

## PROCESS

Within the Manual's main body, each sustainable credit has four subsections: Intent, Requirements, Submittals, and Technology/Strategy, as described below:

- **Intent:** The primary motivations for any sustainable practice.
- **Requirements:** Specifies institutional, operational, and mechanical elements that satisfy the intent. The prerequisites must be achieved; the credits are optional, but contribute to the overall project rating.
- **Submittals:** Required and supporting documentation and/or information required to achieve applicable prerequisites or credits. This documentation may include calculations, short narratives, or references to specification sections or design drawings indicating how the requirements are being met.

**Technology/Strategy:** Highlights specific ways of meeting the recommendations within the scope of work for each specific project. Case studies where available, are presented to help guide the application of sustainable credits to operations and maintenance activities. To aid with consideration of applicable strategies and technologies, they are organized into the following three categories; "Standard Practice," "Recommended Practice," and "Best Available Practice."

- **Standard Practice:** These are requirements that may be due to standards, specifications, codes, general best management or construction practices. They are practices already in place, and in many cases SAM prerequisites, which also serve to meet sustainable goals.
- **Recommended Practice:** These include recommendations that are expected to have insignificant impacts to cost and are therefore, encouraged to be incorporated into the design process.
- **Best Available Practice:** These are strategies and practices that are expected to enhance the environmental efforts of the Chicago Department of Aviation (CDA), but are anticipated to potentially increase costs or effort.
- **Case Study:** Examples of credit intent "in action" at airports and/or other industry facilities.

While not all strategies will be applicable to every project category, Operations and Maintenance, teams are highly encouraged to think creatively and to consider the intent of each issue throughout the decision process. In all cases, it is the responsibility of the design and construction teams to evaluate and review with the Chicago Department of Aviation any anticipated cost or schedule impact.

---

Projects are rated on the achievement of credits depending on the appropriate stage of the project, based on sustainable elements included in the project from the following categories:

**1.0 Administrative Procedures (applies to any type of project as well as everyday operations and activities)**

**Applies to OPERATIONS/MAINTENANCE activities:**

- 2.0 Sustainable Site Management**
- 3.0 Water Efficiency**
- 4.0 Energy & Atmosphere**
- 5.0 Materials & Resources**
- 6.0 Indoor Environmental Quality**

- 7.0 Innovation
- 8.0 Education / Training
- 9.0 Monitoring / Reporting

**Topics of Consideration, but not limited to:**

- Equipment/Vehicle Washing
- Equipment/Vehicle Fueling
- Equipment/Vehicle Maintenance
- Equipment/Scrap Material Storage
- Vehicle Parking
- Aircraft Fueling
- Aircraft Washing
- Aircraft Maintenance
- Aircraft Deicing
- Airfield Deicing
- Runway Maintenance
- Taxiway Maintenance
- Apron Maintenance
- Underground Storage Tanks (USTs)
- Aboveground Storage Tanks (ASTs)
- Mobile Tank Trucks
- Chemical Handling/Storage
- Drum Storage
- Battery Storage
- Floor Washdown
- Truck Loading/Unloading
- Spill Control Kits and Spill Response
- Storm Drain Protection
- Cargo Handling & Transport Across Airfield of Hazardous Materials
- Disposal of Water/Glycol
- Trench Drain and Oil/Water Separator Cleaning
- Pesticide, Fertilizer & Herbicide Application
- Storm Drain Identification
- Sanitary and Storm Sewer Manhole Inspection
- Street Sweeping
- Landside Elevated Parking Structure Level 6
- Landside Roadway & Parking Lot Deicing
- Facilities and ancillary buildings
- Training and education
- Good Housekeeping

---

**1.0 ADMINISTRATIVE PROCEDURES**

**2.0 SUSTAINABLE SITES**

**2.1 LEED Certified Design and Construction – 1 pt**

**Delta Air Lines 'Terminal A'**

**Boston Logan International Airport – Boston, MA**

The new Delta Air Lines 'Terminal A' at Logan International Airport in Boston has achieved an environmental milestone as the world's first air terminal to earn LEED certification from the U.S. Green Building Council. The facility maximizes sustainable building methods and technologies, overcoming the significant obstacles inherent in bringing green design to airports. To combat the

accelerated heat island effect and stormwater runoff issues typically caused by impervious surfaces on runways, parking lots and large roofs areas.  
<http://www.sustainablebusiness.com/index.cfm/go/news.feature/id/1358>

**2.2 Exterior Facilities and Hardscape Grounds Management – 1 pt**

**State-of-the-Art-Deicing Facility  
 Philadelphia International Airport- Philadelphia, PA**

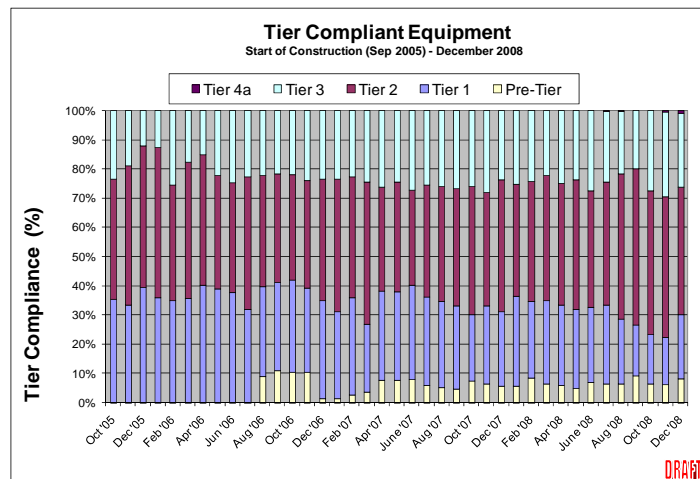
The deicing facility at Philadelphia International Airport captures and disposes deicing fluid runoff in order to protect nearby waterways and the groundwater system.  
[http://www.phl.org/pdf/PHLEnviro\\_feb08.pdf](http://www.phl.org/pdf/PHLEnviro_feb08.pdf)

