



2018

PHL PNE

PHILADELPHIA INTERNATIONAL AIRPORT
NORTHEAST PHILADELPHIA AIRPORT

Environmental Progress Report

PHILADELPHIA INTERNATIONAL AND NORTHEAST AIRPORTS

OPENING REMARKS



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The City of Philadelphia Division of Aviation (DOA) is proud to present its third annual Environmental Progress Report, documenting our sustainability commitments and progress in the areas of Recycling, Energy, Noise, Emissions, and Water (RENEW), among others.

The DOA owns and operates both the Philadelphia International Airport (PHL) and Northeast Philadelphia Airport (PNE). As two of the largest economic

contributors to the Philadelphia region, PHL and PNE have an opportunity to integrate sustainability and have a positive impact on our region and customers.

Since our last report in 2017, we've been busy. We completed two strategic plans focused on energy, emissions, and resilience, and waste and recycling; implemented numerous energy-efficiency upgrades; and piloted several projects that will lead to broader deployment of sustainability initiatives across the airports. In addition, we continued our focus on educating employees, business partners, and passengers on sustainable practices.

While we are proud of our accomplishments to date, we are also cognizant of some challenges that we continue to face as well as new hurdles. For example, the declining market for recyclables caused by international policy changes has negatively impacted the DOA's diversion rate from landfills. Despite such challenges, we continue to press forward with sustainability innovation at both airports. We are piloting several projects with great potential to enhance our facilities'

sustainability, such as a green roof and liquid collection sinks at our checkpoints.

We hope that you enjoy this year's update. Sustainability at PHL and PNE is continuously evolving, and we look forward to sharing additional updates in the future.



SUMMARY OF ACHIEVEMENTS

Sustainability Evolution

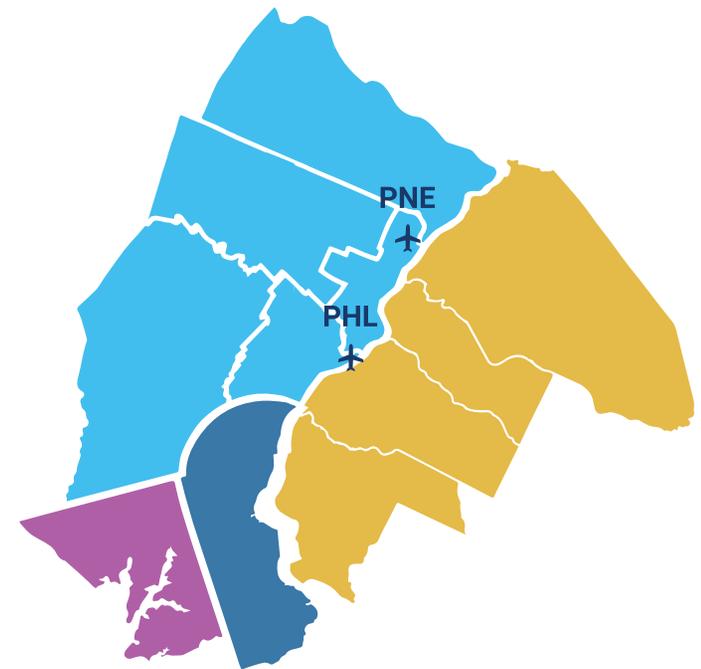
Beginning with its Environmental Policy Statement in 2006, the DOA has spent over a decade developing environmental programs and pushing the boundaries in sustainability in alignment with the City's leadership in this arena. The first two annual reports in 2016 and 2017 documented some of the recent achievements:

2016

- PHL developed an initial, short-term sustainability action plan.
- CEO Chellie Cameron signed a comprehensive sustainability policy.
- PHL signed the Airport Sustainability Declaration at the international Airports Going Green conference.

2017

- PHL received the Delaware County Green Award for air quality initiatives.
- PHL received the Airports Going Green Conference's honorable mention in recognition of the Terminal F Baggage Claim building and outstanding leadership in pursuit of sustainability within the aviation industry.



**PHL and the Region:
Being A Good Neighbor**

SUMMARY OF ACHIEVEMENTS

2018 Highlights

The DOA continued its progress in 2018 while turning an eye towards the future in the areas of resilience and adaptation.

