



Sustainability Analysis

Photo: Glenn Sutfenfield

Introduction

In conjunction with the Airport Master Plan Update, Shenandoah Valley Regional Airport (SHD) has developed its first Sustainability Analysis. The purpose of this analysis is to determine a vision for sustainability at SHD, identify relevant sustainability categories, and establish a series of sustainability goals, objectives and initiatives. Incorporation of the Sustainability Analysis into the SHD Master Plan Update allows for an integrated sustainable design approach and allows solutions to be reviewed for both long-range expenditure and cost-reduction impacts. Sustainability at SHD is about using innovative techniques to create positive impacts for people and the planet while remaining an economically viable entity.

Although sustainability covers organizational metrics (revenues, expenses, employee relations, etc.), the SHD Business Plan specifically addresses these areas and therefore are not discussed as part of this analysis.

Sustainability at SHD is about using innovative techniques to create positive impacts for people, the planet, and still be economically viable

Related Resources

Augusta County Comprehensive Plan Update 2014

Sustainable Aviation Guidance Alliance (SAGA)

ACRP Report 80: Guidebook for Incorporating Sustainability into Traditional Airport Projects

ACRP 119: Prototype Airport Sustainability Rating System

ACRP 10: Airport Sustainability Practices

ACRP 66: Lessons Learned from Airport Sustainability Plans

Airport Sustainability, A Holistic Approach to Effective Airport Management

Sustainability Overview

Sustainable decision making establishes a new standard of analysis for projects and operations. This model sets a standard that moves beyond the traditional system of weighing alternatives purely on the basis of economic strength. Instead it uses a triple bottom line analysis and weaves economic, social, and environmental factors into decision making processes. Within the airport industry, this definition has been expanded to include a fourth element: operational efficiency.¹ Sound sustainability planning manages resources in a way that meets the needs of today without threatening the resources of the future.²

Sustainability has various realms of influence including:

- *Organizational*
- *Local*
- *Regional*
- *Global*

The realm of influence is an organizational decision that can depend on the level of resources, the degree of influence, and the level of experience or interest an organization has in pursuing sustainability.

¹ Airport Council International-North America, 2006

² Principles of Brundtland Report, 1986



EONS Model. Developed by ACI-NA sustainability working group.
Source: SAGA Website.

Shenandoah Valley Regional Airport

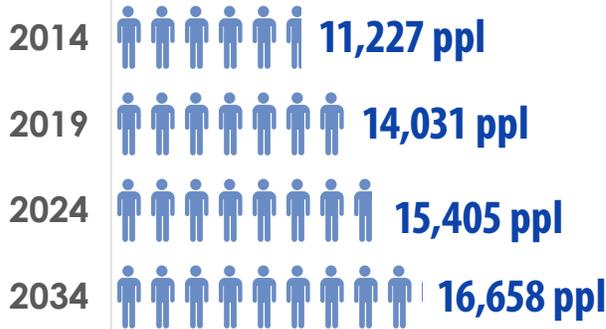
SHD is a 433 acre commercial service airport located in Augusta County, Virginia. The airport is owned and operated by the Shenandoah Valley Regional Airport Commission, consisting of five members from Augusta and Rockingham Counties, Harrisonburg, Staunton, and Waynesboro.

Commercial airline service to Dulles is currently offered by Silver Airways. Existing operational characteristics such as number of enplanements, based aircraft, and operations, as well as more detailed information of the nature of these operational characteristics are covered in detail in Chapter 2, Existing Conditions. Forecasted operational characteristics for SHD are covered in detail within Chapter 3, Aviation Forecast.

SHD Quick Facts

Commercial Service Primary Non-Hub

Enplanements Per Year



Annual Operations

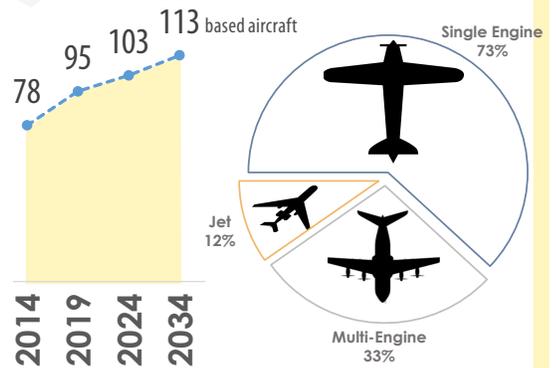


Airport Characteristics

433 acres

Runway 5-23
6,003 feet long

Based Aircraft



Airport Design Criteria



C-III-2400
Runway Design Code

images from manufacturers' websites

Sustainability at SHD

A Vision for Sustainability at SHD

Organizational sustainability is a way of life at SHD. However, this Sustainability Analysis signals the desire to move toward a new level of dedication to decision making practices which meld project and program desired outcomes with economic, social and environmental factors. Sustainability is a practice of continuous improvement, and as efforts continue over time, sustainability initiatives and goals will change; however, the vision should remain relevant. This Analysis is focused on beginning the conversations and creating a framework for setting sustainability goals, objectives, and initiatives.

