

Appendix 16

City of Philadelphia Aviation Division Philadelphia International Airport (PHL)

Philadelphia, Pennsylvania

The City of Philadelphia's sustainability program, Greenworks, includes a "Zero Waste" vision to eliminate the use of landfills and conventional incinerators by 2035. Philadelphia aims to achieve this goal by reducing waste generation, increasing diversion to 90% and limiting waste to energy to 10%. To reach these milestones, the City is working to reduce the amount of trash created and to increase the amount that is reused and recycled. The City's Division of Aviation is responsible for reducing waste and increasing reuse and recycling at Philadelphia International Airport (PHL). The Division of Aviation's Environmental Policy includes a goal to reduce the impacts of operations and activities through recycling and waste reduction. Specifically, the Division has a goal to increase the recycling rate to 25% by the year 2020. PHL had reached 21.5% landfill diversion, primarily through recycling; however, the program has struggled with contamination and rejected loads and consequently is analyzing every aspect of the program and working to meet and exceed this previous level of performance.

PHL has a single stream recycling program for passengers and employees, including items generated in public areas of the terminals and employee offices and other work areas. Cardboard and office paper are also recycled separately. Except for a few small lessees, Airport tenants manage their own recyclables and waste. One of the airlines operating at PHL participates in the Division of Aviation's recycling program, including materials from deplaned waste. Most of the food and beverage and retail tenants recycle.

All waste collected from City of Philadelphia facilities, including PHL, that is not recycled is processed to generate energy. Waste to energy is considered landfill diversion; however, PHL is working to reduce the carbon impact of incineration and overall waste generation (including loads of rejected recyclables).

Environmental staff administers the facility's waste and recycling collection contracts and is responsible for monitoring, measuring, and tracking the programs' activities and metrics. Waste collection and transport is performed by Airport Facilities Maintenance staff; recycling collection is the responsibility of a private company. The City provides data from scales at the waste transfer facility; the recycling company provides quantity information for collected materials from each compactor haul. PHL has also completed composition studies to better understand the makeup of the facility's waste and recycling streams; however, further study is needed to understand the composition of all airport waste streams. The Capital Development Group funds waste management planning and environmental activities; the Facilities Maintenance Department funds custodial activities and other associated costs.

PHL's dedicated Recycling Coordinator is responsible for managing the facility's waste management programs and contracts, in collaboration with other Environmental/Sustainability staff and staff from other departments. The Environmental/Sustainability Department has employed interns and co-ops to assist with the program while learning about sustainability careers. PHL has a Sustainability Committee made up of representatives from throughout the Division of Aviation. This committee meets monthly to discuss waste

reduction and other sustainability topics. The committee also tracks the facility's recycling rate throughout the year.

Environmental staff coordinate with personnel from the City of Philadelphia Office of Sustainability, Streets Department, Solid Waste Recycling Advisory Committee, and Zero Waste + Litter Cabinet. Environmental staff regularly meet with Custodial staff and the TSA to discuss issues, concerns, and plans. Custodial services in Airport-controlled areas are provided by Division of Aviation Custodial personnel. Custodial services are performed by tenants' contractors in their leased spaces.

Environmental/Sustainability staff recently developed a poster campaign to provide information about PHL's recycling program; other signage and messaging campaigns have been developed as well. Written procedures are in place which provide operating instructions for recycling compactors and lists of acceptable materials. PHL produced an annual recycling report for several years (see sample at end of this case example); waste data is now included in a larger environmental report, which is shared with management.

PHL is also working to increase passenger and employee participation in the recycling program. Some of the strategies PHL is using to increase participation include design and installation of new labels and additional paired recycling and waste bins at terminal security checkpoints. The Division of Aviation has distributed reusable water bottles to employees to discourage use of single use disposable beverage containers. The City and Division of Aviation have implemented paper reduction initiatives including electronic billing, digital signatures for approvals, digital reports, and paperless procurement processes. PHL purchases materials which contain recycled content, are packaged in bulk, or can be recycled, including paper, bins, and toiletries. Office paper is shredded by a specialty contractor who provides certificates that certify that the material has been recycled. PHL's Warehouse and Maintenance Departments alert other personnel about items available for reuse where possible. Chippers are used for yard waste which is composted on site.

PHL would like to add new containers and new signage, install liquid disposal stations at the security checkpoints, and expand to areas not currently served by the program. PHL is prioritizing liquid contamination of the recycling stream due to ongoing challenges with rejected loads. In the long-term, the Division of Aviation is also considering centralizing waste management and consolidating equipment and services to create a more sustainable system for Division of Aviation and its tenants. To this end, PHL will be engaging tenants through surveys and waste composition studies to determine feasibility of a more centralized program.

2014 Annual Recycling Report

**City of Philadelphia
Division of Aviation
June 2015**



Photo Credits: Rick McMullin, Philadelphia International Airport

This Page Intentionally Left Blank

Table of Contents

GLOSSARY OF TERMS	ii
EXECUTIVE SUMMARY	v
I. Introduction	1
Environmental Stewardship and Recycling	1
Environmental Policy Statement	3
II. 2014 Environmental Accomplishments	5
Recycling and Solid Waste	5
Contamination	5
DOA 2014 Waste Disposal and Recycling Tonnage.....	6
Additional Recycling	11
Hazardous Waste.....	13
Public Outreach and Education	15
Earth Day 2014.....	15
America Recycles Day 2014	16
Messaging on Shuttle Buses	17
Recycling Committee	17
III. Tenant Recycling.....	18
American Airlines (US Airways)	18
MarketPlace Philadelphia Management	18
Tenant Pilot Compactor Program	20
IV. Future Goals and Objectives	21
Food Waste Collection.....	21
Partnering Opportunities: Expansion of Tenant Recycling	21
Waste and Recycling Receptacle Placement and Messaging.....	22
Expansion of C & D Waste Recycling Program	23
Feasibility of a Source-Separation Facility	23
Overall Program Reassessment	23
V. Conclusion.....	24

GLOSSARY OF TERMS

BigBelly[®]: a trademarked two-component system made up of a recycling receptacle and a compacting trash receptacle for external use. The solar-powered and software controlled components send a message when a receptacle is reaching capacity, thereby saving money through reduced waste collections.

Construction and Demolition (C & D) Waste: discarded materials generally considered to be not water soluble and non-hazardous in nature, including but not limited to steel, glass, brick, concrete, asphalt material, pipe, gypsum wallboard, and lumber, from the construction or destruction of a structure as part of a construction or demolition project, or from the renovation of a structure.

Contaminated Recycling: Recycling load that has been picked up by hauler and taken to a Materials Recovery Facility (MRF) and has been rejected due to a large portion of the load being made up of materials or liquids that are not recyclable.

Diversion Rate: the percentage of material diverted from landfill through recycling or waste-to-energy (WTE). It is calculated by dividing the total weight of recyclable and WTE material by the total weight of all waste streams (solid waste, recycling, and WTE material).

Envyrozones[®]: commonly used to describe the Hazelton product line of Envyrozone, Inc., which is a trademarked, interior multiple collection receptacle for trash, paper, bottles and cans. There are 56 “Envyrozones” located throughout PHL’s terminals.

Fullness Usage System: a pressure gauge and electronic monitoring system that tracks a waste or recycling compactor’s activity and reports container fullness levels to a computer. This equipment sends a message when a compactor is reaching capacity, thereby saving money through reduced waste collections. This system also eliminates the need for employees to check and report the fullness level of each container.

Hauling: the transport of waste materials or recyclables in accordance with local environmental guidelines or laws.

Hazardous Waste: waste that is dangerous or potentially harmful to our health or the environment. Hazardous wastes can be liquids, solids, gases, or sludges. They can be discarded commercial products, like cleaning fluids or pesticides, or the by-products of manufacturing processes.¹

¹ Source: <http://www.epa.gov/osw/hazard/>

LEED: Acronym for Leadership in Energy and Environmental Design. A rating system developed by the U.S. Green Buildings Council for the design, construction and operation of high performance green buildings, homes and neighborhoods.

Marketplace Philadelphia Management (MPM): as part of Development, Inc. (a retail development firm that partners with airports and businesses to develop, lease, and manage retail programs), Marketplace Philadelphia handles the development, management and leasing of all retail, food and beverage concessions throughout the seven domestic and international terminals at PHL.

