Section One

# SUSTAINABILITY MANAGEMENT SYSTEM REFERENCE DOCUMENT

ABQ INTERNATIONAL SUNPORT

Sustainable Airport Master Plan


JACOBS
CONSULTANCY

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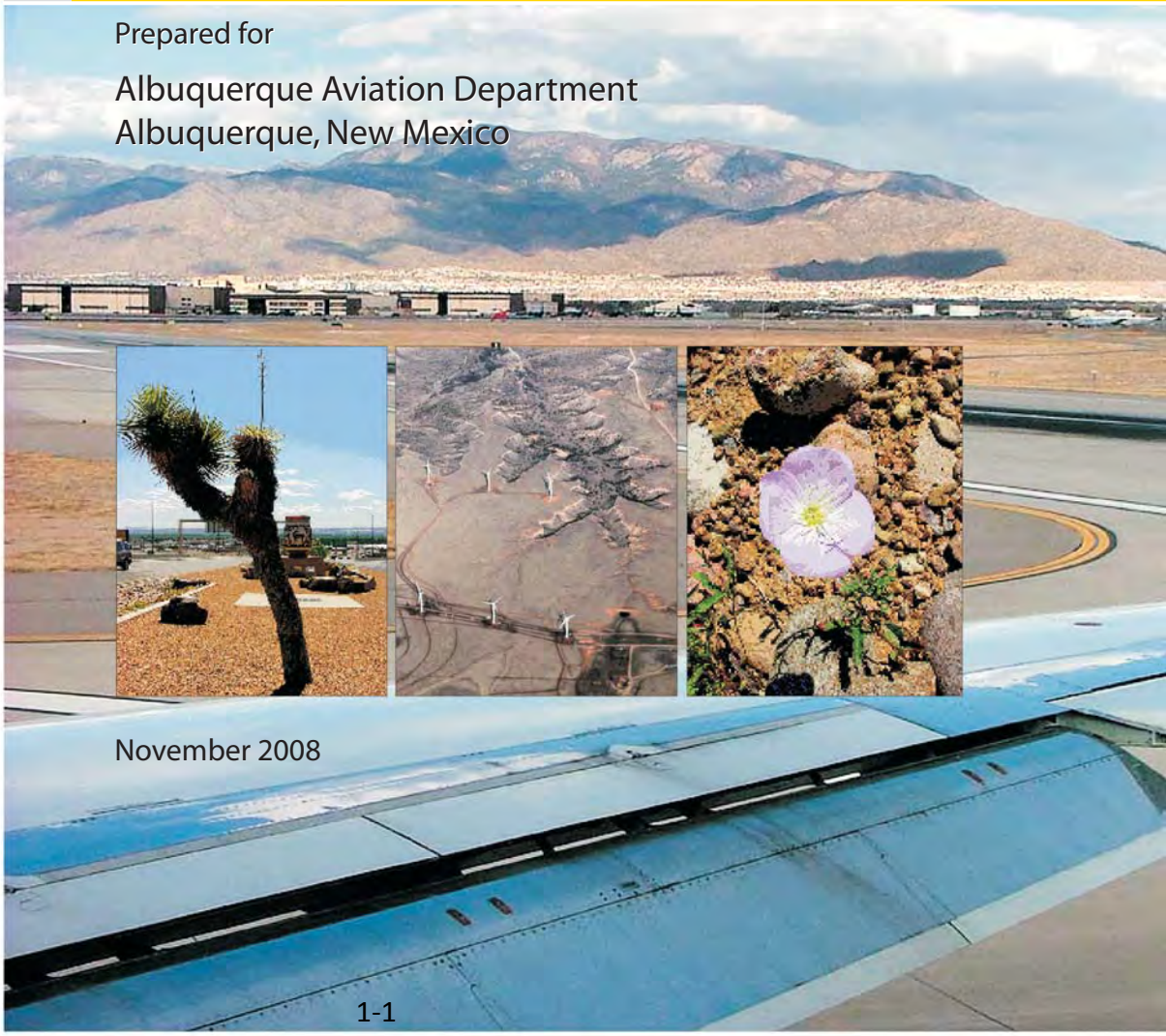
# SUSTAINABILITY MANAGEMENT SYSTEM REFERENCE DOCUMENT

## Albuquerque International Airport

Prepared for

Albuquerque Aviation Department
Albuquerque, New Mexico



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# Chapter 1

# INTRODUCTION

The City of Albuquerque (the City), owner of Albuquerque International Sunport (ABQ or the Sunport) and Double Eagle II Airport (collectively, the Airport System), has undertaken a sustainability program with the goal of operating the "greenest" airport system in the country. There is a broad and supportive context for this goal, given the City's considerable sustainability accomplishments.

The City's Aviation Department, operator of the Airport System, has identified sustainable management as a tenet of a proactive approach to conducting the business activities of both system airports. This approach involves leading a cultural change among Airport System staff so that sustainability becomes increasingly integrated into daily decision-making.

The City retained Jacobs Consultancy to assist with development of a management system that incorporates sustainability into the Aviation Department's daily business decisions. This Sustainability Management System (SMS) requires (1) Aviation Department executive management to embrace sustainability as a priority, and (2) participation by all key Asset Managers.

A number of elements are involved in implementing a functional SMS, including:

- Documenting existing sustainability practices
- Setting goals and objectives
- Performing a gap analysis
- Achieving management commitment to sustainability
- Developing tools for financial analysis
- Delineating staff roles and responsibilities
- Establishing performance metrics
- Developing a communications program
- Developing a sustainability policy
- Training staff on the SMS
- Continuing evaluation and improvement of the SMS

This document explains the importance of these key elements and is intended to serve as a reference manual for the integrated implementation of these elements. This document is not a "how to" guide for achieving these key elements; it is a complementary tool to support staff training and communications programs. Aviation Department management will need to address culture change, which will be accomplished primarily through education and coordination.

This document is intended to support implementation of an SMS for the Albuquerque Airport System. Shortly after its implementation, the SMS is expected to become a 'living and breathing' feature of the Aviation Department's culture, which will grow in complexity and further penetrate organizational behavior over time.

## AVIATION SUSTAINABILITY

Around the world, the aviation industry is rapidly integrating sustainability concepts into all aspects of its operations. Implementation usually includes a strategic element in which the organization's management sets a policy direction followed by tactical measures that include specific actions for implementation.

- **At airports,** there is a wide-ranging and growing commitment to sustainability. Use of Leadership in Energy and Environmental Design (LEED™) as a standard for new facilities is increasing, although it only marginally addresses aviation issues.

- **At airlines,** fleet modernization and significant operational changes are improving efficiency and reducing the use of natural resources.

- **At aviation equipment manufacturers,** more sustainable products are being developed along with consideration for the environmental impacts related to end-of-life disposal.

Sustainability for airports involves developing a systematic approach to responsibly address the concerns of stakeholders regarding economic, environmental, and social impacts of airport operations. While the concept of sustainability includes achieving a balance among these impact areas, the way this balance can be achieved may vary from airport to airport. Each of these impact areas is of vital importance to the airports and their surrounding communities.

- ***Economic*** refers to the continued business viability of an airport enterprise, the tangible assets created by capital investments at the airport, and the direct and indirect economic impact on the region. This impact includes the value added to public and private sectors through investments in partnerships, tax payments, and other contributions.

- ***Environmental*** refers to the natural resources that are used or affected as a result of airport operations and the ecosystem in which these resources are located.

- ***Social*** refers to contributions to the surrounding community via practices that promote social interaction and the cultural enrichment of the region.

## SUSTAINABILITY MANAGEMENT SYSTEM

A Sustainability Management System is a method of consistently and uniformly applying sustainability to daily business decisions.

An SMS does not prescribe how business decisions will address sustainability, but instead prescribes the methodology for making sure that sustainability is a factor in business decisions.

- An SMS is best implemented by encouraging all staff to make a mental leap toward recognizing sustainability as a driver of, rather than a barrier to, innovation. This recognition will enable staff to see the inherent opportunities and potential for growth, continually improving the system in the process. Similarly, Aviation Department executive management must understand that sustainability is broader than the organization's environmental footprint. Sustainability includes social and economic issues, such as providing good working conditions for employees, respecting the local communities, and acting on opportunities to enhance community culture.

- An SMS is a dynamic system that relies on continual improvement and staff innovation. The organization must draw upon and learn about sustainability developments outside the organization, benefiting from the rapid pace of developments in this field.

- An SMS requires measurable targets to ensure that sustainability is not treated as an add-on, but, instead, viewed as fundamental to creating value in financial as well as environmental and societal terms. Along with setting targets, a system for measuring and documenting progress is required.

Most importantly, any change toward more sustainable innovation needs to be inspired by clear leadership, demonstrated by public commitment, and driven by internal support for those involved in sustainable activities and programs that will further growth. In considering the array of existing management systems, it is recommended that the Aviation Department implement an SMS based on the Plan-Do-Check-Act process that defines most quality assurance methods (e.g., ISO 14001* for environmental management systems). This process is best suited to

* ISO = International Organization for Standardization

organizations where the responsibility for success crosses multiple divisions and chains of command.

## SUSTAINABILITY POLICY

The Aviation Department has already undertaken the important step of developing a sustainability policy statement, which serves as the basis for the SMS. The environmental policy, which was developed in collaboration by the Environmental Manager, key Asset Managers, and executive management, is provided on the following page.

# Sustainability Policy Statement

City of Albuquerque Airport System

**The City of Albuquerque Aviation Department will be increasingly sustainable with regard to natural resource conservation, economic strength and community contributions.**

We will:

- ✈ Establish and meet sustainability targets;
- ✈ Continually improve our sustainability approach and results; and
- ✈ Make informed business decisions that incorporate sustainability factors.

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**Sustainable Priorities**

Albuquerque's unique environmental attributes have been significant factors in its establishment, growth, and development. The Aviation Department will increase its emphasis on sustainability efforts to protect these resources, through the following priorities.

- ✈ The Department will achieve its transportation and economic mission in a manner that demonstrates responsible stewardship with a focus on water conservation, minimizing greenhouse gas emissions and innovation.

- ✈ As it implements proactive sustainable management and practices that continually improve the environment, the Department will contribute to the economic, social, and environmental well being of the City of Albuquerque and the region.

- ✈ The Department will fully comply with all applicable environmental laws, regulations, and other requirements, and will exceed legal and regulatory standards where appropriate.

- ✈ The Department will influence tenants to encourage active participation in the sustainability efforts.

**Management Approach**

The Aviation Department will actively approach environmental stewardship and sustainability using the following principles:

**Establishing Environmental Goals and Targets:** Using innovative technologies and best management practices, the Department will develop, monitor, and regularly review specific activities and programs that improve environmental performance.

**Achieving Continual Environmental Improvement:** The Department will strive to continually reduce the impacts of operations so that it preserves and protects surrounding natural resources through cost-effective *energy use, recycling, water conservation, waste reduction, pollution prevention activities, and procurement of green materials.*

**Using Sustainability in Business Decisions:** The Department will seek to enhance the sustainability of it's airports by incorporating sustainability into daily business decisions.

ALBUQUERQUEGREEN

# Chapter 2

# SUSTAINABILITY GOVERNANCE AND INTEGRATION

Sustainability should be treated as a key aspect of business, with the Director of Aviation and executive management charged with oversight of sustainability performance and strategic review of material sustainability issues. The long-term goal is to fully integrate sustainability issues into the Aviation Department's core business structures and processes, rather than managing them as separate issues. As the Aviation Department moves toward that goal, it is also important to establish sustainability-specific structures and processes. Implementing a sustainability policy for the Airport System, along with monitoring and documenting environmental and socio-economic performance, should be a priority. This chapter has three main components: a discussion of sustainability governance, including ways to integrate sustainability into an organization; a delineation of environmental responsibilities within the Aviation Department; and a guide to establishing appropriate performance metrics to measure achievements in sustainability.

## SUSTAINABILITY GOVERNANCE

An organization's governance and accountability structure is an important pre-condition for integrating sustainability into a range of business processes, and is a key factor in achieving progress on sustainability. Clear accountability and effective oversight help drive improved sustainability performance. Sustainability issues should be a formal part of executive management's agenda when it meets to review strategic and operational issues affecting the viability of the Airport System.

Standard business processes are the platform for integrating sustainability into management practices and decision-making. It is essential that each Division of the Aviation Department be proactive in developing approaches and tools for integrating sustainability into daily work processes. Sustainability factors should be included in setting each Division's agenda and strategic plan through the annual business planning process. Each Division would be expected to develop appropriate sustainability objectives at the Director/Associate Director level (as part of the full set of Aviation Department business objectives), identify and incorporate business-specific sustainability initiatives, and integrate these initiatives into annual business plans and budgets.

### Structures for Managing Sustainability

Typically, a cohesive structure covering both social and environmental sustainability aspects is not in place at airports. Examples of the types of departments that often have individual responsibilities for the management of sustainability aspects are

environment, human resources, communication, operations, maintenance, and public affairs. In all areas, managers and front line staff can contribute to the goal of sustainability by considering social and environmental aspects in business decisions. In this context and on a strategic level, procurement, finance, strategy, and marketing managers can be strong contributors. These managers should view sustainability as a principle in considering long-term effects and indirect/external value aspects in their business decisions. In the context of sustainability management, the importance of buy-in by executive management cannot be over-emphasized.

The Airport System affects the City of Albuquerque economically, environmentally, and socially and it has the opportunity to have a positive impact on the region. Within the context of sustainability, this opportunity can be realized through principled decision-making, systematic engagement of stakeholders, and increased transparency. Traditional governance – that is, the overarching system and processes by which the Airport System is directed and controlled – is a key element of sustainability implementation responsibility. An important part of embedding responsibility within the organization is the provision of an organizational structure and the associated management processes that ensure the employees have a clear understanding of expectations and are then held accountable for making decisions and taking actions aligned with those expectations.

### Objectives Lead to Goals

Objectives in the context of the Sustainability Management System are defined as broad targets for environmental improvement based on the Sustainability Policy Statement (provided in Chapter 1). Goals are defined as specific steps designed to meet an objective. As an example, an environmental objective might be to reduce air pollutant emissions from the airport's vehicle fleet. That objective would be accomplished through a series of goals that might include reducing the size of the vehicle fleet, buying lower emitting vehicles, and reducing the mileage driven.

Executive Management will need to decide how broadly to involve Airport System staff and stakeholders in defining objectives. While high levels of involvement tend to improve the quality of information and decisions, and the level of acceptance, it can consume significant staff time.

Airport Asset Managers should have primary responsibility for identifying goals to meet environmental objectives--for each proposed goal, the necessary resources and anticipated benefits should be identified. The Asset Managers should be directed to present each of these goals to executive management to determine which goals will be relied upon to meet the environmental objectives. The Asset Managers oversee operations and activities at the system airports. For the SMS, the Asset Managers are the "frontline staff" responsible for meeting the program goals on a daily basis.