Each airport operates differently and within a different regional context. For this reason, the thresholds of sustainability will vary. The drafted vision statement provides a context for the Shenandoah Valley Regional Airport Commission's (Commission) discussion of sustainability goals, objectives, and initiatives.

The final vision should be shared with Airport employees and tenants through any number of methods, including updates to the rules and regulations and minimum standards to ensure consistency.

Sustainability Goals

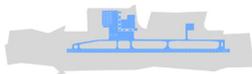
In order to continue operating, SHD must be economically viable. Sustainable measures should seek to strengthen the **economic viability** of SHD through decreasing costs, increasing revenue, and promoting the sound management of resources. The primary function of SHD is to provide a safe and efficient facility for the operation of aircraft, serve the air service needs of the region. Sustainability initiatives should not inhibit this primary function; instead they should promote and enhance them.

Below is suggested text for the Sustainability Vision Statement which should be further developed and implemented:

SHD Sustainability Vision Statement

To promote organizational sustainability in a way that fosters social and environmental capital by evaluating and making sustainable decisions while protecting our economic viability and operational efficiency.

Organizational



Revenue and Expense
Employee Relations
Customer Satisfaction
Site Ecology

Local



Community Initiatives
Local Economy
Infrastructure Updates
Community Outreach

Regional



Resource limitations
Environmental Sensitivities

Global



Resource Consumption
Carbon Emissions
Social Fairness

Aeronautical activity at SHD produces both direct and indirect impacts and influences on the environment and ecological systems. For this reason, sustainability initiatives should seek to promote **environmental stewardship** to the degree that it is not in conflict with economic viability or primary function of SHD. Sustainability initiatives should seek to promote **social equity**--minimizing undue impacts to the community during operations and construction while promoting a balanced workplace. Likewise, sustainability initiatives should continue to foster **community participation and partnerships** to allow for alignment of goals, and initiatives.

The strength of sustainability initiatives can be measured based on the degree to which they align with SHD's sustainability goals.

Below are some suggested goals for the Commission to discuss as the opportunity arises to further develop and implement.

Sustainability Focus Areas

These are three focus areas for sustainability at SHD: Waste Management, Water & Stormwater, and Energy.

Waste Management

- *Solid waste generation*
- *Wastewater*

Water and Stormwater

- *Water Usage*
- *Stormwater*

Energy

- *Energy Baseline & Monitoring*
- *Energy Reduction*
- *Renewable Opportunities*

These focus areas are described and discussed in the following sections.

Shenandoah Valley Regional Airport

sustainability goals

- **Economic Viability**
- **Environmental Stewardship**
- **Social Equity**
- **Operational Efficiency**
- **Community Partnership**



Sustainability Category 1 | Waste Management

Overview

There are five key waste streams at SHD: municipal solid waste (MSW), yard waste, construction waste, hazardous waste, and wastewater. This section will review the feasibility of solid waste recycling and minimizing generated waste as described in the FAA’s Synthesis Document on Recycling, Reuse, and Waste Reduction at Airports.

Below are some potential Waste & Wastewater objectives for SHD:

Related Resources

Recycling, Reuse, and Waste Reduction at Airports, FAA 2013

Shenandoah Valley Regional Airport Spill Prevention, Control, and Countermeasure Plan

waste & wastewater objectives

- 1 Minimize materials** consumed and waste produced at SHD.
.....
- 2 Re-purpose** materials which have met the end of their intended usefulness with good material management practices.
.....
- 3** Where materials cannot be reused, **divert waste streams** using the most responsible means available.
.....
- 4 Close the loop.** Create demand through the purchase of recycled goods, compost, and upcycled materials.



Municipal Solid Waste

Approximately 1,450 cubic yards of municipal solid waste (MSW) are generated annually at SHD. Currently this waste is collected twice per week by Waste Management, Inc. and taken to the Augusta County Regional Landfill. This section focuses on the everyday commingled waste generated and therefore does not include construction and demolition and yard waste, which are discussed independently in subsequent sections.

It is estimated that 55 percent of the MSW collected at SHD could be diverted from the landfill. Based on a preliminary waste assessment conducted by Waste Management, Inc. on November 15, 2015, 35 percent of MSW generated at SHD is recyclable and 20 percent is compostable.

There are two MSW collection bins, a 6 cubic yard bin in the terminal area and an 8 cubic yard bin between Hangars 2 and 3. MSW going to the terminal area bin is generated primarily within the air-carrier terminal and is highly dependent on the number of enplanements. In 2014, the terminal area generated approximately 0.06 cubic yards of waste per enplanement. Waste generated in the airfield MSW bin is generated largely by activities in the hangars and general aviation terminal as well as maintenance and ARFF facilities. In 2014 waste generation for the airfield bin was 0.07 cubic yards per operation.

waste audit **Current**

Municipal Solid Waste (MSW)