The employee-led Sustainability Committee held several events, even engaging other airports in information sharing.

The DOA initiated a pilot of liquid collection sinks to divert liquids from checkpoint waste. Tackling waste and recycling issues was a major focus throughout the year. Staff even sorted through trash and recyclables to better understand the current makeup of materials.



In collaboration with the Pennsylvania Horticultural Society, the DOA selected a finalist for the PHL Landscape Renewal design competition.



The DOA completed design of two vegetated green roofs for the north and south sides of the Terminal D-E Connector.



North Green Roof: View From Concourse

A number of energy efficiency projects were completed at the airports including LED upgrades and HVAC improvements, resulting in over 1.9 million kWh in annual energy savings.



Focus Area Overviews

The following pages highlight this year's progress in each of the RENEW focus areas, as well as the DOA's efforts related to sustainable design and construction. Recognizing the importance of looking forward, the report also includes a snapshot of future opportunities.

2018 Environmental Progress Report

Sustainability Initiatives

Sustainability initiatives are taking place across the entire airport. Notable locations are identified below.

Recycling

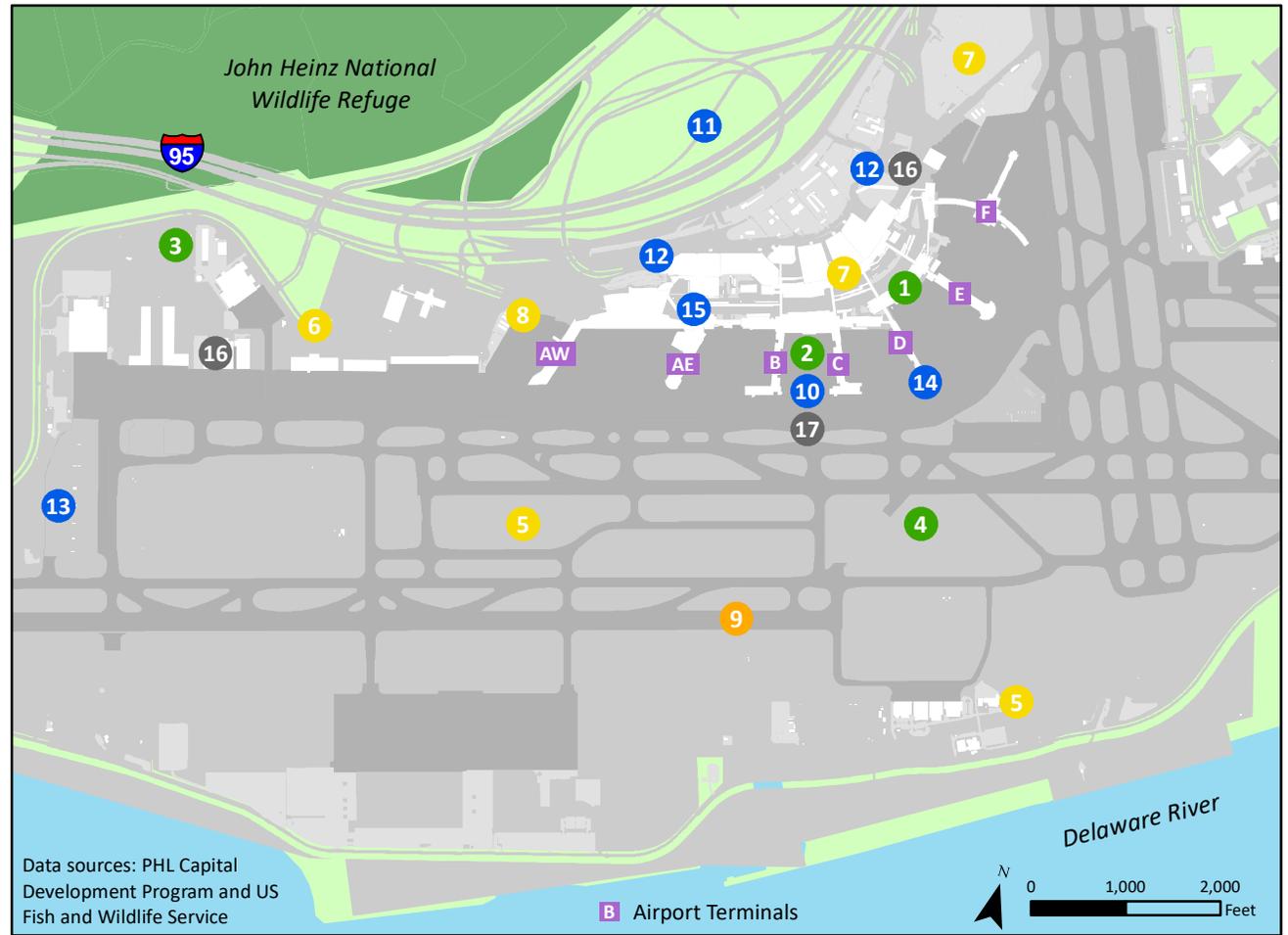
- 1** Liquid Collection Sinks
Piloted liquid collection units at security checkpoints to reduce recycling contamination
- 2** America Recycles Day Event
Public education event about reducing, reusing, and recycling in Philadelphia
- 3** 2018 Waste Audit
Performed audit of waste and recycling for insight into opportunities and contamination
- 4** Concrete Recycling
Recycled construction and demolition debris from Runway 27L Extension and Associated Taxiways project

