and conditions evolve in accordance with the resources available. To provide an example of this, Section 3 identifies two different ways that sustainability can be achieved by adapting and using the approach outlined herein. These efforts can be undertaken exclusively with existing airport staff or with contracted resources.

II. Building a Diverse Sustainability Team

Participation of appropriate stakeholders plays a critical role in achieving success in a sustainability program. Building a diverse sustainability team will allow for effective integration of sustainable practices from both the top down, bottom up and laterally across all departments within the airport organization. A diverse group that represents all levels and departments within an airport combined with outside stakeholders such as tenants, community groups, sustainability experts, and members of the national and global aviation industry will bring varied perspectives, authority for action, opportunities for collaboration, and momentum to a sustainability program.

The sustainability team should be designed to ensure that all stakeholders have a seat at the table and to get the right people taking appropriate actions. To assist in building a sustainability team, the following organizational structure and description of roles and responsibilities may be used (see Figure 2-1 and Table 2-1). A Sustainability Team Communication Plan should be developed to establish accountabilities and means of keeping all members of the Sustainability Team apprised of progress.

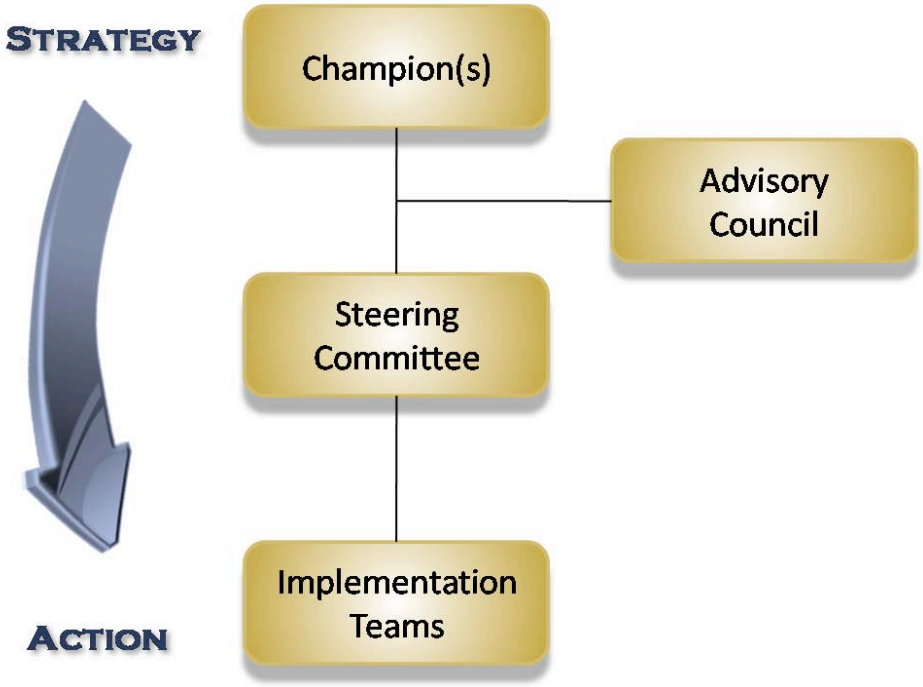


Figure 2-1. Organizational structure that may be used to build a diverse sustainability team

Table 2-1. **Roles and Responsibilities of Members of the Sustainability Team**

Role	Responsibilities	Potential Participants
Champion(s)	The Champion(s) leads the development of the sustainability program and works to ensure that it addresses sustainability issues across the breadth of the airport's management practices and operations. The Champion(s) also oversees implementation of sustainability initiatives and is ultimately accountable for the success of the program. It is generally advised that the responsibilities of the Champion(s) not just be added to an existing position without consideration of whether the appropriate time can be dedicated to the program or if other resources are needed.	○ Sustainability Coordinator ○ Environmental Manager ○ Facilities Manager ○ Airport Planner
Advisory Council	The Advisory Council provides input to the Champion(s) in establishing priorities that are consistent with the airport's goals and aligned with the overall business strategy. The Advisory Council reviews progress on sustainability performance, provides recommendations to the Champion(s) on activities to further enhance the program and identifies opportunities for collaboration outside the airport industry.	○ Board of Airport Commissioners ○ City Managers ○ Community Groups ○ Consultants ○ Aviation Industry
Steering Committee	The Steering Committee is responsible for the synchronization and systematization of the initiatives of the sustainability program. Because much of an organization's internal sustainability performance improvement will be achieved through the work of multiple departments, the Steering Committee works to streamline resources and facilitate cross-departmental coordination.	○ Representatives from each department ○ Consultants ○ Tenants ○ City Departments

Implementation Teams	Implementation Teams may be formed for each focus area or logical grouping of initiatives and will be comprised of staff at various levels from different departments. The Implementation Teams can be assembled for a specified duration (typically several months) as required to achieve the sustainability actions. The results of each team will be summarized for the Steering Committee in accordance with the Communication Plan.	○ Representatives from each department ○ Consultants ○ Tenants

III. Approach to Sustainability

One approach to sustainability that has been proven successful is use of a management system to plan, implement, improve, and maintain a sustainability program. A management system outlines specific steps, provides a decision-making structure and can be used to develop processes and tools that are coordinated with existing business and environmental practices. In this way, sustainability becomes a value shared by all parts of the airport organization. This approach enables an airport to streamline resources, coordinate interdepartmental initiatives, engage stakeholders, and establish guiding principles that will serve as the foundation for all sustainability-related activities. A sustainability management system can be a stand-alone program or can be integrated into an existing management system, such as an environmental management system or health and safety management system.

The components of a sustainability management system are depicted in Figure 2-2 and are described in detail in Table 2-2. A management system framework enhances the traditional planning process by allowing a continual reassessment of goals, as well as monitoring of performance and communication of results. An important part of this approach is the creation of feedback loops based on successes and obstacles and the overall financial plan and budget and growth strategy of the airport.

It is important to note that the sustainability management system described in Figure 2-2 and Table 2-2 is scalable and flexible, and should be modified by individual airports to develop a program that meets their specific circumstances, needs and resources. The approach is aimed to organize an airport's sustainability initiatives, establish processes to select and monitor actions, communicate progress, and get the right people doing the right things. In particular, this approach can be used to prioritize action items when resources are limited.

If this approach appears to be overwhelming at first, SAGA recommends establishing a pilot program that focuses on one important initiative for an airport. Through the pilot program, the airport operator will gain experience with the basic premises of the management system approach and will determine how to modify the steps to fit the airport's unique operating environment and set of resources.

Section 3 of this document presents two theoretical examples of an airport utilizing the approach described in Figure 2-2 and Table 2-2. The first example outlines a pilot program that is focused on establishing a recycling program. The second example is for a full sustainability program that focuses on several sustainability initiatives.

Note: The sustainability management system approach is applicable for organizational sustainability as opposed to implementing sustainable design and construction activities for projects. Developing sustainable design and construction standards for projects may be an activity identified and selected for implementation during those steps in the approach. Sustainable design and construction opportunities are included in the compilation of opportunities presented in Section 4.