Food waste, recyclables, trash, deplaned garbage

Yard waste

Grass clippings, trees, and trimmings

Hazardous Materials

Used oil, used batteries, light bulbs

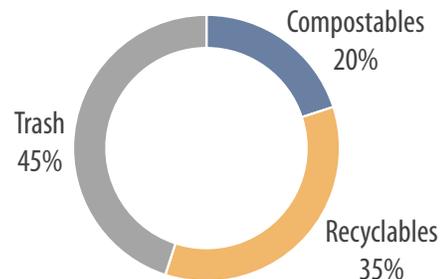
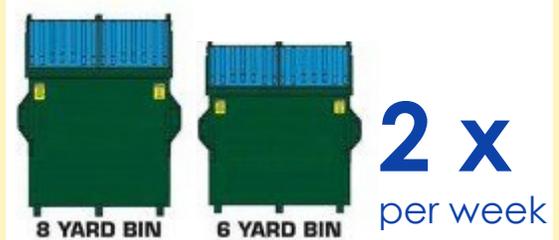
Construction & Demolition (C&D)

Asphalt millings, concrete, building materials,

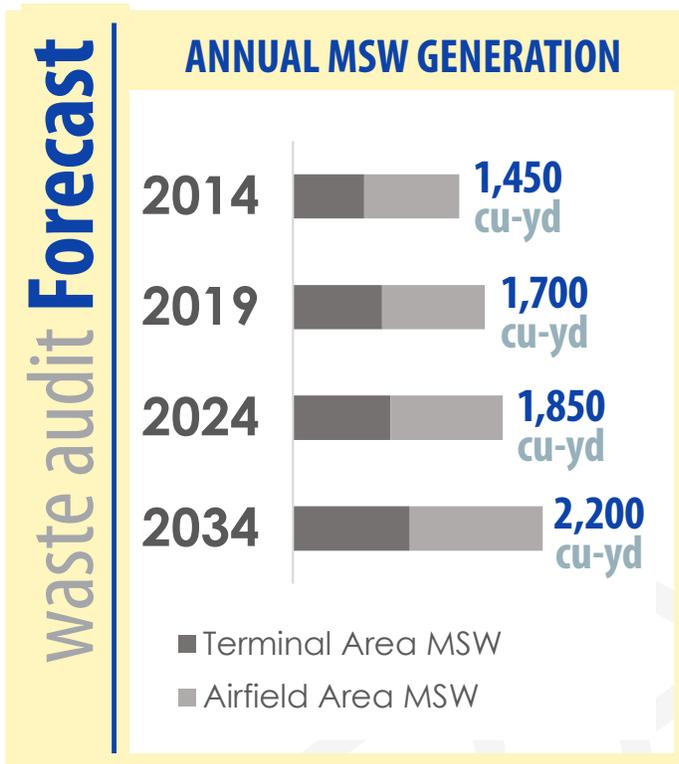
Wastewater

Generated onsite, deplaned lavatory waste, diverted stormwater

MSW BASELINE



images from



Waste Forecast

Within the next 20 years Shenandoah is forecasted to increase the number of enplanements by at least 7,200 and operations by at least 4,740. Assuming the same rate of waste generation, MSW in the terminal area and airfield is forecasted to increase by 430 and 330 cubic tons per year, respectively. Overall this would amplify the amount of MSW by 760 cubic yards, or a 50 percent increase over the next 20 years.

To accommodate this increase additional collection capacity will be needed and the current **collection storage shelters will require expansion**. A more detailed **waste stream assessment** could be used when it is prudent and appropriate to determine remaining capacity in the current bins.

Waste Minimization & Re-purposing

Opportunities for MSW minimization include choosing to source products that **minimize packaging waste**, implementation of **reusable goods** such as kitchenware, and the **re-purposing and reusing** items before they enter the waste stream. Waste minimization can reduce waste collection costs and reduce the need for new materials.

At non-hub commercial service airports like SHD, the scale of service is such that many choices regarding MSW minimization, re-purposing, and commoditization are in the hands of the end user. Developing an effective waste minimization strategy will involve **engaging key stakeholders in the waste management process** such as the kitchen operator in the air-carrier terminal building and operations staff, setting a minimization target, and determining methods for monitoring progress.

Recycling Feasibility

Recyclable goods at SHD consist primarily of cardboard packaging, bottles and other goods. Currently there is no recycling program at SHD. Historically routine curbside recycling collection has not been offered at SHD due to the low population densities of the area. Recycling is, however, common in the region and regional recycling facilities are available. Augusta County currently exceeds the state mandated recycling rate of 25 percent and has identified a goal within the 2015 August County Comprehensive Plan Update to “promote and expand local recycling efforts for residential, business, and industrial users and continue to exceed the state’s mandatory recycling rate.”

Waste management has recently expanded their service to SHD to allow for regular curbside collection as low as \$27 per month.



Compost Feasibility

Composting of food waste allows organic materials to be diverted from the landfill and generates nutrient rich soil. Food waste is generated at SHD from the commercial aviation concession tenants, passengers or other consumers, and staff. Passengers or other consumers are not as careful about what they throw away. Therefore, it is not anticipated that collection of food waste from consumers is feasible due to the possibility of contamination by non-compostable goods.