Materials Recovery Facility: Specialized facility that receives, separates, and prepares recyclables for marketing to end-user manufacturers. Materials have typically been previously separated from other waste streams through single-stream recycling programs or other methods.

MTCO₂e: Metric Tons of Carbon Dioxide Equivalent. This unit of measurement represents an amount of a greenhouse gas whose atmospheric impact has been standardized to that of one unit mass of carbon dioxide.

OCC: an acronym that stands for Old Corrugated Cardboard (OCC). OCC is a paper-based material that is widely used in the manufacture of corrugated boxes and shipping containers.

RCRA: Federal Resource Conservation and Recovery Act (42 U.S.C. §6901 et seq. (1976))

Recyclables: Existing waste materials and goods that are able to be reprocessed and reused. At PHL these items consist of recyclable plastics (#1-7), glass, aluminum, shredded paper, corrugated cardboard, C & D waste, tires, and scrap metal.

Recycling Rate: the percentage of material recycled (diverted) from the total waste stream rather than disposed of in a landfill or waste-to-energy (WTE) facility. It is calculated by dividing the total weight of recyclable material by the total weight of all waste streams generated (i.e. weight of regular/solid waste plus the weight of recyclable materials).

Regular Waste: (or waste) material that is not considered recyclable or special cleanups that are disposed of in a landfill. Also called “solid waste.”

SEPTA: Southeastern Pennsylvania Transportation Authority whose rail, bus, and trolley lines serve Chester, Delaware, Bucks, Montgomery and Philadelphia counties.

Single Stream Recycling: a system in which all recyclable paper, plastics, metal, and glass are disposed in the same container and commingled instead of remaining separate during the waste collection and hauling process. In single stream, both the collection and

processing systems are designed to handle this fully commingled mixture of recyclables, with materials being separated for reuse at a materials recovery facility.

Special Cleanups: waste that is generated through specific projects and often consists of, but is not limited to, tree stumps, concrete cinder blocks, street sweeper dirt and other materials not considered regular waste and is disposed of in a landfill.

Transportation Security Administration (TSA): a federal agency established to protect the nation's transportation systems to ensure freedom of movement for people and commerce.

Total Generated Tonnage: the amount of regular waste tonnage plus the amount of recyclables tonnage.

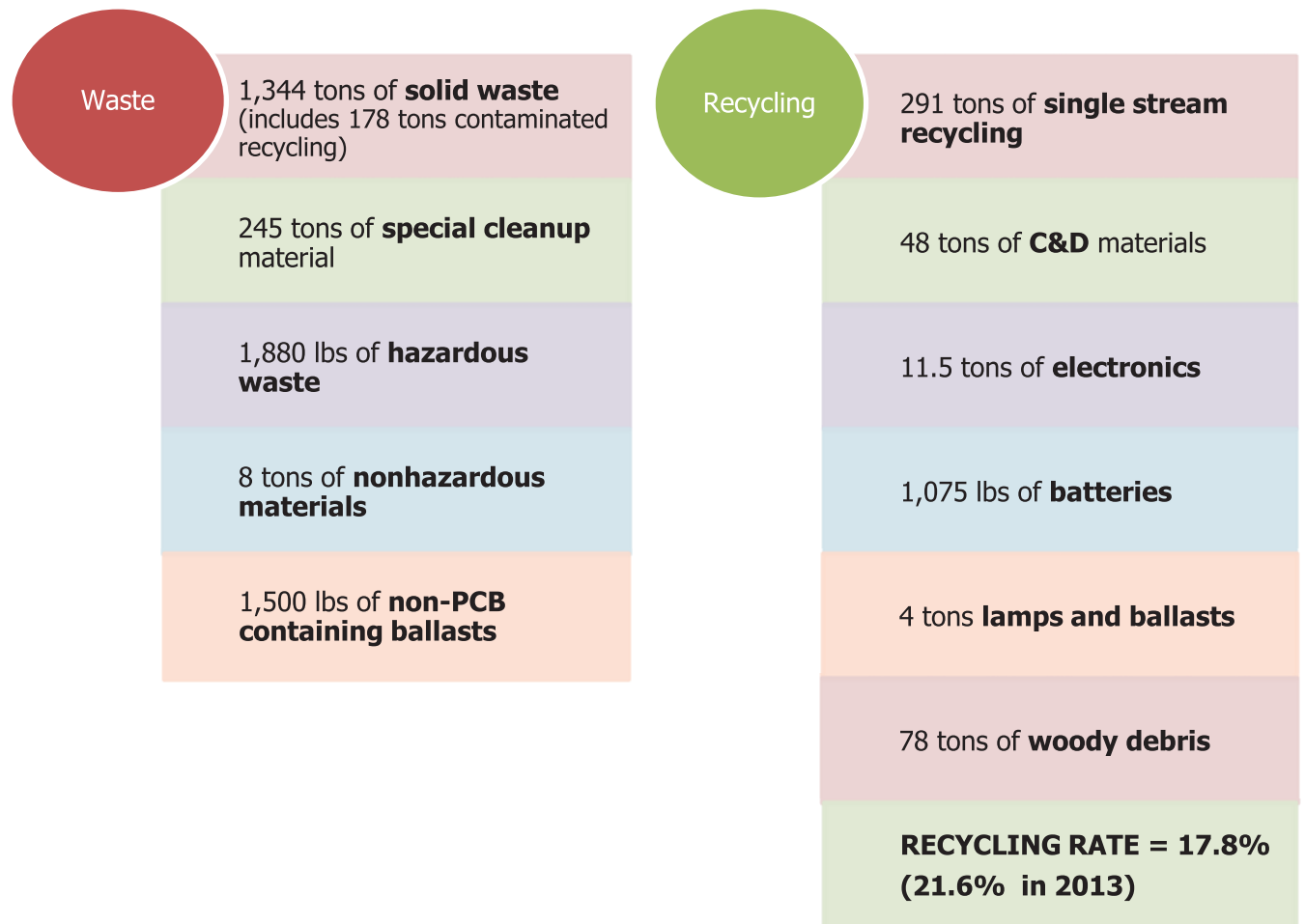
Waste Stream: the aggregate flow of trash from generation, to handling and transport, to final disposition.

Waste-to-Energy (WTE): the process of generating fuel or energy from the incineration of waste. Since 2013, all City-collected solid waste has been delivered to waste-to-energy plants as part of its effort to divert trash from landfills. The Waste Management Spec Fuel Plant began processing 100 to 400 tons per day of City-collected trash in May 2014.

EXECUTIVE SUMMARY

This report provides a summary and analysis of 2014 waste data tracked by the Philadelphia Division of Aviation (DOA), which includes solid waste, recycling, hazardous waste, universal waste, and construction and demolition (C&D) debris. In 2014, DOA processed the following materials for recycling and waste.

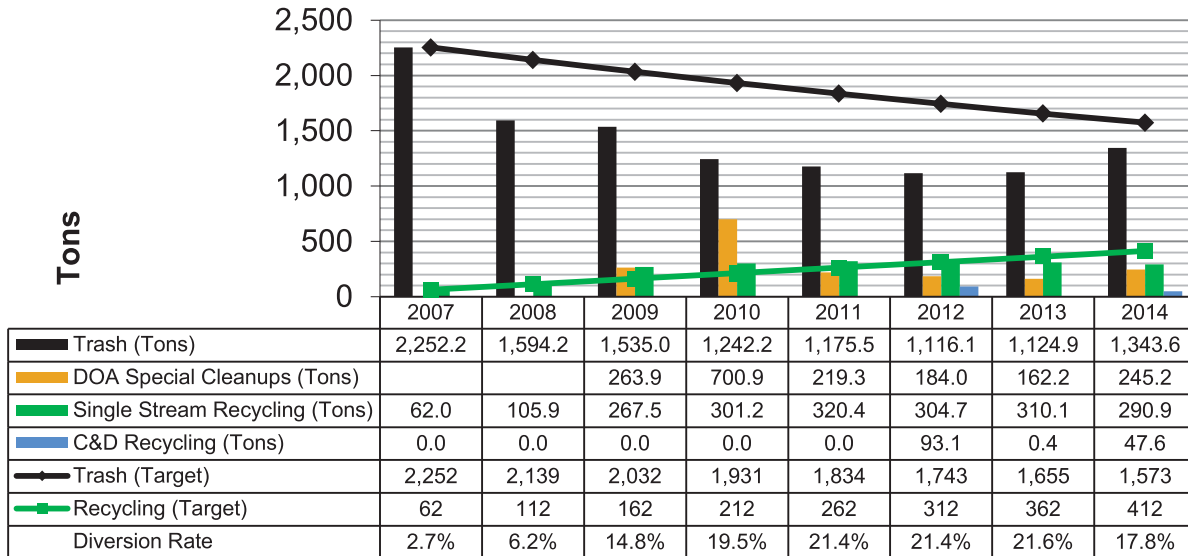
Figure 1: Waste and Recycling Materials at PHL



