

Solid Waste





Credit: NYC Dept. of Sanitation/Michael Anton

Together we can

Reduce waste by not generating it

Increase the recovery of resources from the waste stream

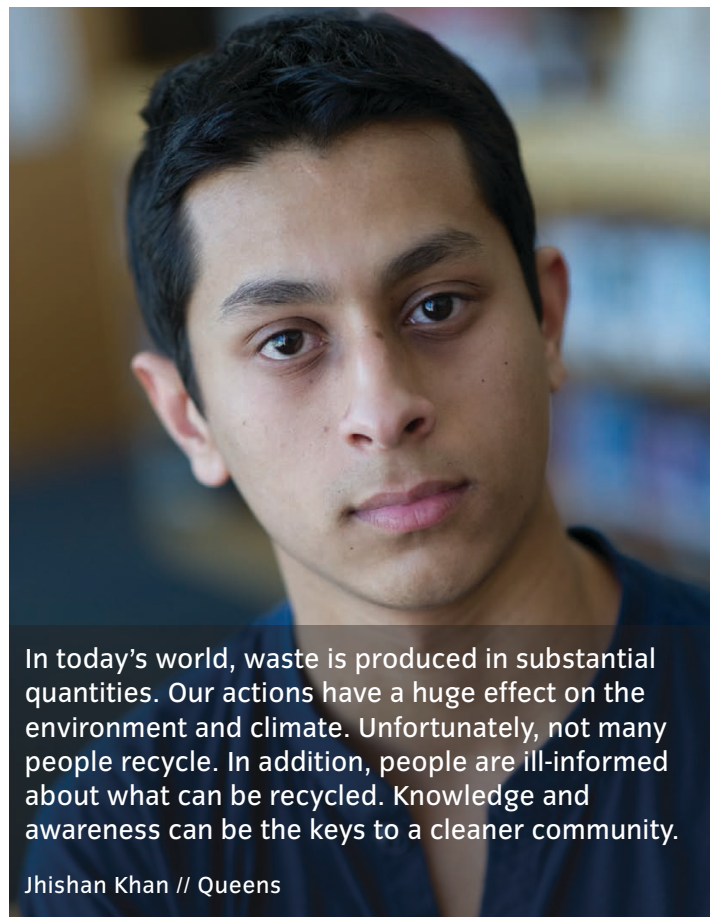
Improve the efficiency of our waste management system

Reduce the City government's solid waste footprint



Organic waste can easily be turned into what gardeners refer to as “black gold” or compost to revitalize depleted urban soils. Composting is a self-empowering and scalable process, requiring a pair of hands and a patch of open space. We can put compost to use in our green infrastructure, from the street trees, to public and private gardens, to green roofs.

Christine Datz-Romero // Manhattan



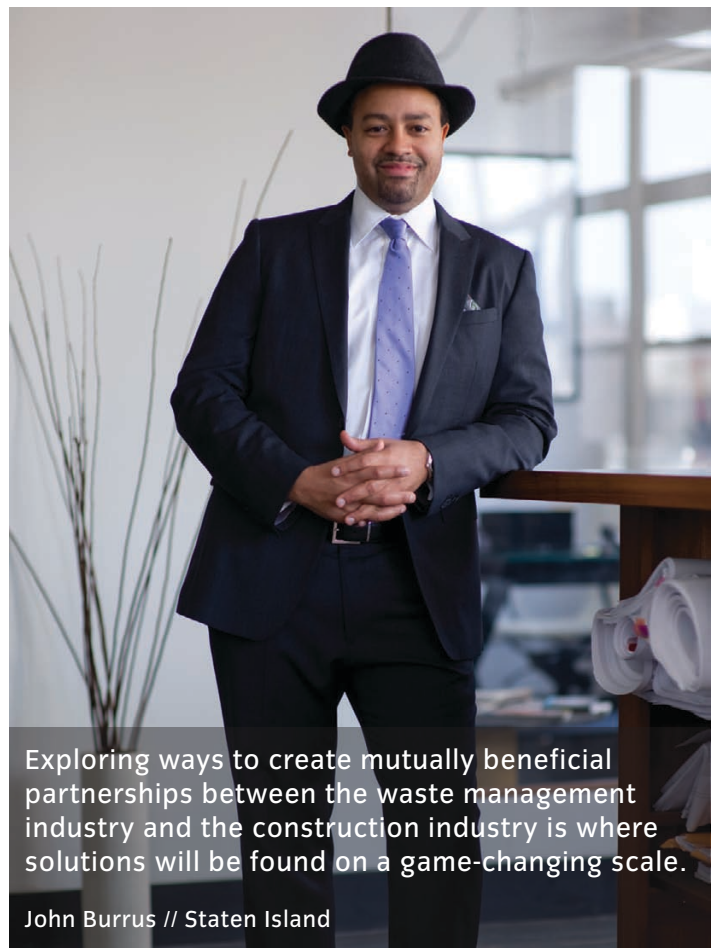
In today’s world, waste is produced in substantial quantities. Our actions have a huge effect on the environment and climate. Unfortunately, not many people recycle. In addition, people are ill-informed about what can be recycled. Knowledge and awareness can be the keys to a cleaner community.

Jhishan Khan // Queens



I run a couple of green bakeries and we’re trying to create a new paradigm for a sustainable food business. Every day we are trying to reconfigure the operation towards sustainability. We’re composting and asking vendors and suppliers to take tangible steps towards greening their own businesses and we’re talking everyday about how to create consciousness on the consumer and the industry side.

Maury Rubin // Manhattan



Exploring ways to create mutually beneficial partnerships between the waste management industry and the construction industry is where solutions will be found on a game-changing scale.

