

2010 Annual Recycling Report



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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. Solar powered and software controlled to send a message when nearing capacity thus saving money on reduced collections.

Envyrozones: commonly used to describe the Hazelton product line of Envirozone, Inc. which is a trademarked multiple collection container receptacle for 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 Envirozone 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 and is disposed of in a landfill.

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

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.

EXECUTIVE SUMMARY

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

Highlights of the 2010 recycling program include:

- Recycling diversion rate of 19.5%
- Cost savings of over \$25,000
- Installation of 7 solar powered waste compactors at cell phone waiting and employees parking lots
- Expansion of plastics recycling to include #1 through #7
- An increase in the capacity of compactors by 85% since 2009
- Completion of a Landside Waste Sort Analysis and Waste Handling Study
- Refinement of solid waste stream practices, understanding and tracking, including the separation of special cleanups from the overall DOA waste stream

This report provides a summary and analysis of 2010 waste and recycling data tracked by the DOA, which includes materials disposed of from the DOA's offices and shops, public space recycling containers, and compactors on the airfield.

In 2010 the DOA made progress towards a consolidated, comprehensive, and efficient airport-wide resource recovery program that saves money and conserves natural resources.

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I. Background

A. Why PHL Recycles

The benefits of recycling are environmental, social, and economic. 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 of sustainable solid waste resource management, recycling reduces the amount of waste that is landfilled, and provides cost savings for PHL, its 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.

The recycling program at PHL is consistent with Greenworks Philadelphia: a plan initiated by the Mayor's Office of Sustainability which sets sustainability targets for energy, environment, equity, economy, and engagement. Greenworks Philadelphia set a goal to divert 10% of waste towards recycling, which PHL has exceeded.¹

B. 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 and Secondary waste streams, as described below.

Primary Waste Stream

There are three principal stakeholders in the production and management of the primary waste streams at PHL: the DOA, the airlines, and the tenants (see **Table 1 and Figure 1**). While this report focuses on the waste and recycling managed by the DOA, tenants and airlines also manage their own recycling and waste programs and play a key role in contributing to a comprehensive, airport-wide resource recovery program.

¹ Mayor's Office of Sustainability, City of Philadelphia, <http://www.phila.gov/green/greenworks/>, accessed 07/30/2011

Table 1: Production and Management of Primary Waste Streams

Stakeholder	Location	Collection/Disposal
DOA	<p><u>Landside</u>: Arrivals Road, Departures Road, Commercial Roads, Cell Phone Waiting Lot, Employee Parking Lot, SEPTA train (public transit) platforms.</p> <p><u>Terminals</u>: DOA offices, shops, break areas, public common spaces within Terminals A-F.</p> <p><u>Airside</u>: DOA Warehouse, airfield debris/waste.</p>	<p><u>Trash</u>: collected and transported by Municipal Staff (<i>Pavement and Grounds and Custodial Departments</i>).</p> <p><u>Recycling</u>: collected by Municipal Staff and transported to market by a private hauler.</p>
Airlines	<p><u>Airside</u>: deplaning waste, offices, hold rooms, break areas.</p>	<p><u>Trash and Recycling</u>: collected and transported by private haulers.</p>
Tenants	<p><u>Landside</u>: hotel, rental car facilities.</p> <p><u>Terminals</u>: merchant stores and concession areas (MarketPlace Philadelphia Management),</p> <p><u>Airside</u>: Cargo City facilities.</p>	<p><u>Trash and Recycling</u>: tenants, other than those under MarketPlace Philadelphia Management, are individually responsible for procuring private haulers.</p>

Source: DOA.

1. DOA

Waste and recycling are collected by the DOA from receptacles along Arrivals Road, Departures Road, Commercial Roads, the employee parking lot, the cell phone waiting lot, SEPTA platforms, all terminals (including the DOA offices and public common areas), and from the DOA Warehouse, which includes airfield debris and waste. Municipal staff collects all DOA waste and recycling. Waste is transported by municipal staff while recycling is transported to market by a private hauler.

