PHL PHILADELPHIA INTERNATIONAL AIRPORT

2011
Annual Recycling Report

Prepared by the
Division of Aviation
and
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Philadelphia, PA

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Glossary of Terms

Big Belly: a trademarked two-component system made up of a recycling receptacle and a compacting trash receptacle for exterior use. Solar-powered and software controlled, sends a message when nearing capacity thus saving money on reduced collections.

Keep America Beautiful: a U.S. based non-profit organization founded in 1953. It is the largest community improvement organization in the United States, with approximately 589 affiliate organizations which focuses on three key issues: litter prevention, waste reduction/recycling and community greening & beautification. This is accomplished through a combination of community organizing, public education and the fostering of public/private partnerships.

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

Envyrozones: commonly used to describe the Hazelton product line of Envyrozone, Inc., which is a trademarked, multiple collection receptacle used in the internal disposal of trash, paper, bottles and cans. There are 56 “Envyrozones” located throughout the airport terminals.

Recyclables: consists of recyclable plastics (#1-7), glass, aluminum, shredded paper, corrugated cardboard and scrap metal. Recyclable materials are collected from all office recyclable receptacles, Big Belly and Envyrozone containers, and are transported to a local processing facility.

Recycling diversion rate: the rate or percentage of waste diverted to be recycled rather than disposed of in a landfill. It is calculated by dividing the total tonnage of recyclable material by the total generated tonnage of regular waste plus the tonnage of the recyclable material.

Regular waste: waste that is not considered recyclable or special cleanups that are disposed of in a landfill.

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

Smart Belly: the newest generation of Big Belly waste and recycling receptacles that utilizes solar energy in its collections system.

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

Transportation Security Administration (TSA): protects 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 waste material from generation to treatment to final disposition.

Zero waste: according to the Zero Waste International Alliance, zero waste is achieved at a landfill diversion rate of approximately 90% - an acknowledgement that some small amount of waste is inevitable in many complex municipal, commercial and industrial environments. Zero waste also examines the entire materials management system, from a product’s beginning to its end.

Zero Waste International Alliance: The Zero Waste Alliance is a national leader providing assistance to industry sectors and organizations for development and implementation of standards, tools and practices that lead to a more sustainable future through the reduction and elimination of waste and toxins.

EXECUTIVE SUMMARY

Since 1999, the City of Philadelphia's Division of Aviation's (DOA) recycling program at Philadelphia International Airport (PHL) has continued to make steady improvements to its workplace and public space recycling efforts.

Highlights of the DOA's 2011 Recycling Program include:

- Recycling diversion rate of 21.6%; an increase of 2.1% from 2010.
- Cost savings of over $40,000
- Organics Waste Composting Pilot Study
- Public Venue Recycling Analysis
- Bottle Filling Station Study
- Educational Awareness for travelers and employees through environmental events including Earth Day and America Recycles Day

This report provides a summary and analysis of 2011 waste and recycling data tracked by the DOA, which includes materials disposed of from the DOA's offices and operational shops, public space recycling containers, and DOA compactors on the airfield.

The DOA continues to make progress towards a consolidated, comprehensive, and efficient airport-wide resource recovery program that saves money and conserves natural resources.

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I. Introduction

A. Environmental Stewardship and Recycling

PHL's environmental stewardship plan encompasses many green initiatives to lessen its impact on the surrounding environment. The recycling program is the DOA's cornerstone green initiative that over the years has been a staple in its mission to improve the sustainability of its operations at PHL. As one of the three key tenets (reduce, reuse, recycle) of sustainable solid waste resource management, recycling reduces the amount of waste that is landfilled, and provides cost savings for PHL's tenants, and airlines. As PHL develops its capacity enhancement program, the DOA will continue to facilitate and expand recycling efforts throughout the airport in order to maximize its recycling diversion rate.

B. PHL Waste Streams

Waste streams at PHL include airside, landside, and terminal waste. Airlines generally contribute the majority of the airside waste stream, while passengers and employees contribute the majority of the landside and terminal waste streams. These waste streams are divided into Primary (DOA, airlines and tenants) and Secondary waste streams (hazardous and non-hazardous materials). The DOA Warehouse manages the receipt and distribution of DOA goods, as well as collecting and diverting from the waste stream compact fluorescent bulbs and wooden pallets. In addition, the DOA diverts shredded paper fibers and baled corrugated cardboard.