Black Bear Composting provides curbside collection of compostable goods for as low as \$50 per month. Black Bear also provides compost soil for landscape once a year as part of the service. As with food waste currently disposed of within MSW containers, collection of compostable materials are a potential for wildlife attractants and should therefore be enclosed in bins with lids.

Trash

Trash is classified as materials that have reached the end of their useful life and cannot be repurposed through recycling or composting, or that require special disposal. Examples of trash at SHD include bathroom waste, non-recyclable packaging, and consumer waste, due to the difficulty of sorting passenger waste.

Recommendations

Implementation of recycling and composting collection can reduce the volume of MSW collection, offsetting some of the incremental costs for these programs. As appropriate and prudent, implementation of recycling and composting will require a **review of waste collection storage shelters** and this assessment should also take into consideration forecasted increases in waste generation.

Based on the nature of the waste stream, it is assumed that a large percentage of recyclable goods and food waste are generated in the back of the house, by SHD tenants and staff. When the opportunity arises, tenants and staff can be trained on proper recycling and composting techniques; moreover, tenants and their employees are subject to airport rules and regulation, and leasing contracts. These are tools that can be used to greatly increase the potential for a high degree of recovery by requiring recycling and composting.

When the time is right, a next step toward waste diversion would include integrating consumer based recycling and composting into the collection plan. Consumer based collection communicates to patrons SHD's commitment to proper waste management. When beginning consumer based recycling and composting, consumer education (such as a docent or clear signage) is needed; and the waste may still require post consumer sorting. Once these measures are in place, there are opportunities for the food and beverage concessionaire tenants to use compostable serving ware and other compostable goods.

Yard Waste

Yard waste, including grass clippings, trimmings, and vegetation, removed during grounds maintenance and in construction projects should be stockpiled on site. Currently, top soil is stockpiled for reuse at SHD. Stumps and roots are ground for mulch. Grass clippings are not caught. Instead, they are mulched by the mowers. All of these are ongoing sustainable activities. Vegetation and trimmings that are not mulched are taken out back and are occasionally burned and buried on-site. Burning the excess material is little to no cost. Since the mulch has a resale value, it is taken and sold off site as a commodity.

Construction & Demolition

Past projects at SHD diverted select construction and demolition (C&D) for use on-site. Asphalt millings have been used on-site for perimeter roads and grade stabilization. Extra materials have historically been stockpiled on-site. Open stockpiling of C&D waste has been designated as a non-wildlife attractant by the FAA AC 150/5200-33B, Hazardous Wildlife Attractants on or Near Airports.

Other means of disposal in the area include the landfill and third-party C&D recyclers. If sent to Augusta County Regional Landfill, C&D waste is commingled with municipal solid waste (MSW). Facilities for recycling and reuse of construction materials within the region include Green Earth, for concrete and asphalt. Currently disposal of C&D waste during projects is a discretionary opportunity. When the opportunity presents itself, further increasing waste diversion of C&D waste could include [setting a project target for C&D diversion](#).

The Commission could work with the project engineers and contractors for each project to determine if C&D can be recycled and diverted from waste. Typically, C&D items like concrete steel, copper wire, mulch can all be recycled. It takes a little effort and planning ahead. Millings and broken concrete are saved and stockpiled currently for future use at SHD. When the opportunity arises, the Commission could also help by encouraging contractors to recycle other C&D material when possible.

Hazardous Waste

Hazardous waste at SHD is primarily generated from on-site vehicle maintenance associated with both aircraft and rental cars. The disposal and management of this waste is highly regulated and documented in the SHD Spill Prevention, Control, and Countermeasures Plan.

Hazardous wastes are collected by Safety Kleen, whose service includes removal of lights, batteries, and oil filters. Fuel oil is recycled and burned for heat at SHD, which reduces the hazardous waste removal costs and decreases the hazardous waste footprint. The cost of hazardous waste removal is about \$9,000 per year, which includes waste from the oil water separator and grease. Waste Management provides services for the removal of select universal hazardous wastes such as household batteries and light bulbs. Pricing for this service is calculated by collection bin.

Wastewater

SHD's wastewater consists of three sources; wastewater generated on-site, deplaned lavatory waste, and stormwater diverted to the wastewater treatment facility from the main apron areas. Approximately 170,000 gallons of wastewater are generated at SHD per month.

Wastewater service is provided by Augusta County Services Authority and is conveyed to the Weyers Cave Wastewater Treatment Facility, which is working to upgrade their facility to improve effluent quality. Efforts to reduce wastewater quantity at SHD are directly linked to efforts to reduce water consumption.