2. Airlines

Airlines account for almost half of the waste flow at PHL, and contribute significantly to recycling at the Airport. Waste and recycling from international flights is handled under international regulations which differ from domestic practices. Regulations and practices followed on domestic flights are consistent with DOA. DOA is exploring ways to work with airlines to collect and track deplaning waste.

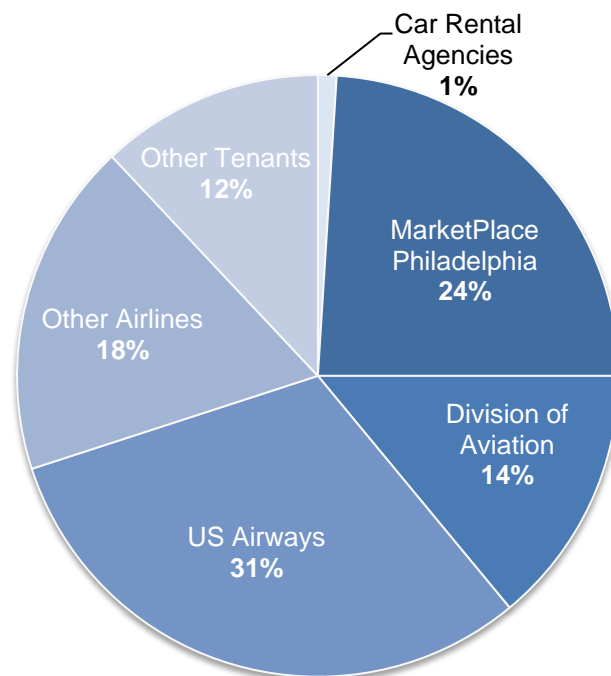
3. Tenants

The tenants at PHL have an integral role in recycling. MarketPlace Philadelphia Management manages more than 160 stores and restaurants (collectively referred to as MarketPlace) within the terminal complex. Although MarketPlace does not fall directly under the DOA's recycling program, each merchant's trash and recycling are handled independently of DOA's waste stream. Other tenants at PHL also have active recycling programs. The DOA, MarketPlace Philadelphia Management and other tenants are exploring ways to work together in order to maximize and streamline tenant recycling efforts.

Secondary Waste Streams

In addition to primary waste streams, the DOA and its tenants manage secondary waste streams that include hazardous materials (paint, batteries, certain chemicals and electronics, etc.) and non-hazardous materials (motor oils/filters, compact fluorescent bulbs, cardboard, etc.). The DOA Warehouse manages the receipt and distribution of DOA goods and diverts compact fluorescent bulbs, wooden pallets, bales of recycled paper and recycles corrugated cardboard.

Figure 1: Sources of Waste Generation at Philadelphia International Airport



Source: Philadelphia International Airport Phase III Recycling Program: Preliminary Solid Waste and Recycling Analysis and Estimates, 2010.

C. Recycling Program Progress and Trends

The DOA recycling program was initiated at PHL in 1999. The DOA structured the program into three phases:

- Phase 1: establishment of a DOA workplace recycling program
- Phase 2: establishment of a public space recycling program
- Phase 3: development of a strategic resource management plan

The DOA has completed Phases 1 and 2 by establishing DOA workplace and public space recycling programs, and is nearing completion of the third phase by developing resource management programs described in this report. Annual PHL Recycling Reports dating back to 2007 have been completed and are available on PHL's website (http://www.phl.org/enviro_intro.html).