**2.3 Maintenance Equipment – 1 pt**

**Ultra Low Sulfur Diesel Fuel Mandate  
 Chicago O’Hare Modernization Program - Chicago, Illinois**

When the O’Hare Modernization Program (OMP) construction began in September 2005, several years before the EPA was mandating the use of ULSD fuel, the OMP made it a priority to minimize the air quality impacts of such a large construction project. At the time, the availability and cost of the specialized fuel and emissions control equipment caused concern to program officials and contractors alike. However, because of the size and duration of the construction activities, in addition to the need to meet EPA standards by 2010, the program may have bolstered the market for ULSD and the newer, cleaner burning construction. As of the end of 2008, there have been as many as 200 to 300 pieces of diesel powered equipment in use on the airport.

In 2008, approximately 70% of all equipment met Tier 2 emission standards or better. The tier compliance is an emission based standard set by EPA. The higher the tier level the more stringent the emissions will be from the equipment. As of late 2008, Tier 4a compliant vehicles were starting to be used.



**Excessive standing of diesel powered vehicles with the engine running  
Ordinance**

**City of Chicago – Chicago, Illinois**

The City of Chicago's Vehicle Idling Management Policy limits idling of municipal vehicles to 3 minutes, with certain exceptions. This policy applies to all non-emergency City vehicles, whether powered by gasoline, diesel, or alternative fuels.

[http://www.cityofchicago.org/content/dam/city/depts/dae/general/ESB\\_PDFs/StandingLimitOrdinanceAsPassed.pdf](http://www.cityofchicago.org/content/dam/city/depts/dae/general/ESB_PDFs/StandingLimitOrdinanceAsPassed.pdf)

**2.4 Integrated Pest Management and Wildlife Deterrence – 1 pt**

**Southwest Florida International Airport Wildlife Management Program**

**Southwest Florida International Airport- Fort Myers, Florida**

The airport utilizes various projects that analyze problematic habitats and species to develop specialized methods of prevention. The formation of a Hazardous Wildlife Working Group in 2005 improved communications between Environmental Compliance, Airport Operations and Airport Maintenance to assist in the implementation of new and innovative deterrence methods. And in March 2008, the airport initiated a Wildlife Hazard Assessment that used a unique methodology that broke down species into hazard guilds, assigning relative risk values to more effectively focus on specific airfield areas that attract the highest risk species

[http://www.aci-na.org/news/2010\\_August18](http://www.aci-na.org/news/2010_August18)

**2.5 Erosion Control – 1 pt**

**Environmental Management**

**Santa Barbara Airport- Santa Barbara, California**

At Area I, the Santa Barbara Airport has removed invasive non-native species and planted native plants. These plants were carefully grown by Growing Solutions at the Airport Nursery using seeds collected in the Slough

[http://www.flysba.com/news\\_facts/environmental\\_management.com](http://www.flysba.com/news_facts/environmental_management.com)

**2.6 Landscape Management – 1 pt**

**Storm Water Management Plan**

**San Diego International Airport- San Diego, California**

San Diego International Airport is responsible for administering approximately 661 acres of public lands on the shore of San Diego Bay. The Storm Water Management Plan is a major element of the Airport's commitment to preventing, eliminating, and reducing the discharge of polluted storm water into the surrounding environment and San Diego Bay. The Stormwater Management Plan is directed at those activities of the Airport Authority itself, as well as those of the airlines and other airport tenants that have the potential to cause stormwater pollution.

The Storm Water Management Plan is designed to control the pollutants generated by everyday operation of the airport, including: trash, litter and debris; petroleum products that might leak from aircraft and motor vehicles; heavy metals potentially contained in the dust from brake pads, rubber tires, engine exhaust; and the fertilizers and pesticides used to maintain the airport's landscape and facilities.

[http://www.san.org/sdcraa/airport\\_initiatives/environmental/protection/stormwater.aspx](http://www.san.org/sdcraa/airport_initiatives/environmental/protection/stormwater.aspx)

## 2.7 Alternative Commuting Transportation for Employees – 1-4 pt(s)

### **Bike to Work Plan**

#### **Chicago O'Hare International Airport - Chicago, IL**

The Chicago Department of Aviation promotes employee bicycle commuting, in support of the goals and objectives set forth in the City of Chicago Bike 2015 plan. Airport employees are encouraged to bike to work, year-round. The program allows indoor employee bike storage, the installation of employee bike racks at the Airport, and the availability of lockers and showers for employees. Additionally, an Airport Bike Ambassador has been designated to take any bike related questions, suggestions and concerns.

<http://www.flychicago.com/environment/oharebiketowork.htm>

### **Preferred Parking for Carpoolers**

#### **Denver International Airport – Denver, Colorado**

Denver International Airport has launched an aggressive program to encourage carpooling which offers reduced parking cost for carpoolers. Additionally, the airport offers designated locations which include unreserved spaces typically in close proximity to employees or passenger access points.

[www.flydenver.com/environmental](http://www.flydenver.com/environmental)

## 2.8 Stormwater Management for Pollution Prevention – 1 pt

### **North Air Traffic Control Tower**

#### **Chicago O'Hare International Airport - Chicago, Illinois**

The proposed site for the new North Air Traffic Control Tower was an existing parking lot with an impervious area of 89 percent. The new development greatly reduced the impervious area of the site to 43 percent. Because the existing site had an impervious area greater than 50 percent, in order to meet the requirement of this credit, the rate and quantity of stormwater runoff needed to be reduced by 25 percent. By reducing the impervious area of the new development by 46 percent or 47,200 square feet, the project met the requirements of this credit.