They set and implement sustainability programs based on departmental needs and overall Airport System objectives. Similar to the Directors, they receive their information from the Finance and Administration Division and use it to evaluate and maintain their goals to ensure compliance with overall Airport System objectives. Further, the Asset Managers are in a position to discover new sustainability initiatives that can be added to the SMS as it matures.

### Distributed Accountability

Distributed accountability is the process of holding individuals responsible for tasks that contribute to a larger goal. To implement such a system, a clear delineation of responsibilities is required. During implementation of the SMS, distributed accountability is required for the system to be successful, and this may require varying degrees of culture change. Without distributed accountability, Asset Managers often incorrectly expect the Environmental Manager to achieve the environmental goals regardless of the level of involvement by the Environmental Manager.

Distributed accountability empowers Asset Managers to make sustainability decisions that are appropriate for their business units. However, with distributed accountability comes a responsibility by Airport System management to provide the requisite support and resources that will enable each Asset Manager to successfully implement the sustainability strategy.

Some elements of accountability are well established through legal requirements and traditional governance practices. Other elements are expanding in response to regulatory and legislative changes, as well as greater societal expectations. The following three concepts underlie all elements of accountability:

- ***Relevance***: Focus efforts on issues that are most relevant to a fiscally, socially, and environmentally responsible Airport System *as well as* stakeholder concerns.

- ***Delivery***: Follow through on commitments and strive for consistency in communications and actions.

- ***Transparency***: Actively communicate performance in a balanced and straightforward manner.

Underlying the decisions on sustainability objectives, including levels of accountability and involvement, are fundamental questions related to understanding the organization's structure. Transparency and predictability of information affect decisions ranging from the timeline for meeting sustainability objectives to the assignments of accountability and the structure of incentives.

Transparency, as it relates to sustainability, includes the degree to which a person understands the factors underlying the sustainability objectives. This understanding is important in developing, monitoring, and analyzing sustainability objectives.

In creating sustainability objectives, it was assumed that the environmental or social impacts could be measured and monitored well enough to establish a future objective. If these impacts are not predictable, managers will feel disinclined to set goals that support achieving the objectives. Aviation Department staff, therefore, must understand the nature of potential sustainability impacts well enough to make reasonable predictions of outcomes and establish meaningful and achievable objectives. Sustainability impacts will never be completely controllable, but the organization should make every effort to manage the activities causing the impacts. Further, it is important that all individuals involved are aware of the frequency and timing of reviews so that compliance with Airport System sustainability policies, and environmental and socio-economic performance, can be monitored.

## KEY ENVIRONMENTAL RESPONSIBILITIES

Virtually every individual who makes business decisions has responsibilities in the sustainability program. However, key individuals in the Aviation Department are especially critical to the success of the sustainability program. These responsibilities are discussed below and summarized in the proceeding organizational chart.

### Director of Aviation

The Director of Aviation is responsible for setting the policy and overall sustainability goals for the Airport System and fostering and promoting sustainable practices within the individual Divisions. The Director of Aviation is also responsible for communicating the Aviation Department's sustainable efforts and results to the stakeholders. Generally, the Director of Aviation should:

- Establish overall sustainability objectives
- Annually approve the sustainability goals recommended by the Associate Directors and Managers
- Provide resources to support sustainability strategies
- Establish incentives and rewards to encourage innovative sustainability programs
- Routinely monitor sustainability strategies
- Communicate efforts to stakeholders

### Associate Director of Airport Operations and Maintenance

The Associate Director of Airport Operations and Maintenance is responsible for fostering and promoting sustainable practices within the individual operating

Divisions. The Associate Director of Airport Operations and Maintenance has responsibility for a vast majority of the activities that result in daily environmental impacts, including the airport operations segment. Additionally, the Associate Director of Airport Operations and Maintenance is responsible for using the Airport System's environmental objectives to set and coordinate environmental goals for the Aviation Department. The Associate Director of Airport Operations and Maintenance should:

- Approve environmental goals for each Division in the Aviation Department
- Promote sustainable practices
- Monitor results of sustainability strategies
- Coordinate sustainability initiatives with the Administrative Division
- Allocate resources to implement sustainability strategies
- Promote sustainable practices and foster a spirit of innovation
- Prepare an annual report on the sustainability program and achievements

# PROPOSED PROJECT ORGANIZATION
## City of Albuquerque Aviation Department
## Sustainability Management System

### DIRECTOR OF AVIATION

- Establish overall sustainability objectives
- Annually approve the sustainability goals recommended by the Associate Directors
- Provide resources to support sustainability strategies
- Establish incentives and rewards to encourage innovative sustainability programs
- Routinely monitor sustainability strategies
- Communicate efforts to stakeholders

### ASSOCIATE DIRECTOR OF OPERATIONS AND MAINTENANCE

- Approve environmental goals for each department in the Operations Division
- Promote sustainable practices
- Monitor results of sustainability strategies
- Coordinate sustainability initiatives with the Finance and Administration Division
- Allocate resources to implement sustainability strategies
- Promote sustainable practices and foster a spirit of innovation
- Prepare an annual report on sustainability program and achievements

### DOUBLE EAGLE II AIRPORT MANAGER

- Establish annual environmental goals for Double Eagle II Airport
- Manage energy and fuel expenditures
- Implement sustainable operational practices
- Monitor and report results from departmental sustainability strategies
- Incorporate sustainability objectives into daily decision making
- Apply triple bottom line and life cycle cost analyses in all capital requests

### ASSOCIATE DIRECTOR OF PLANNING AND DEVELOPMENT

- Establish and approve environmental goals for the Planning and Development Division
- Integrate LEED™/green initiatives into capital projects
- Coordinate sustainability measures among all airport departments
- Monitor results of sustainability strategies
- Apply triple bottom line and life cycle cost analyses in all capital decisions
- Allocate resources to implement sustainability strategies
- Promote sustainable practices and foster a spirit of innovation
- Prepare an annual report on sustainability program and achievements

### ASSOCIATE DIRECTOR OF FINANCE AND ADMINISTRATION

- Establish and approve environmental goals for the Finance and Administration Division
- Coordinate sustainability measures among all airport departments
- Monitor results of sustainability strategies
- Review triple bottom line and life cycle cost analyses prepared by others for all capital decisions
- Allocate resources to implement sustainability strategies
- Promote sustainable practices and foster a spirit of innovation
- Establish green purchasing specifications
- Ensure sustainable purchasing procedures

### INFORMATION TECHNOLOGY PROGRAM MANAGERS

- Establish annual environmental goals for the Technology Division
- Support environmental performance monitoring of other departments through electronic tools
- Implement environmentally friendly office practices
- Provide electronic communication tools specific to the sustainability program
- Provide electronic tools for triple bottom line and life cycle cost analyses

### TERMINAL FACILITIES MANAGER

- Establish annual environmental goals for the Airport Facilities Division
- Implement green custodial practices
- Manage energy and fuel expenditures
- Implement energy and water conservation measures
- Monitor and report results from departmental sustainability strategies
- Incorporate sustainability objectives into daily decision making
- Apply triple bottom line and life cycle cost analyses in all capital requests

### AIRFIELD MAINTENANCE MANAGER

- Establish annual environmental goals for the Airfield Maintenance Division
- Manage energy and fuel expenditures
- Develop programs to support preferential acquisition of green vehicles
- Implement sustainable operational practices
- Monitor and report results from departmental sustainability strategies
- Incorporate sustainability objectives into daily decision making
- Apply triple bottom line and life cycle cost analyses in all capital requests

### OPERATIONS DIVISION MANAGER

- Establish annual environmental goals for Operations and provide appropriate training for Operations staff
- Monitor and observe environmental impacts around the Airport System
- Foster and promote sustainable practices
- Monitor and report results from departmental sustainability strategies

### ENVIRONMENTAL MANAGER

- Establish annual environmental goals for the Noise Abatement Division and help Associate Directors evaluate the benefits of environmental goals established for their respective divisions
- Coordinate with multiple stakeholders to support implementation of sustainability measures
- Serve as a technical resource, assisting airport staff with evaluating sustainable programs
- Keep abreast of current sustainability trends that are relevant to the Department and the region
- Help departmental managers incorporate sustainability objectives into daily decision making
- Develop tools to help Asset Managers to apply triple bottom line and life cycle cost analyses in all capital decisions
- Track and report results of all Airport System environmental programs
- Prepare an annual sustainability report
- Prepare an annual gap analysis

### PLANNING MANAGER

- Establish annual environmental goals for the Planning and Development Division
- Place emphasis on sustainability in all planning and strategy activities
- Monitor and report results from departmental sustainability strategies
- Incorporate sustainablity objectives into daily decision making
- Apply triple-bottom-line- and life-cycle cost analyses in all capital analysis

### HUMAN RESOURCES MANAGER

- Establish incentives to promote sustainability measures and foster innovation
- Establish guidelines for environmental accountability
- Annually prepare a summary of personnel management actions taken to support the sustainablity program

### PLANNING MANAGER

- Apply triple-bottom-line and life-cycle cost analyses in all capital analysis
- Integrate green provisions into all leases
- Promote sustainable tenant practices
- Establish green incentives for tenants.

### LANDSIDE OPERATIONS MANAGER

- Establish annual environmental goals for the Landside Operations Division
- Implement sustainable practices
- Monitor and report results from departmental sustainability strategies
- Incorporate sustainability objectives into daily decision making
- Apply triple-bottom-line and life-cycle cost analyses in all capital requests
- Establishing incentives for cleaner transportation choices

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### Information Technology Managers

The Information Technology Managers are responsible for implementing environmentally beneficial office practices and providing tools to track and monitor the sustainability program. Such environmental programs can be as simple as purchasing Energy Star computers, or facilitating double-sided printing. The Information Technology Managers also play a key role in establishing systems for the tracking and dissemination of sustainability performance data. The key responsibilities of the Information Technology Managers are to:

- Establish annual environmental goals for the Information Technology Department
- Support environmental performance monitoring of other Departments through electronic tools
- Implement environmentally friendly office practices
- Provide electronic communication tools specific to the sustainability program
- Provide electronic tools for triple-bottom-line and life-cycle cost analyses

### Terminal Facilities Manager

The Terminal Facilities Manager is responsible for implementing sustainable and environmentally friendly practices in the passenger terminal area. The Terminal Facilities Department is responsible for some of the most environmentally important activities, making this Department key to success of the overall sustainability program. Activities overseen by the Terminal Facilities Manager include reducing the environmental footprint of the terminal. The Terminal Facilities Manager should:

- Establish annual environmental goals for terminal facilities
- Implement green custodial practices
- Manage energy and fuel expenditures related to terminal operations
- Implement energy and water conservation measures
- Monitor and report results from Departmental sustainability strategies
- Incorporate sustainability objectives into daily decision-making
- Apply triple-bottom-line and life-cycle cost analyses in all capital requests

### Airfield Maintenance Manager

The Airfield Maintenance Manager oversees activities that include managing energy and fuel expenditures and ensuring that green vehicles are being used for airport activities. Additionally, the Airfield Maintenance Manager uses best practices to minimize pollution from airfield operational activities (e.g., painting, pavement rubber removal). The Airfield Maintenance Manager should:

- Establish annual environmental goals for the Airfield Maintenance Division
- Manage energy and fuel expenditures related to airfield operations
- Develop programs to support preferential acquisition of green vehicles
- Implement sustainable operational practices
- Monitor and report results from Divisional sustainability strategies
- Incorporate sustainability objectives into daily decision-making
- Apply triple-bottom-line and life-cycle cost analyses in all capital requests

### Operations Manager

The Operations Manager monitors and observes daily airport activities and has the responsibility of running a Division that is educated on sustainable practices and whose staff can identify opportunities to adopt new sustainable practices. The Operations Manager should:

- Establish annual environmental goals for the Operations Division and provide appropriate training for operations staff
- Monitor, observe, and report environmental impacts around the airports
- Foster and promote sustainable practices
- Monitor and report results from Divisional sustainability strategies

### Associate Director of Planning and Development

The Associate Director of Planning and Development is responsible for environmental compliance of the Airport System and ensuring that LEED™ and sustainability design practices are integrated into all capital programs and procurements. The Associate Director of Planning and Development should:

- Establish and approve environmental goals for the Planning and Development Division
- Integrate LEED™/green initiatives into capital projects
- Coordinate sustainability measures among all airport departments
- Monitor results of sustainability strategies
- Apply triple-bottom-line and life-cycle cost analyses in all capital decisions
- Allocate resources to implement sustainability strategies
- Promote sustainable practices and foster a spirit of innovation
- Prepare an annual report on the sustainability program and achievements

### Environmental Manager

The Environmental Manager is primarily involved in securing environmental compliance of the Airport System. The Environmental Manager is also involved in implementing and promoting the recycling program, managing the Airport System noise programs, serving as a technical resource on environmental technologies, and

managing data used to report the results from any environmental/sustainable programs. It is recommended that the Environmental Manager be given the responsibility to act as a "sustainability champion" within the Aviation Department. In this role, the Environmental Manager would act as a liaison between executive management policy and goal directives and front line staff responsible for implementation. In fulfilling this role, the Environmental Manager should:

- Establish annual environmental goals for the Noise Abatement Division and help Associate Directors evaluate the benefits of environmental goals established for their respective Divisions
- Coordinate with multiple stakeholders to support implementation of sustainability measures
- Serve as a technical resource, assisting Airport System staff with evaluating sustainable programs
- Keep abreast of current sustainability trends that are relevant to the Aviation Department and the region
- Help Departmental managers incorporate sustainability objectives into daily decision-making
- Develop tools to help Asset Managers apply triple-bottom-line and life cycle cost analyses in all capital decisions
- Track and report results of all Airport System environmental programs
- Prepare an annual sustainability report
- Prepare an annual gap analysis

### Double Eagle II Manager

The Double Eagle II Manager oversees all operational activities at Double Eagle II Airport. Additionally, the Double Eagle II Manager helps identify and implement sustainable measures at Double Eagle II Airport. The Double Eagle II Manager should:

- Establish annual environmental goals for Double Eagle II Airport
- Manage energy and fuel expenditures at Double Eagle II Airport
- Implement sustainable operational practices
- Monitor and report results from sustainability strategies
- Incorporate sustainability objectives into daily decision-making
- Apply triple-bottom-line and life-cycle cost analyses in all capital requests

### Associate Director of Finance and Administration

The Associate Director of Finance and Administration oversees all finance and administration activities at the airports. While these activities do not have the environmental footprint of the Development Division or the Aviation Department, they are fundamental in facilitating the sustainability program. Activities such as

establishing "green" specifications for procurement and ensuring that those specifications are consistently followed are essential for the other Departments to achieve their independent goals. Additionally, the Associate Director of Finance and Administration is involved in setting and coordinating environmental goals for the Airport System. The Associate Director of Finance and Administration should:

- Establish and approve environmental goals for the Finance and Administration Division
- Coordinate sustainability measures among all Airport System Departments
- Monitor results of sustainability strategies
- Review triple-bottom-line and life-cycle cost analyses prepared by others for all capital decisions
- Allocate resources to implement sustainability strategies
- Promote sustainable practices and foster a spirit of innovation
- Establish green purchasing specifications
- Ensure consistent purchasing procedures

### Human Resources Manager

The Human Resources Manager helps align personnel management with the sustainability program. This includes establishing incentives for employees and management to adopt and implement sustainable practices, as well as appropriate consequences for individuals and Asset Managers who fail to meet expectations for the sustainability program. The Human Resources Manager should:

- Establish incentives to promote sustainable measures and foster innovation
- Solicit administrative approval for incentive plans
- Establish guidelines for environmental accountability
- Annually prepare a summary of personnel management actions taken to support the sustainability program

### Business Development Managers

The Business Development Managers perform strategic decision-making and planning that set the course for development of the Airport System, and they are responsible for relationships with Airport System tenants. The Business Development Managers are actively involved in coordinating sustainable practices with daily airport and tenant operations.