II. 2011 Solid Waste and Recycling

A. DOA 2011 Waste Disposal and Recycling Tonnage

Recyclable materials were collected from eight DOA compactors varying in size from 15 to 39 cubic yards. The total combined maximum storage volume of the compactors is 244 cubic yards. In 2011, DOA custodial staff deposited 1,176 tons of discarded recyclable materials in these compactors strategically located around the airport for ease of use by custodial staff and pickup by a private hauler.

In 2011, the DOA continued to separate special cleanup waste from the overall DOA waste stream. Special cleanups consist of waste generated from non-regular airport projects and included items such as tree stumps, 221 tons of concrete cinder blocks, and miscellaneous debris. Special cleanups are tracked separately from the regular waste stream, which allows the DOA to determine its actual recycling diversion rate.

B. DOA Recycling Diversion Rates

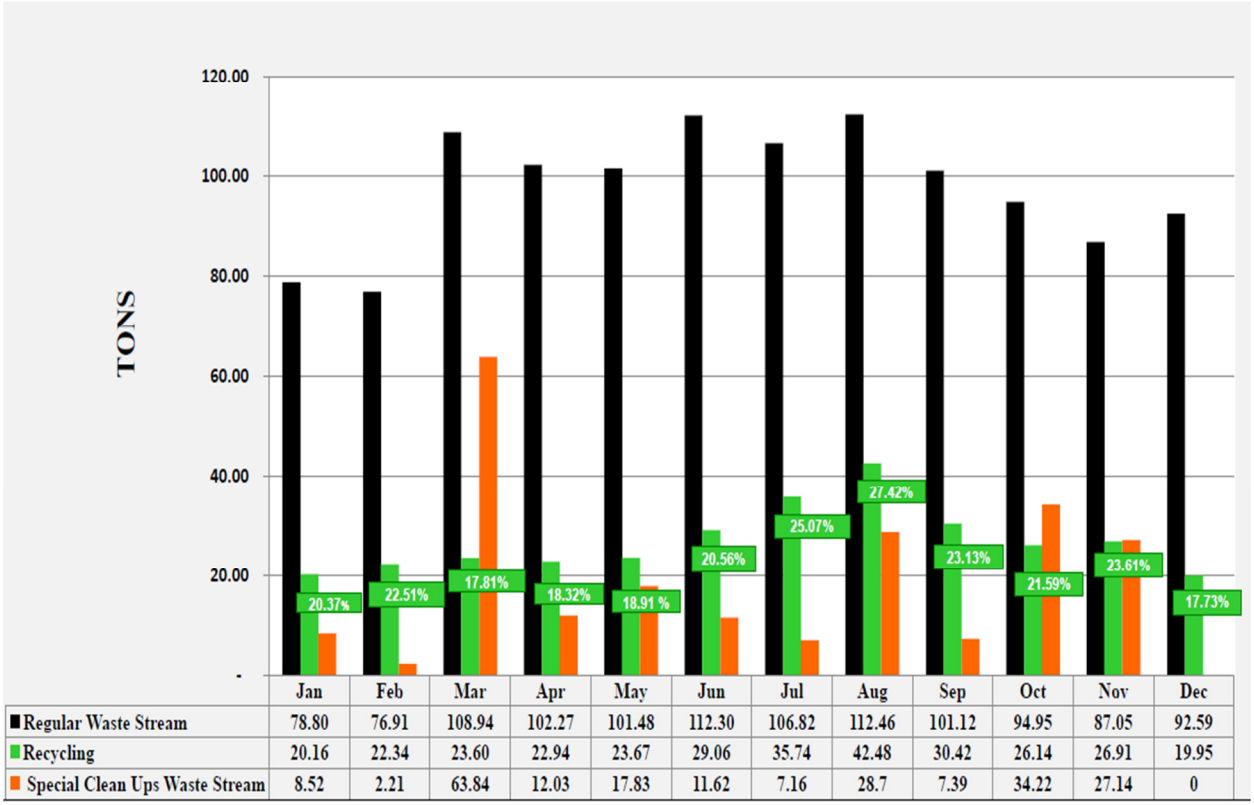
The DOA tracked and recorded waste and recycling tonnage throughout 2011 (see **Figure 1** on next page). Solid wastes tonnages are separated into three distinct categories: regular waste, special cleanups, and recycling. As in 2010, the DOA recycling and regular waste quantities remained relatively consistent throughout 2011. Regular and special cleanup wastes are transported to a landfill for disposal. Regular waste totaled 1,176 tons, a 5.5% decrease from 2010. The total tonnage for special cleanups was 221 tons, almost a 70% decrease from 2010's 701 tons primarily attributed to clearing debris deposited in the Fleet Management lot, located on airport premises.