As Figure 2 shows, the recycling rate was 17.8% in 2014. This drop from 21.6% in 2013 is due primarily to contaminated recycling loads. Without such contamination, DOA estimates that its recycling rate would be roughly 23%, about the same as it has been since 2011. Several remedies for improving the recycling rate are proposed in this report, including research on best practices and technology, closer coordination with haulers, and additional education and outreach.

The table below identifies trends since 2007, when recycling data was first tracked. More detailed analysis is presented in Section II.

Figure 2: Annual Total Solid Waste and Recycling Quantities



This report also incorporates tenant recycling programs that are operated by Philadelphia Marketplace Management and American Airlines (formerly US Airways), which, along with DOA recycling program, accounts for the majority of solid waste and recycling at PHL. Tenant recycling is summarized in Section III of this report. It is estimated that DOA, Marketplace, and American Airlines’ combined recycling efforts in 2014 reduced greenhouse gas emissions by more than 8,200 MTCO_{2e}, which is equivalent to removing annual emissions from more than 1,700 passenger vehicles.²

In the short-term, there are opportunities to improve PHL’s recycling rate through expanded collection and education efforts. In the long-term, DOA will conduct research into the feasibility of building an on-site sorting facility, similar to other airports such as Fort Lauderdale/Hollywood International Airport and Charlotte-Douglas International Airport, where all waste would be collected via one container and sorted for recycling and composting at a single separation facility.

² Emissions estimates based on US EPA Waste Reduction Model (WARM).

I. Introduction

This report provides a summary and analysis of 2014 waste management data tracked by the DOA, which includes solid waste, recycling, hazardous waste, universal waste, and construction and demolition (C&D) debris.

Along with waste reduction, recycling is an important component of any overall waste management program. Another option to recycling that many municipalities are using is incineration or Waste-to-Energy (WTE) facilities. Waste that is not recycled at a Materials Recovery Facility (MRF) is transported to a transfer station where the City of Philadelphia Streets Department sends the materials to a WTE facility where energy or fuel is produced; therefore, it can be stated that all regular/solid waste and single-stream recycling is diverted from a landfill. Despite this 100% “*diversion rate*,” DOA is working at increasing its “*recycling rate*,” which has seen only minor improvements since 2011. In general, recycling is preferable over WTE as the recycling process saves more energy than incinerating trash, which is a nonrenewable resource, and recycling produces fewer greenhouse gas emissions.

Environmental Stewardship and Recycling

Environmental Stewardship is the careful and responsible management of natural and cultural resources for the benefit of present and future generations. Philadelphia International Airport (PHL) is committed to operating its facilities and future developments in an environmentally responsible manner so as to conserve the existing resources unique to the Airport and its environs, and to produce a better environment for neighboring communities, for the public at large, and also for PHL’s customers, tenants and staff. In defining and applying sustainable design principles, PHL strives to address environmental issues early in the planning process.

PHL’s Environmental Stewardship Plan encompasses many green initiatives to reduce the Airport’s impact on the surrounding environment. Over the years the recycling program has served as a cornerstone in the DOA’s efforts to improve the sustainability of its operations at PHL. As one of the three key tenets (reduce, reuse, recycle) of sustainable waste resource management, recycling reduces the amount of waste that is landfilled or incinerated, and provides cost savings for PHL’s tenants and airlines. PHL is committed to continuing to facilitate the expansion of recycling programs throughout the Airport to maximize its recycling rate.

The City of Philadelphia's Greenworks Plan sets a goal of diverting 70% of the City's municipal solid waste. The City, including DOA, accomplishes this by diverting all materials that are not recycled to Waste-to-Energy (WTE). In the effort to minimize the amount of waste that is sent to WTE, DOA is committed to continuing to find new ways to improve the collection, sorting, and diverting of all streams of recyclable materials.

Numerous airports in the U.S. have implemented recycling programs with ambitious waste minimization goals. San Francisco International Airport (SFO) has a goal to achieve 80% solid waste recycling by 2015. In 2012, SFO had achieved a 78% overall diversion rate and recycles over 90% of C&D waste³. Chicago O'Hare International Airport's latest Sustainable Airport Manual provides guidelines for Chicago Department of Aviation projects, with goals of 100% diversion of recyclable, reusable, or compostable waste from landfill and 100% of soils should be kept onsite during construction projects.

DOA also looks for ways to recycle through its capital improvement program. The City of Philadelphia requires LEED Silver for all new construction or renovations greater than 10,000 sf. Under this program, the Philadelphia Division of Aviation will apply the mandatory credit of supplying storage and collection of materials for recycling to all LEED certified projects. The Terminal F baggage claim building, currently under construction, will offer recycling to the public and employees. DOA is also pursuing a Construction Waste Management credit for this project, which requires diverting 75% of non-hazardous construction and demolition debris. In addition, the building's concrete will contain 30% slag cement or fly ash.



Terminal F Baggage Claim Building Under Construction

³ Source: ACRP Synthesis 53: Outcomes of Green Initiatives: Large Airport Experience, 2014

Environmental Policy Statement

On July 31, 2006 the City of Philadelphia issued its Environmental Policy Statement that applies to the Philadelphia Airport System, which includes both of our airports, PHL and Northeast Philadelphia Airport (PNE). This important policy statement, presented below, provides the framework and direction that the DOA pursues with respect to its environmental commitment.

Environmental Policy Statement

The many natural resources that surround the Philadelphia International Airport and Philadelphia Northeast Airport, which comprise the Philadelphia Airport System (Airports) have helped shape the region's rich history and their use has led to the region's prosperity. The Airport will focus on protection and restoration to reduce resource use.

The Airports transportation and economic mission will be achieved in a manner that demonstrates responsible environmental stewardship. The implementation of proactive environmental management systems will contribute to the economic, social, and environmental wellbeing of the City of Philadelphia and the metropolitan region.

The Airports will comply with all applicable regulations and other requirements, while striving to continually improve environmental performance, prevent pollution, and reduce the potential impact of their activities. This commitment will be tracked through the establishing, implementing, and reviewing of relevant environmental objectives and targets for Airport operations and activities.

Philadelphia Airport System will actively seek resolutions to environmental issues by striving to achieve the following goals:

Compliance and Monitoring: The Airports will fully comply with all applicable environmental laws, regulations and other requirements, and strive to exceed legal and regulatory standards where doing so is consistent with the transportation and economic development mission of the Airports. Using innovative technologies and best management practices, the airport will develop, monitor, and regularly review specific targets for activities and programs that help achieve compliance and improve environmental performance. The Airports will hold tenants responsible for compliance with all the applicable laws and statutes regulating their activities.

Sustainability: The Airports will strive to reduce the impacts of operations and activities to preserve and protect surrounding natural resources through cost-effective energy use, recycling water conservation, waste reduction pollution prevention activities, and

procurement of green materials. Airport facilities, where possible will be designed, constructed, and rehabilitated to make use of sustainable materials and green building techniques.

Communications: The Airports will distribute the environmental policy to all on-Airport city employees so they can be aware of and active in implementing this policy. This policy will serve as an impetus to promoting open discussions among all employees about the environmental aspects of their operations and activities and the environmental management system so that they may make informed choices and assist in the accomplishment of the environmental goals. The airports will require all tenants to communicate to their employees the requirements of the environmental management system.