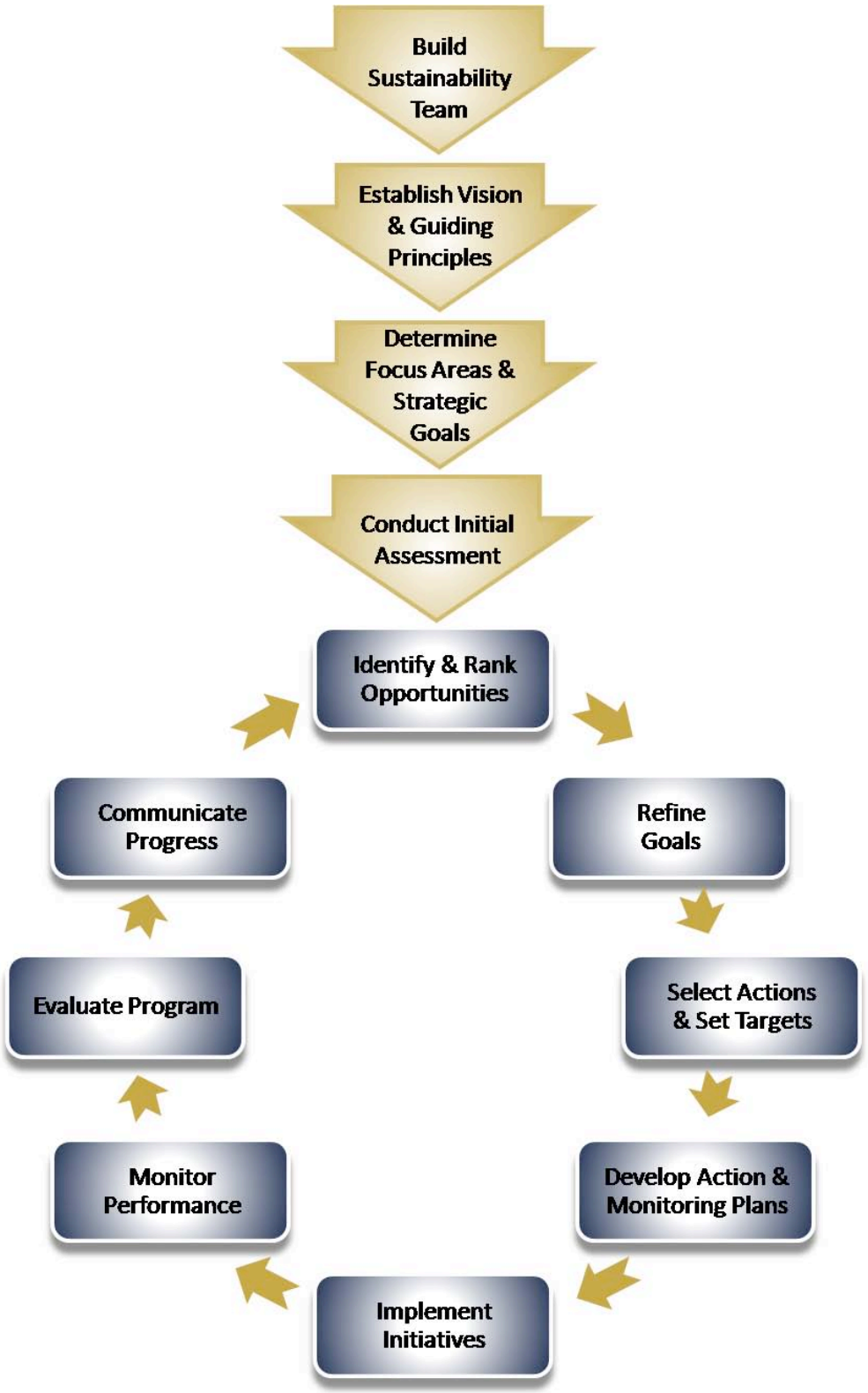


Figure **2-2.** Steps for a management system approach to sustainability

Table 2-2. Steps to Plan, Implement, Improve and Maintain a Sustainability Program

Step	Description	Product
Build Sustainability Team	Identify key stakeholders to participate in the sustainability program and appoint roles and responsibilities. Develop a Sustainability Team Communication Plan. Utilize Figure 2-1 and Table 2-1 to assist in the development of a diverse sustainability team.	○ Organizational Chart ○ Consensus-based description of roles & responsibilities ○ Sustainability Team Communication Plan
Establish Vision & Guiding Principles	Engage stakeholders, such as the Steering Committee, to develop a sustainability vision and set of guiding principles for the airport that will serve as the foundation for future sustainability initiatives. A sustainability policy statement can also be instituted for the airport that includes the vision and guiding principles.	○ Vision Statement & Guiding Principles ○ Sustainability Policy
Determine Focus Areas & Strategic Goals	Focus areas are established that are based on the guiding principles and will fulfill the vision and policy statement. The focus areas will reflect the issues that are most important for the specific airport. Strategic goals, including existing commitments, may also be set.	○ List of Focus Areas ○ Consensus-based list of strategic goals
Conduct Initial Assessment	Determine the status of current sustainability initiatives by conducting an assessment. Key performance indicators (KPIs) are often established to guide the assessment. An evaluation of the current conditions, programs, and	○ Sustainability Assessment Report ○ Listing and definition of Key Performance

Step	Description	Product
	important contextual factors establishes a baseline upon which further actions can be selected.	Indicators (KPIs)
	The vision, goals, and sustainability assessment are analyzed to derive opportunities for advancing the airport's sustainability program. Opportunities are also captured through facilitated discussions with stakeholders. The opportunities are compiled and their alignment with the strategic goals is evaluated. Following, the opportunities are ranked according to a variety of criteria. The SAGA Sustainability Spreadsheet (Section 4 of this document) and other materials published by the airport trade associations are good resources for identifying opportunities.	○ Ranking Criteria ○ List of prioritized opportunities for action that are aligned with the strategic goals
	Following the assessment of current progress in sustainability and identification of opportunities, the strategic goals and focus areas are re-evaluated and refined to account for any gaps that may exist.	○ Consensus-based list of refined goals
	Based on the opportunity rankings and the refined goals, opportunities for action are selected for implementation. Measurement metrics and targets are set for the refined goals and are informed by the selected actions.	○ Consensus-based list of actions, metrics and targets

Step	Description	Product
Develop Action & Monitoring Plans	For the selected actions, Action Plans and Monitoring Plans are developed to streamline resources, determine roles and responsibilities, and establish accountability for achieving progress.	○ Consensus-based Action Plans ○ Consensus-based Monitoring Plans
Implement Initiatives	Upon approval and/or consensus on the Action Plans, the selected actions are implemented by the Implementation Teams. Implementation may include the development or revision of guidance documents, procedures, standards, specifications, or best management practices. Actions may be initiated during the RFP/RFQ stage, pre-bid or pre-design stage, construction activities, operation and maintenance, or procurement. Implementation may also include the achievement of LEED® certification.	○ Listing of Implementation Teams and their members ○ Successful sustainability initiatives ○ Tangible outcomes including specifications, standards, procedures, etc.
Monitor Performance	Using identified metrics, targets, and the defined Monitoring Plan, the airport can measure its performance towards achieving the established goals.	○ Monthly or quarterly progress reports
Evaluate Program	The progress reports can be analyzed to determine gaps in the sustainability initiatives and the impact of the sustainability program, including cost savings. These feedback loops can be combined with the financial plan and budget and growth strategy to appropriately plan for future sustainability activities and business performance.	○ Bi-annual program evaluation report, including a list of recommendations for improvement ○ Memorandum outlining the specific connections between

Step	Description	Product
		sustainability and business performance
	The airport can further its success in meeting the established goals by regularly communicating achievements and milestones in coordination with existing Public Relations efforts.	○ Annual Sustainability Report ○ Website updates ○ Press releases

IV. Integrating an Airport's Sustainability Program into the Larger Community

In addition to focusing on the improvement of an airport's day-to-day management practices and operations, it is also important to consider how an airport operator's sustainability program impacts and is impacted by local, regional and global sustainability activities. An airport operator may consider collaborating with these groups to broaden the overall perspective of their program, pool resources and expertise, receive guidance, and capture and share information that may assist in decision-making regarding the selection of sustainability activities. In addition, airport operators are also in a unique position to contribute to the momentum and progress of sustainability programs occurring in their town or city as well around the world. Consideration of the interconnections that may exist between an airport's sustainability program and local, regional and global sustainability programs will potentially leverage the experiences and successes of the larger community and amplify the benefits of both the airport operator's and the world's sustainability efforts.