### **Terminal Building Cooling System**

#### **New Chitose Airport - Hokkaido, Japan**

The New Chitose Airport terminal building in Hokkaido, Japan, will utilize a new cooling system by the fiscal year 2010. The transport ministry plans to collect snow during the winter and preserve it to provide 30 percent of the building's cooling needs during the summer. Of the snow collected throughout the winter, approximately 45 percent of the snow is preserved for the summertime through the use of heat-insulating materials. The collected snow would be used to chill the liquid of the building's cooling system. This practice could stave off 2,100 tons of carbon dioxide emissions per annum compared to using the building's existing cooling system.

[http://www.goodcleantech.com/2008/10/new\\_chitose\\_airport\\_in\\_japan\\_t\\_1.php](http://www.goodcleantech.com/2008/10/new_chitose_airport_in_japan_t_1.php)

**Stormwater Quality Initiative**

**Denver International Airport - Denver, Colorado**

Denver International Airport was built with a dedicated system for the capture, conveyance, treatment, and discharge of stormwater contaminated with aircraft deicing fluids. The system includes seven dedicated deicing pads, five wastewater retention ponds, and an onsite deicing fluid recycling facility.

<http://aci-na.org/static/entransit/Going%20Green%209-7-07.pdf>

**Terminal Building Cooling System**

**New Chitose Airport - Hokkaido, Japan**

The New Chitose Airport terminal building in Hokkaido, Japan, will utilize a new cooling system by the fiscal year 2010. The transport ministry plans to collect snow during the winter and preserve it to provide 30 percent of the building's cooling needs during the summer. Of the snow collected throughout the winter, approximately 45 percent of the snow is preserved for the summertime through the use of heat-insulating materials. The collected snow would be used to chill the liquid of the building's cooling system. This practice could stave off 2,100 tons of carbon dioxide emissions per annum compared to using the building's existing cooling system.

[http://www.goodcleantech.com/2008/10/new\\_chitose\\_airport\\_in\\_japan\\_t\\_1.php](http://www.goodcleantech.com/2008/10/new_chitose_airport_in_japan_t_1.php)

**Stormwater Quality Initiative**

**Denver International Airport - Denver, Colorado**

Denver International Airport was built with a dedicated system for the capture, conveyance, treatment, and discharge of stormwater contaminated with aircraft deicing fluids. The system includes seven dedicated deicing pads, five wastewater retention ponds, and an onsite deicing fluid recycling facility.

[http://aci-na.org/static/entransit/Going\\_percent20Green\\_percent209-7-07.pdf](http://aci-na.org/static/entransit/Going_percent20Green_percent209-7-07.pdf)

**2.9 Heat Island Reduction: Nonroof – 1 pt**

**Line Station 4 Living Wall**

**Vancouver International Airport- Vancouver, Canada**

The first Canadian airport to install a green wall, Vancouver International Airport has erected one on a wall of the SkyTrain Station. One of the largest living walls in North America (the largest at the time in 2009), it measures 55.8 feet x 38 feet, and houses a total of 27,391 individual plants. Landscape architect Randy Sharp used a modular system by G-Sky for this living wall that encompasses 2,107 stainless steel panels. His design concept stresses the connection of the vegetated wall to the rapid transit station to the ground.

<http://www.greenroofs.com/blog/2010/03/26/gpw-yvr-canada-line-station-4-living-wall/>

**2.10 Heat Island Reduction: Roof – 1 pt**

**Chicago O'Hare International Airport - Chicago, Illinois**

The O'Hare Modernization Program (OMP) has made vegetated roofs a priority for any large roof construction at ORD. Although reducing the heat island effect is the primary goal of this credit, the airport, with its large expanses of impervious pavement also looks to this technology for its stormwater management aspects. Where vegetated roofs are not used or if there is only partial coverage by a

vegetated roof, a high reflectance roofing material in accordance with the requirements of this credit is encouraged to be used where applicable.

As of 2008, there were a total of four vegetated roof projects totaling approximately 33,000 square feet. The projects include the following:

- South Airfield Lighting Control Vault – 14,200 sq. ft
- North Air Traffic Control Tower Base Building – 8,822 sq. ft
- Guard Post 1 Canopy – 6,500 sq. ft
- Aircraft Rescue and Firefighting Facility #3 – 3,440 sq. ft

As of 2009, there are an additional four projects proposed that will add an additional 350,000 sq. ft of vegetated roof space at ORD including two cargo buildings that will rank in the top 25 of the largest roofs in the world<sup>1</sup>. These are:

- FedEx Sort Building (proposed completion 2011) – 174,442 sq. ft
- UAL Cargo (proposed completion 2012) – 162,763 sq. ft
- FedEx World Service Center (proposed completion 2010) – 10,024 sq. ft
- FedEx Vehicle Maintenance Building (proposed completion 2009) – 3,170 sq. ft

It should be noted that the areas above only include the vegetated roof area. In all cases a highly reflective roof (high SRI value) makes up the balance of the roof area. For example, the UAL Cargo Building has a total roof area of 350,000 square feet of which 47 percent will be vegetated and the remaining will be a high SRI roof. In comparison, 100 percent of the Guard Post 1 Canopy is covered by a vegetated roof system.