Recyclable materials collected by the DOA include: mixed paper, cardboard, glass, metal, plastics (#1 through #7), shredded office paper and scrap metal. Recycling weight totaled 323 tons - an increase of 22 tons compared to 2010. Significant components included shredded paper (6.38 tons) and scrap metal (28.22 tons), with the latter increasing by almost 60% from 2010. In addition, 4.15 tons of electronic waste was collected, recycled and diverted from landfills.

The DOA recycling diversion rate is calculated by dividing the recycling tonnage by the total generated tonnage, excluding special cleanups. In 2011, the annual DOA

recycling diversion rate was approximately 21.6%. The monthly diversion rates ranged from a low of 17% in December to a high of 27.4% in August (see **Figure 2** on page 4). The DOA's recycling program provided over $40,000 in cost savings through avoided landfill fees and recycling rebates, which is over $15,000 greater than the savings that were realized in 2010 ($25,500)[1].

Figure 1: 2011 DOA Waste, Recycling and Special Cleanups

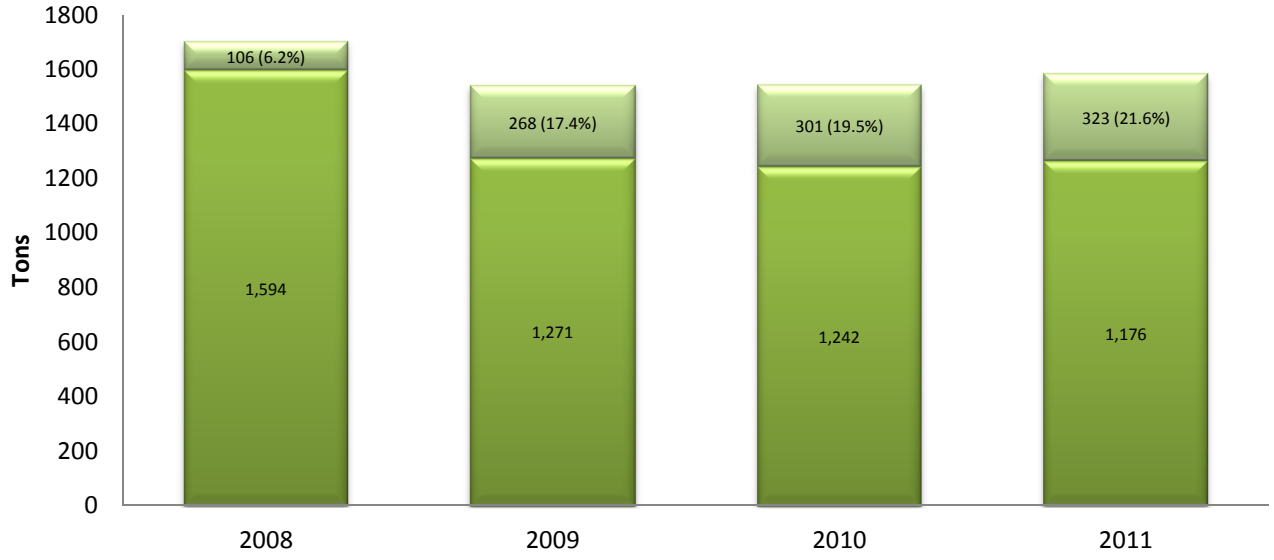


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Regular Waste Stream	78.80	76.91	108.94	102.27	101.48	112.30	106.82	112.46	101.12	94.95	87.05	92.59
Recycling	20.16	22.34	23.60	22.94	23.67	29.06	35.74	42.48	30.42	26.14	26.91	19.95
Special Clean Ups Waste Stream	8.52	2.21	63.84	12.03	17.83	11.62	7.16	28.7	7.39	34.22	27.14	0

Source: DOA

[1] Savings do not include other capital and labor costs, such as compactor rental or hauling fees.