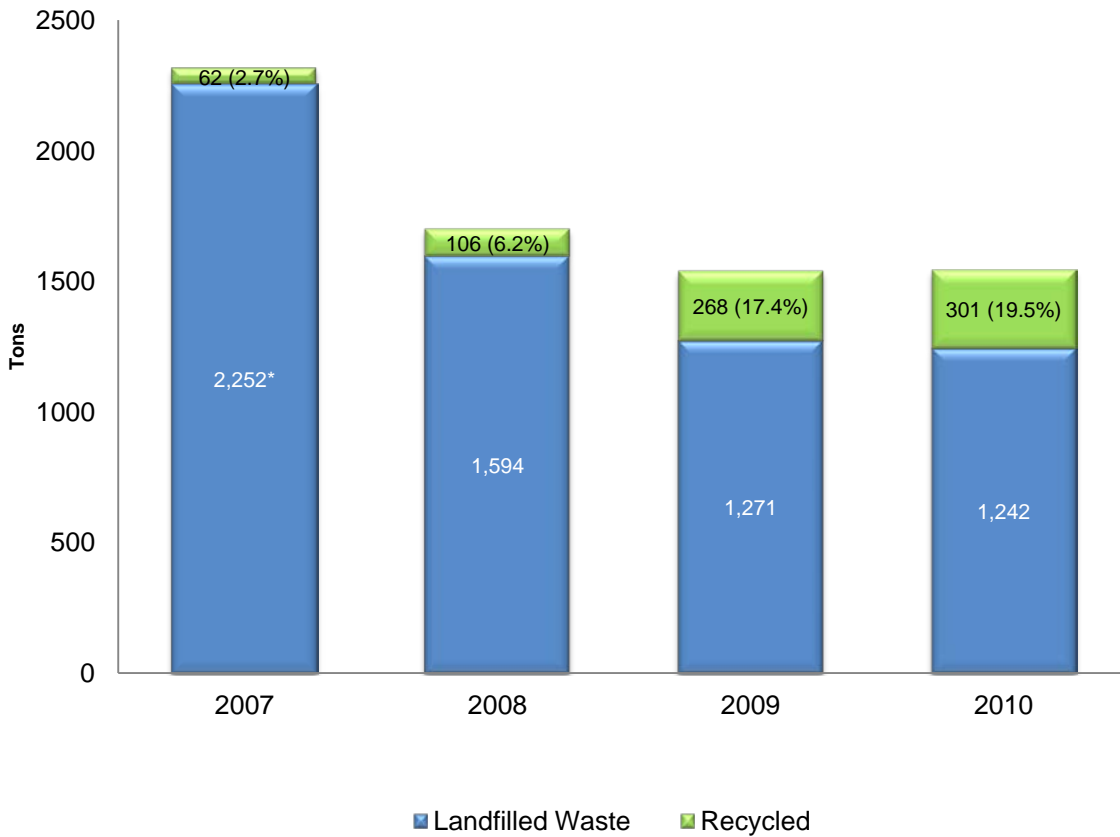
Since 2007, the tonnage of waste generated by DOA was reduced by approximately 33% (from 2,252 to 1,242 tons) and the recycling rate increased from just less than 3% (62 tons) in 2007 to nearly 20% (301 tons) in 2010 (see **Figure 2**).

In 2010, the recycling program resulted in:

- Recycling diversion rate of 19.5%
- A cost-savings of over \$25,000²
- An increase in the capacity of compactors by 85% since 2009
- Installation of 7 solar powered waste compactors at cell phone waiting and employees parking lots
- Expansion of plastics recycling to include #1 through #7
- Completion of a Landside Waste Sort Analysis and a Waste Handling Study
- Refinement of the solid waste stream practices understanding and tracking, including the separation of special cleanups from the overall DOA waste stream

² Savings calculation includes landfill fees avoided plus revenue generated per ton of recycling.

Figure 2: Annual Recycling Rates



Source: DOA.

*Beginning in 2009, the data reflects the separation of special cleanups waste from regular waste.

II. 2010 Solid Waste and Recycling

A. DOA 2010 Waste Disposal and Recycling Tonnage

Recyclable materials were collected from eight DOA compactors varying in size from 15 to 39 cubic yards. Additional capacity was obtained in March 2010 when four new compactors measuring 34 cubic yards replaced compactors measuring six cubic yards. This additional capacity will help to facilitate recycling efforts of smaller airlines under a Memorandum of Understanding with the DOA in utilizing recycling compactors' surplus capacity. As a result, the total combined maximum storage volume of the compactors increased 85% (from 132 to 244 cubic yards). The new compactors are located at Terminals A-1, A-LD (loading dock), E-4 and F-11. The DOA custodial staff deposit discarded recyclable materials for later pickup by a private hauler.