In all cases, existing and proposed (thus far) vegetated roof systems are extensive, that is low profile (< 6 inches), and plants consist entirely of varieties of *Sedum sp.* to minimize wildlife attraction. Refer to OMP Standard Specification 02905 – Sustainable Airport Landscaping – for additional details on acceptable plant species

## 2.11 Light Pollution Reduction – 1 pt

### Total Lighting Control System

#### T.F. Green International Airport - Providence, Rhode Island

The newly renovated terminal at T.F. Green International Airport implemented an energy-efficient and automated Total Lighting Control (TLC) system by General Electric. The system features programmable networked technology, controlling the internal and external lighting at the facility, including lights in the concourse areas, departure areas, baggage claims and outdoor parking areas.

[http://www.geindustrial.com/publibrary/checkout/Case\\_percent20Studies\\_percent7Ctfgreen\\_percent7CPDF](http://www.geindustrial.com/publibrary/checkout/Case_percent20Studies_percent7Ctfgreen_percent7CPDF)

---

<sup>1</sup> “The Greenroof Projects Database”, [www.greenroofs.com](http://www.greenroofs.com)

**3.0 WATER EFFICIENCY**

**3.1 Indoor Water Efficiency – 1 pt**

**3.2 Water Efficient Landscaping – 1-3 pt(s)**

**3.2.1 Irrigation Controls – 1 pt**

**3.2.2 Rain Water Harvesting/Graywater – 2 pts**

**Rainwater Harvesting – Abbey Wood**

**Regional Prime Contract South West (RPC SW), England – United Kingdom**

A rainwater harvesting system was installed at Abbey Wood (North) in Bristol at the Oak Building (formally known as Neighborhood 5) development. The new building, with a capacity to accommodate 600 employees, will collect rainfall in a 15,000 L capacity system, and will be used for toilets and urinals. Based on the average occupancy and existing rainfall rates the system will save an estimated 280,000 L of water per year or enough water to take over 3000 baths and will eliminate the need to draw water for sanitary plumbing purposes.

**Rainwater Harvesting – Bovington**

**Regional Prime Contract South West (RPC SW), England – United Kingdom**

Bovington Camp, located in Dorset, has been developed as a training facility for maintenance and operation of the Terrier track armored excavating vehicle.

As part of the development, two new buildings were required – a junior ranks mess and communal facility serving several hundred people per day; and a building to house the Terrier simulators, and provide training and workshop space for 65 people.

A rainwater harvesting system was installed on both buildings, each with a 5,000 L tank capacity. The system is designed to continuously meet the water demands for the toilets and urinals in both buildings, with each taken providing enough water for over 1,000 flushes when full.

[http://www.ogc.gov.uk/documents/Regional\\_Prime\\_Contract\\_SouthWest\\_Water.pdf](http://www.ogc.gov.uk/documents/Regional_Prime_Contract_SouthWest_Water.pdf)

**3.2.3 No Irrigation – 3 pts**

**Blackwater Recycling Treatment Plant**

**Canberra Airport- Canberra, Australia**

A Blackwater Recycling Treatment Plant was launched in May 2007. This system takes sewer (or "black") water from the buildings and treats it to a drinkable level using a self cleaning membrane system and UV safety filters. After the treatment, the water is then used (along with rainwater captured off roofs) in toilets and externally for irrigation (whilst the water is drinkable, it is not used for drinking or showering). This was the first commercial large scale water recycling system in the ACT, and the first at an Australian Airport. Furthermore, Canberra Airport has water tank capacity of approximately 1.38 million litres - the largest non-ACTEW water storage in the ACT. Rain runoff from the Special Purpose Aircraft hangar complex alone is retained in a million-litre tank for irrigation and fire fighting.

[http://www.canberraairport.com.au/air\\_environment/water.cfm](http://www.canberraairport.com.au/air_environment/water.cfm)

**Sustainable Airport Landscaping Design**

**Chicago Department of Aviation – Chicago, Illinois**

The key focus of the landscaping design elements is that it is aesthetically pleasing and at the same time, low maintenance, ecologically and financially sustainable yet does not compromise Airport security and aircraft safety. All landscaping within ORD property boundaries falls into the following two categories: Airside and Landside.

### **3.3 Rain Harvesting – 2 pts**

#### **Rainwater Harvesting and Utilization System Singapore Changi International Airport – Changi, Singapore**

A rainwater harvesting and utilization system exists in the Changi Airport. Rainfall from the runways and the surrounding green areas is diverted to two impounding reservoirs. One of the reservoirs is designed to balance the flows during the coincident high runoffs and incoming tides, and the other reservoir is used to collect the runoff. The water is used primarily for non-potable functions such fire-fighting drills and toilet flushing. Collected and treated water accounts for 28 to 33% of the total water used at the airport and has resulted in financial savings.

<http://www.unep.or.jp/ietc/publications/urban/urbanenv-2/9.asp>

### **3.4 Wastewater Recycling – 1 pt**

#### **3.4.1 Chemical Management**

#### **3.4.2 Nonpotable Water Source Use**

#### **Blackwater Recycling Treatment Plant Canberra Airport – Brindabella, Australia**

The plant was launched in 2007 and is a system designed to take sewer ( or “black”) water from the buildings and treat it to a drinkable level using a self cleaning membrane system and UV safety filters. After the treatment, the water is then used (along with rainwater captured off roofs) in toilets and externally for irrigation (whilst the water is drinkable, it is not used for drinking or showering). This was the first commercial large scale water recycling system in the ACT, and the first at an Australian Airport.

[http://www.canberraairport.com.au/air\\_environment/water.cfm](http://www.canberraairport.com.au/air_environment/water.cfm)

## **4.0 ENERGY AND ATMOSPHERE**

### **4.1 Prerequisite 1: Energy Efficiency Best Management Practices: Planning, Documentation and Opportunity Assessment – Required**

#### **Sustainable Airport Master Plan Ithaca Tompkins Regional Airport, Ithaca, New York**

Ithaca Tompkins’s Regional Airport Master Plan applies sustainable principles and practices to everything from airport operations to maintenance practices to selection of materials for capital improvements. Ithaca’s sustainable master plan will achieve all of the FAA required elements of a master plan, but with an improved and greater focus on making the airport a healthier place for people and the planet.