Below is a summary of recommended Waste Management Initiatives are provided below for further evaluation and possible implementation:

waste management initiatives

		Resources Required	Economic Viability	Environmental Stewardship	Social Equity	Operational Efficiency	Community Partnership
Minimize Use of Materials							
WW01	Use non-disposable goods such as kitchenware	\$	✓	✓			
WW02	Choose products that minimize waste and packaging	none*	✓	✓	✓		
Re-purpose Materials							
WW03	Engage key stakeholders in waste management, set targets, and monitor progress	staff	✓	✓	✓		
WW04	Set a project target for C&D diversion	none*		✓		✓	
Divert Waste							
WW05	Review collection storage shelters for expansion	staff		✓			
WW 06	Add recycling to waste diversion	\$	✓	✓			✓
WW 07	Add compost collection to waste diversion	\$		✓			✓
WW 08	Tenant and Staff education, update rules and regulations	staff		✓	✓	✓	
WW 09	Initiate Consumer based recycling and compost	staff	✓	✓	✓		
WW 10	Encourage tenant to use compostable serving ware	staff		✓	✓		
Close the Loop							
WW 09	Purchase products made from recycled materials	\$		✓			
WW 10	Add the requirement to purchase products made from recycled material to all future tenant leases	staff		✓			
WW 11	Use compost from local vendors when additional soil is needed	\$	✓	✓	✓		✓

*These items are minimal to low cost and should be reviewed as the easiest to implement.



Sustainability Category 2 | Water & Stormwater

Overview

SHD is located within the Appalachian mountains which provides source water for many communities locally and downstream, and eventually drains to the Potomac River and the Chesapeake Bay. Managing water quantities and quality is an important part of promoting healthy ecological function and communities within Potomac River Water Basin. Augusta County has newly designated source water overlay districts, and they have recently made water and stormwater management a community priority.

Below are some potential Water & Stormwater objectives for the Commission to discuss and implement as appropriate and prudent:

Related Resources

Chesapeake Bay Stormwater Act, 2014

Augusta County Zoning Ordinance 25-523, Source Water Overlay Districts

water & stormwater objectives

1 Reduce Water consumption

.....

2 Decrease Stormwater Quantity and
Improve Stormwater Quality



Water

SHD has three water meter connections: two 1 inch connections and one 2 inch connection. Average annual water use (2011-2014) is approximately 510,000 gallons. The chart on the right shows the breakdown of average water use by water meter connection and location.

Water service is provided by Augusta County Service Authority. Water is sourced from Drip's Spring and disinfected through chlorination. Groundwater supplies are finite with an aquifer recharge rate of approximately 66 percent.¹

Potable water is used for landscape irrigation at SHD creating a significant peak in summer water consumption. Since the rate structure for water usage assumes that 100 percent of water used on-site goes to wastewater, there is a significant cost advantage to reducing water consumption.

Opportunities to Reduce Water

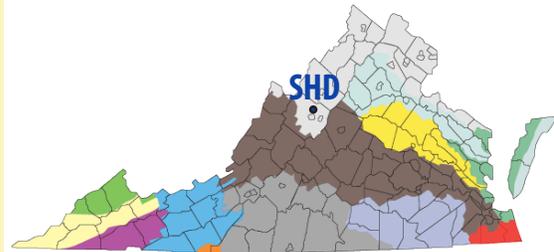
Three strategies exist to decrease total water usage: reduce water consumption; eliminate water losses; and use on-site water collection to defray the requirement for treated water.

1-Reduce Baseline Consumption

Baseline water consumption comes from water used through fixtures and appliances like sinks, toilets, showers and washers. The Commercial Aviation Terminal has incorporated low flow fixtures into the restrooms. When practical and the opportunity presents itself, future projects that include water service could **incorporate low flow water fixtures**. The Commission could also **review existing appliances for water efficiency**. Existing

¹ <http://www.shenandoahconnection.com/water-primer.pdf>

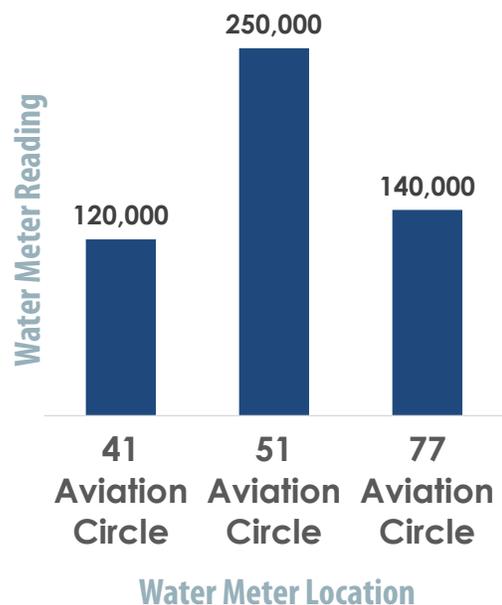
Current water and stormwater audit



Potomac River Water Basin
which flows to the **Chesapeake Bay**

WATER USAGE

510,000 Gallons
of water used annually



images from VirginawaterRadio.org.

high water use fixtures could be changed out with low flow fixtures, and any future appliances purchased should be required to be high efficiency. These are all recommendations that could be implemented when prudent and the timing is right.

2-Landscape

In the summer, when precipitation levels and temperatures are the greatest, up to 73 percent of precipitation is lost to evaporation. Smart irrigation methods such as **reducing grass and plant watering, avoiding daytime irrigation, and the use of ground level drip hoses** could greatly decrease water demand.

When the opportunity arises, **collection of stormwater** for on-site use can reduce water demands and provide cost savings for both water and wastewater rates.