For example, an airport operator may consider collaborating with:

- Task forces or committees organized through the city/town, state, region, country, or aviation industry. These task forces or committees may be focused on sustainability specifically or they may be focused on important components of an airport's sustainability program, such as climate change, urban development, transportation, water resources, energy management, or materials and resources;

- Local businesses or community groups;

- Related industries (e.g., renewable energy, pavement technologies, alternative fuels) to develop a needed technology or create a demand for an emerging technology to boost overall supply;
- Regional transportation organizations;
- Metropolitan planning organizations;
- Local and national environmental groups;
- Local or regional utilities to optimize resource conservation and participate in training or educational opportunities;
- Global Reporting Initiative (GRI) to investigate common metrics used to measure sustainability progress in the airport industry; or
- Local Governments for Sustainability (ICLEI), the Institute for Sustainable Development, or other non-governmental organizations (NGO). Note: SAGA does not endorse a specific NGO.

Figure 2-3. An airport operator's sustainability program can enhance or be enhanced by activities occurring in their backyard as well as around the world, such as those underway by cities and towns, community groups, the aviation industry and related industries, the Global Reporting Initiative (GRI), non-governmental organizations (NGOs), and the C40 Cities Climate Leadership Group. An airport operator may consider collaborating with these groups, among others, to broaden the overall perspective of their program, pool resources and expertise, receive guidance, and capture and share information that may assist in decision-making and contribute to the momentum and progress of local, regional and global sustainability programs.

Section 3 - Sustainability Program Examples

The following examples demonstrate how an airport can execute the steps of the management system approach to sustainability outlined in Figure 2-2 and Table 2-2. Example #1 presents the development and implementation of a pilot project similar to one that an airport may use to begin a sustainability program. In Example #1, one sustainability initiative (setting up a recycling program) is explored. Example #2 presents an application of the sustainability management system approach described in Section 2 to develop a comprehensive sustainability program.

The Regional Sustainable Airport in Example #1 and the Sustainable Airport Authority in Example #2 are fictitious airports, based on the combined experience of a number of airports. Any similarity to a specific airport is purely coincidental.

Example #1: Pilot Program for Sustainability

The following example presents a pilot program that uses the management system approach outlined in Figure 2-2 and Table 2-2. This example focuses on the development and implementation of a recycling program.

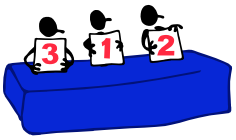
Build a Diverse Sustainability Team: Pilot Program (Example #1)	
The Regional Sustainable Airport (RSA) is interested in starting a sustainability program. To begin, RSA has decided to do a pilot program prior to developing and implementing a full-blown sustainability program. The pilot program will allow RSA to test the management system approach and determine how the approach may be modified to meet RSA's specific needs and resources. For a variety of reasons, the pilot program will focus on recycling. Recycling has been identified as a key issue by the local community, the passengers and the tenants, and a landfill ban on certain materials is being considered by the state regulatory agency. Tipping fees for recycling are also less expensive than for solid waste, so significant savings may be realized by RSA. The idea to start a sustainability program was conceived by a member of the environmental group. As such, this individual volunteers to be the "Champion" of the pilot program and gains support of upper management to proceed. Recognizing that participation of several departments of RSA will be needed for success, the Champion and upper management identify stakeholders that will serve as a Steering Committee for the pilot program activities. Note: RSA determines that an Advisory Council is not needed for this pilot program.	 **The Sustainability Team includes:** **<u>Champion</u>** ▪ An employee who has been actively involved in sustainability initiatives at the airport and as part of the airport trade association committees. **<u>Steering Committee</u>** ▪ Terminal Managers ▪ Contract administrator for the waste hauling company ▪ Supervisor for the janitorial staff responsible for waste disposal in the terminals and office spaces.

Establish Vision Statement & Guiding Principles: Pilot Program (Example #1)	
The Champion organizes a meeting with the Steering Committee to brainstorm components of a Vision Statement for the recycling program. Based on the meeting, the Champion develops a Recycling Vision Statement that is reviewed and approved by upper management prior to proceeding. The Vision includes a statement that the airport will strive to maximize RSA's recycling rate and participate in local recycling initiatives. Note: RSA determines that a set of Guiding Principles is not needed for this pilot program.	 **RSA's Recycling Vision Statement are developed by the Steering Committee**
Determine Focus Areas & Strategic Goals: Pilot Program (Example #1)	
At a second meeting with the Champion and the Steering Committee, focus areas that are required for success of the recycling program are established based on the Vision. Strategic goals are also developed and include commitments that the airport has already made to the city in which it resides in regards to recycling.	 **RSA's Strategic Goals & Focus Areas:** **<u>Materials to be Recycled</u>** ▪ Include paper, cardboard and plastic **<u>Protocol Development</u>** ▪ Develop consensus-based protocols for collection and disposal of recyclables **<u>Community Outreach</u>** ▪ Clearly communicate to airport users how they can participate in the recycling program

Conduct Initial Assessment: Pilot Program (Example #1)	
After RSA's Vision Statement is established, an assessment of current waste profiles and weights is conducted. The Champion begins the assessment by reviewing waste hauling invoices and summarizing weights and costs associated with current waste disposal practices. Interviews with the Terminal Managers and janitorial staff to understand current trends are also conducted. The Champion also spot checks the contents of the waste disposal bins in the terminals and office spaces to determine the composition of the waste stream. During the assessment, opportunities to enhance a recycling program at RSA are also captured.	 **RSA's Assessment Includes:** ▪ Review of waste disposal invoices ▪ Interviews of Terminal Managers and Janitorial Staff ▪ Inspection of current waste stream

Identify & Rank Opportunities: Pilot Program (Example #1)

The Champion reviews the assessment and begins to compile opportunities for a recycling program. A meeting with Steering Committee is also conducted to capture ideas on potential components of the recycling program. Opportunities include single stream recycling (all recyclable materials are included in one collection and disposal unit), collecting each material separately, and participating in the region's recycling reporting initiative. In addition, the SAGA Sustainability Spreadsheet (Section 4 of this document) is also consulted to identify opportunities. The opportunities are evaluated to determine how well they align with the strategic goals and focus areas, and gaps in the opportunities are identified and filled in. Consensus-based ranking criteria are established and a ranking score is determined for each opportunity to prioritize the opportunities and assist RSA in selecting which opportunities will be turned into actions and initiatives.



RSA's Ranking Criteria:

- Environmental benefit
- Social benefit
- Financial incentive
- Personnel availability
- Technical feasibility

Refine Goals: Pilot Program (Example #1)	
At this point in the sustainability program, RSA has a comprehensive understanding of where it stands in regard to waste disposal and recycling and what the best opportunities are for moving forward. Building on this information, the strategic goals and focus areas are revisited and refined. The Champion re-engages the Steering Committee to present the results of the assessment and opportunities identification to gain consensus on the modification to the strategic goals and focus areas.	**RSA's Refined Strategic Goals:** **Materials to be Recycled** ▪ Include paper, cardboard, aluminum, plastic, and glass **Protocol Development** ▪ Develop consensus-based protocols for collection and disposal of recyclables **Community Outreach** ▪ Clearly communicate to airport users how they can participate in the recycling program **Training** ▪ Provide training to janitorial staff and airport employees to ensure that collection and disposal protocols are followed

Select Actions & Set Targets: Pilot Program (Example #1)

The Champion and Steering Committee meet to review the rankings of the opportunities and select those that will be implemented over the next year. In addition, metrics for each strategic goal are established based on the selected actions. To determine appropriate targets, a benchmarking study is conducted to evaluate current industry standards and targets. A follow-up meeting with the Steering Committee is convened, at which time the baseline and benchmarking data are presented and targets are established. The selection of actions and the associated targets is then reviewed and approved by upper management.