Figure 2: Annual Recycling Rates



C. Tenant Recycling

Philadelphia Marketplace Food & Shops at PHL (Marketplace) is made up of over 160 stores and restaurants and is operated by Marketplace Philadelphia Management (MPM). In 2011, Marketplace achieved a 21.5% recycling rate and a total cost savings of almost $85,000[2]. In addition, **Table 1** lists its other recycling program highlights:

Table 1 – Marketplace Recycling Program Highlights

Waste Type		Amount	Cost Savings
Single Stream	Waste	2,440 tons	$39,558
	Recyclables	667 tons	$45,341
Fryer Oil (recycled into biodiesel)		10,500 gallons	$23,070
LED Light Bulbs		399 bulbs	$8.400[3]
Food Waste Composting		6,041 lbs	n/a
Electronic Waste		900 lbs	-$934

Source: MPM

[2] MPM; Obtained through avoided disposal fees and recycling rebates.
[3] MPM; electricity savings based on watts consumed per hour.

While there was only a slight increase in passengers traveling through PHL from 2010 to 2011, the expansion projects at PHL beginning in 2012 will be even more of a reason for the DOA to work with Marketplace to develop integrative recycling approaches for the future.

In addition to MarketPlace, the airlines and other tenants have active recycling programs. According to US Airways, it had a total of 4,598 tons of waste and a total of 1,048 tons of recycling in 2011. Based on this data, its overall recycling rate for 2011 was 18.6%. The DOA hopes to work with more airlines in tracking waste and recycling tonnage in order to get a more comprehensive recycling rate for the entire airport.

III. Key Projects and Accomplishments

The DOA Recycling Program had many accomplishments in 2011 that included the following:

- Recycling diversion rate of 21.6%; an increase of 2.1% from 2010.
- Cost savings of over $40,000
- Organics Waste Composting Pilot Study
- Public Venue Recycling Analysis
- Bottle Filling Station Study
- Educational Awareness for travelers and employees through environmental events including Earth Day and America Recycles Day

A. Organics Waste Composting

An Organics Waste Pilot Program at Terminal A-West was conducted for a two-week period starting on July 19, 2011 and ending on August 1, 2011. Its purpose was to assess the feasibility of an airport-wide food waste composting collection program. Funded in part by a grant from the United States Environmental Protection Agency, the Organics Program was sponsored by the DOA in partnership with Marketplace Philadelphia Management (MPM).

The Organics Program targeted the daily collection of pre-consumer compostable food scraps, along with soiled paper products and soiled/waxed cardboard discarded from six restaurants: Famous Famiglia, Maki of Japan, Chickie's & Pete's, Cibo Bistro & Wine Bar, Le Petit Bistro, and McDonald's. A two-day assessment of trash and recyclable materials was also performed to gain both a qualitative and quantitative understanding of the trash and recyclable materials produced by each restaurant.

A total of 6,041 lbs of food scraps and other organic material were collected with an average of 431.5 lbs a day. [4] Food waste represented approximately 37% of all waste produced, while recycling and trash represented approximately 36% and 27%,

[4] A private hauler transported all collected materials to the Wilmington Organics Recycling Center (WORC) in Wilmington, Delaware for composting.

respectively. Notably, one restaurant averaged a landfill diversion rate of 91%, which would qualify the establishment at this location as achieving a zero waste industry standard of 90%, as established by the Zero Waste International Alliance (ZWIA).

Based upon the findings collected during the Organics Program, it was concluded that implementation of an airport-wide food waste collection/composting program is practical from a logistical and financial perspective. MPM hopes to begin implementation in 2012.

B. Public Venue Recycling Analysis

In December 2011, an analysis of the recycling data collected from the Big Belly Receptacles (BBR) and a sampling of the total number (56) of Envyrozones around PHL was conducted in order to draw conclusions on what percentage of the overall recycling amounts that the DOA manages are attributed to BBRs and Envyrozones.

In June 2010, the DOA installed seven BBRs – 5 in PHL's Cell Phone Waiting Lot and 2 in PHL's main Employee Parking Lot bus shelters. These BBRs contribute, on average, almost two tons of recyclables a year. The analysis used data from June 17, 2010 through June 1, 2011.

Big Belly Receptacles

In June 2011, twenty-two Envyrozones were selected to represent a sampling of the Airport's Envyrozones, and tracked the weights for paper, cans/bottles and waste. The analysis used data from June 3, 2011 through November 10, 2011.