<http://www.cscos.com/pdf/portfolio/SD/sustain8.pdf>

**4.2 Prerequisite 2: Refrigerant Management: Ozone Protection – Required**

**Central Utilities System**

**Toronto Pearson International Airport - Toronto, Ontario Canada**

Sustainable principles were implemented in an effort to modernize Toronto Pearson International Airport and increase passenger capacity. A new central utilities plant replaced older equipment with a new HVAC system and a state-of-the-art deicing facility. The new system is supplied with chillers that use non-ozone depleting, chlorine free HFC-134a refrigerant. These chillers were customized to add extra temperature sensing capabilities to allow for closer monitoring of the chiller's motor temperatures, while enhancing equipment safety through an effective preventative maintenance program.

<http://www.xpedio.carrier.com/idc/groups/public/documents/marketing/casestudy19.pdf>

**4.3 Optimize Energy Efficiency Performance – 2-15 pts; 2 points mandatory**

**Delta Airlines Terminal A**

**Boston Logan International Airport - Boston, Massachusetts**

Terminal A at Boston Logan International Airport has become the first airport terminal in the country to win certification for its green technology. The terminal, which opened to Delta Air Lines customers in March 2005, received the Leadership in Energy and Environmental Design certification for Environmental Sustainability from the US Green Building Council.

[http://www.boston.com/news/local/articles/2006/08/02/logans\\_terminal\\_a\\_goes\\_green/](http://www.boston.com/news/local/articles/2006/08/02/logans_terminal_a_goes_green/)

**Moving Walkways**

**Boston Logan International Airport - Boston, Massachusetts**

Boston Logan International Airport is undergoing tests on energy-efficient moving walkways. The walkways are equipped with EcoStart, which contains a motor efficiency controller that soft starts an electric motor, bringing it from rest to full speed. Once at full speed, the EcoStart monitors the motor and improves its efficiency when operating. Initial test efforts are estimated to conserve approximately 60,000 kilowatt-hours (kWh) per year.

<http://www.automation.com/content/boston-logan-international-airport-saves-energy-on-moving-walks-in-project-with-kone-inc-and-power-efficiency-corporation>

**Baggage Check-In Building**

**Reno-Tahoe International Airport - Reno, Nevada**

The new airport baggage check-in building at Reno-Tahoe International Airport was designed with an efficient HVAC system; in addition to utilization of energy-efficient entryways to reduce heat/cooling loss. This helps the airport monitor and reduce overall energy use.

<http://www.qdconstructionreno.com/projects/newest-projects/reno-tahoe-airport-baggage-check-in.html>

**4.4 Existing Building Commissioning – 1-6 pt(s)**

**4.4.1 Option A or Option B (1-2 pts)**

**4.4.2 Implementation (2 pts)**

**4.4.3 Ongoing (2 pts)**

**STAR Program**

**Metropolitan Airports Commission – Minneapolis, Minnesota**

Minneapolis – St. Paul International Airport recently launched the Stewards of Tomorrow's Airport Resources (STAR) initiative. Airport operators develop and implement sustainable solutions that address long-term environmental, operational, financial and social needs. Goals include minimizing impacts to air quality, reducing waste reduction and hazardous materials use, as well as developing alternative energy programs.

<http://www.enviro.aero/MSPSTAR.aspx>

**4.5 Performance Measurement: Building Automation System – 1 pt**

**Building Automation System**

**Midfield Airport – Pittsburgh, PA**

Installation of a building automation system at Pittsburgh's new Midfield Airport, and is currently the largest construction project under way in the United States. It's been noted that "Integration of Midfield Airport's energy management and fire alarm systems will provide maximum comfort control, life safety, and energy-efficient operation in the facility..."

<http://www.highbeam.com/doc/1G1-12188695.html>

**4.6 Performance Measurement: System-Level Metering – 1 pt**

**4.7 Performance Measurement System-Level Metering – 1 pt**

**4.8 On-Site and Off-Site Renewable Energy 1-4 pt(s)**

**Wind Turbines**

**Boston Logan International Airport - Boston, Massachusetts**

A fleet of miniature wind turbines at Boston Logan International Airport, each 6-foot-tall, placed at the edge of the rooftop of the airport's headquarters, is affixed at a unique angle to capture the winds that gust through Boston Harbor and climb the building's walls. The 20 turbines, installed in July 2008, are expected to generate about 100,000 kilowatt-hours annually, equal to 3 percent of the building's energy needs.

<http://www.leadbuilding.org/News/USGBCInTheNewsDetails.aspx?ID=3829>

**Hangar 25**

**Bob Hope Airport - Burbank, California**

Hangar 25 at Bob Hope Airport, Burbank, California, is a \$17 million structure designed to be a model of green construction and was built for what a traditional aircraft hangar would cost, said Andy Meyers, president of Shangri-La Construction. The hangar features solar panels, skylights, artificial grass, low-flush toilets, and massive aerating fans. Situated on a former industrial lot with a cement slab, the hangar property now houses a state-of-the-art green aviation hangar minimizing the 51,000-square-foot building's carbon footprint. Avjet Corp. is the building owner. The building received a Platinum LEED® certification. In addition to providing power to run the tools and machines to maintain the planes, the energy from the solar panels on the roof powers the building's offices, copiers, computers and coffee machines, Picard said. The building generates 110 percent of the energy it needs and then gives the surplus energy back to the municipal grid. Grates at the building's entrance scrape off contaminants under shoes. No toxic chemicals fill the fire suppression system. The concrete floor has no chemical polymers. In the office area, all of the cabinets are made of Plyboo®, a type of bamboo with a water-based finish.