In 2010, DOA gained information that led to the ability to separate special cleanup waste from the overall DOA waste stream. Special cleanups consist of waste resulting from non-regular airport projects and may include tree stumps, 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.

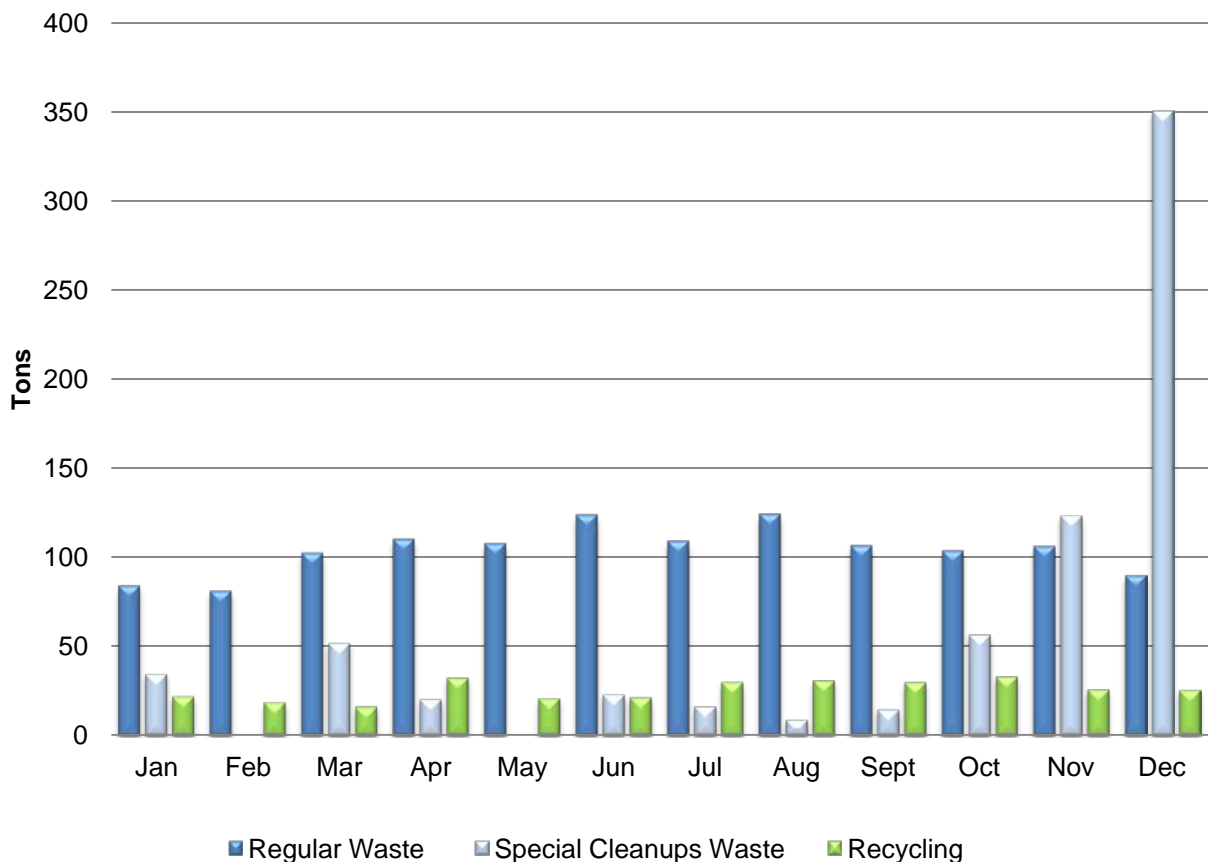
B. DOA Recycling Diversion Rates

Throughout 2010, waste and recycling tonnage were tracked and recorded (see **Figure 3**). Solid wastes tonnages generated at PHL are recorded in three categories, which are regular waste, special cleanups, and recycling. DOA recycling and regular waste quantities remained relatively consistent throughout 2010, while special cleanup waste fluctuated significantly (especially during November and December). Regular waste that was landfilled totaled 1,242 tons, while special cleanups (also landfilled) totaled 701 tons. The reason for the significant special cleanups spike in December was due in part to cleaning and clearing of accumulated debris on a portion of the Fleet Management lot.

DOA recyclable material includes mixed paper, cardboard, glass, metal, plastics, shredded office paper (compacted into bales), electronics, pallets and scrap metal. Recycling weight totaled 301 tons—an increase of 33 tons compared to 2009. Significant components of the recycling included 6.8 tons of shredded office paper and 18.14 tons of scrap metal.

The recycling diversion rate is calculated by dividing the recycling tonnage by the total generated tonnage, excluding special cleanups. In 2010, the annual recycling diversion rate was approximately 20%, ranging from a low of 16% in March to a high of 32.6% in October. Waste diverted saved approximately \$20,000 in landfill fees and brought in \$5,500 in recycling rebates³.

Figure 3: 2010 DOA Waste, Recycling and Special Cleanups



Source: DOA.

³ Savings do not include other capital and labor costs, such as compactor rental or hauling fees.

An airport's recycling diversion rate can vary greatly based on method of rate calculation, thereby making it difficult to compare PHL's recycling program with other airports'. At PHL, the recycling diversion rate is currently tracked for DOA only (not including retail/food tenants or the airlines), while other airports may track recycling for the entire facility. To illustrate this, **Table 2** depicts six U.S. airports, including PHL that have reported recycling diversion rates. By examining best practices at other airports, the DOA may be able to gain important knowledge to help increase PHL's overall recycling diversion rate.