3-Reduce Losses

Some degree of water loss is inherent to building operations, however the impact of leakage like that experienced at 51 Aviation Circle can be costly. **Smart metering** allows for electronic monitoring of water usage and allows for leaks to be identified quickly when compared to standard review every two months. Augusta County Service Authority has not offered smart metering in the past; however, they are beginning a pilot program to review the potential for the smart metering which SHD will be a participant.

Stormwater

Surface water from SHD flows into the Potomac River Water Basin, where it then joins the waters of the Chesapeake Bay. Stormwater regulation is based on the Chesapeake Bay Stormwater Act of 2014.

The geology around SHD is primarily karst, consisting of limestone and dolomite. Even though limestone and dolomite are non-porous, stormwater infiltrates quickly through cracks, caverns, and caves, creating complex surface and underground drainage patterns and allowing for contaminants to easily enter the aquifer. This underlying geology also makes the area susceptible to sinkholes.

On-site stormwater reuse provides a commodity for SHD and reduces the time of concentration from rainfall events. **Infiltration of stormwater** can serve as a groundwater supply source. The aquifers of Augusta County are integrally connected with and recharged by waters at the land surface and are therefore particularly vulnerable to spills and discharges of toxic and hazardous materials. Currently, domestic water is not used for irrigation, which is a best practice. When water is needed at SHD, it is recommended that watering is done in the morning and drip hoses are used whenever possible. Grass swales are used to increase water penetration and decrease water runoff to the stormwater system, which is a stormwater best practice.

Below are some potential Water and Stormwater initiatives for the Commission to discuss for possible future implementation:

water & stormwater initiatives

		Resources Required	Economic Viability	Environmental Stewardship	Social Equity	Operational Efficiency	Community Partnership
Reduce Water Consumption							
SW01	Incorporate low flow water fixtures on projects/retrofits	\$	✓	✓			
SW02	Review of existing appliances for water efficiency	staff		✓			
SW03	Incorporate smart metering to the degree it is available	\$	✓	✓	✓	✓	
SW04	Reducing irrigation, avoiding daytime irrigation, and the use of ground level drip hoses	\$	✓	✓			
Decrease Stormwater Quantity & Improve Quality							
SW05	Incorporate Onsite Stormwater Use	\$	✓	✓			✓



Sustainability Category 3 | Energy

Overview

SHD receives electrical power from Dominion Power for their airfield vault and Shenandoah Valley Electric for the main airport facilities. Their propane gas is provided by Dixie Gas. Electrical consumption at SHD has increased 22 percent, and propane gas consumption has increased by 29 percent over the last two years. The center table on page 17 shows the electrical consumption of the airport for 2013, 2014 and 2015 and how the consumption has increased. SHD’s energy (electric and gas) consumption will continue to increase based on expected future growth. Given this growth rate, when the opportunity arises, The Commission could focus its efforts on reducing energy consumptions at SHD through **benchmarking and monitoring** consumption, improving **education and communication**, using more **energy efficient equipment**, and changing to **renewable energy sources**.

Below are some potential Energy objectives for the Commission to discuss and implement as appropriate and prudent:

energy objectives

1 Reduce Electricity usage

2 Improve Education and Communication

3 Evaluate Renewable Energy opportunities

Related Resources

ACRP Report 141: Renewable Energy as an Airport Revenue Source, 2015

ACRP 119 Sustainability Rating System

FAA Review of Solar Energy System Projects



Energy Baseline & Monitoring

It is important to measure energy use on a frequent and consistent basis; therefore, the Commission could **set a baseline for future comparative analysis**. The comparative analysis is described below. The baseline can be the energy consumption by type **[electric, gas-propane, etc.]** of a current or past year.

To evaluate energy costs, it is good to have the total consumption, but it is best to track consumption by each meter on a monthly basis. **Installing SmartMeters** would allow the Commission to monitor usage more accurately. By knowing where energy is being consumed, the Commission can do a **comparative analysis of the baseline** to current data to see if there are spikes or trends. Spike and trend analysis will indicate where and when energy use is increasing or decreasing. The next step would be to determine what areas need more attention as well as what energy strategies are working best. If there is an unusual spike, then the Commission will notice it quickly, preventing extra energy consumption and high energy costs.

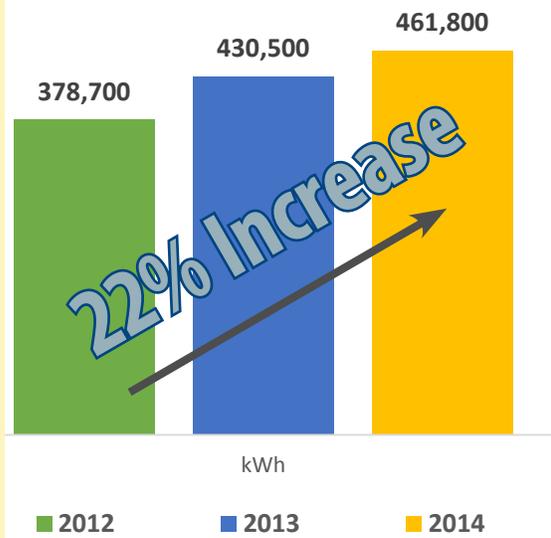
In 2014, SHD used 461,808 kWh of electricity in the General Aviation and Air Carrier terminal buildings representing over **60 percent of the total airport electric energy** usage accordingly. When the opportunities arise, the Commission could concentrate **energy conservation measures** on these two buildings to significantly reduce energy consumption.