Environmental Stewardship: Current Airport operations and activities will be modified and improved by incorporating sustainable business practices to minimize or avoid impacts to natural resources to the greatest extent possible. The Airports will participate in activities that assist in enhancing the natural environment with a focus on sustaining resources that are vital to local stakeholders. The Airport will improve overall environmental quality through clean up and restoration efforts focused on areas affected by past Airport operations and activities.

II. 2014 Environmental Accomplishments

Recycling and Solid Waste

The City of Philadelphia Division of Aviation's (DOA) recycling program at Philadelphia International Airport (PHL) has made great progress since its inception in 1999. In 2014, however, due to contaminated recycling loads and a change in hauling policies, the recycling rate dropped to 17.8%. Improved coordination between PHL and its haulers, as well as a significant reduction or elimination of contamination, is expected to provide an opportunity to return to continued growth in the recycling rate in 2015.

Highlights of the DOA's 2014 recycling program include:

- 291 tons of **single stream recycling** materials
- 48 additional tons of recycled **C&D** materials (mostly concrete and steel)
- A **recycling rate of 17.8%**, a decrease from 21.6% in 2013
- By diverting material from the regular waste stream, recycling at PHL provided a **cost savings of approximately \$21,500** to the Division of Aviation.

Contamination

In 2014, contamination in the warehouse and Terminal A loading dock compactors became a significant issue. There were 19 recycling loads that became contaminated with liquid, which is believed to have originated at TSA security checkpoints. The weights for these loads, a total of 177.8 tons, are exaggerated when compared to regular solid waste loads because of the excess liquid. DOA staff visually estimate that liquid was approximately 65% of the load by weight. These loads were rejected by the hauler, Waste Management, and processed as trash. DOA is working on multiple training and technology-oriented interventions for 2015, to significantly reduce the amount of liquid contamination.

DOA 2014 Waste Disposal and Recycling Tonnage

Regular waste totaled 1,343.6 tons, a 16.3% increase from 1,124.9 tons in 2013. As mentioned previously, much of this increase is due to weight added by liquids in contaminated recycling loads (178 tons or 15% of total solid waste collected), which were counted as trash as the hauler was not processing contaminated recyclables at the Material Recovery Facility. In all, the total amount of solid waste hauled in 2013 was exceeded by 301.7 tons or 23.4% in 2014.

DOA hauled 245.2 tons of special cleanup waste in 2014; a 51.2% increase from 162.2 tons 2013. This waste is generated from non-routine sources, such as seasonal projects and construction activity. It includes tree stumps, street sweeper material, concrete cinder blocks, and other miscellaneous debris. Due to the inconsistent nature of this element of the waste stream, special cleanup waste is tracked separately from regular waste, which allows the DOA to more precisely monitor the overall waste stream and recycling rate. Both regular and special cleanup wastes are transported to WTE facilities.

As with solid waste, some recycling materials are generated through seasonal projects and construction activity. For accuracy and consistency over time, DOA measures the recycling rate using the weights for single stream materials (mixed paper, OCC, glass, metal, plastics #1 through #7), shredded office paper, and corrugated cardboard. Weights for recycled concrete, scrap metal, woody debris, electronics, batteries and the disposal of hazardous waste are included in this report, but are not included in the calculation of the recycling rate.

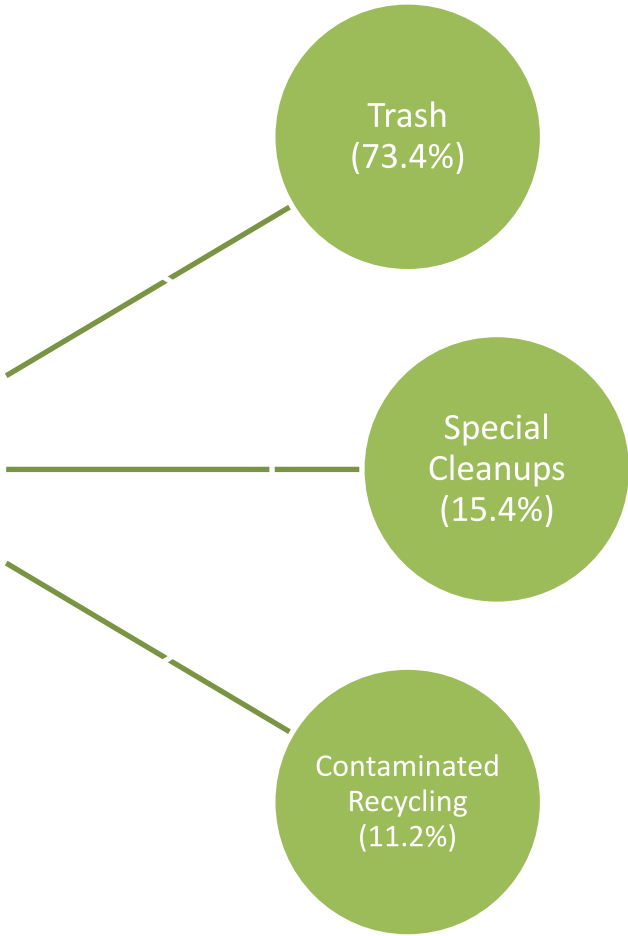


Paper Shredding at DOA Warehouse

The total amount of regularly recycled waste equaled 290.9 tons in 2014; a 6.2% decrease from the 310.1 tons collected in 2013. Single-stream recycling is collected from the Envirozones in the terminals, SEPTA platforms, BigBelly receptacles located in the cell phone lot and employee parking lot, and DOA offices and shops. This brings the DOA's recycling rate to 17.8% for 2014, a significant reduction from a rate of 21.6% in 2013. If the visual estimate of 65% liquid contamination is accurate, the 177.8 tons of contaminated recycling would have added approximately 62 tons to the amount of

recycled material and reduced total trash by 177.8 tons to 1,165.8, resulting in a recycling rate of 23%. DOA considers this to be consistent with the previous three years when the recycling rate had been flat at around 21.5%

Figure 3: 2014 Solid Waste Breakdown



The DOA’s annual goals and observed solid waste and recycling totals from 2007-2014 are illustrated by **Figure 4: DOA Annual Solid Waste Annual Goals & Totals (2007-2014)** and **Figure 5: DOA Annual Recycling Annual Goals & Totals (2007-2014)**.