Table 2: Comparison of US Airports Recycling Diversion Rates

Airport Code (city)	Airport Size (passengers)	Recycling Diversion Rate (year)	Program Notes
BWI (Baltimore)	21,949,902	31.6% (2010)	Includes terminal and airfield.
FLL (Fort Lauderdale)	22,412,627	30% (2005)	Includes terminal area only.
LAX (Los Angeles)	59,070,127	64% (2009)	Based on 0.9 lb waste per passenger and each air cargo ton makes 4 lb of waste, a CA state calculation. Includes common areas, airfield and majority of tenants.
OAK (Oakland)	9,857,845	37% (2010)	Maintains one coordinated program including airlines and tenants.
PHL (Philadelphia)	30,775,961	19.5% (2010)	Tenants and airlines are not included and contract separately with a waste company.
SEA (Seattle Tacoma)	31,775,961	22% (2008)	Measures in tons per passenger, started airfield recycling in 2009.

*Airport size based on ACI-NA 2010 total passengers

C. Tenant Recycling in 2010

In 2010, MarketPlace (made up of over 160 tenants) recorded that it had recycled 460 tons of waste and converted over 8,000 gallons of fryer oil to biodiesel fuel. With a 4.5% increase in passengers traveling through PHL from 2009 to 2010, the DOA recognizes that partnerships with tenants are vital to developing a more stream-lined recycling approach for the future.

MarketPlace, the airlines and other tenants have active recycling programs. By working together with the DOA and sharing recycling data, recycling efforts at PHL can be improved as well as possible opportunities to take advantage of economies of scale.



III. Key Projects and Accomplishments

A. Expansion of Recyclable Plastics

The expansion of plastic types accepted by the City of Philadelphia for recycling made a significant improvement to the recycling program in 2010. As of August 1, 2010, a new recycling services contract expanded recycling plastics with identification codes #1 and #2 to plastics with codes #1 through #7. Now custodial staff collects the plastics with these codes during their regularly scheduled routes. Spot checks are also completed by members of the DOA's Recycling Committee throughout the office, terminals, shops, and parking lot areas to ensure proper recycling in designated recycling containers.