<http://www.usgbc.org/News/USGBCInTheNewsDetails.aspx?ID=3899>

**Solar Power System**

**Denver International Airport - Denver, Colorado**

The airport has implemented a renewable energy project that consists of a two megawatt solar panel system designed to generate over three million kilowatt hours of clean electricity annually. This cost-effective energy system encompasses 7.5 acres and was developed by a public-private partnership utilizing tax credits and incentives. This initiative shows that airports can embrace renewable energy in a financially viable way and increase the overall sustainability of their operations.

<http://coloradoenergynews.com/2008/08/public-private-partnership-powers-dia-solar/>

**4.9 Enhanced Refrigerant Management – 1 pt**

**Airport Energy Evaluation**

**Syracuse Hancock International Airport – Syracuse, New York**

A new energy management system to provide a centralized control system of all HVAC equipment. The energy management system will optimize the scheduling of the equipment and load shed non-critical HVAC equipment. A preventative maintenance software was recommended to computerize maintenance activities.

<http://www.cscos.com/pdf/portfolio/energy/energy9.pdf>

**4.10 Emissions Reduction Reporting – 4 pts**

**Emissions Reduction Strategy**

**Boston Logan International Airport – Boston, MA**

Boston Logan initiated the voluntary Air Quality Initiative (AQI) implemented in 2001 with the goal of maintaining levels of nitrogen dioxide emissions associated with the airport at or below the levels from 1999. It is a 15-year program that has four (4) primary commitments:

- Expand on existing initiatives at Logan. View the Air Quality Initiative Inventory Tracking of Nitrogen Dioxide Emissions for information on programs in place at Logan Airport when the Air Quality Initiative was developed;
- Retire emissions credits giving priority to mobile sources in order to maintain nitrogen dioxide emissions at or below 1999 levels;
- Report the status and progress in Massport's Environmental Data Report (EDR) and Environmental Status and Planning Report (ESPR); and
- Continue working to decrease air emissions from aviation sources at both a national and international level.

[http://www.massport.com/environment/environmental\\_reporting/Air%20Quality/EmissionsReductionStrategies.aspx](http://www.massport.com/environment/environmental_reporting/Air%20Quality/EmissionsReductionStrategies.aspx)

## 5.0 MATERIALS AND RESOURCES

### 5.1 Prerequisite 1: Sustainable Purchasing Policy – Required

#### **Hong Kong Green Purchasing Charter**

##### **Hong Kong International Airport- Hong Kong, China**

In October 2007, the airport authority made a commitment with 10 other major corporations to be founding members of the Hong Kong Green Purchasing Charter. The Charter, coordinated by the Green Council, has the ambitious objective of promoting green purchasing in the private sector, and encouraging better recognition of the substantial environmental benefits achievable from selecting and procuring products and services with lower environmental impacts.

[http://www.hongkongairport.com/eng/pdf/media/publication/report/07\\_08/e\\_12\\_corporate\\_social\\_responsibility.pdf](http://www.hongkongairport.com/eng/pdf/media/publication/report/07_08/e_12_corporate_social_responsibility.pdf)

#### **Environmental Purchasing Policy**

##### **Port of Seattle – Seattle, Washington**

The Port of Seattle, which is the authority over Seattle-Tacoma International Airport, has initiated a new strategic plan for 2010's Priority Actions that consist of an Environmental Purchasing Policy that will execute a contract for the purchase of sustainable office products and paper.

<http://www.portseattle.org/downloads/community/environment/airport-enviroprogress09.pdf>

### 5.2 Prerequisite 2: Solid Waste Management Policy – Required

#### **Incentives for Waste Sorting and Recycling**

##### **Geneva International Airport – Geneva, France**

Waste management efforts are focused on the promotion of sorting and recycling. Airport authorities and companies, such as the aircraft maintenance workshops, offices and restaurants, sort waste at source, sometimes even ahead of the incentive measures taken by Geneva International Airport (GVA).

More than 4'000 tons of waste are removed from the airport annually. Three waste categories are covered: industrial waste, recyclable waste and hazardous waste.

<http://www.gva.ch/en/desktopdefault.aspx/tabid-113/>

### 5.3 Sustainable Purchasing: Ongoing Consumables – 1-3 pt(s)

#### **Environmentally Friendly Cups**

##### **Southwest Airlines**

Southwest coffee is now served in new 8oz, environmentally-friendly paper cups. The cups are made from 12% post-consumer recycled material with built-in sleeves made from 99% post-consumer recycled material.

<http://www.allbusiness.com/transportation/air-transportation-airlines/12320556-1.html>

### 5.4 Sustainable Purchasing: Durable Goods – 1-2 pt(s)

**5.5 Sustainable Purchasing: Facility Alterations and Additions – 1 pt**

**San Francisco Terminal 2 Renovations**

**San Francisco International Airport, San Francisco, California**

The Green renovations being made to Terminal 2 will incorporate building materials that help conserve natural resources were carefully selected. These include terrazzo flooring with recycled glass chips, recycled-content carpet, wall systems, bathroom tiles, ceiling tiles, furniture and innovative and efficient use of structural steel. For indoor air quality, low emitting paints, adhesives, and millwork materials were specified.

<http://www.flysfo.com/web/page/about/news/pressrel/2010/sf1019.html>

**5.6 Sustainable Purchasing: Reduced Mercury in Lamps -2 pts**

**Barcelona Airport Backlight Billboards**

**Barcelona Airport, Barcelona, Spain**

Five large billboards, each measuring 4m high by 3m tall, have been installed at Barcelona airport. The billboards use an array of LEDs, rather than fluorescent lamps, to achieve uniform lighting with much lower operating costs. This initiative lead to direct energy cost savings via lower power consumption, as well as the use of environmental friendly, lead- and mercury-free technology.