Figure 4: Annual Solid Waste Quantities 2007-2014

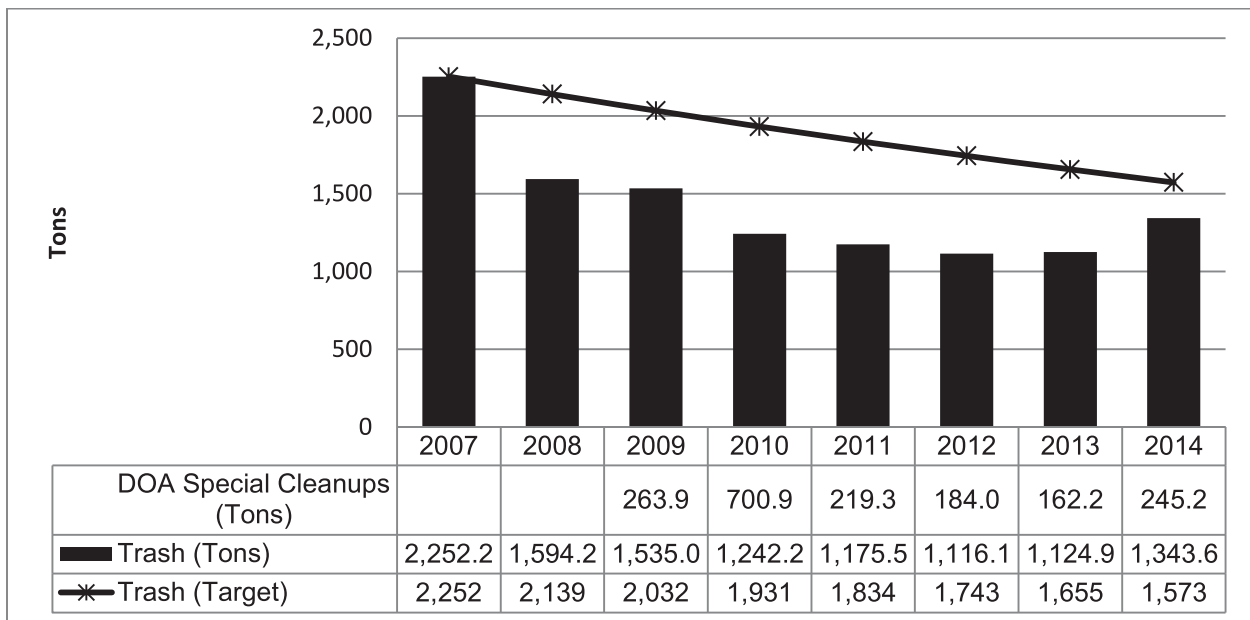
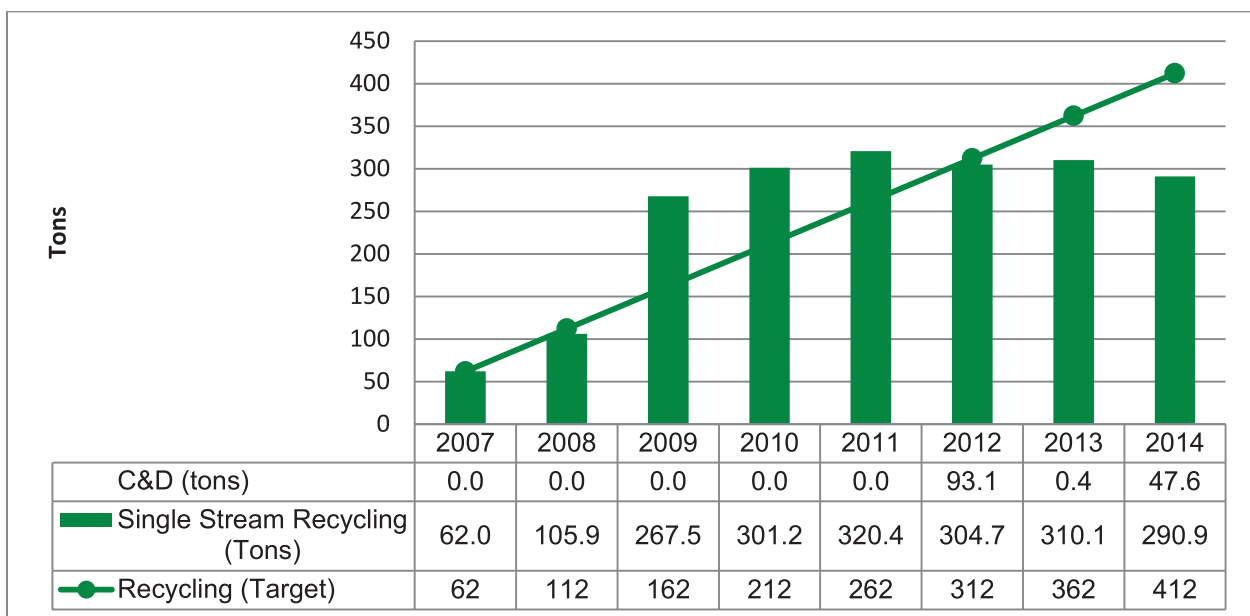
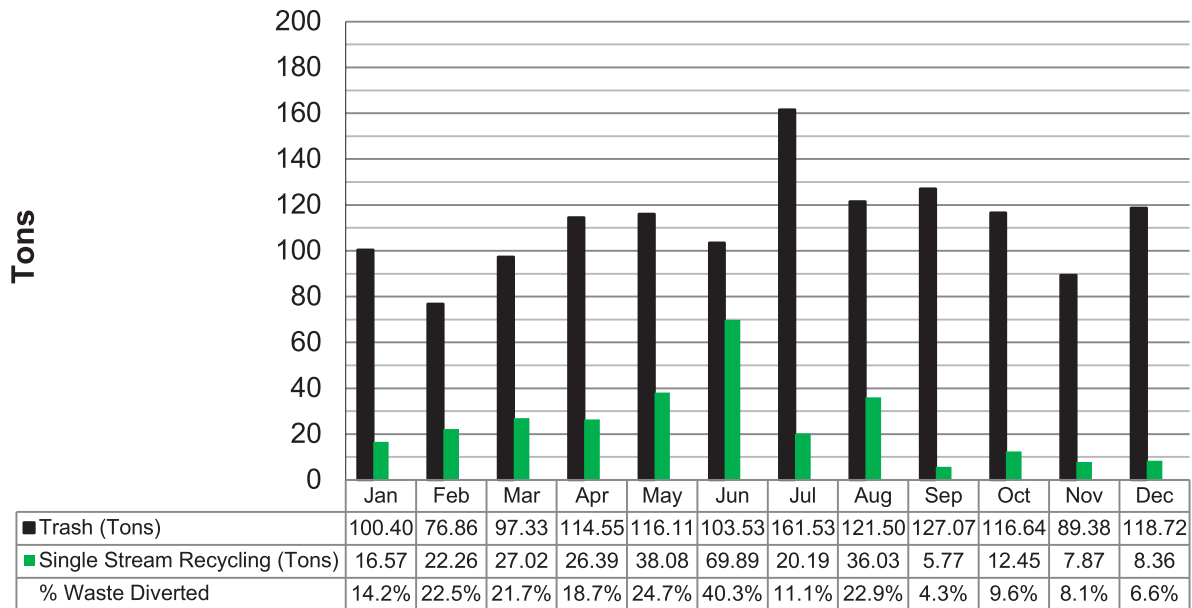


Figure 5: Annual Recycling Quantities 2007-2014

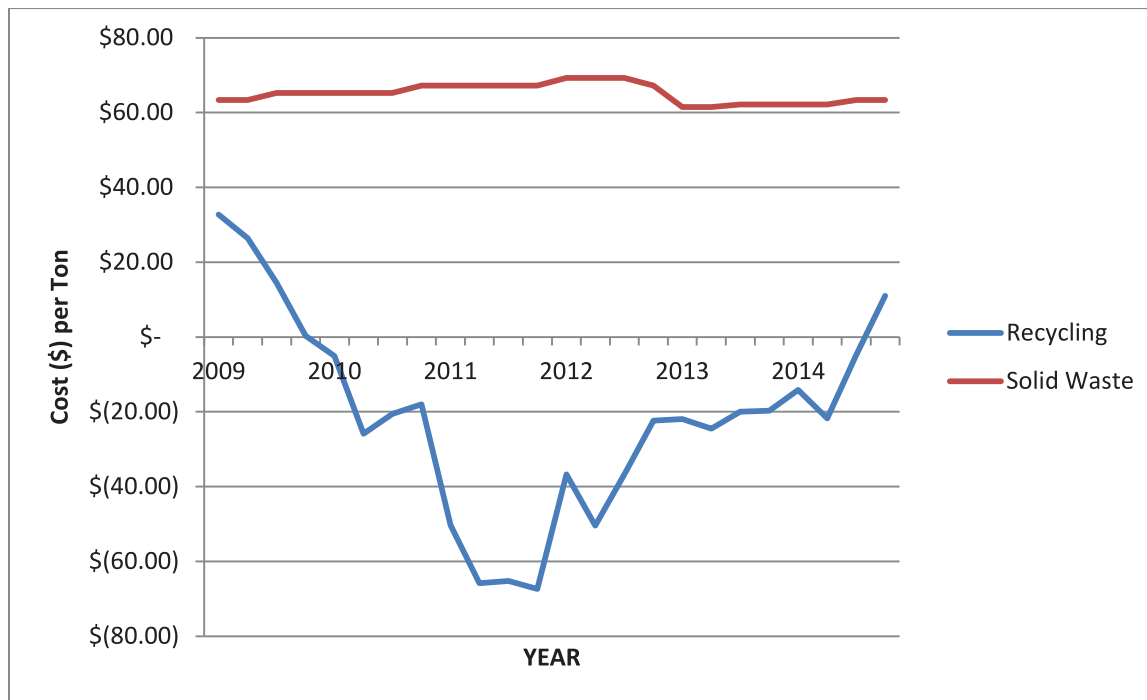


DOA recycling and waste hauls are tracked on a monthly basis. Recycling rates are calculated by dividing: (the recycling tonnage and WTE material) by (the total generated tonnage of waste, recycling, and WTE material, excluding special cleanups). In 2014, the annual DOA recycling rate was 17.8%. The monthly recycling rates ranged from a low of 4.3% in September to a high of 40.3% in June (see **Figure 6**).