B. Solar Powered Waste and Recycling Compactors

In June, 2010, PHL placed seven solar powered waste and recycling compactors (Big Belly Units) in the Cell Phone Waiting Lot and the Employee Parking Lot. The compaction process of the Big Belly Units reduces the frequency of collections. The Big Belly Units contribute, on average, almost two tons of recyclables a year and are another way PHL increased its recycling diversion rates.



C. PHL Landside Waste Sort Analysis

A Landside Waste Sort Analysis was conducted in 2010 during a 24-hour cycle between September 21st and 22nd. Five areas were analyzed: Departures Road, Arrivals Road, South Commercial Road, Southeast Pennsylvania Transportation Authority (SEPTA) train platforms, and the Employee Parking Lot. The purpose of the analysis was to obtain data helpful in maximizing recyclable recoveries.



A total of 830 pounds of waste was collected from the waste sort (see **Table 3**). This total represented 7.5% of the airport's total waste tonnage (5.5 tons) during the period of the analysis. The most landside waste was generated from Departures (52%) and Arrivals Roads (22%). The analysis also revealed that an average of 27% of waste was recyclable at these locations. The potential for diverting additional recycling in these

areas represents significant future savings for PHL through reduced landfill tipping fees and rebates. Further, since the landside waste represented only 7.5% of the airport's total waste tonnage (during the two day period); this showed that significant volumes of potential recyclable materials would be expected from the airside and MarketPlace waste streams.

As a result of these findings, the DOA is considering installing recycling receptacles along Departures Road, partnering with SEPTA on installing recycling receptacles on train platforms, and performing a waste sort for the airside and MarketPlace.

Table 3: Landside Waste Weight (9/21/10 to 9/22/10)

Area	Total Waste Weight (pounds)	Percentage of Total
Departures Road	428	52%
Arrivals Road	184	22%
SEPTA Platforms	116	14%
Employee Parking Lot	68	8%
South Commercial Road	34	4%
Total	830	100%