RSA's Targets:

Materials to be Recycled

- Divert 25% (by weight) of waste by 2011 based on the 2008 baseline through recycling of paper, cardboard, aluminum, plastic, and glass.

Protocol Development

- Establish consensus-based protocols for collection and disposal of recyclables by February 2010.

Community Outreach

- Install 10 signs in public areas describing the recycling program.

Training

- Provide training sessions every 6 months in two languages for janitorial staff and airport employees.

Develop Action & Monitoring Plans: Pilot Program (Example #1)	
For every opportunity (or group of opportunities) that was selected for implementation, the Champion works with the Steering Committee to develop Action Plans. The Action Plans are used to determine resources and streamline efforts. The Action Plans include specific action items, priority level, persons responsible for implementation, deliverables, resource needs (personnel and financial), coordination needs with tenants, and schedule and milestones. An accompanying Monitoring Plan is developed for each Action Plan that establishes a protocol to ensure that progress is measured at an appropriate frequency and that the correct information is collected on a consistent basis. The Monitoring Plan facilitates the recording of data and includes those responsible for collecting the information.	 **RSA's Action Plans include:** ▪ Specific action items ▪ Priority level ▪ Personnel responsible for actions ▪ List of deliverables ▪ Resource needs (personnel and financial) ▪ Tenant coordination needs ▪ Schedule and milestones
Implement Initiatives: Pilot Program (Example #1)	
The Action Plans are implemented. The Champion oversees all initiatives and is available to address concerns and answer questions.	
Monitor Performance: Pilot Program (Example #1)	
The Monitoring Plans are used to track progress. The Champion meets with the Steering Committee on a quarterly basis to review progress and make adjustments to the sustainability efforts.	

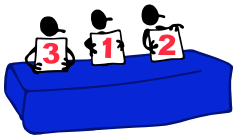
Evaluate Program: Pilot Program (Example #1)	
On a bi-annual basis, a thorough analysis of the progress reports is conducted by the Champion to determine if major changes need to be made to the recycling program. Changes are reviewed and approved by the Steering Committee. Savings from the recycling program, including lower tipping fees, are quantified. Upper management is made aware of these savings and the cost avoidance is integrated into the annual financial plan and budget.	 The Champion determines that the recycling goal will not be met without expanding the program to the office center. The recommendation for program expansion is approved by the Steering Committee and resources are allocated to implement this additional activity immediately. The Champion also composes a memorandum to upper management quantifying the overall savings resulting from the recycling program. These savings are integrated into the budget for the next fiscal year.
Communicate Progress: Pilot Program (Example #1)	
The Champion develops a progress report after one year, which is reviewed and approved by Steering Committee. The revised report is then sent to upper management. In addition, the Champion utilizes the airport's website to regularly report recycling progress.	 **RSA's Communicate Progress Through:** ▪ An annual progress report to upper management ▪ Updates on RSA's Website

Example #2: Comprehensive Sustainability Program

The following example presents application of the sustainability management system approach described in Figure 2-2 and Table 2-2. This example focuses on a comprehensive, holistic approach to sustainability planning and implementation and includes several sustainability initiatives.

Build a Diverse Sustainability Team: Comprehensive Program (Example #2)	
The Sustainable Airport Authority (SAA) understands the importance of improving the sustainability performance of their management practices and operations. SAA's upper management has authorized and endorsed the establishment of an official sustainability program. A position is created by upper management for a "Sustainability Coordinator". A Champion is identified by upper management to fill the Sustainability Coordinator position and, together, they decide to follow the management system approach to sustainability described herein. In addition, the Champion and upper management identify stakeholders to participate in the program as part of the Sustainability Team. The Sustainability Team includes an Advisory Council and a Steering Committee. The Champion drafts roles and responsibilities for both the Advisory Council and Steering Committee and contacts all team members to solicit their involvement. Initial meetings are held with each group to review the sustainability approach and gain approval for the roles and responsibilities.	**The Sustainability Team includes:** **Champion** ▪ An employee who has been actively involved in sustainability initiatives at the airport and as part of the airport trade association committees. **Advisory Council** ▪ Board of Airport Commissioners ▪ An airline tenant ▪ A local community group ▪ ICLEI **Steering Committee** ▪ Executive Director ▪ Deputy Executive Directors ▪ Department Directors ▪ Employees active in sustainability-related initiatives ▪ Program manager for capital projects ▪ Sustainability consultant

Establish Vision Statement & Guiding Principles: Comprehensive Program (Example #2)	
The Champion of the sustainability program organizes a meeting with the Steering Committee to develop a sustainability Vision and set of Guiding Principles. During the meeting, the airport's definition and approach to sustainability are discussed and brainstorming on the Vision and Guiding Principles is conducted. Based on the meeting, the Champion develops a Sustainability Vision Statement and Sustainability Policy that is reviewed and approved by the Advisory Council. A press release is used to inform the public of the Airport's sustainability progress.	 **SAA's Vision Statement and Guiding Principles are reviewed and approved by the Advisory Council.**
Determine Focus Areas & Strategic Goals: Comprehensive Program (Example #2)	
At the second meeting with the Champion and the Steering Committee, the Vision Statement and Guiding Principles are reviewed. At that time, focus areas that are most important to the airport are established. For example, climate change modeling results project that the region where the airport is located will experience prolonged droughts in the future, so a focus area of "Water Conservation" is established. Following, strategic goals for each focus area are established. The strategic goals include commitments that the airport has already made to the city in which it resides.	 **SAA's Strategic Goals & Focus Areas:** **Energy** ▪ Reduce energy demand **Community** ▪ Increase participation in public hearings **Water Conservation** ▪ Reduce potable water use

Conduct Initial Assessment: Comprehensive Program (Example #2)	
After SAA's Vision Statement and Sustainability Policy are published, an assessment of current sustainability-related actions is conducted. The Champion begins the assessment by conducting both formal and informal discussions to collect anecdotal information regarding current sustainability activities. Following, KPIs are identified that will help to measure progress related to the strategic goals and focus areas. Several stakeholders are involved in the assessment, including the department directors and their delegates, facilities and operations representatives, and general maintenance and construction employees. During the assessment, opportunities to improve SAA's sustainability performance are also captured. A Sustainability Assessment Report is published.	 **SAA's KPIs:** ▪ Electricity used per passenger ▪ Number of public hearing attendees ▪ Water use per passenger
Identify & Rank Opportunities: Comprehensive Program (Example #2)	
The Champion reviews the sustainability assessment and begins to compile opportunities to improve the sustainability program. Facilitated meetings with key stakeholders are also used to capture ideas and opportunities. In addition, the SAGA Sustainability Spreadsheet (Section 4 of this document) is also consulted to identify opportunities. The opportunities are evaluated to determine how well they align with the strategic goals and focus areas, and gaps in the opportunities are identified and filled in. Consensus-based ranking criteria are established and a ranking score is determined for each opportunity to prioritize the opportunities and assist SAA in selecting which opportunities will be turned into actions and initiatives.	 **SAA's Ranking Criteria:** ▪ Environmental benefit ▪ Social benefit ▪ Financial incentive ▪ Personnel availability ▪ Technical Feasibility

Refine Goals: Comprehensive Program (Example #2)	
At this point in the sustainability program, SAA has a comprehensive understanding of where it stands in regard to sustainability and what the best opportunities are for moving forward. Building on this information, the strategic goals and focus areas are revisited and refined. The Champion re-engages the Steering Committee to present the results of the assessment and opportunities identification to gain consensus on the modification to the strategic goals and focus areas.	**SAA's Refined Strategic Goals:** **Energy** ▪ Reduce energy demand through efficiency **Community** ▪ Increase participation in public hearings **Water** ▪ Reduce water usage **Sustainable Design and Construction** ▪ Develop and implement a set of sustainable design and construction standards