Energy & Emissions

- 5** LED Retrofits
Replaced airfield and facility lighting with more efficient LED fixtures
- 6** Compressed Natural Gas (CNG) Shuttles
Switched to CNG vehicles for shuttle fleet
- 7** Electric Vehicle (EV) Charging Stations
7 EV charging stations located in short-term garages and economy lot for passenger use
- 8** Electric Ground Support Equipment (eGSE)
Using eGSE, including baggage tugs and beltloaders, reduces CO2 by using electric chargers

Noise

- 9** Fly Quiet Program
Program to reduce noise at night had between 87% and 94% monthly compliance in 2018



Water and Natural Resources

- 10** Restroom Upgrades
Installed low-flow fixtures and toilets with restroom upgrades
- 11** Landscape Renewal
Selected firm to prepare landscape renewal project, including native plantings, for airport gateway
- 12** Stormwater Management
Features such as bioswales, rain gardens, and rainwater harvesting systems are incorporated into new development and renovations
- 13** Reducing Glycol in Deicing Fluid
More efficient deicing system uses less glycol by supplementing it with water based on temperature

- 14** Green Roof Design
Completed design of two green roofs for future installation
- 15** Flood Resiliency Efforts
Reinforcement of electric substation with stackable aluminum flood barriers

Other

- 16** LEED-Certified Buildings
LEED-certified buildings contribute to reduced impacts and operational efficiency
- 17** Earth Day
Earth Day celebration and educational campaign with partners

Although waste diversion rates have decreased due to international policy changes the DOA maintains its commitment to reducing waste and finding ways to maximize the potential for recycling.

Waste Audit & Planning

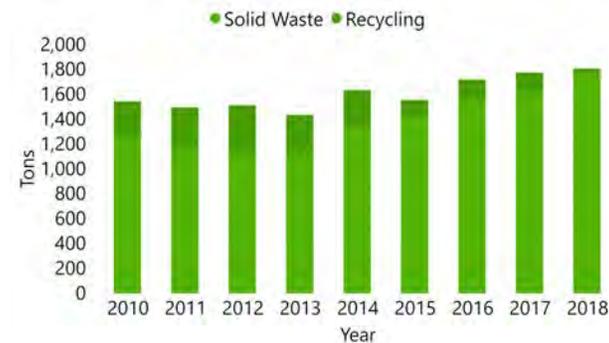
In 2018, the DOA conducted a waste audit and developed a Recycling, Reuse, and Waste Reduction Plan. The Plan documents current processes, data, and initiatives, culminating with recommendations to minimize waste generation, increase diversion, reduce environmental impacts, and save costs.



During the May 2018 audit, staff sorted through trash and recyclables collected from several areas at the Airport. The

results showed that the DOA-controlled areas, in particular, continue to struggle with contamination in the recyclable bins. Over 80% of the materials' weight at the checkpoints was liquid.

Waste & Recyclables Progress



Annual Solid Waste and Recycling

The combined total of waste and recycling tonnage is rising with the increase in passengers traveling through the Airport.