<http://www.ledsmagazine.com/news/5/10/37>

**5.7 Solid Waste Management: Waste Stream Audit – 1 pt**

**5.8 Solid Waste Management – 1-2 pt(s)**

**Sea-Tac Airport Recycling Program**

**Seattle-Tacoma Airport- Seattle, Washington**

After expanding their bottle and can collection, the Sea-Tac added office paper collection. Based on the initial success, Sea-Tac has continued to grow their program, which now includes printer cartridges, batteries and coffee grounds.

<http://www.epa.gov/osw/conserves/rrr/rogo/documents/seatac.pdf>

**6.0 INDOOR ENVIRONMENTAL QUALITY**

**6.1 Prerequisite1: Outdoor Air Introduction and Exhaust Systems – Required**

**Metasys System**

**Toronto Pearson International Airport- Toronto, Ontario**

Maintaining comfort is challenging in a facility with large open spaces, glass exteriors and virtually constant in-and out traffic. The HVAC system throughout the terminals and ancillary facilities, including the parking structures, is controlled by the Metasys system, which provides a single-seat interface for monitoring and regulating multiple functions. This system operates on a campus wide-area network (WAN) configured as a dual-redundant fiber optic ring. Management and other authorized personnel can access the system from a central workstation or from their offices and from off-site, by way of the airport intranet.

[http://www.johnsoncontrols.com/publish/etc/medialib/jci/be/case\\_studies.Par.84744.File.tmp/Toronto%20Airport%20\\_08.pdf](http://www.johnsoncontrols.com/publish/etc/medialib/jci/be/case_studies.Par.84744.File.tmp/Toronto%20Airport%20_08.pdf)

**6.2 Prerequisite 2: Environmental Tobacco Smoke (ETS) Control – Required**

**Airports that Host Designated Smoking Areas**

**Hartsfield-Jackson Atlanta International- Atlanta, Georgia**

Hartsfield-Jackson Atlanta International Airport developed two smoking lounges throughout each of the Airport's five concourses. Passengers will be warned and directed to the locations with lighted warning signs and automatic glass doors. The smoking areas can be found in the following places: in Concourse B near gates 7 and 24; at Concourse C near gates 16 and 26; around gates 16 and 26 in Concourse D; and in Concourse E near gates 9, 17, and 29.

**Dulles International Airport- Sterling, Virginia**

Within Dulles International Airport smoking is permitted in several areas. Smoking lounges are located in the B, C, and D gate areas.

**Denver International Airport- Denver, Colorado**

The Aviator's Club on the west side of Jeppesen Terminal is tobacco smoke friendly as well as the Mesa Verde smoking lounge within the A gates on the mezzanine level of the airport. The B gates have a smoking lounge as well, and the Smokin' Bear is located in the center of the C gates.

<http://www.jaunted.com/story/2010/9/21/84134/7027/travel/Five+US+Airports+That+Still+Have+Smoking+Lounges>

**6.3 Prerequisite 3: Green Cleaning Policy – Required**

**Green Seal Cleaning Products**

**O'Hare International Airport –Chicago, Illinois and Midway International Airport- Chicago, Illinois**

Both airports have implemented the sustainable initiative of using Green Seal certified cleaning products and eliminating the use of aerosol sprays to clean and disinfect airport facilities.

[http://www.explorechicago.org/city/en/about\\_the\\_city/green\\_chicago/green\\_airport.html](http://www.explorechicago.org/city/en/about_the_city/green_chicago/green_airport.html)

**6.4 IAQ Best Management Practices – 1 pt**

**6.4.1 Outdoor Air Delivery Monitoring**

**6.4.2 Increased Ventilation**

**6.4.3 Reduce Particulates in Air Distribution**

**6.4.4 Management for Facility Alterations and Additions**

**Energy Recovery and Air Purification System**

**Reno Tahoe Airport- Reno, Nevada**

High efficiency particulate filters rated at 90% efficiency were installed to remove airborne particles. The system is periodically tested for effectiveness and replaced when fully saturated.

[http://www.dectron.com/html\\_en/doc/Case%20Study-Reno%20Airport.pdf](http://www.dectron.com/html_en/doc/Case%20Study-Reno%20Airport.pdf)

**Displacement Ventilation System**

**San Francisco International Airport- San Francisco, California**

Terminal 2 at San Francisco International Airport features an innovative “displacement ventilation” system that introduces fresh, filtered, cool air into the rooms near waist-level, pushing the older, warmer air to rise to the exhaust points. This system provides fresher air and uses over 25 percent less fan power than most ventilation systems

<http://www.flysfo.com/web/page/about/news/pressrel/2010/sf1019.html>

**Bournemouth Airport New Arrivals Hall**

**Bournemouth Airport, Bournemouth, England**

The facility additions at Bournemouth Airport's new arrivals hall make maximum possible use of solar gain, solar shading, daylight and natural ventilation. Collectively, this will reduce the need for mechanical and electrical installations which, in turn, reduces the building's energy requirements.

<http://www.enviro.aero/blog/airports/>

**6.5 Occupant Comfort: Occupant-Controlled Lighting – 1 pt**

**Lighting Management System**

**Toronto Pearson International Airport- Toronto, Ontario**

The system integrates lighting management, an important function on a campus with annual electric bills totaling \$18 million. Lighting management lets allows the airport to use natural light to the fullest extent possible without creating inconvenience for staff. Lighting can be adjusted or switched off automatically based on natural lighting levels, building schedules, ATIMS information and other factors. The program saved an estimated \$1 million in electricity in 2004 and is projected to save \$1.5 million in 2005.