Figure 6: 2014 Monthly DOA Solid Waste and Recycling Quantities

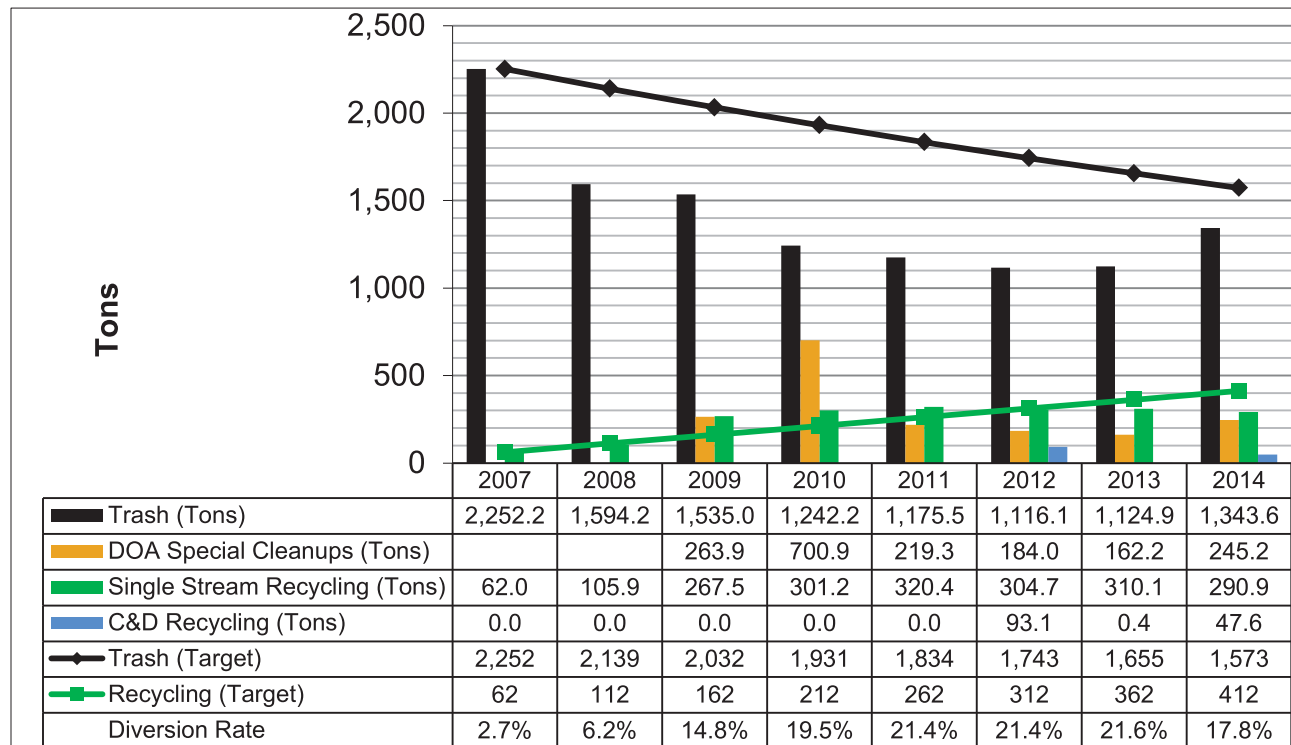


In 2014, the DOA’s recycling program provided approximately \$21,500 in cost savings through avoided landfill fees and recycling rebates. As **Figure 7** shows, overall program savings have decreased since 2012 due mainly to the declining price of single stream material; recycling provided a rebate of over \$60 per ton at the end of 2011, but by the close of 2014, DOA had to pay to haul recycling (note, this fee is still lower than the hauling fee for trash).

Figure 7: Cost/Ton of Recycling vs. Solid Waste

Additionally, while the waste reduction and recycling programs significantly exceeded expectations in 2009, 2010, and 2011, in the past few years, the rate appears to be leveling-off or in decline. Section III of this report identifies several opportunities to improve the recycling rate.

Figure 8: Annual Total Solid Waste and Recycling Quantities*

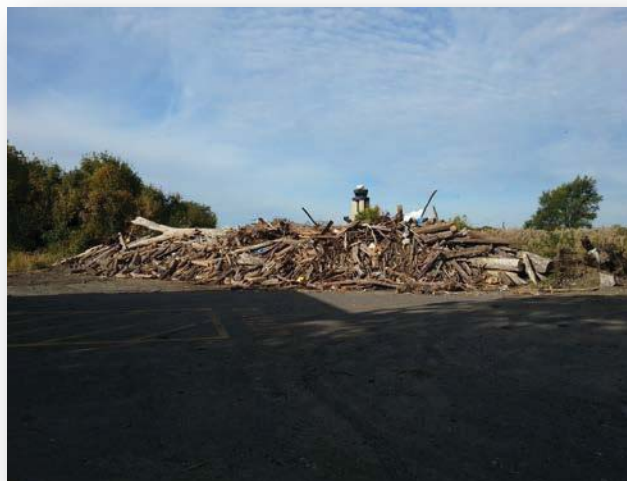


(*reprint of Figure 1)

Additional Recycling

As mentioned above, other than single stream, shredded paper and corrugated cardboard, DOA processes other re-usable materials, including woody/landscaping debris, scrap metal, concrete and other construction & demolition debris.

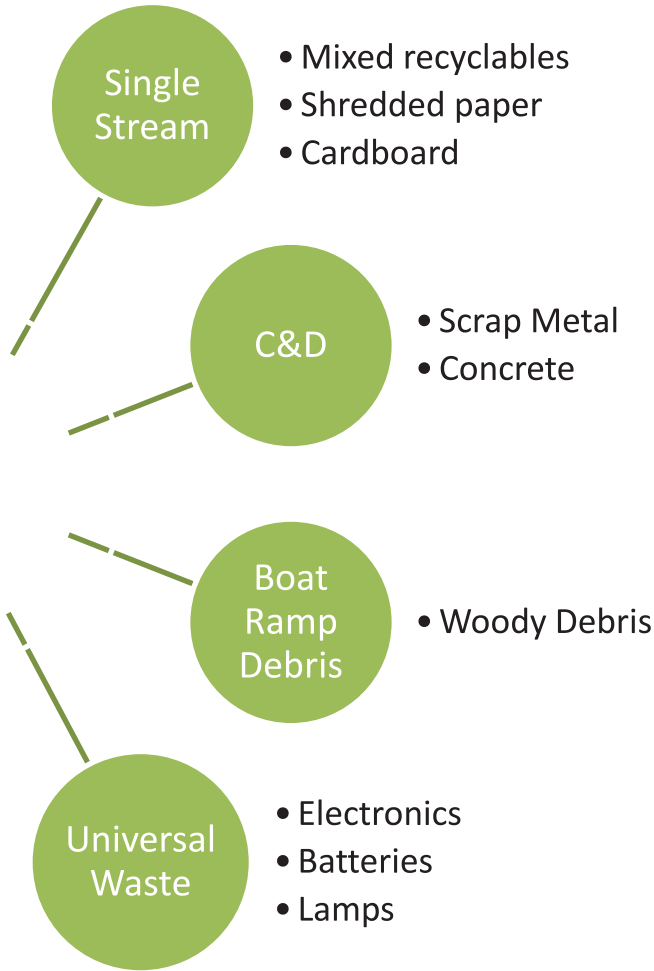
DOA recycled 47.6 tons of C&D waste in 2014. Like special projects waste, C&D recycling is done sporadically. Previously, DOA



Boat Ramp Debris Collected

recycled 0.4 tons and 93.1 tons of C&D waste in 2013 and 2012, respectively. The Pavement and Grounds Unit recycled an additional 78 tons of woody debris collected from the boat launch along the Delaware River (pictured).