The Business Development Managers are also responsible for including provisions in tenant leases that encourage sustainable practices, such as recycling and water and energy conservation. The Business Development Managers should:

- Establish annual environmental goals for the Business Development Division
- Place emphasis on sustainability in all planning and strategy activities
- Monitor and report results from Divisional sustainability strategies
- Incorporate sustainability objectives into daily decision-making
- Apply triple-bottom-line and life-cycle cost analyses in all capital decisions
- Integrate green provisions into all leases
- Promote sustainable tenant practices
- Establish green incentives for tenants

### Landside Operations Manager

The Landside Operations Manager oversees the Sunport's parking lots and ground transportation functions. Typical sustainability strategies for this area include reducing dwell times for drivers departing the parking areas and minimizing congestion at passenger drop-off points. Additionally, the Landside Operations Manager establishes incentives for carpoolers and green vehicles and ensures that energy-efficient lighting is used in parking areas. The Landside Operations Manager should:

- Establish annual environmental goals for the Landside Operations Division
- Implement sustainable practices
- Monitor and report results from Divisional sustainability strategies
- Incorporate sustainability objectives into daily decision-making
- Apply triple-bottom-line and life-cycle cost analyses in all capital requests
- Establishing incentives for cleaner transportation choices

## PERFORMANCE METRICS

A key part of a Sustainability Management System is measuring and tracking performance as the basis for evaluating the efficiency of the Airport System's progress toward improved sustainability. As such, it is important to carefully select performance metrics that are closely aligned with the environmental objectives for the Airport System, and reflect deliberate environmental management decisions of the respective Asset Managers at the airports. Further, the performance metrics must be appropriate to the type of activities and the overall regional environmental context.

### Metrics Overview

The following performance metrics are recommended based on their alignment with the aspects identified in the Sustainability Policy Statement and explained later in Chapter 4: Typically, these metrics will involve some unit of time; it is also

appropriate to use enplaned passengers as a proxy for airport activity levels during a given time period.

*Air Emissions*

This metric focuses on Aviation Department -related activities that generate criteria pollutants and greenhouse gas emissions. Measurement of the tons of criteria air pollutants released captures the Airport System's performance in this category, but the measurements should exclude aircraft-related activities, such as taxiing, landing, and takeoff, and engine run-ups, because the Aviation Department has minimal control over these activities. However, emissions from fleet vehicles, generators, ground support equipment (GSE), and heating, ventilation, and air conditioning (HVAC) systems would be included.

*Water Consumption*

This metric accounts for water consumption associated with facilities, landscaping, HVAC supply, and vehicle and aircraft maintenance. Measurement of gallons of potable water used per unit area and gallons of potable water used per enplaned passenger capture the Airport System's performance in this category. An additional metric should be gallons of gray water or harvested rainwater used per unit area, as this category demonstrates a commitment to renewable resources.

*Energy Consumption*

Energy consumption associated with lighting and the operation of buildings, runways, parking areas, HVAC, and common areas are the subject of this metric. The metric for energy consumption should be total kilowatt hours (kWh) and kWh per enplaned passenger.

*Waste Generation and Minimization*

This metric accounts for solid and hazardous waste generation and minimization. The metric for waste minimization should be tons of waste diverted from traditional landfill disposal.

## Establishing Performance Metrics

Achieving sustainability at airports is a comprehensive process whereby all Asset Managers modify their daily business decisions, operations, and procedures to optimize performance under a common series of sustainability goals and objectives. Establishing performance metrics is an important component of achieving sustainability as it provides the basis for placing accountability with each Asset Manager. As such, it is important to carefully consider whether a performance metric will (a) accurately reflect the actions of an Asset Manager or external trends,

(b) support sustainability goals and objectives, and (c) result in any unintended consequences.

Even in cases where voluminous information exists, tracking environmental performance will not be successful unless the data are collected in a timely manner, put into usable formats, evaluated, and widely disseminated.

***Control***

For the performance metrics to be meaningful, they must include elements that are effectively controlled by the Aviation Department. For example, "total airport air emissions" is not an appropriate metric because such emissions result from aircraft operations over which airport operators have little control. It is far more appropriate to track air emissions from sources that the Aviation Department directly controls (such as GSE). Information must be produced, collected, and analyzed at regular intervals (monthly or quarterly) so that the Asset Manager controlling that element can receive feedback on performance at meaningful intervals. Performance metrics should reflect the full range of operational control; metrics should apply at both the strategic level with the Executive Management down to the tactical level with individual Asset Managers.

***Conversion***

For information to be useful, data must be converted from raw form into meaningful environmental parameters. For example, while recording data from an invoice that displays the total number of gallons of fuel used by the fleet vehicles per month is helpful, it is not sufficient for sustainability evaluations. For fuel usage data to be meaningful, they should be examined in the context of fleet vehicle operations. In this case, if the number of vehicles used during the time period were reported, along with the respective mileage, the Aviation Department could convert the fuel totals into informative numbers, such as gallons per vehicle and gallons per mile. These data are much more likely to reflect deliberate sustainability decisions rather than unintended impacts.

***Tracking***

For a sustainability program to be ultimately successful, performance data must be consistently monitored and disseminated in a timely manner. Additionally, it is preferable to rely on the existing data collection systems in use at the airports. The Finance Division has dealt with much of this type of information in the past and has the available infrastructure to compile and disseminate much of the relevant information. As such, it is recommended that the Finance Division have primary responsibility for compiling and tracking the relevant environmental data. Other Divisions would support the effort to

track performance metrics by providing relevant data that they may be better suited to track (e.g., vehicle mileage). Data should be tracked using simple spreadsheet formats that later can be converted to more sophisticated formats if desired.

### Environmental Information

It is recommended that the Aviation Department collect and analyze data for the following metrics:

- Electrical power use
- Natural gas use
- Water use
- Vehicle fuel use
- Solid/hazardous waste removal
- Recycling volumes

Utility use should be quantified by meters installed at critical locations in the Airport System infrastructure. This sustainability program does not recommend extensive installation of new metering locations, but does recommend understanding what areas are measured by existing meters and then adding meters at additional sites that are deemed important. The intent of monitoring meter readings is to track utility use by key areas, which include:

- Parking structures
- Non-terminal buildings
- HVAC systems
- Runway lighting
- Public terminal areas
- Tenant areas
- Airfield
- Operational areas
- Administrative areas

Fuel use should be determined by a combination of Aviation Department self-reporting and information provided by supplier receipts related to the following:

- Maintenance vehicles
- Airport personnel vehicles
- Emergency vehicles
- Contractor vehicles
- Generators
- Tenant vehicles
- Rental car shuttle buses

Solid/hazardous waste and recycling efforts would be monitored by the Environmental Manager through a combination of tenant surveys and the number of periodic waste removals. Any re-use of materials would be self-reported by the Aviation Department, tenant, or contractor. Information that would be relevant to waste disposal includes the following:

- Vehicle maintenance supplies (oil, tires, etc.)
- Facility maintenance supplies (paints, cleaners, runway rubber removal, etc.)
- Construction materials (lumber, concrete, etc.)
- Food waste (cooking oils and solid foods)
- Recyclables (paper, plastic, glass, etc.)
- Office materials (computers, monitors, etc.)
- De-icing materials

## Action Plan

For the sustainability program performance metrics to be successfully obtained, the flow of information must occur in a timely and structured fashion. The following schedule is recommended as being optimum for the tracking of sustainability information for the Airport System:

***Information Recording – 30 days***

Once environmental data have been obtained, each Asset Manager would have 30 days to record the information into appropriate tracking software (e.g., Excel, Access, or Outlook). Having the data recorded allows for the efficient transfer of information and for future reference. This 30-day period of time includes time for the necessary conversion of the data to a useful form. For example, the electric bill should be converted to a consumption-metric and delineated by operational units or areas, rather than a single cumulative total.

***Information Reporting – 60 days***

Once the environmental data have been recorded and tracked, the Asset Managers would have 60 days to transfer the information to the Environmental Manager. This information would allow the monitoring of current environmental trends at the airports. Again, this information must be in a form that is meaningful. For example, water consumption should reflect gallons-per-passenger rather than an absolute number of gallons of water consumed. The information provided to the City by the Environmental Manager should be related to:

- Meter readings
- Fuel use

- Water use
- Solid waste

### Economic Relationship

While setting and achieving sustainability goals are environmentally important, often the "bottom line" of airport sustainability is complementary to financial goals. Avoiding resource consumption also avoids expenses.

Sustainability efforts can be classified into two main categories based on the financial hurdles to implementation. Some efforts are not costly and require only minor efforts to implement because they are based on education, planning, coordination, and communication (e.g., recycling of common consumer materials in the passenger terminal). Other efforts, however, require large capital outlays to implement (e.g., modernization of HVAC systems).

Performance metrics should reflect these differing financial hurdles to implementation. Efforts that are easily implemented may not deliver the environmental results that would be noticed with a general metric, and perhaps would warrant a separate metric to reflect progress toward a specific strategy (e.g., replacing emergency exit signs may not be noticed on total electric consumption). These smaller strategies need to be accomplished while planning and awaiting funding for the larger strategies.

Likewise, for larger efforts, a performance metric should reflect the triple-bottom-line analysis to track actual performance over an extended period of time.

### Program Management

As previously mentioned, the performance metrics need to be targeted to Airport System staff at both the strategic and tactical levels. The Director of Aviation and the Associate Directors should manage the SMS by addressing the "big picture," which includes setting overall Airport System objectives and, based on returning information, assessing the effectiveness of the SMS and implementing any necessary changes. The Directors receive properly collected and converted information (from the Finance and Administration Division and the Environmental Manager) and make decisions that affect the entire sustainability program.

The following matrix provides an overview of the various sustainability program areas that must be addressed by the Asset Managers on a daily basis.

## MANAGEMENT MATRIX

| Sustainability Element | Asset Manager | | | | | |
|---|---|---|---|---|---|---|
| | ABQ Terminal | ABQ Airfield | ABQ Landside | ABQ Business | ABQ IT | Double Eagle II |
| AIR EMISSIONS | | | | | | |
| Fleet Vehicles | | X | X | | | |
| Generators | X | X | | | | X |
| HVAC | X | | | | | X |
| WATER CONSUMPTION | | | | | | |
| Plumbing | X | | | | | X |
| Landscaping | | X | | | | |
| Oil/Water Separator | X | X | X | | | |
| ENERGY CONSUMPTION | | | | | | |
| Fossil Fuel | | X | X | X | | X |
| Electricity | X | X | X | X | X | X |
| Natural Gas | X | | | X | | X |
| WASTE DISPOSAL | | | | | | |
| Recycling | X | X | X | X | X | X |
| Organic Waste Recovery | | X | | X | | |
| Solid Waste Minimization. | X | X | X | X | X | X |
| Hazardous. Materials Minimization | X | X | X | X | X | X |

IT = Information Technology

# Chapter 3

# FINANCIAL IMPACTS AND ANALYSIS

## INTRODUCTION

Until recently, implementation of sustainable technologies at airports was the exception rather than the rule. However, with improvements in costs, and the growing movement toward environmental and social responsibility, sustainability is rapidly gaining acceptance.

Airport operators have always strived to be good environmental neighbors, but recent trends have led them to seriously and voluntarily undertake responsible environmental stewardship. Additionally, public opinion has forced many companies to favor business opportunities only with green businesses.

Recently, local and state governments and the federal government began to provide incentives for investments in green technology. What were once seen as extreme and reactionary measures legislated in only a handful of states have now become commonplace across the country. For example, the Federal Aviation Administration (FAA) recently introduced the Voluntary Airport Low Emissions (VALE) program, which provides funding to airport operators that desire to purchase green vehicles and GSE.

While the costs of green technologies have been decreasing, the costs of conventional technologies have been slowly increasing. Due to a combination of increased fuel and utility costs and fees associated with taxes and credits, it is not unrealistic to find that "old" technology costs relatively the same as newer, green technology.

It is important to understand the relative costs and benefits of implementing sustainability measures. The process of evaluating SMS costs must be viewed in two different aspects. First, for a given business decision, the costs over the lifetime of the asset (the life-cycle costs) must be quantified. Second, the sustainability program must be assessed with respect to the economic, environmental, and social costs (the triple-bottom-line). In most cases, these comparable techniques allow multiple alternatives to be compared, but, in some cases, an analysis of the life-cycle cost may reveal that long-term costs undermine the viability of a project.

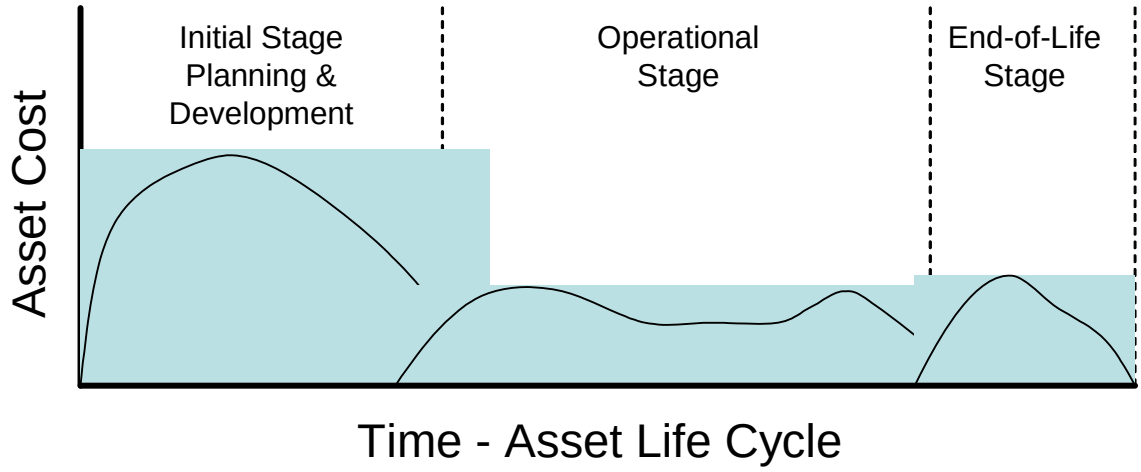
These financial analysis techniques should be understood and used by all of airport Asset Managers as they make daily business decisions and formulate environmental goals and sustainability strategies. The following sections describe the methodology for completing life-cycle cost analysis and triple-bottom-line decision-making.