Unfortunately, the strict threshold for contamination in the materials recovery industry has shifted much of PHL's recycling to waste.

Addressing New Challenges with Collaborative Solutions

Liquid contamination continues to challenge PHL's recycling rate and the international market for recyclables has drastically declined due to China's new threshold (accepting less than 0.5% contamination). The DOA is working continuously with its stakeholders and partners to address these issues. In 2018, PHL launched a liquid collections sink pilot to divert liquids from the checkpoint and encourage passengers to hold onto their reusable bottles. Post-security, nearly 50 water fountains and bottle filling stations offer the chance to hydrate sustainably.

Each year, the DOA organizes and hosts two environmentally themed events - Earth Day and America Recycles Day. Both events encourage stewardship, conservation, and recycling through awareness and education.

Tenant Efforts

Although both American Airlines and MarketPlace saw slight declines in their diversion rates from 2017 to 2018, these partners are working hard to address the same challenges as the DOA and participated in the PHL waste audit.

Survey Takeaways

As part of the recycling planning efforts, the DOA distributed a survey to tenants to understand their challenges and practices. Results showed that many have sustainability commitments that align with PHL efforts and are seeking opportunities to participate in the DOA's initiatives. Several are interested in a centralized recycling program, which could increase efficiencies across the Airport.



Earth Day 2018



America Recycles Day 2018

Meet Our Recycling Coordinator!

PHL is one of the few airports in the country to have a dedicated Recycling Coordinator. Tamika Davis, a 24-year employee of the City of Philadelphia, came to PHL's Capital Development Group in March 2014. "It Takes a Village!" says Tamika when it comes to the community of PHL employees that help keep the airport beautiful and sustainable. Her responsibilities include, but are not limited to, managing regular waste and recycling hauls, contamination monitoring, and some sustainability messaging at the Airport. She also coordinates the America Recycles Day and Earth Day education events, which showcase the sustainability initiatives of PHL and local businesses.



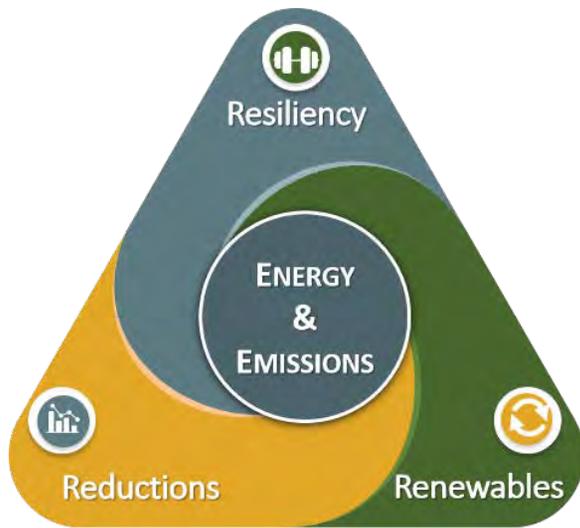
Philadelphia International Airport is one of the largest consumers of energy among City departments. Both PHL and PNE rely on electricity and natural gas as their primary energy sources, with electricity accounting for utility costs. In addition to the impact on the DOA's finances, energy consumption directly contributes to the airports' Greenhouse Gas (GHG) emissions.

With this in mind, the DOA completed a Strategic Energy and Emissions Reduction Plan in 2018 aimed at **Reducing** energy and emissions, achieving long-term **Resiliency**, and transitioning to **Renewables**. The objective of this "Re-PHL Strategy" was to help the DOA realize financial savings, increase its operating efficiency, and achieve long-term resiliency.

The DOA has implemented a number of projects to drive down energy and emissions, including projects such as transitioning to LEDs for PHL Runway 9R-27L lighting, LED lighting at fire and police facilities, roof and air handling unit replacements at Concourses B, C and D,

and both ramp control towers underwent HVAC improvements. Phase 2 of Terminal LED upgrades will be implemented in 2019 in addition to new airfield signage lighting at PNE.