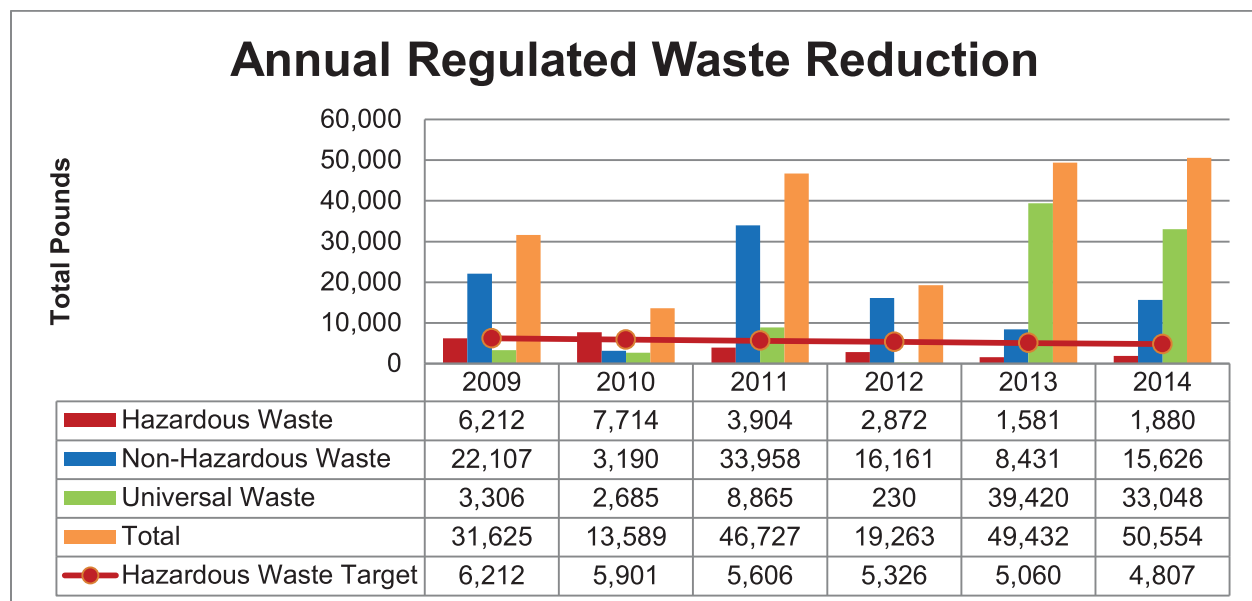
Figure 9: 2014 Recyclables Breakdown



Hazardous Waste

The Philadelphia International Airport facility is classified as a Small Quantity Generator under the Resource Conservation and Recovery Act (RCRA), which limits on site hazardous waste generation to less than 1,000 kg (2,200 lbs) per month. A total of 1,880 pounds of hazardous waste was generated in 2014, an increase of 19% from 2013 (see **Figure 10**). Even though the hazardous waste generated in 2014 increased compared to 2013, the totals presented in **Figure 10** below also include 790 pounds (42 percent of total) of hazardous waste and 6,160 pounds of nonhazardous waste that was abandoned by a former tenant, which became the DOA's responsibility.

Figure 10: Annual Regulated Waste



In 2014, DOA managed a total of approximately 33,000 pounds of universal waste, which included more than 23,250 pounds of electronics, 1,075 pounds of recycled batteries, and approximately 4,000 pounds of fluorescent lamps, compact fluorescent bulbs, and other types of lamps. Additionally, DOA recycled 4,645 pounds of ballasts, both non-TSCA⁴ polychlorinated biphenyl (PCB) and non-PCB containing, which is considered non-hazardous waste. As with C&D waste and special cleanups, universal

⁴ Regulated under the Toxic Substances Control Act

waste is collected sporadically, and is generally associated with capital improvements or ongoing maintenance.

Public Outreach and Education

DOA organizes two environmentally-themed educational events each year: Earth Day and America Recycles Day (ARD). The purpose of these information fairs, held at PHL is to demonstrate to employees and the traveling public strategies and innovations in sustainable living.

Earth Day 2014

In April, PHL participated in the 44th observance of Earth Day. On Monday, April 21, the planning unit led twenty (20) PHL volunteers (pictured) to clean up trash along the creek near Terminal A West and Arrivals Road. The crew removed 50.2 lbs of recyclables and 63.8 lbs of trash from the creek area. This cleanup event improved water quality and significantly enhanced PHL's appearance in this area.



On Tuesday, April 22nd, DOA hosted an Earth Day Celebration in the B/C connector. The event served over 240 people, including approximately 40 travelers and over 200 employees who signed in. Additionally, eighteen (18) employees and contractors volunteered to assist in setting up and running the event.

Ten (10) exhibitors, listed below, participated in the event offering information, educational games, and environmentally themed giveaways:

- Philadelphia Division of Aviation
- Clean Air Council
- Delaware County Transportation Management Association
- John Heinz National Wildlife Refuge
- Marketplace Management
- The Paradies Shops
- PECO
- Pennsylvania Resources Council
- Penn State Extension Master Gardeners Program
- American Airlines / US Airways

America Recycles Day 2014

The 2014 America Recycles Day (ARD) celebration, held on Thursday, November 13, provided an ideal showcase to highlight PHL's recycling program and demonstrate methods for airport users to help it succeed. The event also provided resources for helping/encouraging attendees to recycle more effectively at home.

In addition to the Division of Aviation, nine (9) exhibitors participated by providing information and activities to the over 254 attendees. (Of the many visitors who attended the event, 77 travelers and 177 airport employees signed in; 17 airport employees and contractors assisted with the event).

The exhibitors for 2014 included:

- Division of Aviation, Planning Unit
- Marketplace Vendors
- Penn State Extension Master Gardener Program
- Philadelphia Department of Streets
- Philadelphia Prisons (Food Composting program)
- Recycled-Artist-in-Residency (RAIR)
- Revolution Recovery
- Tincum Schools
- Waste Management
- Waste Oil Recyclers



Streets Department Mascot, Curby Bucket, at America Recycles Day

The most popular exhibitor was the Department of Streets' Recycle Bank table, which brought knowledgeable officers to explain the city's single-stream recycling program and gave away 80 large blue recycling bins for residential use.

Messaging on Shuttle Buses

The DOA has also implemented educational messaging boards, intended to inform employees and travelers about environmental programs at PHL. Messaging boards have been added to employee and parking shuttle buses and provide information on alternative methods of transportation, in addition to other recycling and environmental initiatives at PHL.

Recycling Committee

The DOA Recycling Committee is comprised of DOA staff members representing each of DOA's departmental units. It meets periodically to discuss the progress of the recycling program, identify future initiatives, and coordinate activities such as the annual Earth Day and America Recycles Day events. The Recycling Committee continues to work towards identifying ways to reduce overall waste within the DOA and tenants, while acting as a liaison to bring recycling information and protocol to their respective units.

Meetings were held in 2014 on February 20, June 13, and September 17. Committee members are active volunteers for the annual Earth Day and America Recycles Day events.

III. Tenant Recycling

American Airlines (US Airways)

American Airlines (AA) reports that it recycled 1,098 tons of its 5,733 ton waste stream in 2014, reaching a diversion rate of 19.2%, a slight reduction from 19.5% in 2013.

Figure 11: American Airlines Total Solid Waste and Recycling Quantities (Tons)

	2011	2012	2013	2014
Solid Waste	4,598	4,016	3,873	4,635
Recycling	1,048	723	936	1,098
Total	5,646	4,739	4,809	5,733
Diversion Rate	18.6%	15.3%	19.5%	19.2%

In addition to this single stream diversion, AA also recycled tires, motor oil, toner cartridges and universal waste items including fluorescent light bulbs and used batteries.

Figure 12: American Airlines Solid Waste and Recycling 2014 (Tons)

Material	Quantity
Solid Waste	4635 tons
Single Stream	1098 tons
Other	
Light Bulbs	0.65 tons
Batteries	0.85 tons
Tires	2,083
Used waste oil	9,075 gallons
Antifreeze	276 gallons
Scrap Metal	19.44 tons
GSE Equipment*	39.22 tons

* Ground Support Equipment – trucks, carts, tugs and other vehicles for servicing aircraft

MarketPlace Philadelphia Management

Marketplace saw a continued drop in its diversion rate from 22.4% in 2012, 17.5% in 2013, and 12.8% in 2014. It saw an increase, however, in energy savings from the installation of LED light bulbs, from \$8,713 in 2012 and \$25,213 in 2013 to \$30,720 in 2014. See **Figure 13** below.