[http://www.johnsoncontrols.com/publish/etc/medialib/jci/be/case\\_studies.Par.84744.File.tmp/Toronto%20Airport%20\\_08.pdf](http://www.johnsoncontrols.com/publish/etc/medialib/jci/be/case_studies.Par.84744.File.tmp/Toronto%20Airport%20_08.pdf)

**6.6 Occupant Comfort: Thermal Comfort Monitoring – 1 pt**

**Novar Controls System**

**101 North Tower- Phoenix, Arizona**

By installing a building automation system (BAS) to replace older pneumatic controls, the tower enjoys central management, simpler operation, faster responses to any issues that crop up, and significant energy savings. The 101 North Tower project includes cooling tower fans, chillers, air handling units, system pumps, and hundreds of dual duct VAV boxes. Novar Controls' IQ controllers—running on a dedicated high-speed Ethernet network—manage all the building's functions through Novar Controls' 963 supervisor operator software.

<http://www.bas-az.com/Images/MK-CS-NOVAR-101NORTH.pdf>

**6.7 Occupant Comfort: Daylight and Views – 1-2 pt(s)**

**Sheltering Glass Roof**

**Indianapolis International Airport – Indianapolis, Indiana**

The great sheltering roof at Indianapolis International Airport uses filtered glass to mitigate heat from solar gain whilst allowing light into the terminal to minimize the use of artificial lighting. The roof is designed to create a great gateway and to shelter in a sustainable and energy efficient way the activities inside the building.

The pattern on the roof was devised not as decoration but as a system of light to illuminate these internal spaces whenever the sun is shining. The great civic space, 200 feet in diameter, is the threshold to Indianapolis. It is devised to move people and as a stage set that allows Indianapolis and Indiana to present themselves and their culture to the outside world every time you cross the threshold.

[http://www.e-architect.co.uk/america/indianapolis\\_airport\\_terminal.htm](http://www.e-architect.co.uk/america/indianapolis_airport_terminal.htm)

**6.8 Green Cleaning: High-Performance Cleaning Program – 1 pt**

**Green Care Service Program**

**Seattle-Tacoma International Airport- Seattle, Washington**

ABM Janitorial Service, a GS-42 Certified Cleaning Company at Seattle-Tacoma International Airport, has established a Green Care Service program. Certification under GS-42 proves that a service uses products and equipment that have less impact on the environment, and has adopted processes and procedures that help protect the health of workers as well as building occupants.

[http://www.green Seal.org/newsroom/green\\_cleaning\\_certification\\_GS\\_42\\_11-07.pdf](http://www.green Seal.org/newsroom/green_cleaning_certification_GS_42_11-07.pdf)

**6.9 Green Cleaning: Purchase of Sustainable Cleaning Products and Materials – 1-3 pt(s)**

**Green Housekeeping**

**Oakland International Airport- Oakland, California**

Oakland International Airport has instated the "Green Housekeeping" program to reduce environmental and health impacts of cleaning products and chemicals used in the terminals.

[http://www.flyoakland.com/press\\_releases\\_detail.aspx?ID=581&t=p](http://www.flyoakland.com/press_releases_detail.aspx?ID=581&t=p)

**6.10 Green Cleaning: Sustainable Cleaning Equipment – 1 pt**

**6.11 Green Cleaning: Entryway Systems -1 pt**

Comment [SDM1]: Overlap with the C&T Chapter

**7.0 INNOVATION IN OPERATIONS AND MAINTENANCE**

**7.1 Innovation Credit 1: Innovation in Operations**

**7.1.1 Credit 1.1**

**7.1.2 Credit 1.2**

**7.1.3 Credit 1.3**

**7.1.4 Credit 1.4**

**Active Water Leak Detection**

**Canberra Airport- Canberra, Australia**

Water leakages are a very large source of water use, and typically account for 25% of water consumption in non-monitored buildings. Canberra Airport actively manages and monitors its water use, continuously searching for leakages or potential leakages in its buildings. Water sub meters have been connected to all major uses, and our newer buildings are electronically connected to a Building Management System, which provides alarms when leaks are detected. The Airport employs a licensed plumber on site to repair any leaks and inefficient infrastructure. Three full time irrigation plumbing experts also work on site to repair irrigation leaks and monitor water usage.

[http://www.canberraairport.com.au/air\\_environment/water.cfm](http://www.canberraairport.com.au/air_environment/water.cfm)

**7.2 Innovation Credit 2: LEED Accredited Professional – 1 pt**

**City Of Atlanta Department of Aviation**

**Hartsfield-Jackson Atlanta International Airport- Atlanta, Georgia**

As of August 2009, the City of Atlanta Department of Aviation had six architects and engineers on staff who was LEED certified.

[http://www.airportgoinggreen.org/Content/Documents/ATL%20Sustainability%20Initiatives\\_Nissalke.pdf](http://www.airportgoinggreen.org/Content/Documents/ATL%20Sustainability%20Initiatives_Nissalke.pdf)

**7.3 Innovation Credit 3: Documenting Sustainable Building Cost Impacts – 2 pts**

**Green Airport Initiative (GAI)**

**Fort Lauderdale-Hollywood International Airport- Fort Lauderdale, Florida**

The Fort Lauderdale-Hollywood Green Airport Initiative is designed to help airports achieve quick and measurable benefits in environmental quality and energy savings. Broken down into two sections, the second section focuses on documenting cost impacts and identifies the many opportunities the airport will have in the future to reduce its environmental impact and operating costs.

[http://www.cleanairports.com/reports/gai\\_flforweb.pdf](http://www.cleanairports.com/reports/gai_flforweb.pdf)