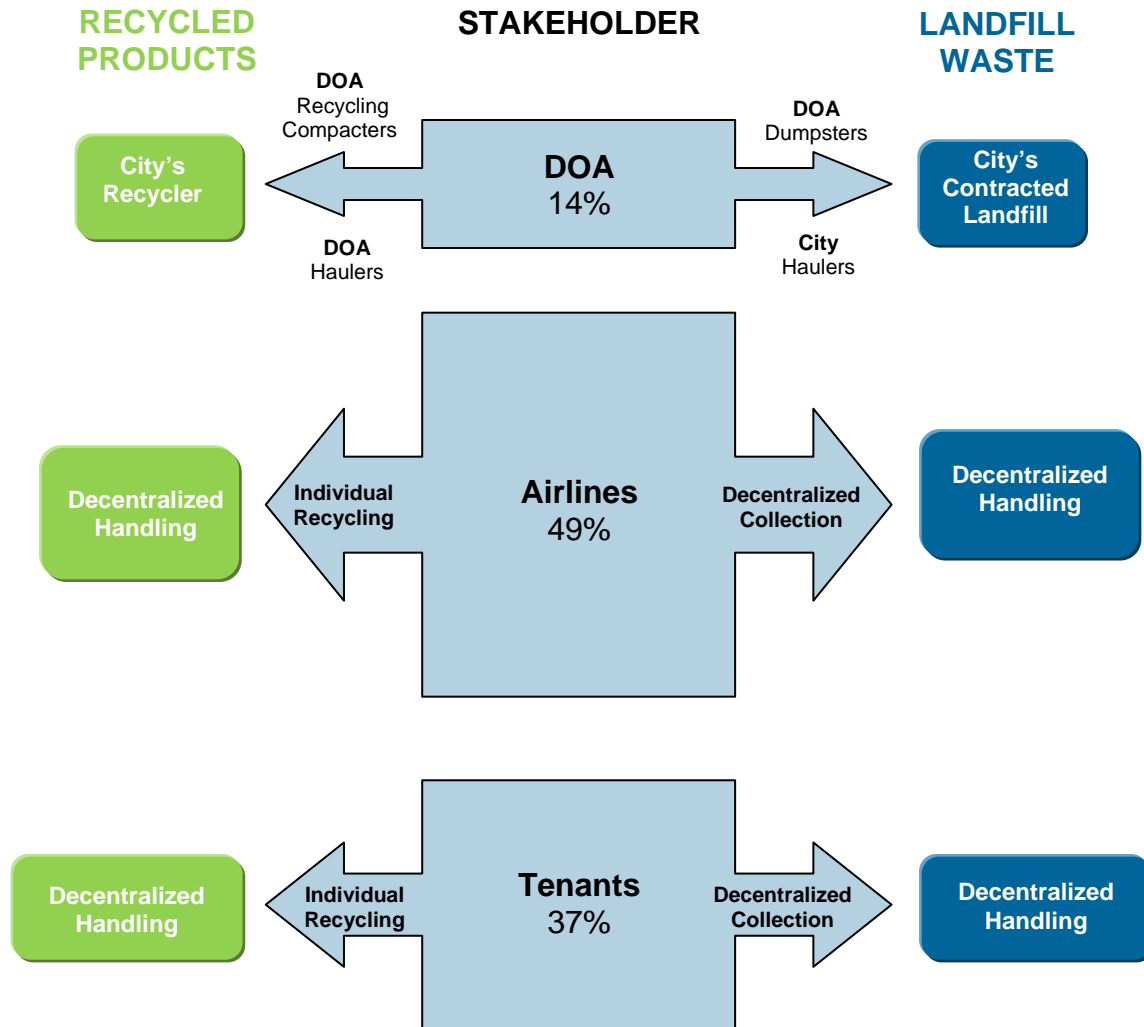
Source: *Philadelphia Airport Landside Waste Sort Analysis*, TRC, 2010.

D. DOA Waste Handling Study

An assessment of the waste handling practices and collection routes of the three main waste generators (landside, airside, and the DOA Warehouse) was conducted in December 2010. The purpose of the assessment was to further characterize and quantify waste generation, handling, and disposal. From this assessment, a more detailed understanding of the waste stream, and process was established. The *2008 Annual Recycling Report*, the *2010 Preliminary Solid Waste and Recycling Analysis and Estimates*, as well as the *September 2010 PHL Landside Waste Sort Analysis* were reviewed as part of the analysis. As depicted in **Figure 4**, PHL's waste streams (and percentage, by weight, of waste generation) are primarily generated from the following sources: DOA (14%), Airlines (49%), and Tenants (37%). The assessment indicates a majority of solid waste/resources at PHL is handled in a decentralized manner, with different entities handling waste and implementing recycling.



Figure 4: PHL's Generalized Waste Stream



E. Organics Pilot Study

In 2010, the DOA and MarketPlace Philadelphia Management worked together to develop and implement an organics collection and resource management pilot study. The study, sponsored in part by a US Environmental Protection Agency (EPA) grant, was set up to evaluate the feasibility of an airport wide food composting program. The study will occur over a two week period during the summer of 2011.



Source: Organic Diversion, LLC

F. PHL Recycling Committee

The PHL Recycling Committee consists of 24 DOA staff members representing 14 departments at PHL. Throughout 2010, the Recycling Committee met monthly to discuss the program, coordinate activities, and discuss progress and improvements. The Recycling Committee also has three subcommittees, including the 1) Education Subcommittee 2) Events, Recognition & Incentives Subcommittee, and 3) Quality Assurance Subcommittee.

G. 2010 Earth Day Celebration and Awards Ceremony

The weeklong 2010 PHL Earth Day celebration was concurrent with the US EPA's national effort in promoting environmental awareness. PHL's celebration was organized and administered by the Recycling Committee. The celebration included an award ceremony as well as the dedication and ribbon cutting ceremony for new bike racks installed in five different areas of the main terminal complex.