## LIFE-CYCLE COST ANALYSIS

Over the useful life of a given asset, costs are incurred in several stages. As shown on Figure 3-1, an initial cost is involved in planning, design, purchase, and construction of an asset, which leads to the asset being commissioned for operation. At that point, the asset enters the operational stage where energy and maintenance costs usually predominate. Near the end of the operational stage, a refurbishment effort could lengthen the overall useful life of the asset. Following the operational phase is the end-of-life stage in which decommissioning and disposal costs predominate. The total cost of ownership of an asset is the sum of all costs incurred in these stages.

Figure 3-1

**ASSET LIFE STAGES**




For a given asset, the operational stage can last much longer than the initial or end-of-life stage. If energy and maintenance costs can be significantly reduced over this longer time frame, the cost savings can be substantial. Therefore, evaluating costs in consideration of the total cost of ownership can provide justification for implementing sustainability measures that have substantial initial costs, but result in lower costs during the operational stage.

A life-cycle cost analysis (LCCA) is used to determine the total cost of owning and operating a system, building, or product over its useful life. A comparative LCCA can provide insight into the overall costs of multiple alternative approaches to a project, allowing selection of the design that results in the lowest overall cost of ownership. The ultimate goal of an LCCA is to provide a consistent platform for the financial analysis and comparison of multiple designs that may have different life cycles, capital costs, or operational costs. The LCCA serves as input to the triple-bottom-line evaluation described in the next section.

## When to Use LCCA

The LCCA should be implemented at the Asset Manager level for all capital decisions. The Asset Managers are typically responsible for identifying capital needs and meeting departmental goals. Further, these individuals are most familiar with budgetary, operational, and technological constraints associated with their respective departments. The Asset Managers should also consult with the Associate Director of Finance and Administration and the Environmental Manager for guidance in establishing discount rates and end-of-life disposal costs, and to ensure that the most current planning information is being used.

## Methodology

The LCCA should be performed in conjunction with the business decision to undertake a project. Typically, this occurs early in the planning process to allow for the evaluation of alternatives with the widest range of design, capital costs, and technologies. Before performing an LCCA, the Asset Manager should ensure that the range of alternatives meets programmatic objectives (financial, operational, and sustainability constraints). After a project that meets all constraints has been identified, the Asset Manager can then consider the life-cycle cost implication of the project. The cost factors relevant to a life cycle of a sustainable system or product include:

- Project Formulation and Design
- Procurement, Construction, and Commissioning
- Project Financing
- Operational, Maintenance, and Repair
- Utilities
- Life cycle/End of life
- Replacement
- Disposal
- Environmental Remediation

## Cost Factors

Only the costs that are relevant to the decision and significant in amount are needed to make a valid decision. Costs are relevant when they vary by alternative and costs are significant when they make a noticeable difference in the analysis of an alternative. All costs should be considered in current dollars. Therefore, a discount rate should be applied to future costs so that they are expressed as a net present value (NPV). The following describes some of the aspects of properly characterizing the cost components.

*Project Formulation and Design Costs*

These costs can include planning and programming, as well as any environmental reviews and approvals.

*Procurement, Construction, and Commissioning Costs*

Costs may include capital investments for land acquisition, installation or construction, renovation, and any required ancillary equipment. Construction and renovation costs can be estimated by vendor quotes, using historical data from similar facilities, or from government or private sector cost estimating guides and databases. Installation costs should be available from equipment suppliers.

*Project Financing Costs*

Financing costs or other interest payments should be factored into the LCCA if the project is to be funded by bonds or another debt instrument.

*Operational, Maintenance, and Repair Costs*

Maintenance and repair costs include costs of typical operations, periodic maintenance requirements, and repairs, which may be difficult to estimate. The costs may vary from airport to airport and can be influenced by operating schedules, environmental conditions, and passenger volumes. Costs may be estimated from historical data or from information provided by suppliers.

Even subtle aspects of a project can influence these costs; for example, two building designs may use similar numbers and types of bulbs. However, if light fixtures are placed on a high ceiling in one design, requiring mechanical lifting devices to change light bulbs, and bulbs can be changed by a janitor on a step ladder in the other design, the maintenance costs of the two alternatives will differ significantly.

*Utility Costs*

Energy costs may be clearly defined, or may depend on an overall larger structure or system. However, to the extent possible, utility costs should be quantified in the LCCA. For example, the energy required for an HVAC system, when it is not separated from the other energy requirements of a building, can be calculated from the anticipated thermal loading of a proposed improvement.

*Electricity Costs*

Predicting energy costs requires assumptions about usage and rates. When installing equipment *de novo,* much of the cost information will need to be calculated. Generally, however, historical usage data are

sufficient for estimating the costs of replacing and upgrading equipment.

Quotes of current energy prices from local suppliers should take into account the rate type, the rate structure, summer and winter differentials, block rates, and demand charges to obtain a projection as close as possible to the actual energy cost. Energy prices are assumed to be independent of general inflation rates. As such, the differential energy price escalation should be taken into account when projecting future energy costs. Energy price projections can be obtained either from the supplier or from published energy price escalation rates.

***Water Costs***

Water costs should be projected similar to the way energy costs are projected. Current and projected usage should be based on information provided by an equipment supplier.

***Fuel Costs***

In recent years, the price for petroleum-based fuels has been extremely unpredictable. Future usage rates, however, can be accurately projected from historical data. A conservative pricing assumption may be the safest way to project future fuel costs.

***Life Cycle/End of Life***

When evaluating multiple alternatives that have differing life cycles, the NPV costs should reflect similar time periods. Two fundamental approaches can be used: (1) multiple replacement cycles or (2) quantification of average annual cost. In either case, a "cradle-to-grave" cost should be included in the LCCA to truly reflect the disparate life cycles.

***Replacement Costs***

The number and timing of capital replacements depend on establishing a common time frame for the multiple alternatives and/or establishing a planning horizon for the program or facility. Historical data should provide guidance on the frequency of replacement, but the data can be influenced by operating and environmental conditions.

Consideration should be given to the anticipated life span of the equipment as it relates to the operational timeframe of the overall system. For example, a 100-year roof should not be installed on a terminal building that only has a 50-year functional life remaining. Rather, a single 50-year roof or two 25-year roofs should be considered for replacement costs.

Future replacement costs can be estimated by escalating the current cost to the future time of replacement. With newer sustainable technologies, however, future costs may be more difficult to project. Some newer technologies reduce in price as manufacturing capabilities and availability increase, while others remain unchanged because of constant innovation. The supplier should be able to provide guidance concerning future pricing trends.

*Disposal Costs*

The cost of removing and disposing of both the current and replacement system or equipment should be considered. Costs associated with removal include work hours, utility and aircraft operation interruptions, and passenger inconvenience. Costs associated with disposal include contract vehicle hauling, final destination charges, and fees associated with hazardous materials disposal. These costs may be offset, to some extent, by the residual value (value at the end of the LCCA period) of the equipment being disposed of through resale, scrap, or salvage.

*Environmental Remediation Costs*

Environmental remediation costs are generally associated with installation, operation, and removal of equipment. These costs may include hazardous materials abatement, removal, and cleanup; environmental permit fees; offset/reduction fees; effluent waste control; waste disposal; and taxes.

## Consideration of Externalities

In the context of an operating airport, it is often important to complete life-cycle cost analyses that include many of the costs and benefits borne by external parties. As an example, the provision of preconditioned air at jet bridges is a fiscally prudent method of reducing auxiliary power unit consumption of jet fuel. However, if an LCCA were conducted for this project without any externalities (just the airport's bottom line), reduced jet fuel consumption by the airlines would not show any benefit to the airport enterprise. As such, first-tier externalities should be considered in many airport life-cycle cost analyses; that is, the project's impact on the cost for airlines to operate at the airport should be considered.

## Life-Cycle Cost Calculation

All costs should be calculated in NPV, which compares the value of a dollar today to the value of a dollar at the end of the LCCA period. The formula for calculating NPV is:

$$PV = \frac{FV}{(1+i)^n}$$

Where:

PV = Present value
FV = Future value
i = Discount rate
n = Number of years between the present value and future value

Once the cost factors have been determined, they should be summed according to the following equation:

$$\mathbf{LCC = I + Op + EoL}$$

Where:

LCC = Life-cycle costs in current dollars
I = Initial costs
Op = Operational costs
EoL = End-of-life

## LCC Example

The Aviation Department would like to install a new roof on a building (building has a 50-year functional life remaining), which is more environmentally friendly and contains solar panels to supply electricity to the entire airport. The Aviation Department has calculated the following costs (the numbers are arbitrary for purposes of this example):

***Construction Costs***—installation of the new roof would cost $20,000 and the solar panels would cost $100,000

Const = $120,000

***Financing Costs***—financing costs for the project would amount to $5,000

Fin = $5,000

***Total Initial Costs***

I = $125,000

***Operational, Maintenance, and Repair Costs***—the roof and the solar panels over the 50-year life would have present maintenance and repair costs of $20,000 and $50,000, respectively.

OM&R = $70,000

***Replacement Costs***—in the alternative being considered, it was assumed that the proposed long-life roof has a life-cycle consistent with the 50-year building life. Thus, no replacement cost is anticipated.

***Utility Costs***—the solar panels would supply any lighting requirements for the roof. The solar panels would also reduce the annual costs of electricity for the entire airport by $6,317. With a discount rate of 6%, this equates to an NPV of $100,000 for utility costs.

U = -$100,000

***Total Operational Costs***—the sum of utility costs and operational, maintenance, and repair costs.

Op = $ -30,000

***Disposal Costs***—disposal of the existing roof and the new roof would cost $10,000 and $15,000, respectively

Dis = $25,000

***Environmental Remediation Costs***—hazardous materials abatement procedures for roof removal (asbestos, etc.) would cost $20,000.

Env = $20,000

***Residual Costs***—the roof and solar components could be reclaimed and resold for $40,000.

Res = $40,000

***Total End-of-Life Costs***—the sum of disposal, remediation, and residual costs.

EoL = $85,000

Substituting the costs into the LCC equation:

LCC = $125,000 - $30,000 + $85,000
**Total life-cycle-cost = $180,000**

*Conclusion*

This example should demonstrate that many of the cost considerations related to a project occur well after initial construction, and meaningful differences between alternatives that otherwise would appear to be similar could be identified using the LCCA methodology.

## TRIPLE-BOTTOM-LINE ANALYSIS

Sustainability is not isolated to environmental concerns; rather, principled decision-making is based on responsibly balancing the economic, environmental, and social impacts of a decision—the triple-bottom-line. By making decisions in consideration of all three components, airport management begins to focus on accountability to stakeholders.

The triple-bottom-line process does not dictate a preferred alternative or approach. It is a process that fully discloses the impact of a project in each of the three impact categories. The balance among the categories is project-specific and varies depending on the project under consideration and the issues involved at any given time. This process allows an airport operator to maximize economic capital while simultaneously maximizing environmental and social benefits. The essence of the triple-bottom-line is that an airport enterprise can be environmentally responsible while also maintaining economic stability and enhancing the community and culture.

### Economic Capital

Economic capital relates to the assets created by capital investments made by an airport operator. These assets include both enhancements to the property, facilities, and infrastructure and the beneficial impacts of community employment and other business ventures. Additionally, sustainability increases economic capital within the local community. By implementing and investing in environmentally responsible technologies, businesses profit through procurement and citizens and government profit through the decreased economic burden associated with environmental impacts.

Returning to the previous example of the new roof, installation of solar panels would have the potential to generate significant economic capital. The initial costs of installation would be relatively high, but monetary savings would begin almost immediately. Every kilowatt generated by the solar panel system would be a kilowatt of electricity for which the airport operator is not being billed. While the system is initially expensive, the economic benefits would pay for the system over time.

### Environmental Capital

Environmental, or natural, capital relates to both "goods" and "services" of natural resources and is a measure of an entity's ecological "footprint." A smaller footprint represents a larger amount of capital. Environmental goods include natural resources that are consumed by human activities and can be finite (coal, oil, and clean water) or infinite (solar and wind power). Environmental services describe the ability of the natural environment to provide benefits and protection to humans, such as wetlands, the ozone layer, and carbon sinks. In the absence of proper environmental responsibility, these goods and services can be irretrievably consumed, thus lowering the available environmental capital not only for an airport, but also for the planet.

An airport operator increases its environmental capital of the airport by implementing a sustainability development program. The program promotes natural resource conservation, lessening human impacts to the environment, protecting environmental services, and increasing the use of renewable energy sources. For example, if an airport operator were to implement solar power technology, its reliance and use of electricity would be reduced, thereby reducing the burning of fossils fuels at nearby power generating stations. Environmental capital would be increased through the decreased use of non-renewable energy resources.

### Social Capital

Social capital is the ability of the local community to benefit from the activities of an airport. The community benefits from the interaction of its citizens with an airport through employment, enhanced infrastructure, and the feeling of a worldwide connection. Often, these benefits are difficult to discretely quantify, but generally appear in the form of community support. Implementation of the sustainability program creates a sort of symbiosis, or giving-back, whereby the local community benefits from positive airport environmental policies and programs and the airport benefits from the increased support of the local community.

A good example of social capital would be the display of regional art and artifacts at an airport, strengthening knowledge of the rich cultural heritage of the area. The airport would be viewed benevolently by the community (rightly so) for being culturally supportive. In return, the community would be more supportive of future airport improvements.

### Analysis Example

The Aviation Department would like to install new flooring in the passenger terminal area. After viewing many flooring options, the Aviation Department has narrowed the choices to one of the following two options:

- A high quality synthetic indoor/outdoor carpet that is specifically made for high traffic areas. It has special coatings to resist stains. The carpet is produced in California and a life-cycle-cost analysis has determined that the NPV of using the carpet over the 25-year life of the building would total approximately $375,000. Due to wear from large volumes of foot traffic, this price includes the need to replace the carpet every 5 years. This NPV also reflects the need for additional cleaning and maintenance associated with carpeting.

- A modern terrazzo tile that is especially strong and resistant to breakage. The tiles are made of a special composition of clay and minerals found only in the Southwest that prevents fracturing. The tile is produced locally and a life-cycle-cost analysis has determined that the overall cost would total approximately $400,000. It is estimated that the tile breakage and replacement rate is 10% per year.