Select Actions & Set Targets: Comprehensive Program (Example #2)	
The Champion and Steering Committee meet to review the rankings of the opportunities and select those that will be implemented over the next year. In addition, metrics for each strategic goal are established based on the selected actions. To determine appropriate targets, a benchmarking study is conducted to evaluate current industry standards and targets. In addition, to determine appropriate targets the original sustainability assessment is reviewed to ascertain baseline values for SAA in the terms of the selected metrics. In cases where the baseline value was not collected, an additional assessment is conducted. A follow-up meeting with the Steering Committee is convened, at which time the baseline and benchmarking data are presented and targets are established. The selection of actions and the associated targets is then reviewed and approved by the Advisory Council.	 **SAA's Targets:** **Energy:** ▪ Reduce energy demand per passenger through efficiency measures by 25% by 2015 **Community:** ▪ Increase participation in public hearings by 20% in the next year **Water:** ▪ Reduce water usage by 10% by 2010 **Sustainable Design and Construction:** ▪ Develop a set of sustainable design and construction standards and implement on 90% of projects by 2011.

Develop Action & Monitoring Plans: Comprehensive Program (Example #2)	
For every opportunity (or group of opportunities) that was selected for implementation, the Champion works with the Steering Committee to develop Action Plans. The Action Plans are used to coordinate initiatives, determine resources, and streamline efforts. The Action Plans include specific action items, priority level, persons responsible for implementation, deliverables, resource needs (personnel and financial), coordination needs with tenants, and schedule. An accompanying Monitoring Plan is developed for each Action Plan that establishes a protocol to ensure that progress is measured at an appropriate frequency and that the correct information is collected. The Monitoring Plan facilitates the recording of data and includes those responsible for collecting the information.	 **SAA's Action Plans include:** ▪ Specific action items ▪ Priority level ▪ Personnel responsible for actions ▪ List of deliverables ▪ Resource needs (personnel and financial) ▪ Tenant coordination needs ▪ Schedule and milestones
Implement Initiatives: Comprehensive Program (Example #2)	
The Action Plans are implemented. The Champion oversees all initiatives and is available to address concerns and answer questions.	
Monitor Performance: Comprehensive Program (Example #2)	
The Monitoring Plans are used to track progress. The Champion meets with the Steering Committee on a quarterly basis to review progress and make adjustments to the sustainability efforts.	

Evaluate Program: Comprehensive Program (Example #2)	
On a bi-annual basis, a thorough analysis of the progress reports is conducted by the Champion to determine if major changes need to be made to the sustainability program. Changes are reviewed and approved by the Steering Committee and Advisory Council. In addition, the evaluation of the existing program is used to add to the overall list of opportunities. On an annual basis, the opportunities are re-evaluated and supplemental actions are selected to be implemented as part of the overall program. The cost savings and additional costs from the sustainability program are quantified. This cost information is presented to upper management and integrated into the overall financial plan and budget for the airport.	 The Champion determines that the water reduction goal will not be met without expanding the program to the office center. The recommendation for program expansion is approved by the Steering Committee and Advisory Council, and resources are allocated to implement this additional activity immediately. On an annual basis, the Champion uses the bi-annual evaluations and other resources to update the list of opportunities and select additional items for implementation. The Champion also composes a memorandum to upper management quantifying the overall savings and added costs resulting from the sustainability program. These savings and costs are integrated into the budget for the next fiscal year. Some of the cost savings from energy efficiency and recycling initiatives are directed to a revolving fund that is used to support future sustainability initiatives.

Communicate Progress: Comprehensive Program (Example #2)	
The Champion develops an annual Sustainability Report, which is reviewed and approved by Steering Committee and Advisory Council prior to being published. In addition, the Champion utilizes the airport's website to regularly report progress on the sustainability initiatives of the Sustainable Airport Authority.	 **SAA's Communication Plan includes:** ▪ Annual Sustainability Report ▪ Updates on SAA's Website ▪ Regular press releases

Section 4 - SAGA Sustainability Database

I. Introduction

The Sustainability Database developed by SAGA consolidates various sources of airport-related sustainability practices into one document, streamlining the ability to search, evaluate, and then implement sustainable practices. The SAGA Sustainability Database (the Database) provides the industry with a compendium of airport sustainability practices that can be searched and organized to correspond to the sustainability goals of airports of all types and sizes.

The Database identifies sustainable airport practices, including policies, technologies, and strategies that may help a Database user (e.g., an airport, contractor, or tenant) achieve sustainability goals. Whether an airport has a project planned, has just begun contemplating improvements, has already started construction, or desires to improve day-to-day operations or maintenance practices, the SAGA Sustainability Database is a valuable resource to aid in sustainability planning. The Database can be tailored to the unique requirements of individual airports, but can also be shared by all airports to improve industry-wide knowledge of sustainable practices and to encourage an increased level of implementation.

II. Background

Airports around the world are developing sustainability programs and guidelines or are incorporating sustainable practices into their existing operations. These efforts have resulted in the development of a wide range of practices developed for different purposes. For example, Boston-Logan International Airport followed nationally-recognized sustainability standards when designing a new terminal building, while O'Hare International Airport developed the Sustainable Airport Manual to guide full scale airport construction and development. Other airports have focused on improving the performance of existing buildings or specific operations, such as reducing potable water use for landscaping.

Airport operators (or other stakeholders) that are interested in implementing sustainable practices may determine that it is difficult to discover, sort through, and comprehend such a wide variety of sustainable practices without expending considerable effort. Today, an airport interested in pursuing practical, proven, and innovative sustainability practices must research a variety of airport sustainability guidebooks, keep updated on the latest news feeds, and/or reach

out to other airports and airport industry professionals to help identify and evaluate sustainable practices.

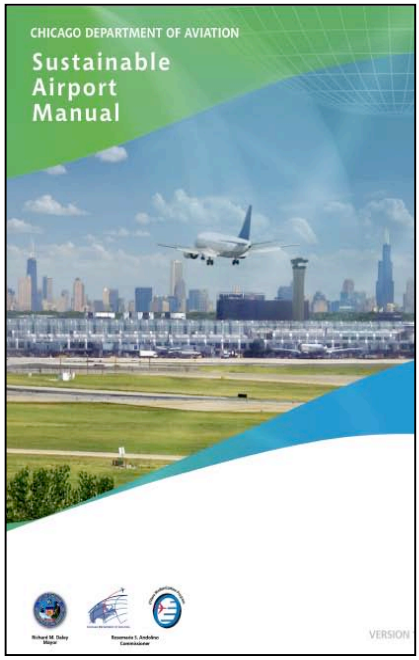
The SAGA Sustainability Database is intended to be a comprehensive, living tool that assists airports interested in embarking on, or expanding, their sustainability program.

III. Sources and Format

The Database lists over 1,000 sustainable practices that have been implemented or are planned for implementation at both domestic and international airports (including applicable sustainability guidance that is not airport specific).

In conducting this effort, SAGA collected and reviewed over 100 resources, including over 30 individual airport sustainability policies, plans, and reports. See **Exhibit 1** for a listing of references researched during this effort or visit the SAGA Airport Sustainability webpage for additional sources used in the Sustainability Database:

A few of the different sources used to compile the sustainable practices include:



- Airport sustainability guidelines and manuals developed for airports, such as the Chicago Department of Aviation Sustainable Airport Manual, the Los Angeles World Airports Sustainable Airport Planning, Design and Construction Guidelines, and the Columbus Regional Airport Authority's Capital Program Sustainable Design Guidance Manual.
- Professional airport organizations such as Airports Council International (ACI), the American Association of Airport Executives (AAAE), and the Air Transport Association (ATA)
- Government agencies such as the Environmental Protection Agency and the Transportation Research Board
- Standard sustainability guidebooks such as the LEED® (Leadership in Energy and Environmental Design) Reference Guide for New Construction
- Industry professionals

As the Database evolved, the source for each practice was identified and documented for reference. In many instances, however, individual practices were common to multiple sources. Yet, since each airport is unique, there may be slightly different attributes as one compares a practice at one airport to

another. The example below illustrates how practices and sources were initially identified.