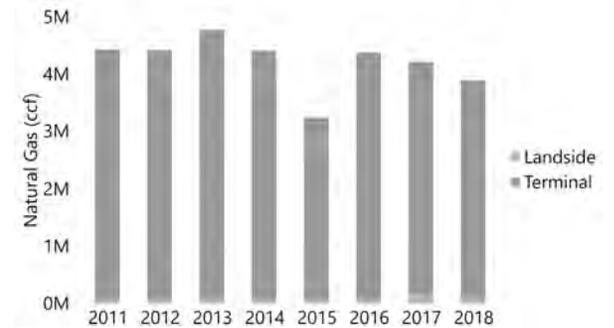
These 2018 projects will result in more than **1.9 million kWh** in annual energy savings.



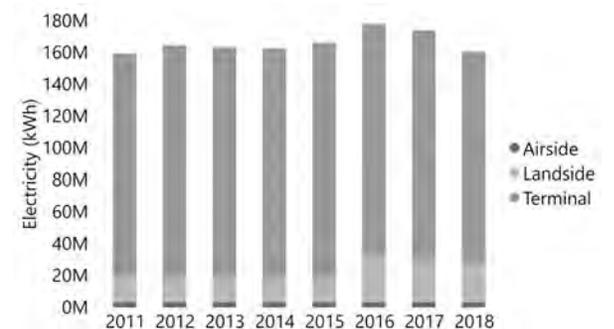
Source: City of Philadelphia DOA

Energy Consumption

For the second year in a row, both natural gas and electricity consumption at PHL decreased from 2017 to 2018.



2018 Annual Gas Consumption



2018 Annual Electricity Consumption

Fuel Consumption

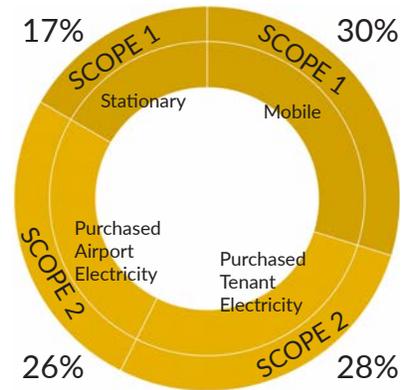
Petroleum-based fuel consumption decreased by 15% from 2017 to 2018 thanks to the DOA shuttle fleet's transition to Compressed Natural Gas (CNG). This represents a 13% reduction compared to the 2016 baseline, outpacing the DOA's goal of achieving a 5% decrease by 2020.



GHG Emissions

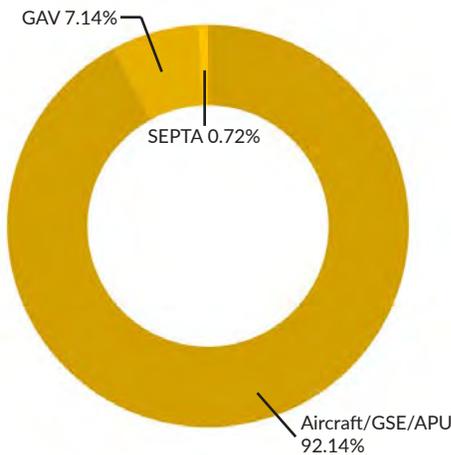
Emissions are reported as either Scope 1 (from sources owned and controlled by the DOA, such as fleet vehicles), Scope 2 (from the generation of electricity consumed by the DOA and its tenants), or Scope 3 (associated with sources owned and controlled by others like aircraft). As shown here, total emissions have increased from 2017 to 2018, though this corresponds to an increase in both aircraft operations and passenger activity levels.

PHL GHG Emissions Inventories

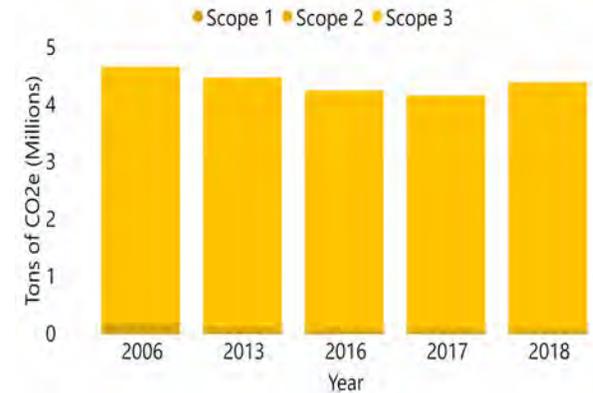


Numbers may not total 100% due to rounding

2018 Scope 1 and 2 GHG Emissions



2018 Scope 3 GHG Emissions



GHG Emissions Inventories by Scope

In addition to addressing energy and emissions, the DOA has taken initial steps toward long-term resilience and adaptation with additional action items planned in 2019 and beyond, including infrastructure upgrades, design standards, and policy updates that will increase resilience of our assets and operations.