A purely numerical analysis indicates that the carpeting is the better choice. Over the 25-year life span, the carpeting would need to be replaced five times, costing $375,000 (NPV), while the tiles would not need to be replaced, but would still cost $25,000 more than the carpet. A triple-bottom-line analysis, however, discloses not only the numerical costs involved in the decision, but also other economic, environmental, and social considerations.

***Economic Capital***

Over the building life, the carpet would cost $375,000. The money goes to a California company and the carpet is delivered by an out-of-state driver. Disposal of the carpet is final and, as there is no local recycling facility, nothing is expected to be reused. Operations in the building would be disrupted every 5 years for carpet replacement. The comparative life-cycle cost analysis has less certainty for this alternative, because much of the future costs for shampooing and routinely vacuuming and cleaning the carpet are speculative and subject to assumptions about inflation and discount rates.

Over the building life, the tiles would cost $400,000. The money goes to a local business and the tiles are delivered and installed by local contractors. This cost includes paying local firms to repair and replace broken tiles. Once the tiles are removed, they are recycled, continuing to be a resource.

***Environmental Capital***

The carpeting is made of synthetic fibers and has a special chemical coating. The production of both generates emissions of toxic hydrocarbons. The carpet is laid with heavy-duty synthetic glue. Once installed, the carpet and glue continue to emit toxics as the coating wears off and evaporates in the passenger area. Removal of the carpet (after 5 years) creates additional releases of toxics and fine synthetic particles.

Disposal of the non-biodegradable carpet in a local landfill results in a large volume of waste. This process is repeated every 5 years.

The tiles are made from naturally occurring materials (clay and minerals). Baking the clay generates no toxics, but requires substantial heat generated from fossil fuels, which results in the release of carbon dioxide. The tiles are applied with mortar, made of naturally occurring materials. Once the tile is no longer serviceable, it is removed by hand and can be crushed for recycling into more tiles or for other applications. This life cycle covers the life span of the building.

***Social Capital***

The carpeting is produced in California and shipped for installation by local contractors. The carpet has a modern, but neutral appearance. Local residents and passengers would hardly notice it.

The tiles are made by a small local company. They are somewhat ornate and add a southwestern style to the Sunport that is characteristic of Albuquerque. Residents and passengers might notice the uniqueness of the tile. This purchase would be a meaningful investment in the local culture.

***Conclusion***

The choice of flooring will require Aviation Department management to make a judgment that reflects its priorities for the Airport System. The triple-bottom-line analysis identified information that is pertinent to external stakeholders. Airport management can evaluate both flooring options in the context of stakeholder concerns and corporate responsibility and thereby make an informed decision.

# Chapter 4

# ENVIRONMENTAL PERFORMANCE – PERSPECTIVE AND OPPORTUNITIES

This chapter is intended to provide context for the environmental performance of the Albuquerque Airport System by examining the efforts at other airports that are perceived as national leaders. When compared to those efforts around the country, it is clear that important initiatives to improve environmental performance have already been undertaken at the Albuquerque Airport System. This chapter identifies some additional opportunities to improve the environmental performance of the Airport System.

## BENCHMARKING INDUSTRYWIDE SUSTAINABILITY INITIATIVES

Sustainability practices vary from airport to airport depending on a number of factors, such as local climate, airport and tenant business practices, aircraft and passenger traffic volumes, and local political considerations. As such, it is not possible to adopt a "one size fits all" approach to sustainability for every airport. To assemble a set of appropriate measures for the Airport System, sustainability initiatives implemented at a number of airports worldwide were reviewed. From that review, current best practices in the industry were determined and used to establish benchmarks for future sustainability efforts in Albuquerque.

It should be noted that sustainability is a recent, but increasingly popular, trend in environmental stewardship and corporate responsibility. Many emerging ideas have only recently been implemented at certain airports and the results from these efforts may not yet be documented and some environmental improvements resulting from sustainability initiatives may not be fully accomplished. Nonetheless, the data present an accurate portrayal of sustainability efforts in the industry.

Given that sustainability implementation is fairly recent, actual data concerning the effectiveness and benefits of the measures vary from airport to airport. One important goal of this project is to assist the City of Albuquerque and the Aviation Department in establishing appropriate methodologies to track the effectiveness of sustainability measures.

The sustainability practices at five large airports in the United States were reviewed; those airports include Salt Lake City International Airport (SLC), Denver International Airport (DEN), Dallas/Fort Worth International Airport (DFW), Seattle-Tacoma International Airport (SEA), and San Francisco International Airport (SFO). In addition, sustainability data from Santa Barbara Municipal Airport (SBA), which is notably smaller than ABQ, were reviewed. For a comparison of domestic versus international sustainability efforts, information from Vancouver International Airport (YVR) and London-Heathrow Airport (LHR) were also reviewed.

### Salt Lake City International Airport

The Salt Lake City Department of Airports operates Salt Lake City International Airport, which accommodates over 22 million passengers per year, and has successfully integrated many of the City's "green" initiatives into its operating practices. The Department of Airports has adopted a "holistic" approach to environmental management by addressing not only the individual elements of airport operations, but also how the separate elements inter-relate with the total system. The Department has applied sustainable concepts to a wide range of airport functions, such as management, conservation, waste minimization, and planning and development. Some of the concepts that the Department of Airports has implemented include:

- Environmental Management System
- Use of alternative vehicle fuels
- Underground storage tank upgrades and monitoring
- Drip irrigation
- Alternative landscaping/xeriscaping
- Recycling and reduction of office, maintenance, and construction materials
- Composting of organic materials (food, coffee, etc.)

By holistically addressing environmental management, the Department of Airports has accomplished the following sustainability improvements at SLC since 2001:

- Conversion of over 12 acres to water-conserving landscapes, which has resulted in a savings of 197 million gallons of water.
- Upgrades and retrofitting of lighting systems in response to tenant needs that have resulted in more than $14,000 in energy savings per year.
- Installation of water-conserving plumbing fixtures in all public restrooms, which has resulted in a 50% reduction in water usage.
- Use of 175,000 gallons of compressed natural gas (CNG) to fuel SLC's fleet of buses, which has resulted in a reduction of 10,000 pounds of air emissions per year. (In recognition of this, the Department received 80 alternative fuel vehicle credits from the U.S. Environmental Protection Agency [EPA].)
- Reuse of more than 80% of construction material from civil projects, which has resulted in a savings of approximately $800,000 in disposal fees.
- Retrofitting of existing heating boilers with new cleaner burning elements, which has resulted in meaningful reductions of nitrogen oxides ($NO_x$) and sulfur dioxide ($SO_2$) emissions.

- Installation of a building automation system to manage and conserve energy consumption throughout the airport property, which has resulted in improved operational efficiency and reduced operating costs.

### Denver International Airport

The City and County of Denver's Department of Aviation operates Denver International Airport, which accommodates 48 million passengers per year. The Department uses an Environmental Management System that assists in environmental management and operational efficiency by outlining a series of guidelines, procedures, and processes addressing environmental impacts in day-to-day business activities. The Environmental Management System is updated annually and a number of sustainable concepts have recently been integrated into it. Some of the concepts that the Department of Aviation has implemented include:

- Solid waste reduction and recycling
- Enhanced aircraft deicing recovery
- Emissions Permit Program
- Environmental outreach programs for tenants and employees
- Ozone Depleting Compounds Program
- Motor Vehicle Emissions Inspection Program

By implementing these sustainability programs, the Department of Aviation has accomplished the following at DEN since 2001:

- No notices, violations, or financial penalties from state or federal environmental regulatory agencies.
- Alternative fuel vehicles account for 64% of the total fleet.
- Use of DOW 1000 brake fluid, which is a mixture of glycols and ethers. (The Department previously paid for the disposal of used brake fluid, but now the fluid is placed into a tank for recycling at no cost.)
- Capture of 69% and recycling of 42% of total applied deicing fluids resulting in an annual savings of over $500,000.

- Recycling of over 500 tons of cardboard, newspaper, aluminum, and other recyclables for a total net annual savings of $27,000.

### Dallas/Fort Worth International Airport

The Dallas/Forth Worth International Airport Board operates Dallas/Fort Worth International Airport, which accommodates over 60 million passengers per year. The Airport Board has implemented a comprehensive Environmental Management System, which serves as a platform for environmental excellence at DFW and advances the principles of sustainability. The Airport Board has focused increasingly on life-cycle cost analysis as an important sustainability concept. Some of the sustainable principles that the Airport Board has implemented include:

- Airport Clean Fleet Program
- Environmental Stewardship Training Program
- Centralized preconditioned air system
- District Energy Plant Upgrade Project

By implementing these sustainability programs, the Airport Board accomplished the following at DFW from 2001 through 2006:

- Captured and treated over 5 million pounds of deicing fluids
- Reduced DFW's energy footprint by 25 MM BTU
- Recycled 355,000 tons of construction debris
- Recycled 6,000 gallons of oil annually
- 86% reduction in emissions from complete boiler/chiller replacement

### Seattle-Tacoma International Airport

The Port of Seattle Aviation Division operates Seattle-Tacoma International Airport, which accommodates over 29 million passengers per year. The Aviation Division seeks to continually integrate responsible environmental stewardship with efficient airport business practices, which include a variety of sustainability practices (*Port of Seattle 2006 Report to the Community*, 2006). Some of the practices that the Aviation Division has implemented include:

- Energy conservation and alternative energy use
- Solid Waste Reduction and Recycling Programs
- Hazardous Waste Reduction Program
- Water Conservation Program
- City-to-airport mass transit system

By implementing these sustainability programs, the Aviation Division has accomplished at SEA include the following:

- Implementation of "pay as you throw" incentives for tenant waste reduction
- Annual recycling of more than 1,200 tons of solid waste
- Annual conversion of over 12,000 gallons of tenant cooking oil into bio-diesel fuel
- Processing of over 10,000 tons of contaminated waste into concrete aggregate
- Replacement of over 2,000 incandescent bulbs with high efficiency bulbs
- Installation of motion-sensitive lighting
- 25% of energy generated from renewable sources
- Photocell control of terminal lighting

### San Francisco International Airport

The Airport Commission of the City and County of San Francisco operates San Francisco International Airport, which accommodates approximately 35 million passengers per year. The Airport Commission integrates environmental sustainability efforts into SFO operations on a daily basis and through all of its airport departments to minimize the impact of its operations on the environment. These operations include administration, business and finance, and planning. Some of the sustainable concepts that the San Francisco Airport Commission has integrated into airport operations and planning include the following:

- "Green" airport building and facility construction
- Solid Waste Reduction and Recycling Programs
- Energy and Water Conservation Programs
- Alternative Energy and Fuels Programs

By implementing these sustainability programs, the Airport Commission has accomplished the following at SFO:

- Operation of Air Train, eliminating 200,000 passenger shuttle trips per year
- Ongoing conversion of airport vehicle fleet to CNG
- Retrofit of 83 ground support equipment (GSE) vehicles to propane
- Installation of 50,000 square feet of solar panels on the passenger terminal
- In addition, all energy supplied by hydroelectric and solar sources (a reduction of 56,000 tons of carbon dioxide [$CO_2$] per year)

### Santa Barbara Municipal Airport

The City of Santa Barbara Airport Commission operates Santa Barbara Municipal Airport, which accommodates over 900,000 passengers per year and is currently undergoing a large terminal expansion project. For several years the City has aggressively tackled wetlands and coastal area impacts. Noise impacts have also been a major focus of environmental management. The following sustainable programs have been implemented at SBA:

- Wetlands restoration
- Noise abatement
- Tidal circulation
- Biotic protection

By implementing these programs, the Airport Commission has accomplished the following results:

- Restoration of 25 acres of wetlands
- Removal of several invasive plant species
- Restoration of more than 2 acres of tidal circulation
- Enhanced area landscaping and ecology restoration

### Vancouver international Airport

The Vancouver International Airport Authority operates Vancouver International Airport, which accommodates over 15 million passengers per year. The Authority envisions a sustainable future for YVR and will advance this vision by increasing its contribution to the economic, environmental, and social well being of the Fraser River Estuary, British Columbia, and Canada (*YVR Environmental Management Plan, 2005*). The Authority has incorporated a number of sustainable concepts into its Environmental Management Plan, some of which include:

- Reduction of environmental contamination
- Reduction of hazardous waste
- Preservation of natural habitats
- Use of alternative energy resources
- Recycling of solid waste
- Improved water quality and conservation

By incorporating sustainability into its Environmental Management Plan, the Authority accomplished the following at YVR in 2005:

- A nearly 1% reduction in $CO_2$ emissions from the airport vehicle fleet relative to 2004
- A 2% reduction in electrical consumption relative to 2001
- A 30% decrease in natural gas use in the domestic terminal since 2001 through solar heating and efficient monitoring and control
- An annual reduction of 800,000 kWh of energy usage from installation of light-emitting diodes (LEDs) for taxiways, efficient terminal lighting systems, and energy efficient computers
- Recycling, composting, or reuse of 31% of the waste generated from the passenger terminals
- Recycling or reuse of 96% of all construction materials

### London Heathrow Airport

BAA (formerly, the British Airports Authority) operates all major airports in the United Kingdom, including Heathrow, Gatwick, Stansted, Southampton International, Glasgow, Aberdeen, and Edinburgh airports. The BAA consortium, operating airports that accommodate over 140 million passengers per year, uses sustainable practices to address climate change and other environmental impacts (*BAA Corporate Responsibility Report 2005/2006*, BAA 2006). BAA has adopted a large number of sustainable concepts from the UK Department of Transportation and implemented them at Heathrow, including:

- Heathrow's Clean Vehicles Program
- Exploration of onsite renewable energy sources
- Participation in the European Union Emissions Trading Scheme (EU ETS)
- Expansion of mass transit
- Recycling of construction and office wastes
- Avoidance of purchasing environmentally sensitive materials

By incorporating these sustainable practices into its current environmental management program, BAA accomplished the following at Heathrow in 2005:

- 20% recycling of all wastes
- A 3% increase in mass transit use since 2001
- On-target $CO_2$ emissions reductions from non-aircraft sources (15% below 1990 levels by 2010).
- Registration of four heating plants with the EU ETS

### Summary

The above summaries demonstrate that a wide array of sustainability initiatives have been undertaken at airports in the United States and around the world. One common theme that is consistent through this diverse set of programs is that the programs and achievements are generally aligned with the concerns of the local community. This alignment specifically involves the relative priority placed on environmental and social improvements.

These programs have a range of maturities, but it is clear that the programs rely on measuring performance, participation by a wide range of airport departments, and a strong commitment to sustainability by executive management. These are important features of an effective sustainability management system.