During the data periods, the DOA managed approximately 302 tons of recyclables. Using only the data that was collected from the BBRs and the Envyrozones, the recyclables from the BBRs accounted for 0.5%, while the Envyrozones were just over 4%. Due to a number of variables (e.g., when data was collected) the findings only provided best guesses as to the amount of recyclables contributing to the overall amount of DOA recyclables.

The DOA will be working with the Custodial Staff in order to coordinate and establish a collection method that would allow for the accurate breakdown of DOA's overall recyclables. In addition, the DOA will review how it selects its sampling of Envyrozones in order for it to be more representative.

This analysis provided valuable insight about better approaches that could be used to obtain statistically valid data that is more representative of the materials being deposited into PHL's pubic venue receptacles. This data will provide guidance to help make important decisions regarding the contributions of BB and Envyrozone receptacles to the DOA's recycling program.

C. Bottle Filling Station Study

In December, 2011, the DOA conducted a week-long waste study at PHL's TSA D/E Security Checkpoint. The primary purpose of the study was to determine the feasibility and usefulness of installing Bottle Filling Stations at PHL and secondly, to gain a better understanding of the composition of waste generated at security checkpoints.

At this checkpoint, passengers can discard their waste in two types of receptacles: two Envyrozones and three 33-gallon round Brute® receptacles. Brute® receptacles are trademarked plastic containers used at PHL for exclusively collecting recyclables.

Due to Transportation Security Administration (TSA) guidelines establishing that passengers are only allowed to bring a 3.4 ounce (100ml) bottle or less (by volume) container of liquids through security checkpoints, plastic water/soda and other containers with fluids exceeding the allowable limits, fill checkpoint receptacles. This then requires frequent collection by DOA Custodial Staff.

<u>The Study & Observations</u>

Each day, on two of three shifts, DOA Custodial Staff collected all waste from the Envyrozone and Brute® containers located at the entry point of the TSA D/E Security Checkpoint area. By the end of the week-long study, the plastic bottles segregated from a total of 122 bags, accounted for 88.1% of the overall waste. Projecting this data over the course of one year, it is estimated that approximately 146,000 plastics bottles, or nearly 37 tons of waste, are deposited at this one Checkpoint area annually.

Other notable observations were that only 19% of the plastic bottles were discarded via the Envyrozone units, with the remaining 81% deposited into the Brute® containers. These observations might suggest the need to re-position the Envyrozone units to maximize their convenience and use, as these units are structured with both trash and recycling options that offer passenger choices in discarding waste.

The following is a list of potential benefits of bottle-filling stations:

- These stations would allow passengers to empty their water bottles on the un-secure side of security checkpoints, carry their empty bottles through inspection, then re-fill their bottles and hydrate at a nearby “filling station” on the secure side of the checkpoint, for free.

- The reduction of plastic beverage containers generated at security checkpoint entrances could result in reduced operational costs, i.e. less time spent by Custodial Staff to collect and transport these materials.

- Fewer plastic bottles could be destined for landfills as a result of them being deposited into the same receptacles that often contain food and other contaminating materials.

- There could be a reduction of the overwhelming amount of plastic beverage containers *inside* the security checkpoint areas. These bottles are destined for the landfill, because recyclables deposited within the Security/Checkpoint area are handled differently and most often are automatically destroyed.

In 2012, the DOA will be exploring different options to reduce plastic bottles in PHL’s waste stream including how passengers can empty and re-use their water bottles.

D. Environmental Events

Clean Out Your Files Day

Originally designed by the U.S. Conference of Mayors as a tool to help educate employees across the nation about recycling and environmental stewardship, PHL's DOA has tailored and re-named this event into its own, "Clean-Out Your Files" campaign.


Paper Collection from DOA Units

In April 2011, the DOA's Recycling Committee organized a "*Clean-Out Your Files"* Campaign and Competition among DOA Units as a fun way to increase recycling awareness, eliminate workplace clutter and "green-up" PHL.

At the conclusion of the 3-week campaign, 13,203 lbs of paper were diverted from a landfill, a rebate was earned through the sale of the materials, and the paper materials were recycled into new paper products by a local paper mill (see **Table 2**).