LEGEND	
=	Airports Council International (ACI) / Ricondo & Associates, Inc. (R&A) Index Sustainable Initiative
=	Los Angeles World Airports (LAWA) Initiative
=	O'Hare International Airport (ORD) Sustainable Design Manual Initiative
=	Boston-Logan International Airport (BOS) and/or Philadelphia International Airport (PHL) Initiative
=	San Francisco International Airport (SFO) Initiative
=	Seattle-Tacoma International Airport (SEA) Initiative
=	Denver International Airport (DIA) Initiative
=	Albany International Airport (ALB) Initiative
=	Leadership in Energy and Environmental Design (LEED) for New Construction V2.2 Initiative
=	Vancouver International Airport (YVR) Initiative
=	New Chitose Airport (CTS) (Hokkaido, Japan) Initiative
=	ACRP Synthesis 10: Airport Sustainability Practices
=	Field Guide for Sustainable Construction (2004), Pentagon Renovation and Construction Program Office & Pennsylvania State University
=	Environmental Protection Online (News Feed)
=	Poudre School District, "Sustainable Design Guidelines for the Construction of New Facilities and the Renovation of Existing Structures", June 2005.

Example detailing 15 of the 100-plus sources researched to obtain representative sustainable practices.

IV. Organization (Understanding the Database Content)

The Database is intended to be used by airports, agencies, organizations, contractors and consultants as a tool for achieving sustainability goals and knowledge. Its use is not limited to a certain airport size or location. As a Microsoft Excel spreadsheet and web-based database, the Database can be viewed, sorted, and organized to meet particular areas of interest. By conducting a simple search (discussed in greater detail below and in **Exhibit 2**), users can promptly focus upon the sustainable practices that are the most relevant to their goals and area(s) of interest.

To aid in the Database's use, a series of searchable criteria were created (see Exhibit 2) to enable a user to conduct a focused search on specific areas of interest. The three main organizational categories consist of the following (however, each organization category contains various searchable criteria):

1) **Activity** – practices are identified by type of airport activity, such as planning and design, construction, day to day airport operations, maintenance, administration, and community outreach.
2) **Airport Functional Area** – considers landside and airside areas. These two functional areas are further divided to enable the user to focus on specific areas.

3) **EONS –** airport practices identified by one of four areas: economic viability (E), operational efficiency (O), natural resource conservation (N), and social responsibility (S)

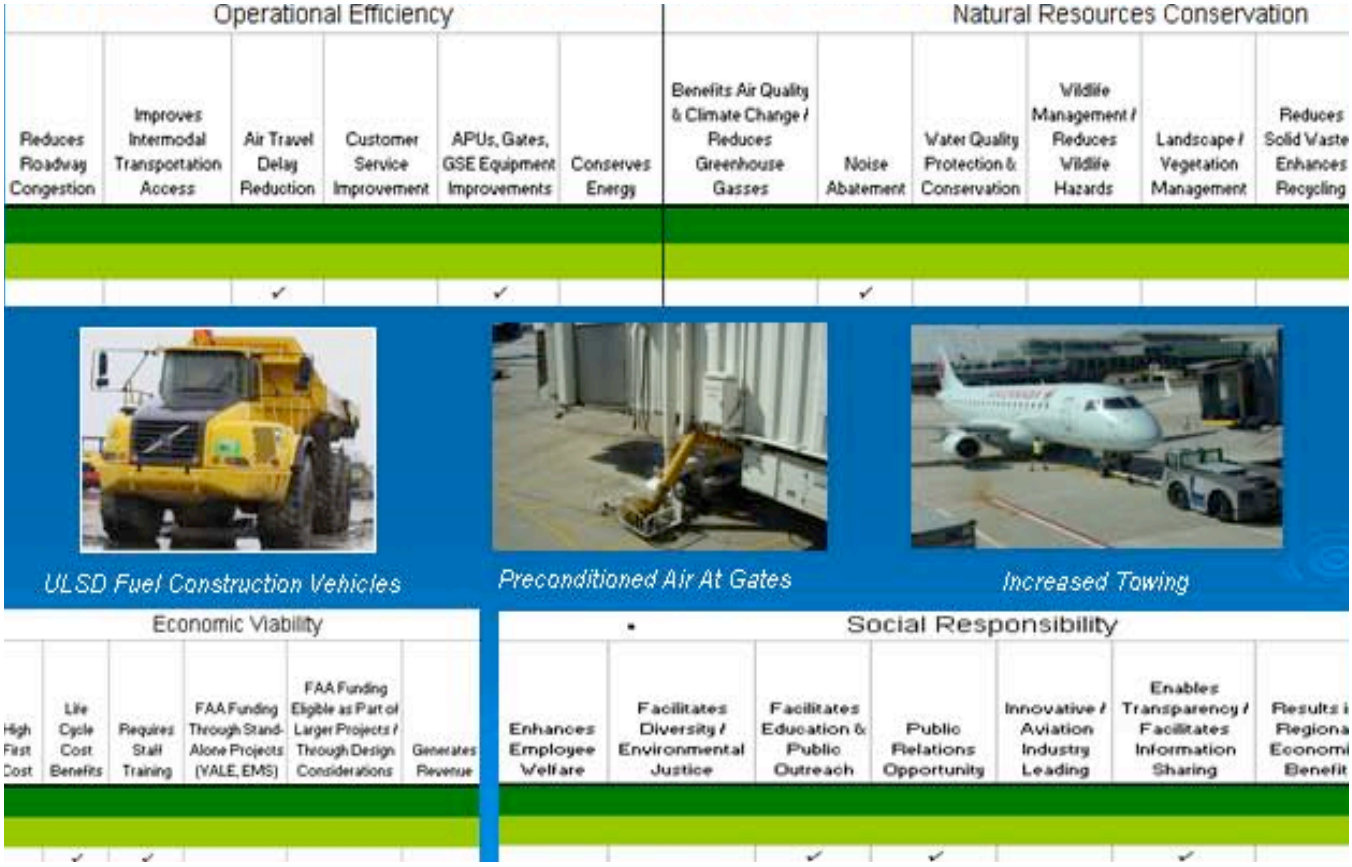
A "Potential LEED® Applicability" criteria/column is also included as a searchable criterion so that a user can conduct a search for sustainable practices that relate to LEED® Credits (per the LEED® 2009 Reference Guide for New Construction and Major Renovations). Please see the excerpt below for examples of sustainable practices identified in the Database and the first of 68 searchable criteria/column headings. A Database user will be able to search the Database based on the searchable criteria/ column headings.