## ALBUQUERQUE BASELINE ASSESSMENT

Albuquerque International Sunport, owned by the City of Albuquerque and operated by the City's Aviation Department, accommodated approximately 6.5 million passengers in 2007. The passenger terminal encompasses over 570,000 square feet of space, including 23 passenger boarding gates. The Department operates three air carrier runways and one general aviation runway at ABQ. The Department also operates Double Eagle II Airport, a smaller general aviation airport, located on the west side of the city.

Figure 4-1

**ALBUQUERQUE INTERNATIONAL SUNPORT**

The Mayor of Albuquerque recently pledged to implement a variety of environmentally friendly and sustainable measures at all levels of City government. Many of these measures have been adopted by the Aviation Department and developed into the following programs:


- Greenhouse gas emission reduction
- Solid waste recycling
- Energy conservation
- Sustainable development

In the relatively short time that sustainability measures have been implemented, the Aviation Department has accomplished the following:

- Installation of preconditioned air units at all passenger gates
- Robust Passenger Terminal Recycling Program
- Reduction of runway lighting at night
- Enhanced sustainability management
- Coordination with airline tenants on recycling opportunities
- Voluntary purchase of a portion of electricity from renewable energy sources

This list of accomplishments demonstrates that the Aviation Department has already undertaken meaningful sustainability projects prior to implementation of this Sustainability Management System. The accomplishments involve multiple airport departments, demonstrating the importance and capability of all departments to implement a comprehensive sustainability program.

## ENVIRONMENTAL ASPECTS

An environmental aspect is any airport-related activity that has the potential to interact with or create an adverse impact on people or the environment. While some environmental aspects may be beneficial, it is generally the aspects that negatively affect the environment that are considered. Aspects may include regulated or nonregulated activities (airport controlled vs. tenant controlled) and may be active or passive in nature.

The environmental impact of aviation on the City and the surrounding community is the combined contribution of activities by the Aviation Department and airport

tenants (airlines and commercial vendors). Some of the aviation related impacts, however, are not under the direct control of the Aviation Department, but rather are the result of individual tenant activities.

Figure 4-2

**ABQ TERMINAL AREA**

A two-step process was used to assess and select the environmental aspects that are the focus of this sustainability effort. The first step was to survey all aviation-related activities that have the potential to impact the environment. The second step was to evaluate and prioritize the impact categories.

### Criteria for Evaluation of Aspects

The selection of environmental aspects was determined by three factors:

- ***Magnitude of Adverse Impact***—While sometimes difficult to quantify with an absolute number, the relative magnitude of the impact was determined with respect to economics, the environment, and society.

- ***Aviation Department Controllability***—The amount of direct control that can be exerted by the Aviation Department varies according to the asset. The potential ability of the Department to control the environmental aspect was determined by the anticipated relative ease of implementing sustainability measures.

- ***Stakeholder Concern***—Community and governmental concerns were assessed to determine which aspects are of the most regional importance. Further, it was determined whether or not implementation of sustainability measures could adequately address those concerns.

In developing the recommended SMS, environmental aspects that will be measured by performance metrics and subject to active management were prioritized. The Aviation Department will continue to actively manage and minimize the environmental impacts of the nonprioritized aspects. However, these aspects should not receive the same commitment of staff and financial resources as the prioritized aspects.

### Aspects Considered

Albuquerque lies within the northern, upper edges of the Chihuahuan Desert ecoregion, based on long-term patterns of climate, associations of plants and wildlife, landforms, and drainage patterns.

The environments aspect categories that would be applicable in the Albuquerque region were reviewed. A summary of this review follows:

- ***Air Quality***—The U.S. EPA has designated the Albuquerque region as a maintenance area for carbon monoxide (CO). Further, visibility in the Albuquerque region is reduced because of light-scattering air pollution, which, in part, is due to airport-related activities. Air emissions resulting from fuel consumption, use of conventionally powered vehicles, airfield activities, and the use of HVAC systems negatively impact local, regional, and global air quality.

- ***Water Quality and Consumption***—ABQ and Double Eagle II Airport are located in a desert environment and, as such, water resources are scarce and are of great concern in the community. A significant portion of water

resources is associated with airport-related activities, such as the passenger terminal, landscaping, and storm water runoff. The Aviation Department maintains significant storm water runoff facilities.

- ***Waste Generation***—Waste is generated from a wide variety of sources at the airports, including passengers, employees, and tenants. Recycling efforts have been established, but there is a potential to divert larger volumes of waste from landfills or specialized hazardous compounds treatment.

- ***Surface Transportation***—The arrival and departure of passengers, guests, and employees generate significant numbers of trips by privately owned vehicles, which contribute to congestion at passenger drop-off/pickup areas and queues at parking payment locations. A significant portion of vehicle congestion is associated with tenant and passenger activities.

- ***Hazardous Materials Use***—Hazardous materials use can cause local pollution, primarily affecting the surrounding communities and biotic habitats. While some hazardous materials are used for maintenance activities at the airports, most are used by airline and commercial tenants.

- ***Energy Consumption***—Airport-related activities, such as terminal and airfield lighting and HVAC systems, consume substantial amounts of electricity. Large electrical demands cause sizable economic impacts and "downstream" effects on local and regional air quality. Further, electrical consumption is directly related to greenhouse gas emissions.

### Identified Priority Aspects

Each environmental impact category was evaluated against the significance criteria to determine if it should be treated as a high- priority environmental aspect to be recommended for early implementation in the SMS. The prioritized categories were selected in terms of their resulting impacts on economic, environmental, and social resources and based on potential opportunities to improve the Airport System's performance in the aspect through careful and focused management. The fact that some impact categories are not prioritized here does not mean that they are unimportant environmental resources or that they should not be subjected to sustainability strategies.

Based on the three significance criteria (magnitude, controllability, and stakeholder concern), three impact categories were identified as having the highest priority:

- ***Air Quality***—As previously mentioned, the U.S. EPA has designated the Albuquerque region as a maintenance area for CO. This designation indicates that air quality in the region has only recently begun to meet the federally mandated air quality standards. Having a maintenance designation can directly inhibit the ability of the Aviation Department to

undertake Airport System capital projects. In addition to CO, emissions of $NO_x$ and oxides of sulfur ($SO_x$), hazardous air pollutants, and greenhouse gases (primarily $CO_2$) have been targeted for regional air quality initiatives. Airport-related activities directly contribute to regional emissions of these pollutants and also contribute to lower visibility and air quality on local and regional levels and to warming on a global level. Based on present and potential local, regional, and global impacts, air quality was determined to be highly significant.

A variety of efficacious measures exist to mitigate airport-related air emissions, and implementation costs of the solutions range from relatively inexpensive to large capital investments. Additionally, the Aviation Department has substantial control over activities that affect air quality, such as fleet vehicle emissions, generator use, dust control, and parking queues.

An efficient and effective sustainability program can reduce the total amount of air pollutants emitted by airport-related activities and can improve visibility in the region. This reduction would proportionally translate into substantial economic, environmental, and social benefits to the local and regional communities. Additionally, this reduction would benefit the Aviation Department in pursuing future growth by reducing regulatory restrictions on such growth.

- ***Energy Consumption***—The use and conservation of energy are of environmental and economic concern. The desert environment of the Albuquerque region places great stresses on human comfort, which can result in large expenditures of energy through heating and cooling systems. Additionally, the nature of airport infrastructure and operations requires constant demand for electricity for vital services and activities. While increased electrical use primarily has a local economic impact, the environmental impacts of electrical generation are felt regionally and globally. Energy consumption is, to some extent, inter-related with air quality, as conventional power generation is associated with many air pollutants and greenhouse gases.

  As with air quality, a variety of efficient and cost-effective solutions are available to reduce energy consumption, ranging from economical (but effective) energy-conscious planning to larger capital projects. Additionally, the Aviation Department has a significant amount of control over energy expenditures, either directly, through planning, education, and incentives, or indirectly, through tenant leases, education, and incentives.

  Potential sustainability strategies would not only reduce energy consumption, but they would also help reduce the Airport System operating budget, thereby reducing costs and fees for the community.

Additionally, reduced energy expenditures would lessen downstream (local, regional, and global) environmental impacts.

- ***Water Quality and Consumption***—Water is the scarcest resource in a desert environment and its availability and consumption are a serious concern to the Aviation Department and the surrounding community. Water consumption is closely related to passenger volumes and, to a lesser extent, airport landscaping and maintenance activities. While landscaping and maintenance activities may remain relatively constant in the future, as annual passenger totals increase, so will the demand for water. Additionally, the large impermeable tarmac surface areas greatly increase storm water runoff during rainfall events and may negatively impact the local ecology. The Aviation Department has constructed retention basins to minimize peak storm water discharge, reflecting the importance of this impact. Any impacts to water quality and use that affect this scarce resource are a significant concern.

  Measures designed to conserve water and ensure water quality are well known and have been successfully used at other airports and in cities located in desert environments. Additionally, the Aviation Department has a significant amount of control over the use and quality of water resources, both directly and indirectly. The implementation of water quality and conservation measures would have a significant beneficial economic impact on the airports and a beneficial environmental impact on the community and local economy.

While it is critical to immediately focus sustainability management on addressing these aspects, for an effective Sustainability Management System, all aviation-related aspects must eventually be considered.

## INVENTORY AND GAP ANALYSIS

Interviews were conducted with most Asset Managers, covering all key environmental responsibilities for the Airport System. These interviews enabled an assessment of current environmental performance and overall sustainability.

As previously identified in the Albuquerque baseline assessment, it is clear that most operational divisions at the Airport have experience implementing sustainability initiatives and that the Aviation Department has been at the forefront of embracing sustainability. However, during the interviews, it became clear that there are a number of environmental hotspots or "sustainability gaps" in operational practices that present opportunities to implement sustainability measures. It should be noted that these gaps are not compliance related, but they present clear opportunities to optimize environmental performance.

Sustainability gaps exist across the operating structure of the airports, ranging from administrative office practices to tenant conservation measures. Some of these gaps can be addressed immediately, while others require longer-term or intensive efforts. Identification of the gaps allows the Airport System management structure to effectively and efficiently use assets to address existing conditions.

The gaps presented in this analysis align with the environmental aspects previously identified. They include:

- Air quality
- Water quality and consumption
- Energy consumption

## Air Quality

Visibility and regional air pollution are regional concerns and the two airports and their tenants contribute to these concerns. Emissions from fleet, tenant, employee, and passenger vehicles contribute to poor visibility. Additionally, landscaping activities and surrounding environmental conditions are also contributors. Further, electrical consumption causes significant downstream air quality impacts as a result of continuing electricity generation.

### *Gaps*

The following air quality gaps were identified:

- Conventionally powered fleet, tenant, employee, and passenger vehicles
- Outdated and inefficient HVAC systems
- Management of dust generation from airport-related activities

Mitigation of dust generating activities requires careful planning and implementation, but would not require long-term capital investment. However, replacing the conventionally powered vehicle fleet and the inefficient HVAC systems would be expensive, but highly effective, endeavors that require long-term planning and capital resource allocation.

## Water Quality and Consumption

Water conservation is an important environmental concern. Passenger traffic in the terminal area requires sizable amounts of potable water. Additionally, the vast areas of impervious surfaces (runway, parking areas, etc.) at the airports create large volumes of storm water runoff.

*Gaps*

The following water quality and conservation gaps were identified:

- Outdated/inefficient plumbing fixtures
- No monitoring or tracking of airport or tenant water use
- Unused gray water system

Monitoring airport and tenant water use involves installing and reading water meters. While water meters do not provide a direct reduction of water use, they are an essential aspect of managing this scarce resource. The Aviation Department has already installed (1) low-flow fixtures in some areas of the passenger terminal, and (2) landscape piping to support a gray water system. Activating the gray water system is a complicated and expensive task requiring coordination with the City to supply gray water, but at the least, a clear strategy for the eventual use of this asset and environmentally important resource should be in place.

## Energy Consumption

Airports require large amounts of electricity for comfort cooling and heating and for terminal and airfield lighting. HVAC systems are particularly stressed in a desert environment. Large cooling demands during hot months create large financial requirements, especially when coupled with conventional lighting systems.

*Gaps*

The following energy use and conservation gaps were identified:

- Outdated/inefficient HVAC systems
- Airfield lighting with incandescent bulbs
- Conventional sources of electricity
- Lack of energy-saving lighting and equipment (e.g., computers)

Addressing gaps relating to energy use is often associated with large capital projects that require extensive planning. The HVAC system at ABQ is expected to be updated as part of the upcoming Terminal Capital Program. While the HVAC system upgrade and the airfield lighting projects would be costly, they would significantly decrease energy use and create long-term financial benefits for the Aviation Department. Measures such as purchasing renewable energy may carry a cost premium, but can be easily accomplished. Many of the measures associated with energy-saving lighting and equipment can be incrementally implemented and only require revising purchase specifications. Thus, they are relatively simple and inexpensive to implement.

## MENU OF GREEN PRACTICES

The Airport System's sustainability program is predicated on providing a consistent and structured management system for delivering sustainability and environmental improvements. This section is intended to be used as a resource by Asset Managers, providing awareness of emerging environmental technologies that may be suitable for implementation at the airports. Each Asset Manager should continue to actively manage environmental aspects seeking to reduce impacts, but these technologies will help identify potential goals. Asset Managers will be responsible for selecting goals that are aligned with the prioritized environmental aspects during initial implementation of the Sustainability Management System.

### Context for Menu

The following list of green menu strategies includes those that address the prioritized environmental aspects, and those that minimize other environmental impact categories. While the Sustainability Management System is intended to focus the Aviation Department's efforts on making improvements related to the prioritized environmental aspects, green menu strategies for additional impact categories are provided because they generally require minimal resources for implementation.

The following green menu provides sustainability strategies that have been proven at other locations and could be implemented by the Aviation Department, as well as the tenants at both airports, in the immediate/short-term- (0-2 years) and medium- to long-term (2+ years and beyond). It is important to note that some recommended action items in the immediate/short-term are already being implemented. The recommended strategies are presented in the menu along a range of impact categories, many of which are interrelated, to achieve the fundamental sustainability goal of balancing environmental preservation, economic and operational performance, and social responsibility.

The following section should serve as a longer-term reference manual for Asset Managers as they implement the SMS. Specific strategies for implementation in the recommended first phase of the SMS are presented in Chapter 5. Asset Managers can draw from the numerous other sustainability strategies identified in the green menu as they set and achieve their environmental goals. This menu should be dynamic and the Environmental Manager should routinely update this green menu to reflect new technological developments.

## ALIGNMENT WITH ENVIRONMENTAL ASPECTS

### Air Quality

The Albuquerque region has been designated as a maintenance area for CO. This designation indicates that the ambient air conditions in the region only recently began meeting federal air quality standards. Regional air quality efforts have also

been initiated to improve visibility in the region. The emissions of $NO_x$ and $S_{ox}$ at the airports directly contribute to the visibility problems.