Table 2 – Clean-out Your Files Contest Unit Totals (lbs)

DOA Unit	4/11/11	4/18/11	4/20/11	Totals
Warehouse/ Tech. Services	725	2,354	1,670	**4,749**
Public Affairs	406	1,730	844	**2,980**
Planning	-	970	476	**1,446**
Engineering	182	596	242	**1,020**
Human Resources	-	268	568	**836**
Communications	500	-	330	**830**
Field Maintenance		-	572	**572**
Finance	-	276	166	**442**
Operations	138	-	-	**138**
Compliance	-	-	82	**82**
IT	-	-	60	**60**
Carpenter Shop	-	48	-	**48**
Totals	**1,951**	**6,242**	**5,010**	**13,203**

Source: DOA

The winners of the DOA's 2011 Clean-Out Your Files Contest was the Technical Services Unit who cleaned-out 4,749 lbs of paper from their workspaces and were awarded a variety of Special Event Tickets in the Philadelphia area along with other tokens of recognition.

Technical Services Unit

Earth Day – April 20, 2011

In celebrating the 41st anniversary of Earth Day, the DOA Recycling Committee organized and presented many educational awareness opportunities including displays by the Fairmount Park Commission, RecycleBank, US Airways, the John Heinz Wildlife Refuge, the City of Philadelphia's Mayor's Office of Sustainability, and Marketplace Philadelphia Management. In addition, certain employees of the DOA were recognized for their environment-related efforts at an awards ceremony.

Information Displays

2011 Earth Day Awards' Ceremony

America Recycles Day – November 15, 2011

On November 15, 2011, the nation celebrated America Recycles Day – the only nationally recognized day dedicated to the promotion of recycling in the United States. The DOA Recycling Committee held an America Recycles Day event in the Terminal B/C Food court area celebrating Keep America Beautiful's national effort in promoting recycling. The event included a variety of interactive activities and displays by the DOA, Philadelphia Marketplace Merchants, Keep Philadelphia Beautiful, and the Philadelphia Water Department. Information was available regarding recycling at home, watershed preservation, alternative uses for plastic bags, products made with recycled content, and an airport book-recycling program.

Travelers, merchants and airport employees participated in DOA sponsored activities including: A "Spin to Win" trivia game (suited for all ages) that tested participants' general knowledge of environmentally-related questions from plastic, glass, aluminum and mystery categories.; a "Guess Your Best" game challenged participants were asked to guess the number of plastic bottles soda/water bottles contained in a 5 ft. tall clear bag based on a given recycling-based clue directly related to the answer; a PowerPoint presentation on recycling-related initiatives at PHL; and a "Recycling Sleuth" who searched for people recycling in the designated receptacles. The event was a huge success with over 200 people participating in activities and more than half receiving prizes.

Passengers playing the Trivia Wheel

America Recycles Day Team Members:
Cynthia Goldsmith, Sean-Erik O'Donnell,
Calvin Davenger, Bob Gizinski and Larry Rich

E. DOA Recycling Committee

The DOA Recycling Committee is comprised of DOA staff members representing each unit and has three subcommittees. It meets quarterly to discuss the program (progress and improvements) and to coordinate activities such as environmental events. The Recycling Committee continues to work towards identifying ways to reduce overall waste within the DOA and at PHL including working with tenants and airlines.

In addition, PHL recycles during down time at softball game challenges between airport agencies. During the 2011 season (June through September), 182 pounds of recyclables were collected at games and diverted from the waste stream.

IV. 2012 Recycling Program Goals and Objectives

A. Promoting Zero-Waste

The DOA continues to strive towards making itself and PHL's tenants and airlines "zero-waste" as described in the DOA's 2010 Annual Recycling Report. The DOA is encouraging tenants and airlines to build consortiums in order to maximize recycling efforts at PHL. Such consortiums could also enter into a Memorandum of Understanding (MOU) with the DOA which would allow them to utilize the DOA's recycling compactors for a nominal fee when disposing recyclables.

B. Expanding Collection of Organic Waste

From the results of the Organics Waste Composting Pilot Program, the DOA has encouraged MPM to implement this program to all of its food vendors throughout PHL. MarketPlace has indicated that it hopes to facilitate and realize an airport-wide food waste composting program in the near future. Such a program would dramatically reduce overall waste tonnage produced by MarketPlace vendors, reduce their landfill costs, and would contribute to PHL's overall dedication to its environmental stewardship.