Figure 13: 2011-2014 Marketplace Recycling and Energy Milestones

	2011	2012	2013	2014
Single Stream Recycling				
Total tons of disposal (trash + recycling):	3,107	3,030	3,133	3,272
Total tons of trash:	2,440	2,350	2,586	2,854
Total tons of recycling	667	680	547	418
Diversification rate:	21.5%	22.4%	17.5%	12.8%
Savings from trash disposal:	\$39,558	\$42,284	\$35,455	\$27,241
Rebates from recycler	\$45,341	\$27,005	\$16,305	\$8,676
Total value from single stream recycling:	\$84,899	\$69,289	\$51,760	\$35,917
Fryer Oil Recycling				
Total gallons of fryer oil removed:	10,500	11,525	15,745	20,380
Total gallons of bio-diesel produced:	7,350	8,068	11,022	14,266
Savings from disposal:	\$21,150	\$21,150	\$21,150	\$21,150
Rebates from recycler	\$1,920	\$8,829	\$12,061	\$13,211
Total value from fryer oil recycling:	\$23,070	\$29,979	\$33,211	\$34,361
Electronic Waste Recycling				
Electronic recycled, pounds	900	450	500	500
Metal Waste Recycling				
Metal waste collected and recycled, pounds (estimate)	2,000	4,000	6,000	7,000
LED Light Bulb Replacements				
“Blade Sign” LED Light Bulb Replacements				
Total number of Blade Sign LED light bulbs operating:	399	425	425	425
Watts saved per bulb per hour	20	20	20	20
Total annual savings from Blade Sign LED bulbs	\$8,200	\$8,713	\$8,713	\$8,713
RMU Cart LED Light Bulbs				
Total number of RMU LED light bulbs operating:	---	---	198	198
Watts saved per bulb per hour	---	---	45	45
Total annual savings from RMU Cart LED bulbs	---	---	\$7,805	\$7,805
B/C Food Court Ceiling Lights LED Light Bulbs				
Total number of Food Court LED light bulbs operating:	---	---	93	93
Watts saved per bulb per hour	---	---	66	66
Total annual savings from B/C Food Court LED bulbs	---	---	\$8,695	\$8,695
D/E Soffit Lights LED Light Bulb Replacements				
Total number of D/E Soffit LED light bulbs operating	---	---	---	106
Watts saved per bulb per hour	---	---	---	37
Total annual savings from D/E soffit LED bulbs	---	---	---	\$5,507
TOTAL ELECTRICITY SAVINGS FROM LEDS	\$8,200	\$8,713	\$25,213	\$30,720
COMBINED VALUE OF ALL PROGRAMS	\$116,169	\$107,981	\$110,184	\$100,998

Tenant Pilot Compactor Program

The DOA is continually looking for ways to collaborate with more airlines and other airport vendors and businesses. By cooperatively tracking waste and recycling tonnage with its PHL partners, DOA can implement policies that reduce costs and improve diversion and recycling for the entire airport.

To this end, the recycling program was expanded in 2012-13 by offering compactor services to two tenants in a pilot tenant recycling program. JetBlue is using one compactor and TSA's recycling contractor is using another compactor out of the eight DOA compactors on site for recycling. JetBlue's estimated contribution to the recycling program is approximately 400-500 pounds per month from the 3-5 flights per day to and from Boston, MA.

IV. Future Goals and Objectives

DOA is committed to continuing its success in recycling by finding new ways to improve the collection, sorting, and diverting of every possible type of recyclable material. Below is a list of long-term goals that the DOA will focus on over the next few years. In the short-term, the current configuration of receptacles inside the terminal areas and other public areas will be reevaluated. Several operational changes will also need to occur in the short-term to address the recycling contamination issue.

Food Waste Collection

The DOA will continue to support Marketplace's efforts to implement a comprehensive organic waste recycling program at PHL. In addition to recycling waste grease from restaurants, such a program would dramatically reduce overall waste tonnage produced by Marketplace vendors, reduce landfill/WTE costs, and contribute to PHL's overall commitment to environmental stewardship.

Partnering Opportunities: Expansion of Tenant Recycling

Forging partnerships through the execution of new Memorandum of Understanding (MOU) agreements with tenants would serve to increase the efficiency of the recycling processes that take place at PHL. These agreements benefit small recycling generators at the Airport by providing them with the resources to comply with the City of Philadelphia's commercial recycling regulations at a nominal fee. MOU users benefit by eliminating the need to procure a recycling hauler for their small quantities of discarded materials. The DOA will benefit by maximizing the capacity of their recycling compactors. MOUs serve as a step toward a more centralized, coordinated, and efficient waste management and recycling program at PHL and also reduce the amount of congestion on the airfield and around the Airport as a whole.

New partnerships would assist the Airport in developing a more organized structure for managing waste and recycling streams, and would also enable the DOA to track program costs and the amounts of waste and recycling from tenants and airlines.

Waste and Recycling Receptacle Placement and Messaging

In 2015, PHL will attempt to raise recycling awareness and compliance through an updated branding and slogan campaign. The new messages will be located on all of the Envirozone recycling receptacles at the Airport (pictured). Public Affairs, Arts Exhibit Director, and Planning are working together to develop concepts and explore ideas for this initiative.

New receptacles that provide both waste and recycling disposal are also being explored. The Envirozones that DOA purchased more than five years ago handle several streams of recycling and are outdated now that PHL has switched from 2-3 streams to single-stream recycling. As mentioned above, the SEPTA platform study underscored the value of placing recycling bins side-by-side with waste receptacles. Additional receptacles and better-placed containers can increase recycling in several locations throughout the airport that are currently underserved.



Expansion of C & D Waste Recycling Program

In 2012, the recycling of C&D waste by DOA Pavement and Grounds served to provide a sizable boost to recycling efforts at PHL. Materials were stockpiled throughout 2013 and hauled in 2014 for a total of approximately 48 tons. Management of this stream could be improved if reporting to DOA for tenant renovations and construction projects were possible; however, requests for data have not produced consistent results. For LEED certified facilities, tracking of recycling of C&D materials is essential. American Airlines is in the process of constructing its second LEED certified facility, Terminal F Baggage Claim, and the project is achieving more than 85% diversion rate of C&D.

Feasibility of a Source-Separation Facility

DOA is evaluating the feasibility of building a source-separation facility, which could collect and sort materials (recyclables, trash, and food waste) sourced from PHL's tenants. Source-separation simplifies collection and has the potential to increase the recycling rate.

Overall Program Reassessment

The DOA has a goal of increasing the recycling rate through program expansion or improvements. New recycling receptacles are planned for the LEED certified Terminal F Baggage Claim building; however, expanding the program to additional areas of the terminal complex has challenges due to financial, staffing, and operational limitations. The DOA will be reassessing the program in 2015 to determine how issues such as liquid contamination, receptacle placement/type, and general equipment needs can be amended to improve the efficiency of the program overall.

V. Conclusion

The recycling program at PHL has continued to make significant improvements over the past six years since a Recycling Coordinator was hired to manage the program; however, the recycling rate continues to remain around 20% and the DOA is assessing how to maximize collection of recyclables from public, DOA, and tenant waste streams to increase the recycling rate.

Ongoing research into best recycling practices within the aviation industry is yielding opportunities to improve PHL's recycling rate. DOA will focus on the following objectives in 2015 and future years:

- 1) Supporting Marketplace in the development of an airport-wide organics waste recycling program, including ongoing discussions with the Philadelphia Water Department and other potential end users of food waste;
- 2) Expanding partnering opportunities to identify new stakeholders and partners to continue to broaden recycling efforts at PHL;
- 3) Striving towards a more centralized management structure of the waste and recycling streams;
- 4) Seeking methods to reduce contamination in recycling stream; and,
- 5) Reducing overall program costs, where possible.

By continuing to reach out to and work with airlines and other tenants, the DOA continues to explore recycling initiatives that will help protect the environment, improve and streamline waste management efforts, and provide cost savings.