In addition to focusing on regional air quality issues, the City is interested in reducing the emission of any hazardous air pollutants that could affect airport neighbors. Contributions that can be made at the system airports to improve local and regional outdoor air quality conditions are addressed here. Indoor air quality conditions are addressed later under "Indoor Environmental Quality".

**Immediate/Short-Term Action Items:**

- Provide wire mesh or activated carbon filters for concession exhaust stacks.
- Require the use of construction equipment compliant with US EPA Tier III air quality standards (equipment manufactured after 2004).
- Implement policy that prohibits idling of all Airport System vehicles.
- Designate a cell phone lot.
- Evaluate vehicular idling/circling in the passenger terminal area.
- Pursue VALE funding for all air quality projects.

**Long-Term Action Items:**

- When replacing airport vehicles, purchase electric and alternative fuel vehicles (e.g., hybrid and electric vehicles, vehicles that run on CNG or biofuels).
- Retrofit rental car center gasoline dispensing facilities with Stage II vapor recovery systems.
- Replace diesel-powered emergency generators with lower emission units.
- Install electric rechargers to allow airlines to buy electric GSE.

### Greenhouse Gas Emissions

This environmental aspect relates to emissions of $CO_2$ and other gases associated with global climate change. The Mayor of Albuquerque has identified a reduction in greenhouse gases as a priority and the City has made a commitment as an organization to meet the conditions of the Kyoto Treaty. The following actions are recommended to reduce greenhouse gas emissions.

**Immediate/Short-Term Action Items:**

- Encourage employee trip reductions through carpooling, the use of mass transit, bicycling, or walking.
- Allow for parking payment inside the terminal/pay on foot.

- Encourage/sponsor/participate in community tree-planting programs to assist in $CO_2$ absorption.

**Long-Term Action Items:**

- Contract with firm to sell carbon credits to passengers.
- Incorporate the use of renewable energy sources such as solar, wind, and biofuels.
- Purchase materials that are manufactured locally and have lower transportation costs.
- Install shades on windows in administrative spaces.
- When replacing airport vehicles, consider purchasing electric and alternative fuel vehicles (e.g., hybrid vehicles, electric vehicles, vehicles that run on CNG or biofuels).
- Require rental car companies to rent a specified percentage of clean vehicles.
- Enter into research collaborations (e.g., with Sandia National Laboratories).

### Water Quality and Consumption

The City of Albuquerque receives an average of 9 inches of precipitation each year; therefore, water is a scarce and precious resource. The Aviation Department continually attempts to minimize water consumption at the system airports and seeks to ensure that storm water runoff is as clean as possible. Each of the following options would result in a reduction of potable water consumption and would also improve/preserve overall water quality. Also included in this category are storm water management strategies, such as the control and reduction of runoff, erosion, and sedimentation.

**Immediate/Short-Term Action Items:**

- Expand xeriscape to reduce water consumption.
- Conduct audit of bathroom fixtures and performance of low-flow plumbing fixtures.
- Regularly monitor water consumption.
- Establish water consumption reduction targets.
- Avoid/minimize the use of fertilizers and herbicides in landscaping.
- Use nontoxic cleaning products.
- Install oil/water separators for all areas where hydrocarbons are handled.

**Long-Term Action Items:**

- Implement program to reduce, control, and treat surface runoff.
- Operate a water recycling system (nonsewage wastewater, gray water, and roof water) for onsite use, including landscaping.
- Develop storm water storage system to reduce peak discharge.

## Energy Consumption

Energy consumption results in direct Airport System costs that affect financial performance. The Aviation Department is economically and environmentally motivated to reduce energy consumption. Reducing energy consumption typically also helps reduce greenhouse gas emissions. The options for reducing energy consumption focus primarily on the heating, cooling, and lighting associated with the operation of both airports. In addition to being environmentally sustainable, the responsible consumption of energy would result in an overall financial savings.

**Immediate/Short Term Action Items:**

- Pursue commercial energy rebates from the local utility, as applicable, to support the various possible sustainability practices recommended herein.
- Conduct building energy audits to identify opportunities to reduce energy consumption.
- Purchase electricity generated from renewable resources or low-polluting sources.
- Consider turning off parking garage lights ($4^{th}$ floor) during the daytime.
- Install LED emergency lights at all applicable locations at both airports.
- Use solar thermal energy for hot water heaters.
- Obtain energy consumption reports along with utility bills and distribute to responsible Asset Managers.
- Install lighting control devices, such as occupancy detectors.
- As light bulbs are routinely replaced, purchase/replace with compact fluorescent bulbs wherever possible.
- As computer equipment is replaced, require the purchase of Energy Star products.
- Incorporate a preference for Energy Star products for other purchases.
- Set the computer screen saver option to turn off computer monitors.
- Sub-meter tenant electrical loads.
- Adjust thermostats during the nighttime period of minimal occupancy.

- Select amount of makeup air for the HVAC system based on $CO_2$ measurements ($CO_2$ concentration is a direct measure of terminal occupancy).
- Evaluate ability to turn off lights on Runway 8-26 when the runway is not in use.
- Require Ecostart (motion detector type device) on new escalators.

**Long-Term Action Items:**

- Install equipment to monitor and log energy consumption.
- Replace airfield lighting with LED lights.
- Retrofit older chillers with variable-frequency drives.
- Replace older chillers with new, more energy efficient technology.
- Install variable air volume fans in HVAC system.
- Install a photovoltaic electrical demonstration.
- Evaluate thermal storage system or alternative sources of air conditioning.
- Install Ecostart on existing escalators.

## Surface Transportation

The Aviation Department has minimal direct control over how people choose to access the airports. However, the Aviation Department is able to influence and encourage passengers, employees, and commercial ground transportation providers to participate in its sustainability goals. A program to encourage green ground transportation would have high visibility in the community. Surface transportation sustainability practices affect a broad range of the environmental categories included in this menu, including greenhouse gas emissions, energy consumption, air quality, water quality, and others; therefore, the options presented in this section may duplicate or complement options included under other categories. The following options focus on the use of alternative fuel vehicles (e.g., hybrid vehicles, electric vehicles, vehicles that run on CNG or biofuels) and alternative modes of transportation.

**Immediate/Short-Term Action Items:**

- Encourage alternatives to traditional commuting by promoting mass transit, providing sufficient bicycle racks to meet demand, and designating carpool staging areas.
- Install public showers to encourage bicycling as a mode of transportation for Airport System employees.
- Designate premium employee and public parking for green vehicles.

– Encourage police to patrol on bicycles instead of in vehicles.

**Long-Term Action Items:**

– Purchase electric vehicles, such as golf carts, when appropriate.

– Provide refueling/recharging facilities for green vehicles.

– When replacing airport vehicles, purchase electric or alternative fuel vehicles.

– Encourage taxicab and shuttle bus operators to use clean vehicles.

– Encourage local hotels to consolidate their shuttle bus services.

– Seek improved transit service.

– Consider the purchase of clean buses when replacing the shuttle fleet, and/or retrofitting the existing fleet with clean technology.

### Enhancing Cultural Resources

Cultural resources include both physical sites and the growth of the community. Facilities include, for example, archaeological resources and historic objects, buildings, structures, and districts. Growth of the community includes community education and outreach. Because of the nature of facility protection, the applicability of this category to airport development is generally related to significant airport expansion projects. Consequently, the following information focuses predominantly on growing/reflecting the cultural resources of the community.

**Immediate/Short-Term Action Items:**

– Organize school tours to showcase the environmental sustainability of the Airport System.

– Work with local museums to expand art/artifact displays in the terminal.

– Organize fair for Airport employment.

– Facilitate public use of the historic terminal building at ABQ.

**Long-Term Action Items:**

– Develop Internet site that lists all Airport System job openings.

– Prepare annual corporate responsibility report.

### Indoor Environmental Quality

This category relates to indoor conditions in a building/office environment, and the potential hazards to health, safety, and comfort associated with those conditions. Indoor environmental quality includes factors such as air quality, lighting, noise levels, water quality, and temperature and humidity control. Following are options

that can be implemented by the Aviation Department to improve the quality of the indoor environment.

**Immediate/Short-Term Action Items:**

- Conduct an audit of the existing ventilation system with regard to maximizing health, safety, and comfort, as well as energy efficiency. Air intakes should be located away from exhaust fans and areas of high vehicular activity.
- Implement a program to limit/avoid the use of cleaning and construction materials high in volatile organic compounds (VOCs).
- Implement a construction management program that ensures the protection of ventilation components during construction activities.

**Long-Term Action Items:**

- Implement comprehensive air quality commissioning program.
- Evaluate the installation of high-performance windows in administrative spaces.
- Adopt the Minimum Efficiency Reporting Value (MERV) standard (e.g., MERV 13) for building ventilation.
- Adopt a building standard that requires the use of sound-absorbing materials and isolate office equipment to minimize noise levels.
- Install an indoor air quality monitoring system for occupied spaces.

### Hazardous Materials Use

It is recommended that the Aviation Department implement actions at the system airports to reduce the use of products containing materials that are harmful to the environment or the public. Following are options to minimize or replace the use of such materials.

**Immediate/Short-Term Action Items:**

- Conduct an inventory of toxic compound use and identify potential for substitution with nontoxic compounds.
- Develop toxicity specifications for the purchase of cleaning products, paints, and adhesives.
- Encourage the use of water-based paints.
- Require that vehicle painting be performed at a shop that has an enclosed paint booth with filtration.
- Avoid the use of chemical paint removers, when possible.
- Avoid the use of chemical fertilizers in landscaping maintenance.

– Use nontoxic cleaning supplies.
– Require tenant reporting of the use of toxic compounds.

**Long-Term Action Items:**

– Conduct a combined inventory of airport and tenant hazardous materials.
– Implement mandatory carpet recycling.

### Recycling and Materials Reuse

Although the two terms are sometimes used interchangeably, it is important to note the difference between *recycling* and *reuse*. Recycling is the reprocessing of materials, whereas reuse refers to the use of materials more than once (either in the same function or a different function). The following strategies are recommended to minimize the waste of potentially useful materials through reuse or recycling. These strategies would also reduce the consumption of the energy and raw materials associated with excessive production.

**Immediate/Short-Term Action Items:**

– Notify staff regarding the ability to recycle toner cartridges And implement such a program.
– Conduct a solid waste audit.
– Prepare a one-page guide and distribute it throughout the airports describing what materials are recyclable and how to ensure proper separation of recyclable and nonrecyclable materials.
– Set the duplex printing option as the default on all staff computers.
– Recycle construction demolition materials when possible.
– Require the recycling of toner cartridges for all printers.
– Periodically evaluate the frequency of the trash pickup program.
– Provide excess food to local shelters.

**Long-Term Action Items:**

– Institute a pay-to-toss system.
– Establish an airline recycling program.
– Develop a comprehensive program for diverting/stockpiling waste that can be used as concrete aggregate.
– Implement a food waste composting program.
– Promulgate a purchase preference for reused or recycled materials.

### Light Pollution

Light pollution refers to excessive artificial light, which undermines the ability to see the desert night sky. The Sunport is located on an elevated plateau, resulting in greater community sensitivity to light pollution.

At an airport, light pollution is typically associated with interior and exterior building lighting, parking facility lighting, streetlights, airfield lighting, and other artificial light sources. The following strategies are recommended to reduce the amount of obtrusive light while enhancing energy conservation practices at both airports.

**Action Items:**

- Conduct lighting audit to identify improvements in the placement of light fixtures for maximum efficiency (allowing for fewer fixtures).
- Ensure that lighting fixtures incorporate shielding and a downward directional pattern.

### Noise Impacts and Compatible Land Use

The following options pertain to actions that the Aviation Department can implement to minimize noise impacts from aircraft operations and ground transportation at ABQ and Double Eagle II. The compatibility of existing and planned land uses in the vicinity of an airport is determined by the extent of the noise exposure associated with that airport; therefore, these options also include measures to control the proximity of incompatible land uses to both airports.

**Immediate/Short-Term Action Items:**

- Evaluate the most recently completed master plans for both airports to ensure compliance with the noise reduction and land use compatibility recommendations contained therein.

**Long-Term Action Items:**

- Limit noise-sensitive developments in the vicinity of the airports by supporting effective zoning regulations.
- Identify areas of potential development surrounding the airports to ensure compatibility.
- Periodically evaluate/update the master plan for each airport to ensure the effectiveness of the noise/land use compatibility recommendations.
- Conduct an Environmental Assessment on the closure of Runway 17-35.

## Purchasing

The long-term sustainability of the Airport System is dependent on effective operational and maintenance practices. It is important that the management staff have direct input regarding the purchase of products and services that are compliant with the goals of this SMS. Following are options that should be considered when purchasing items such as cleaning supplies, office supplies, and maintenance materials.

**Immediate/Short-Term Action Items:**

- Purchase computers and other office equipment from manufacturers that will safely dispose of (or recycle, if possible) old equipment.
- Require Asset Managers to complete life cycle cost analyses for purchase and capital requests.
- Purchase/rehabilitate used office furniture whenever possible.
- Seek out products that are concentrated (i.e., liquid cleansers), thereby reducing the use of packaging materials.
- Maintain a preference for locally sourced materials to stimulate the local economy and reduce excessive transportation associated with shipping.
- Maximize the use of post-consumer recycled paper.
- Use nontoxic cleaning supplies.

**Long-Term Action Items:**

- Use components of existing buildings/structures in new construction whenever possible.

# Chapter 5

# SUSTAINABILITY MANAGEMENT SYSTEM

The recommended Sustainability Management System is based on the City's Sustainability Policy Statement, as well as a review of industry initiatives and local opportunities. This recommended system is important in cultivating the necessary culture change that will lead to long-term sustainability benefits. As sustainability is embraced within the Aviation Department, the supporting decisions and actions ultimately will be much more numerous than those identified in this document.

The success of the SMS will depend on integration of the following organizational and activity plans:

- **Sustainable Organization Strategy Plan** – a plan to align management focus with sustainability
- **Sustainable Initiatives Plan** - an action plan to initiate projects that measurably improve the overall sustainability of the Airport System

**These plans are set forth in the following sections.**

## SUSTAINABLE ORGANIZATION STRATEGY PLAN

Aviation sustainability strategies will continue to mature as industry acceptance becomes more widespread. There is a significant opportunity for the Aviation Department to implement continual sustainability improvements by instilling sustainability and responsible decision-making as a core culture in management of the Airport System.

The organization strategy for the SMS requires accepted responsibility by executive management, the individual Asset Managers, and the Environmental Manager. Each has a part to play in encouraging culture change, leading through example, and implanting specific sustainability strategies.

### Executive Management Role

The SMS, first and foremost, requires an organizational culture change. Executive management has the responsibility for defining corporate culture, allocating resources to priorities, guiding the overall direction of the organization, and leading by example. It is essential to have a comprehensive set of policies and plans in place that explicitly outlines the sustainability goals for the Airport System. The Director of Aviation should develop long-term objectives for the airports.