Over 1,000 Practices

Over 65 Searchable Criteria

		Activity				Functional Area			
						Landside			
						Terminal Buildings and Interior Areas			
	Practice	Day to Day Airport Operations	Maintenance	Administration & Finance	Community & Public Relations	Terminal Buildings & Concourses	Gate Areas & Passenger Handling	Offices	Tenants / Concessions
634	Establish a non-toxic wildlife control program.	✓	✓	✓					
632	Install Kevlar bird deterrent wires or other mechanisms to prevent waterfowl from using area water bodies.	✓							
635	Develop and implement an Integrated Pest Management plan (IPM).	✓	✓	✓					
	Materials and Resources								
	Waste Reduction								
636	Include educational training on waste reduction for the project team as part of the initial sustainability project planning meeting.	✓	✓	✓					
637	Develop and utilize an off-airport composting facility.	✓	✓	✓	✓	✓			✓
638	Separate food waste from normal waste to utilize for composting (off-site only), biofuels, livestock feed, and other uses.	✓	✓	✓	✓	✓			✓
639	Develop and implement public food waste collection stations.	✓	✓	✓	✓	✓			✓
640	Develop and implement a surplus food program to benefit area food banks by supplying pre-packaged sandwiches, salads, pastries, muffins, cookies, etc.	✓	✓	✓	✓	✓			✓
641	Establish mandates, incentives, and/or inspections to encourage tenants to compost appropriate waste.	✓		✓				✓	✓
642	Design waste management to comply with ASTM E2129-05 and the EPA's Green Purchasing Guidelines.	✓	✓	✓					
643	Conduct a waste composition study (an audit of waste streams) to identify the most common types and amount of waste collected	✓		✓		✓	✓	✓	✓

Sample sustainable practices listed in the SAGA Sustainability Database and the first of 68 organizational columns.



Sample searchable criteria/column headings taken from the EONS section along with examples of sustainable practices.

V. Example Database Use

V.1 Example A: Building a New Runway

An airport may encourage a contractor to follow sustainable practices when constructing a new runway. The airport may also stress an interest in practices that reduce energy consumption due to a constrained energy budget and a desire to reduce carbon emissions resulting from the use of electricity. Thus, the contractor and/or the airport operator would conduct a search within the Database for sustainable practices that apply to the following columns: "Construction" (Activity), "Runways, Taxiways & Aprons" (Functional Area), "Conserves Energy" (EONS – operational efficiency), and "Benefits Air Quality & Climate Change / Reduces Greenhouse Gasses" (EONS – Natural Resource Conservation). (Note that the Database can be searched by multiple criteria at once, regardless of which of the organizational categories/area of interest that it falls under.)

Three of the several practices resulting from the search would include:

1) "Develop a balanced earthwork plan and keep as much excavated earth on-site as possible to reduce off-site hauling;"
2) "For runways and taxiways (as applicable), use LED lighting and signals;" and
3) "Utilize warm-mix asphalt to reduce energy needs during construction."

V.2 Example B: Reducing Waste Generated by Airport Tenants

Financial pressures, consumer awareness, and/or airport operator demands may encourage an airport tenant to reduce the amount of waste that it generates on a daily basis. To combat these pressures, an airport operator or tenant may perform a focused search for sustainable practices by selecting the "Tenants / Concessions" criteria and the "Reduces Solid Waste / Enhances Recycling" criteria.

Three of the many practices that the search would generate include:

1) "Conduct a waste composition study (an audit of waste streams) to identify the most common types and amount of waste collected;"
2) "Recycle coffee grounds as mulch; the grounds create a rich, dark compost that helps replace soil acids needed to keep plants healthy;" and
3) "Use biodegradable plates and cutlery made from corn and wheat starch."

V.3 References within the Database

After an airport performs an initial search for sustainable practices that match its search criteria or area of interest, the resulting practices would provide a starting point for further research, evaluation, discussion, and implementation (if deemed appropriate). Some sustainable practices provide links to websites, examples of the practice, other sustainable guidelines to investigate, regulation document titles and numbers, new technologies to pursue, or even brand names and manufacturers that can be contacted.

The following is an example of a sustainable practice that provides a reference:

> *"Help implement & support all four elements of the International Air Transport Association's (IATA) Fast Travel Program (www.iata.org/stbsupportportal/fasttravel.htm) including: bags ready-to-go, self-document scanning, self-boarding, and electronic baggage recovery."*

Definitions of terms, a listing of abbreviations, case studies and examples, additional web links, and even pictures could be added to each sustainable

practice in the future to enhance the understanding of sustainable practices and to facilitate implementation.

VI. Next Steps

The SAGA Sustainability Database, although valuable in its current format, requires additional industry input to reach its maximum potential as a sustainability guidance tool for the aviation industry. SAGA is continually seeking input to enhance its current listing of sustainable airport practices. Additional input is required to ensure that a check is placed in the appropriate box that matches each searchable criteria/column heading with the corresponding sustainable practice (there are currently over 68,000 boxes to evaluate).

Since airports and technologies are constantly evolving, several challenges arise. The Database will require continuous updating, additions, and revisions based on new technologies, guidebooks, challenges, and airport experiences. All users of the Database are encouraged to continually provide new practices, feedback, and comments. Also, since the Database is designed to cater to the desires of an individual user, each user should indicate any additional searchable criteria (or revisions to existing criteria) that could improve the usefulness of the Database.

Exhibit 1: SAGA and Website Resources

Airport Sustainability Guidelines and Manuals:

1) Chicago Department of Aviation Sustainable Airport Manual (2009)
2) Columbus Regional Airport Authority (CRAA) Capital Program Sustainable Design Guidance Manual (2008)
3) Los Angeles World Airports (LAWA) Sustainable Airport Planning, Design and Construction Guidelines (2008)
4) O'Hare Modernization Program (Chicago O'Hare International Airport) Sustainable Design Manual (2003)
5) Port Authority of New York and New Jersey Sustainable Design Guidelines for New Construction (2004)

Airport Sustainability Policies, Plans, and Reports:

1) ACI / Ricondo & Associates, Inc. Sustainability Index (2006)
2) Airport Maintenance Conference Benchmarking Data Review (2004)
3) Auckland International Airport's Sustainability Program
4) Bristol International Airport, Sustainability Appraisal of the Bristol International Airport Master Plan (2005)
5) Budapest Airport's Approach to Sustainable Aviation (2006)
6) Denver International Airport Sustainability Summary (2008)
7) Düsseldorf International Airport's Environmental Measures
8) Fort Lauderdale-Hollywood International Airport Green Airport Initiative, Executive Summary (2005)
9) Fraport (Frankfort International Airport) Sustainability Report (2007)
10) Heathrow Airport Corporate Responsibility
11) Heathrow Airport Sustainability (2001)
12) Los Angeles World Airports (LAWA) Sustainability Policy
13) Los Angeles World Airports Sustainability Report (2008)
14) Manchester Airport, "Our Vision for Sustainability"
15) Narita International Airport, "Eco-Airport Master Plan" (2006)
16) Natural Resources Defense Council – "Trash Landings: How Airlines and Airports Can Clean Up Their Recycling Programs" (2006)
17) New Horizons, an Environmental Overview of Baltimore-Washington International Airport (2004)
18) Oakland International Airport's (OAK) Environmental Management Program
19) Port of Oakland Sustainability Program (2003)
20) Salt Lake City Airport, Making the Business Connection to Airport Sustainability

21) Salt Lake City Department of Airports, Airport Sustainability Program Assessment
22) Salt Lake City Department of Airports Technical Report (2007)
23) San Diego Regional Sustainability Partnership Goals (2007)
24) San Diego International Airport Sustainability Policy (2008)
25) Seattle-Tacoma International Airport (SEA) Managing a Green Airport (August 2007)
26) Seattle-Tacoma International Airport – Green Works
27) San Francisco International Airport Sustainability Report (2007)
28) San Francisco International Airport 2008 Environmental Sustainability Highlights
29) Stansted (London) Airport Generation 2 Sustainability Report (2008)
30) Vienna International Airport Sustainability Report – "We Take Care" (2004)
31) Vancouver International Airport Authority Sustainability Report Online (2006)
32) Vancouver International Airport Authority Sustainability Report Online (2007)
33) Vancouver International Airport Authority Sustainability Report (2004)