IV. 2011 Recycling Program Goals and Objectives

A. Zero-Waste

PHL will continue to strive towards “zero-waste”. Zero Waste takes into account the entire materials management system, from product design and the extraction of natural resources, to manufacturing and distribution, to product use and reuse, to recycling or disposal. By industry definition, 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, such as an airport.

B. Organic Waste Composting

The DOA will implement the aforementioned organics pilot program in 2011. The pilot program will assess the feasibility of incorporating organic materials (i.e., food waste and soiled cardboard/paper, etc.) into the recycling program. The pilot study will collect organic materials from six restaurants managed by MarketPlace and observe the operations for business cooperation, feasibility, costs and benefits. If the diversion of organic materials produces large enough quantities to justify diverting this waste stream to a composting facility, and if sustainable cost-benefit analysis warrants, further enhancements to the program will be considered. A composting program has the potential to reduce landfill costs and provide other social and environmental benefits.

C. Monitoring of Big Belly Units

The DOA will monitor the Big Belly Units and assess whether additional units are warranted. The monitoring effort will also assess whether the eight compactors at PHL are utilized to their fullest capacity and if the location and size of each compactor is appropriate.

V. Challenges and Opportunities for 2011 and Beyond

A. Waste and Recycling Tracking

In order to evaluate the financial impacts of the recycling efforts at PHL, tracking relevant data needs to be efficient, effective and consistent. Great strides were made in 2010 to better understand solid materials management practices, including how waste from special cleanups affects the recycling diversion rates. Due to the complexity of the airport's operation and the waste management processes of its many users, tracking data remains challenging. Understanding nuances of solid waste materials management practices, such as special cleanups and being able to distinguish special cleanups from routine waste collection, gives a more accurate recycling diversion rate that can be used as a baseline for future recycling program goals. Accurate, consistent data tracking and reporting will also be a key tool in recommending changes to improve efficiency and sustainable practices.

B. Self Sorting and Partnerships

The current decentralized structure of the waste and recycling program at PHL makes it difficult to track not only program costs within the DOA, but composition and amounts of solid waste and recycling occurring at the tenant and airline levels. One concept to address this issue is to implement a Memorandum of Understanding (MOU) between the DOA and individual tenants. MOUs could potentially pave the way for tenants to join the DOA's recycling program at a nominal fee. This would allow the DOA to provide more comprehensive and streamlined recycling reporting.

C. Source Separation Facility

PHL may consider having its own source separation facility (SSF). This SSF would have the ability to accept multiple waste streams from the PHL community and process these materials to applicable markets.

D. Electronic Monitoring

To further maximize efficiency and costs reduction, electronic monitoring through “fullness usage system” is an opportunity under consideration for 2011. Electronic fullness usage systems are installed on compactors, and have digital transmitters that detect the level of fullness. When a full level is reached, an automatic notification is sent to the hauler and only those compactors whose fullness levels are “triggered,” are collected. This system saves money by reducing the frequency of collection and disposal trips. Waste contracts need to be reviewed in order to see if such technology can be accommodated.

E. PHL Recycling Committee

In 2011, the Recycling Committee will continue to explore ways to improve PHL’s overall recycling program and diversion rates and will help to bring various recycling initiatives to fruition through multiple channels.

VI. Conclusion

The recycling program at PHL has made significant improvements since its inception in 1999. In 2010, the Public and Office recycling programs were improved and a greater cost savings was achieved through a recycling rate of approximately 20%.

In addition to increasing its diversion rate and achieving even greater cost savings in 2010, 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,
- 2) examining other methods of reducing waste and increasing recycling rates, such as compositing, and
- 3) overall program costs.

All of the airport's waste management stakeholders, including the Recycling Committee, DOA staff, airlines, and tenants, continue to have an important role in implementing future recycling initiatives and improving waste management efforts at PHL.