The DOA Aviation Noise Abatement Program is a response to community concerns about aircraft noise related to operations at PHL and PNE. The Noise Program continues to be a key liaison between airport, airline, Federal Aviation Administration (FAA), and community stakeholders.

Monitoring

The Noise Abatement Program regularly tracks the status and progress of the following:

- Noise complaints;
- Noise abatement procedures (i.e., nighttime flight procedures and runway utilization);
- Aircraft operations; and,
- Measured noise levels.

PHL has 9 permanent noise monitors, which were upgraded in 2018 and are installed in different locations around PHL to measure noise levels 24 hours a day, 365 days a year. In addition, the DOA offers portable noise monitors to surrounding residents at their request.

Fly Quiet Program

With the large amount of local and transient flight activity in the Philadelphia region, some exposure to aircraft noise is unavoidable. Philadelphia International Airport is working to minimize exposure to aircraft noise as much as possible. The policies in place include having aircraft fly their assigned departure heading until they reach a certain altitude before they turn to their next checkpoint.

During the hours of 10:00 PM and 6:00 AM, designated noise abatement departure headings are used. These headings direct jet aircraft down the middle of the Delaware River until they reach sufficient altitude to perform a turn. This effort keeps departing aircraft further from residential areas while they are at their lowest and loudest. In 2018, compliance with this program ranged from 87% to 94% monthly.

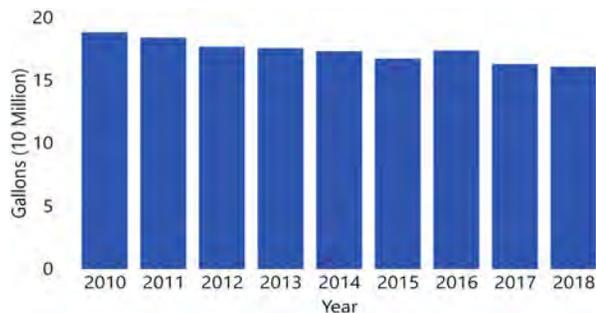


Noise Monitor in the PHL Vicinity

The DOA aims to reduce water consumption by the continued installation of low-flow fixtures and toilets in restroom renovations. To protect water quality, the DOA tracks and reports on fuel spills, has integrated stormwater management projects into its facilities, and collects and monitors stormwater runoff/snow melt affected by deicing activities.

Water Consumption

As shown below, water consumption decreased from 2017 to 2018 thanks to numerous water conservation measures.



Annual Water Consumption

Fuel Spill Prevention

During 2018, over 399 million gallons of fuel products were used at PHL and a total of 66 documented spills were recorded. Although the number of spills increased

slightly compared to 2017 (63), the trend over the past 10 years has been a reduction in both spills and the total amount of gallons released.

Aircraft Deicing Fluid

In 2018, the DOA updated its Best Management Practices Plan for Minimizing Deicing Fluid Discharge. Deicing fluid is used by airports across the world to ensure the safe operation of aircraft during cold weather. Philadelphia International Airport's Plan outlines a number of measures to minimize the volume of fluid and reduce the amount that enters the storm drain system. For example, deicing fluids are blended with water based on the ambient temperature in order to minimize the glycol content while still safely deicing the aircraft, and the solution is heated prior to application for increased efficiency. In

addition, forced air is used to remove ice and snow from aircraft when possible, in order to eliminate the use of deicing fluid in those circumstances.



Blossoming Gardens

Both PHL and PNE are home to beautiful gardens including a Butterfly Garden at Northeast Philadelphia Airport that was installed in 2003 and replaced in 2018. In addition to reducing stormwater runoff and creating habitat for pollinators, these gardens offer a welcoming landscape for airport users and visitors.