Salt Lake City International Airport

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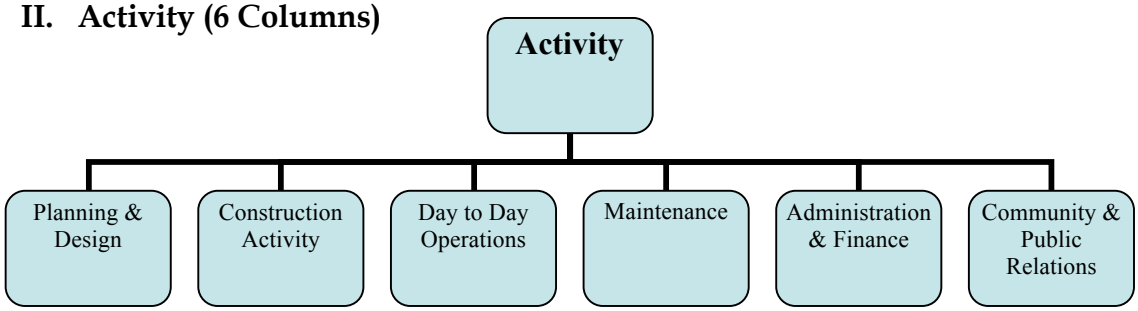
The Transportation Research Board (TRB), Airport Cooperative Research Program (ACRP) Reports:

1) ACRP 10-01: Optimizing the Use of Aircraft De/Anti-Icing Fluids (2009)
2) ACRP Synthesis 10: Airport Sustainability Practices (2008)
3) ACRP Report 14: Deicing Planning Guidelines and Practices for Stormwater Management Systems (2009)
4) ACRP Synthesis 6: Impact of Airport Pavement Deicing Products on Aircraft and Airfield Infrastructure (2008)
5) ACRP Fact sheets: Deicing Practices (2009)

Exhibit 2: Searchable Criteria/Column Headings

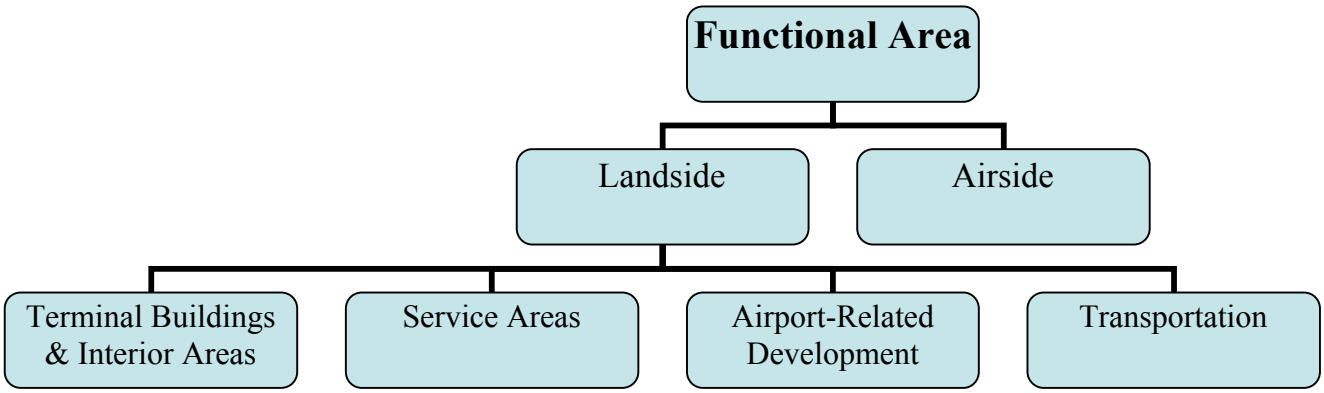
I. **LEED® (1 Column)**
   1) **Potential LEED® Applicability**

II. **Activity (6 Columns)**



   1) **Planning & Design**
   2) **Construction Activity**
   3) **Day to Day Operations**
   4) **Maintenance**
   5) **Administration**
   6) **Community & Public Relations**

III. Functional Area (Landside & Airside) (30 Columns)



Landside:

a) Terminal Buildings & Interior Areas:
- Terminal Buildings & Concourses
- Gate Areas & Passenger Handling
- Offices
- Tenants / Concessions
- Baggage Handling
- FIS / Security
- HVAC & Other Utilities

b) Service Areas:
- Cargo / Warehousing & Freight Forwarding
- Flight Kitchens
- Vehicle Maintenance & Fueling Facilities
- Taxi, Bus & Limo Staging & Buildings
- FAA Facilities
- Water / Wastewater Treatment (Including Pumping Stations)

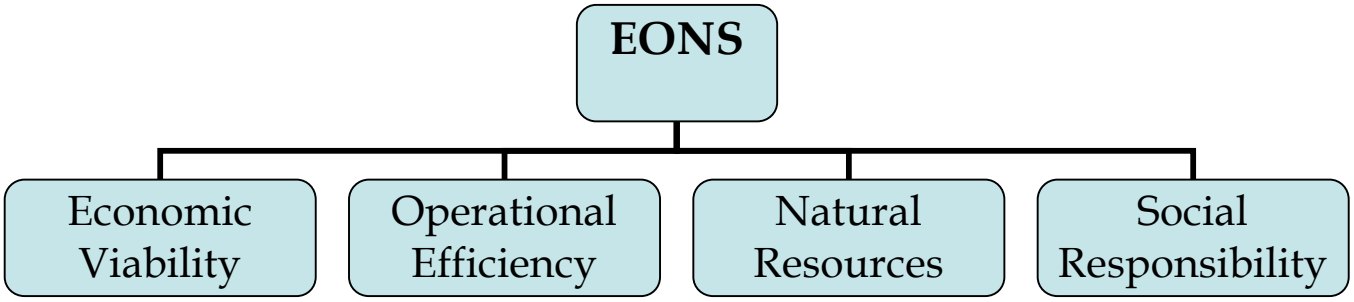
c) Airport-Related Development:
- Business Parks
- Convention Center / Conference Facilities
- Rental Car (CONRAC) / Stand-Alone Tenants
- Parkland / Recreation

d) Transportation:
- Roadways (including signage & curbs)
- Intermodal / Public Transportation Facilities
- Parking Facilities, At Grade & Structures
- People Movers

Airside:

a) Gates, GSE Equipment & APUs,
b) Runways, Taxiways & Aprons
c) Service Roads
d) NAVAIDS, Lighting & Electrical Vaults
e) ARFF / Fire Training
f) Airport Traffic Control Tower
g) Fueling Facilities
h) Deicing Facilities
i) Stormwater Management Facilities

IV. EONS (31 Columns)



1) Economic Viability

a) High First Cost
b) Life Cycle Cost Benefits
c) Requires Staff Training
d) FAA Funding Eligible Through Stand-Alone Projects (VALE, EMS)
e) FAA Funding Eligible as Part of Larger Projects / Through Design Considerations
f) Generates Revenue

2) Operational Efficiency

a) Reduces Roadway Congestion
b) Improves Intermodal Transportation Access
c) Air Travel Delay Reduction
d) Customer Service Improvement
e) APUs, Gates, GSE Equipment Improvements
f) Conserves Energy

3) Natural Resources

a) Benefits Air Quality & Climate Change
b) Noise Abatement Benefits
c) Water Quality Protection & Conservation
d) Wildlife Management / Reduces Wildlife Hazards
e) Promotes Landscape / Vegetation Management
f) Reduces Solid Waste / Enhances Recycling
g) Enhances Management of Hazardous Materials / Chemicals
h) Conserves Natural Resources
i) Utilizes Renewable Energy

4) Social Responsibility

a) Compatible with Nearby Land Uses
b) Benefits / Supports Community
c) Improves Quality of Life (e.g., Noise, Stormwater & Air Quality)
d) Enhances Employee Welfare
e) Promotes Diversity / Environmental Justice
f) Benefits Education & Public Outreach
g) Public Relations Opportunity
h) Innovative / Aviation Industry Leading
i) Enables Transparency / Facilitates Information Sharing
j) Results in Regional Economic Benefit