Electricity Current



ENERGY USAGE

461,800 kWhs
of electricity used in 2014



Energy Reduction

One of the best ways to reduce energy costs is by reducing consumption. Consumption can be reduced in many different ways, but **education and communication** are some of the easiest and least costly ways to reduce consumption. Educating employees, tenants and customers on **best energy saving practices** and communicating those best practices can have immediate results. Some best practices can be seen on the Sustainable Aviation Guidance Alliance (SAGA) sustainable practices web page at <http://www.airportsustainability.org/sustainable-practices>. The table below provides some examples of the 945 best practices that the Commission could implement from the SAGA website.

Efforts have been in place at SHD to reduce energy consumption for several years. The Commission has implemented a light usage reduction program in the GA terminal where only minimal lighting is used during the day. Fans have been installed to circulate air, thermal shielding has been placed on the windows to reduce heat gain and the airfield lighting control has been modified to turn airfield lights off

at night versus the historic practice of running lights at 10 percent. LED lighting was used for sidewalk lighting on the parking lot project.

A suggested next step would be to perform **an energy audit** of the high energy use buildings or systems. At SHD, the top four energy consumers are the AC Terminal, GA Terminal, airfield lighting, and Corporate Hangar 3 in most to least consumption order. The four areas account for 86 percent of the electrical consumption and could comprise of the first audit if funds are available. If an audit cannot include all four areas, then audit as much as possible starting with the highest consuming facilities first. An audit could look at lighting, building envelope (windows, insulation, roof, etc.), HVAC, and all mechanical systems. The results of the audit will help determine the **most cost effective measures to reduce consumption and energy costs**. In the meantime, replacing incandescent lights with LED lights, installing EnergyStar™ appliances and equipment when upgrading, and building to LEED standards are some easy best practices the Commission could implement when the opportunity arises.

SAGA Best Practices	1. Connect monitors, printers, and other accessories to a power strip/surge protector. Turn off the power strip to prevent them from drawing power (even when shut off) when they are not in use.	   
	2. Require a U.S. Green Building Council LEED (Leadership in Energy and Environmental Design) or equivalent building standard and green operating commitment from non-airport controlled buildings that are undergoing construction activities, including renovations.	
	3. Do not use computer screen savers since they consume more energy than not using one and/or they may disable power-down or "sleep mode" features.	
	4. Install waterless or water-efficient urinals.	
	5. Purchase high post-consumer recycled content paper.	

Renewable Opportunities

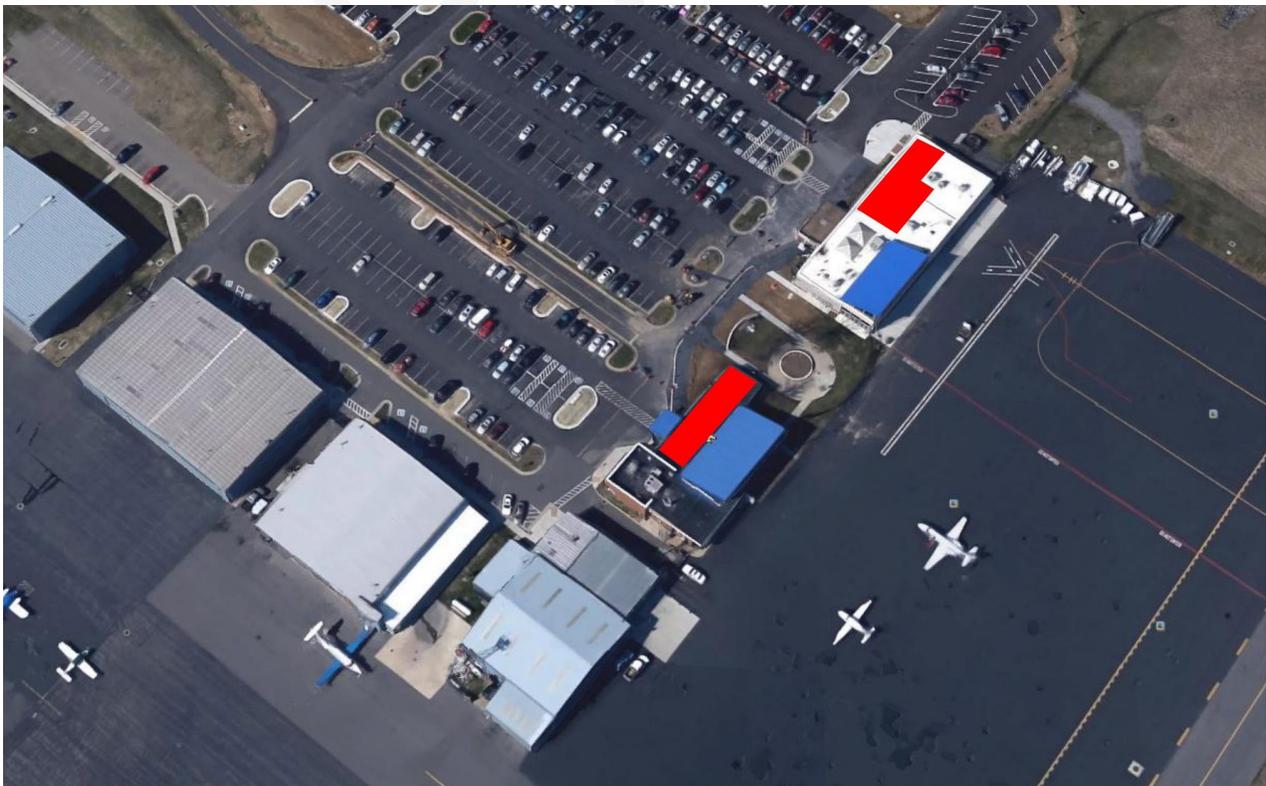
Renewable energy is sustainably generated energy from non-fossil fuel sources including, but not limited to, solar photovoltaic generation, solar thermal, hydroelectric, wind turbine systems, biomass, and geothermal energy. Renewable energy can be supplied to power terminal and building operations, airfield and street lighting, cargo and maintenance hangars, and other infrastructure and operations both landside and airside.