PHL Landscape Renewal

In collaboration with the Pennsylvania Horticultural Society, the DOA conducted a landscape renewal competition for a concept encompassing over 100 acres along PHL's arriving and departing roadways. The goals of the competition were to create an iconic PHL landscape, enhance the environmental sustainability of the Airport, and provide a customer-friendly arrival and departure experience. Five finalist teams presented concepts at the 2018 Philadelphia Flower Show. In 2018, the competition transitioned to a design project that will replace the existing invasive vegetation with a naturalized landscape.



SUSTAINABLE DESIGN & CONSTRUCTION

The DOA is committed to integrating its RENEW principles into sustainable design and construction practices in all airport projects and tenant improvements.

Process Improvements

In 2018, the DOA updated its Design Guidelines to more thoroughly integrate sustainability and climate resilience and adaptation. The Guidelines reference the City's Leadership in Energy & Environmental Design (LEED) policy. LEED certification includes a suite of rating systems designed to work for all types of building and facilities projects, including terminal projects. PHL's Terminal F baggage claim facility achieved LEED Gold in 2016. Further, the DOA is developing the PHL Engineering Project Management Playbook to standardize key steps in project delivery and identify specific DOA personnel crucial for project collaboration.

Sustainable Projects

In 2018, the DOA completed designs for two vegetated green roofs (each approximately 550 square feet) to be

installed on the north and south sides of the Terminal D-E Connector. These features will contribute to a variety of sustainability initiatives, including mitigating the heat island effect, reducing and filtering stormwater, increasing roof longevity, and reducing landfill use by incorporating recycled, glass ballast. Passengers walking between the terminals will be able to view and enjoy the greenery from large windows on the south side of the building.

In addition, the DOA completed many energy-efficiency upgrades as discussed in the Energy & Emissions section. Finally, the PHL Landscape Design Competition (also previously mentioned) emphasizes sustainability and will result in a more welcoming entrance to PHL that reduces energy and water consumption.



South Green Roof: View From Concourse



North Green Roof: View From Concourse

FUTURE OPPORTUNITIES

Looking ahead, the DOA and airport industry as a whole are beginning to prepare for new opportunities, technological advancements, and major disruptors or changes to normal operations.

In keeping with the DOA and the City of Philadelphia's commitment to LEED and green building, the DOA is monitoring the development of LEED for Airports, an extension of the existing LEED rating system designed specifically for airport facilities, and will evaluate opportunities to implement it once formally released.

As a low-lying, coastal airport, PHL may become increasingly susceptible to flooding under future sea level rise and storm surge scenarios. The DOA made progress on this front in 2018 with the incorporation of resilience and adaptation considerations into the Airport's Design Guidelines. Additionally, the hydrology of sites around the Airport were mapped to determine vulnerability to various flooding scenarios. Moving forward, the DOA will continue to seek opportunities to use sustainability

as a planning tool for resilience and adaptation, which will ultimately improve the operational readiness of the Airport and keep passengers flying. In 2019, the DOA will conduct an assessment of the climate change vulnerability of PHL critical assets and provide a plan to promote future resiliency and adaptive capacity of those assets.

Recognizing that the bulk of PHL's emissions result from Scope 3 aircraft fuel consumption, the DOA is evaluating solutions for reducing sources of emissions outside of DOA operational control. One potential solution is sustainable aviation fuel (SAF), a jet fuel produced from renewable resources. Although many logistical and financial challenges exist to supplying SAF to our airline partners, the DOA will continue to monitor SAF

advances across the country and evaluate the potential for SAF deployment at PHL.

2019 will also yield more tangible energy and cost savings with the start of construction of the LED Phase 2 project, the Mechanical Room 12, 13, & 17 upgrades, and the Concourse C rooftop unit replacement projects. Additionally, there is renewed interest in submetering, escalator motor controls/monitoring, and opportunities for renewable energy generation.

SURVEY TAKEAWAYS

Many tenants have sustainability commitments in place that align with PHL efforts. In addition, several are seeking guidance & opportunities to participate in the DOA's initiatives and are interested in Sustainable Aviation Fuel (SAF), electrification, and centralization/consolidation of recycling programs.

Be sure to check back in 2019!