At the outset of the sustainability program, the role of executive management is to publicly embrace the policy, objectives, and goals, and demonstrate a willingness to provide necessary resources to Asset Managers. Management should integrate the success of sustainability elements in evaluating the success of the Airport System as well as its employees. A system of distributed accountability will be needed to encourage the execution of specific strategies.

In any organization, success starts at the top. Likewise, success in developing a sustainability-focused organization is dependent on executive management embracing the principles. In the Sustainable Initiatives Plan, specific measures are recommended, many of which can be implemented by or for the executive management group. It is recommended that executive management volunteer to be first in implementing appropriate strategies, providing visibility of the importance of sustainability to the entire staff.

### Asset Manager Involvement

Asset Managers are responsible for developing the sustainability goals for their respective divisions. In this document, a reasonable set of first-year goals are suggested, which includes shared responsibility. Following the first year of SMS implementation, however, the Asset Managers should have sole responsibility. Each time a set of goals have been identified, they should be reviewed and approved by executive management**.** After approval, the set of goals are implemented and tracked by the Asset Managers on a continual basis. Executive management should assemble all of the respective department goals and accomplishments into a system-wide annual tracking system.

### Development of Goals

Each Asset Manager is to develop goals that are directly related to his/her specific area of responsibility. Goals should be realistic and within the scope of the Asset Manager's duties and their division. However, the Asset Managers should realize that some opportunities will overlap between divisions, and collaboration on goals and strategies should be rewarded by management.

Goals should be developed so that the desired results can be achieved within a reasonable amount of time. In addition, executive management should encourage flexibility in implementation because many previously unknown factors will be discovered during the process of implementing new sustainability strategies.

Once a comprehensive set of goals has been established, the means of successfully accomplishing the goals should be determined through the development of specific procedures and actions. Guidance should be clear and thorough from beginning to end. Written checklists are recommended as the best strategy for communicating the procedures and actions to staff.

Guidance should be detailed enough to be meaningful to all employees, including new employees. This guidance should also be clear regarding its relation to the goals – a lack of clarity can result in ineffective incentives that undermine the goal (e.g., reducing water consumption per toilet flush by 25% is unacceptable if three flushes are necessary instead of one).

### Review of Performance

Executive management will review and approve the Asset Managers' plans. This review is important to ensure that divisional plans align with the overall objectives of the Aviation Department. It is during this stage that resource needs should be clearly delineated; the costs (and long term cost savings) need to be communicated to executive management so that informed decisions can be made about balancing the allocation of staff, financial, and other resources with the benefits of specific strategies. This process provides an opportunity for executive management to work with the Asset Managers in reviewing performance and revising strategies.

### Implementation of a Sustainable Management System

After approval at the executive management level, the Asset Managers are responsible for implementation of the SMS. For the SMS to be successful, five primary areas should be addressed:

- Internal communication
- Execution of goals
- Monitoring of progress
- Planned flexibility
- Reporting results

***Internal Communication***--For a plan to be successful, the goals outlined in the plan must be clearly and precisely transmitted to all staff. Each employee must be fully cognizant of the goals and his/her respective role in implementing the plan. Employees should be given a document that outlines the objectives of the division, for context, and describes the goals established within their own division. The goals should also be permanently displayed in a common work area for continual reinforcement.

Additionally, as progress is made, the results should be disseminated to all employees. Such distribution gives credit to the staff and credence to the plan, underscoring the importance of each staff member in the success of the sustainability initiative. In this way, sustainability topics and discussions become a regular part of internal communications.

***Execution of Goals***--Execution must be planned by the Asset Managers; however given the emerging nature of the sustainability initiative, the Asset Managers should

also be prepared to modify the implementation plan as needed to respond to actual conditions and new information. The Asset Managers should remind all staff that continued progress and improvements are highly important aspects of sustainability.

***Monitoring of Progress***--The Asset Managers must continually monitor execution of the plan to ensure that progress is being made. A process for daily and monthly monitoring of relevant performance data needs to be established to allow Asset Managers to check progress. Continual vigilance will inform the Asset Managers as to how the plan is working and whether adjustments must be made. Progress monitoring implies the capturing, storage, and reporting of performance data. Each element of the plan should have an associated data set to be captured. Without performance data, it is not possible to assess progress toward achieving established goals or to determine if individual elements result in the expected benefits.

***Planned Flexibility***--The Asset Managers must be prepared to adjust the plan as needed. Being flexible means initially acknowledging that unexpected events will occur, and that the plan can still work if the people involved are flexible to make it work. Once the Asset Managers have determined that a given goal will not be met, corrective measures should be implemented. These measures can include modifying the goal or metrics, changing the schedule for implementation, and altering the staffing and financial resources as needed. Changes in the plan should be communicated to executive management as any modifications may potentially affect the goals of other divisions and/or the entire Airport System.

***Reporting Results***--The Asset Managers must report the results of the plan to executive management on a periodic basis. These results should be summarized on an annual basis so that the achievements of the entire Airport System can be evaluated. Ideally, the Asset Managers should discuss sustainability issues and results monthly with executive management. In this way, all concerned parties are incorporating sustainability into the regular work stream through constant monitoring of the plan. Monthly reporting lets executive management know if the plan is working and when a particular aspect may need adjustment.

## Environmental Manager Responsibilities

The Environmental Manager should be the staff-level champion for sustainability. In this role, the Environmental Manager will be a critical environmental resource available to all Airport System employees. This role includes serving as an internal reference on sustainability, supporting the efforts of the executive management team and the Asset Managers, and serving as an internal troubleshooter for issues related to sustainability goals and objectives. The Environmental Manager is also responsible for monitoring, tracking, and reporting the sustainability efforts to key Aviation Department personnel and outside entities.

### *Technical Resource*

The Environmental Manager is a technical resource for Airport System staff. The Environmental Manager is knowledgeable about current environmental technologies and strategies and can provide valuable guidance to executive management by assisting them in developing sustainability objectives. The Environmental Manager can help executive management determine the scope and feasibility of environmental objectives put forth by the executive management. The Environmental Manager also provides guidance to the Asset Managers by assisting them in developing divisional sustainability goals. The Environmental Manager also assists the Asset Managers in performing life cycle cost and triple bottom line analyses.

### *Coordination/Support*

The Environmental Manager is responsible for providing support to executive management and the Asset Managers so that they may establish and accomplish their goals and objectives. Support is provided by coordinating with internal and external stakeholders to ensure that the sustainability program is responsive to their priorities and those of the City. The Environmental Manager should maintain an open and direct line of communication so that key staff can convey their requests and questions and receive answers in a timely manner.

Additionally, the Environmental Manager is also responsible for coordinating efforts and communication between divisions at the airports. A lack of communication and flow of information due to compartmentalization can hamper overall sustainability efforts. The Environmental Manager acts as a liaison between divisions by coordinating regular conversations and facilitating the flow of information.

### *Monitoring, Tracking, and Reporting*

The Environmental Manager must schedule regular monthly meetings with both the executive management team and Asset Managers to receive and review progress. Relevant environmental and financial data and the status of divisional efforts must be conveyed to the Environmental Manager at these meetings. Assimilation of this data can help the Environmental Manager assess the progress and effectiveness of sustainability initiatives. These meetings also serve as a means to disseminate information among various staff members. Information from one division may be highly beneficial to the efforts of another division.

The Environmental Manager must track the incoming and outgoing information by establishing an environmental database. The database should

contain divisional-specific data regarding the results and progress of ongoing sustainability efforts. The database can serve as a quick reference and will be useful for benchmarking future efforts. All management level employees should have access to the database.

The Environmental Manager is also responsible for reporting the efforts and results of sustainability programs to Airport System staff and outside entities. An annual sustainability report must be prepared and disseminated to the executive management team, Asset Managers, and City management. The report will be a comprehensive summary of all sustainability efforts at the airports for the past year. Additionally, an environmental gap analysis must be performed annually. The analysis will identify the sustainability initiatives that require additional scrutiny and possible solutions. The results should be disseminated with the annual sustainability report.

### Process of the SMS

An SMS inherently is the application of consistent and repeatable processes to the management of sustainability. The preceding sections of this report have described the constituent parts of the SMS. The following tables describe the interaction and sequence of each element described above. The tables identify the party with primary responsibility for each element and show the importance of the executive management team. Additionally, the tables indicate the role of executive management in achieving a culture change to sustainable business.

## SUSTAINABILITY INITIATIVES PLAN

This Sustainability Initiatives Plan is predicated on the sustainability gaps and the green menu identified in Chapter 4. The Sustainability Initiatives Plan was developed in coordination with the Environmental Manager based on interviews with the Asset Managers.

The Sustainability Initiatives Plan is designed to engage all Asset Managers, and to provide tangible success stories that will encourage their continued participation in the sustainability program. This plan covers the first year of implementation and is divided into three time horizons – immediate actions, near-term actions, and first-year goals. Following the first year, annual review of the SMS will result in identification of new objectives and goals for the second year. It is also expected that, following the first year, the Asset Managers will develop specific performance metrics and sustainability projects.

The list of sustainability actions provided below provides tangible examples of legitimate sustainability projects. As described in this report, sustainability strategies should provide measurable environmental and social benefits at a reasonable cost.

This plan covers initiation of the SMS; as the SMS matures, it is expected that Asset Managers will develop specific new initiatives. This transition of responsibility to the Asset Managers is exemplified in the first year goals (0 to 12 months) – goals are suggested for the Asset Managers, but the Asset Managers are responsible for developing an adequate series of projects to meet those goals.

### Immediate Sustainability Actions (completion in first 90 days)

Although a wide range of sustainability initiatives can be implemented, it is important to develop a first phase that will be manageable and successful. Therefore, the recommended first phase includes multiple sustainability actions that are likely to result in cost savings and can be quickly implemented. The recommended immediate actions include eight sustainability projects across the full range of Airport System divisions.

The number of initiatives is limited to one per responsible Asset Manager to minimize the potential for the Asset Managers to be overwhelmed with new responsibilities while continuing to effectively manage their current areas of responsibility. The initial projects are intended to familiarize Airport System staff with the sustainability process and instill confidence that future efforts are achievable and worthwhile. The projects were selected based on a balance between ease of implementation and visible results. They are expected to be implemented within the first 90 days following SMS initiation and should require minimal capital investment. As shown in Table 5-1, the recommended initial actions include program coordination, natural resources conservation, and energy conservation measures.

Table 5-1

**IMMEDIATE SUSTAINABILITY ACTIONS**

**PROGRAM COORDINATION**

Communicate with all Asset Managers on the importance of the sustainability program – Director of Aviation

Hold meeting and prepare brochure communicating waste recycling program to Airport System tenants – Environmental Manager

Send utility usage reports to Asset Managers monthly – Assistant Director of Finance and Administration

**NATURAL RESOURCES CONSERVATION**

Implement paper conservation program (default all printers/computers to two-sided printing) – Information Technology Manager

**ENERGY CONSERVATION**

Set screen savers to hibernate on 50% of Airport System computers – Information Technology Manager II

Install 36 room occupancy detectors (lighting) or low energy emergency lights – Terminal Facilities Manager

Report on opportunity for additional runway/taxiway lighting shutdown at night – Airfield Maintenance Manager

Establish preferred parking spaces for carpoolers and green vehicle drivers – Landside Operations Manager

**INTEGRATED SUSTAINABILITY**

Develop green procurement specifications for three commonly purchased items – Purchasing Department

### Near Term Actions (completion in first 6 months)

The near term actions should be initiated concurrently with the immediate action items, but are expected to take more time to complete, either because of the time required to coordinate with multiple divisions, secure adequate resources, or actually implement the actions. Similar to the immediate actions, responsibility for implementing the near-term actions should be distributed among Asset Managers to

minimize the burden on any single Asset Manager. It should be noted that many of these projects require early action as they may have long lead times. The near-term actions are listed in Table 5-2.

**First Year Goals (completion in first year)**

The first-year goals are a series of division-specific environmental improvements based on specific sustainability projects that are consistent with the objectives of the

Table 5-2

**NEAR TERM SUSTAINABILITY ACTIONS**

**PROGRAM COORDINATION**

Require monthly sustainability performance reports from each Asset Manager – Director of Aviation

Implement staff training throughout entire Airport System on roles and responsibilities in the Sustainability Management System – Environmental Manager

Modify capital request process to require inclusion of life-cycle cost analysis and concurrence from all affected Asset Managers for every capital request – Associate Director of Finance and Administration

**ENERGY CONSERVATION**

Modify procurement specifications to require that computer purchases are Energy Star compliant – Information Technology Manager I

Develop tracking system to monitor energy use in the terminal area; clear spatial delineation and tracking of all information necessary for normalizing results should be included – Terminal Facilities Manager

**WASTE REDUCTION**

Create program for collection and recycling of electronic waste – for used equipment of the Aviation Department and tenants – Information Technology Manager II

**NATURAL RESOURCES CONSERVATION**

Develop procurement specification for green vehicles and submit VALE application to support first purchase – Airfield Maintenance Manager

**INTEGRATED SUSTAINABILITY**

Prepare life-cycle cost analysis and triple-bottom-line analysis related to implementing a pay-on-foot system compared to the existing parking booth system – Landside Operations Manager

Prepare triple-bottom-line analysis for at least six commonly purchased products; there should be multiple choices for each product in the City's warehouse – Purchasing Department

Sustainability Policy Statement. These goals are expected to stem from the immediate- and near-term actions, but will also require the Asset Managers to identify and adopt additional sustainability strategies – either those listed in the green menu or ones that the Asset Managers have identified. As the Asset Managers embrace and undertake these goals, they are expected to make sustainability a component of their daily business decisions and management actions. Action on the first year goals also needs to be initiated immediately following implementation of the SMS.

It should be noted that, for each Asset Manager to track and document progress toward the stated goals, they will also need to implement a system of performance metrics. The suggested first year goals are shown in Table 5-3.

Table 5-3

**FIRST YEAR SUSTAINABILITY GOALS**

**PROGRAM DEVELOPMENT**

Initiate public communications program for the sustainability program – Director of Aviation

Develop electronic tools to track financial impacts of sustainability initiatives – Associate Director of Finance and Administration

Prepare annual report on sustainability program and prepare list of proposed goals for second year – Environmental Manager

**ENERGY EFFICIENCY**

Reduce total energy consumption of computer equipment by 10% – Information Technology Manager I

Reduce terminal energy consumption by 10% – Terminal Facilities Manager

Implement program to improve average fleet mileage by 1 mile per gallon – Airfield Maintenance Manager

**WASTE REDUCTION**

Reduce electronic waste sent to landfill by 50% – Information Technology Manager II

**AIR QUALITY**

Reduce ground transportation-related emissions by 1% – Landside Operations Manager

**INTEGRATED SUSTAINABILITY**

Develop “green specifications” that help Asset Managers identify products that are more sustainable – Purchasing Department