As previously noted, the AC and GA terminals consume the most electricity; therefore, it is recommended that installation of a **solar photovoltaic (PV) array** on the roofs of these buildings be further evaluated. Both rooftops are large enough for a PV array to generate sufficient electricity for those two buildings and possibly most of the airport's current

electrical requirement. A separate solar PV analysis is required to properly evaluate the cost benefit and determine if the buildings can structurally support the additional load of the PV panels.

As future repair, maintenance, and new construction projects are developed, appropriate **projects could be reviewed for energy saving opportunities**. It is almost always more cost effective to install energy saving devices during initial construction rather than during retrofit.

Another opportunity would be for the airport to partner with a local utility company to build a **utility sized PV array**, which would generate more electricity than consumed by the airport. The airport could lease property to the utility company through a power purchase agreement. This often results in revenue and sets electricity costs in



SHD Terminals - Possible PV Arrays



SHD Airfields - Possible PV Arrays

exchange for the use of the land. There are many things to consider with this opportunity, and it is recommended that it be evaluated in much greater detail. Areas A, B, and C in the picture above are potential areas where a utility sized PV array could be located on airport property. Based on SHD's master plan, these areas potentially conflict with

possible future taxiways and facilities. Further evaluation is required to determine future growth priorities and if these sites are the best locations for large scale PV arrays. ACRP 141: Renewable Energy as an Airport Revenue Source is a good reference for more information. The table below lists some of the evaluation factors described in ACRP 141.

ACRP 141

Evaluation Factors to consider for Renewable Energy Projects:

1. Physical geography and location of the airport.
2. Airport property characteristics - on-site energy demand, facilities, real estate, and terrain.
3. Energy costs - current cost of conventional electricity versus renewable electricity, cost of power trends, and heating.
4. Public policy programs - available tax credits, state established renewable portfolio standards, grants, executive orders, power purchase agreements and the ability to net meter.
5. Ownership and operational arrangements - is it going to be airport owned, third-party owned - airport host, third-party owned - airport as power purchaser, or utility owned.

SHD’s AC terminal consumes 39 percent of the airport’s total gas-propane usage. A **solar hot water heater** may be beneficial in buildings that require a large amount of hot water for showers, cleaning, and hand washing. Further cost-benefit analysis is required, and the Commission could look into possibly having a solar hot water heater installed on or close to the AC terminal.

As part of the master plan, a solar hot water heater system could be evaluated for the proposed future fire rescue unit.

Below are some potential Energy Initiatives for the Commission to evaluate and implement at the opportune time:

energy initiatives

		Resources Required	Economic Viability	Environmental Stewardship	Social Equity	Operational Efficiency	Community Partnership
Reduce Energy Usage							
EC01	Benchmark and monitor energy use	staff	✓	✓			
EC02	Reduce energy use in terminal buildings	staff		✓			
EC03	Reduce energy use in overall airport	staff	✓	✓			
EC04	Utilize renewable energy	\$	✓	✓			✓
Review Projects							
EC05	Evaluate projects for energy savings	staff	✓	✓			

Summary:

The Commission has already taken some steps toward sustainability which include best practices and projects to recycle waste, limit stormwater, decrease domestic water use, change to LED lights, and use electrical fans for cooling. As SHD continues to grow, more energy and resources will be required. The “Initiatives” at the end of each section have recommended areas and ways to improve sustainability specific to SHD. When the opportunity arises, the Commission could use these initiatives to track and reduce consumption and improve communication. These are just some recommended practices. There are many ways to improve sustainability. The tools provided in this annex can help SHD make a significant impact toward sustainability.

Sustainability at SHD is about using innovative techniques to create positive impacts for people, the planet, and still be economically viable