C. Landside Recycling Monitoring

The DOA will continue to monitor the BBCs and Envyrozones in order to understand what percentage of the overall annual recycling tonnage they represent. Such monitoring will include coordination with DOA Custodial Staff in order to develop protocols that will produce accurate and statistically valid data. By tracking this data, the DOA can better understand the performance of such recycling collection devices and make decisions regarding the number of and strategic locations of such receptacles.

D. Bottle Filling Station Pilot Study

Subsequent to the Bottle Filling Station Study, the DOA will explore whether or not it is cost effective to provide this travel feature for PHL passengers in order to offer an alternative to hydrating needs and reduce the amount of plastic soda/water bottles in PHL's waste stream. The DOA will also explore the impact of this feature on bottled water purchases to airport vendors.

E. Recycling on Train Platforms

The DOA is working with the Southeastern Pennsylvania Transportation Authority (SEPTA) to determine a suitable type receptacle and messaging that informs commuters that they can recycle during their travels to and from PHL. Recycling receptacles and messaging will be provided on PHL's four train platforms located at Terminals A, B, C/D and E. The DOA hopes to have these recycling provisions in place in 2012.

F. Terminal F – LEED Performance Goal

In order to enhance the amenities and services offered to passengers, Terminal F is being expanded and includes, among other things, a new baggage claim facility. As part of its dedication to environmental stewardship, PHL is implementing recycling procedures and requirements to meet the overall projects' LEED Certification Performance Goals.[5] The performance goal is to salvage/recycle as much non-hazardous discarded construction materials as possible, exceeding 75% by total weight generated in the construction project. Among the items to be recovered and recycled are cardboard, paper, brick, concrete, stone, iron and non-iron metals, plasterboard, wood, non-asbestos roofing materials, and trash (90% for electric energy generation and 10% landfill for non-recyclable material).

[5] According to the U.S. Green Buildings Council, Leadership in Energy and Environmental Design (LEED) provides building owners and operators with a framework for identifying and implementing practical and measurable green building design, construction, operations and maintenance solutions. www.usgbc.org

V. Challenges and Opportunities for 2012 and Beyond

A. Waste and Recycling Tracking

Tracking relevant waste stream data should be efficient, effective and consistent in order to assess the waste reduction and recycling efforts at PHL. While operations and solid waste management practices of the DOA, tenants and airlines is complex, the DOA gained a better understanding of its waste hauling practices in 2011. With tracking protocols in place, waste data has become more accurate which provides benchmarks that can be relied upon for future goals. Such accuracy is tantamount in recommending future changes to improve efficiency and sustainable practices.

B. Partnership Opportunities

The DOA has developed a MOU to assist PHL Stakeholders with their recycling efforts. For a nominal monthly fee, the MOU would benefit small-recycling generators with the ability to get into (recycling) compliance with commercial recycling regulations. MOU users would benefit by eliminating the need to procure a hauler for their small quantities of materials. The DOA would benefit from this agreement by maximizing the capacity of their recycling equipment, achieving a more centralized airport program and eliminating the need for increased traffic on PHL's airfield. In addition, the MOUs would be a step towards a more centralized structure of the waste and recycling streams, and would allow the DOA to track program costs and the amounts of waste and recycling from tenants and airlines.

C. Improved Collection Efficiencies

Maximizing efficiency and cost reduction in its recycling program is a priority to the DOA. The DOA is exploring the use of a "fullness usage system" that will help to monitor and schedule pick-up only when its recycling compactors are full and need to be emptied in its next equipment contract. This type of system is expected to generate immediate and significant savings in 2012.

VI. Conclusion

For more than a decade, the DOA recycling program at PHL has made significant improvements. In 2011, the public and office recycling programs were improved and a greater cost savings was achieved through a recycling rate of 21.6%. Notably, the DOA's waste tonnage decreased while its recycling tonnage increased.

In addition to increasing its diversion rate and achieving even greater cost savings in 2011, the DOA seeks to improve the recycling program in terms of:

1) obtaining and tracking the sources of solid waste and its composition throughout the airport, including obtaining waste and recycling numbers from tenants and airlines,
2) examining other methods of reducing waste and increasing recycling rates, such as composting,
3) striving towards a more centralized structure of the waste and recycling streams through various means including MOUs, and
4) reducing overall program costs, where possible.

By continuing to reach out and work with PHL tenants and airlines, the DOA continues to explore recycling initiatives that improve waste management efforts.