John Burrus // Staten Island



Solid Waste

Divert 75% of our solid waste from landfills

Every year, we generate more than 14 million tons of waste and recyclables in our homes, businesses, schools, streets, and construction sites. It takes a fleet of more than 2,000 City government and 4,000 private trucks to collect it all from across the five boroughs. Once these trucks are full, they are emptied or “tipped” at recycling facilities or transfer stations, where the materials are transferred to long-haul trucks, barges, or railcars for processing or final disposal. This complex system has an enormous impact on our environment, communities, and economy.

We estimate that the city’s entire solid waste system creates 1.66 million metric tons of greenhouse gas (GHG) emissions annually, representing 3% of the city’s total GHG emissions. As our city grows, and we meet the challenges posed by climate change, we must reduce the amount of waste we generate and its related impacts.

Solid waste management in New York City has dramatically evolved. Until the 1930s, much of our waste was simply dumped into the ocean or onto city streets. The persistent problem of waste-strewn streets and associated public health concerns led the City to create the Department of Street Cleaning in 1881—the precursor to the current Department of Sanitation—to systematically collect our waste.

Through the 1980s, we relied on a network of thousands of apartment building and City-operated incinerators as well as 89 City-owned landfills for disposal including Fresh Kills in Staten Island, which at one point was the world’s largest landfill. Opposition to incineration and land-filling increased and new regulations forced the upgrade or closure of many such facilities. By the mid 1990s, incineration had ceased, and the City instituted mandatory recycling requirements. Only one of the City’s landfills, Fresh Kills, remained in operation. By the late 1990s, all disposable waste collected by the City—from households, non-profit institutions, government agencies, parks, and street baskets—ended up at Fresh Kills, transported largely by barge from a network of City-run marine transfer stations.

Most private carters disposed commercial waste at Fresh Kills until the early 1990s, when higher disposal fees at the landfill drove them to a growing number of private transfer stations around the city. In 2001, the City closed Fresh Kills and began sending the majority of City-collected waste to private transfer stations concentrated in a handful of neighborhoods in the Bronx, Queens, and Brooklyn.

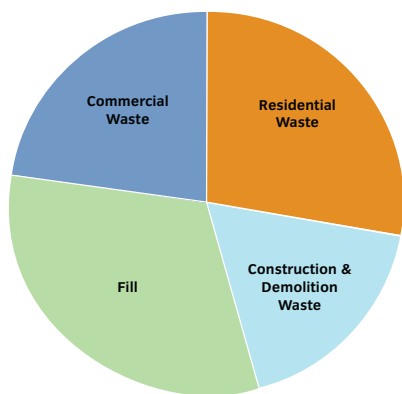
To create a more equitable system, we worked with the City Council, environmental organizations, and community groups to develop a new Solid Waste Management Plan (SWMP) in 2006. The plan charts a strategic path toward “borough equity.” It minimizes the impacts of the system on over-burdened neighborhoods by ensuring that City-collected waste from one borough is not sent to another borough for disposal and by establishing specific transfer stations for residential wastesheds in every borough.

The SWMP also reduces traffic congestion, noise, and related air pollution by maximizing the use of rail and barge to transport (or “export”) waste outside the city. Full implementation will reduce City-collection truck travel by nearly 3 million miles, private long-haul truck travel on city streets by 2.8 million miles, and long-haul truck travel outside the city by 55 million miles. We estimate this shift will reduce GHG emissions by approximately 38,000 metric tons.

The SWMP similarly addresses the impacts from commercial waste collection and export by encouraging a shift to rail and barge. In addition, we committed to expanding recycling programs and piloting emerging solid waste conversion technologies that can dispose of waste more sustainably and further reduce GHG emissions.

Since 2006, we have made significant progress: approximately 30% of City-collected waste now leaves the city by rail, and two refuse marine transfer stations are under construction. In addition, a new large-scale recycling processing facility in Brooklyn is scheduled to open by 2013.

New York City's Waste 14 Million Tons per Year



Source: NYC Dept. of Sanitation, NYC Mayor's Office

Solid waste management practices have improved substantially. We no longer dump our waste at sea, burn it in unregulated incinerators, or dump it in unregulated landfills. Overall, despite a growing population, waste generation citywide and per capita has decreased over the past 10 years, reflecting nationwide trends. But managing our waste in an equitable, sustainable, and cost-effective manner is increasingly challenging.

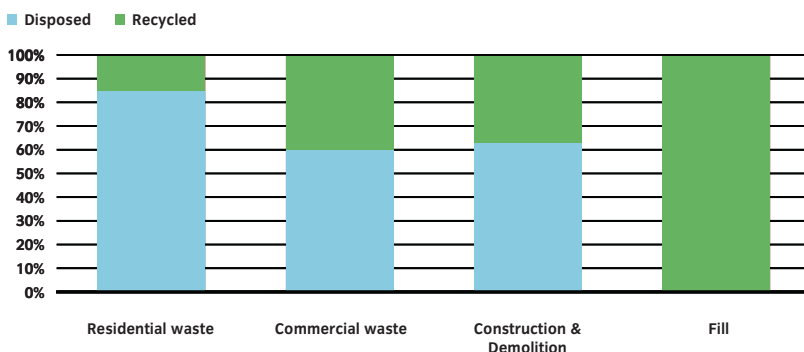
While we are continuously researching alternative methods for disposal and working to increase our diversion rate (the percentage of materials recovered from the general waste stream), we will likely maintain our reliance on landfills far from the city. Together, transportation and methane emissions from these landfills (despite methane capture systems) compose a significant portion of total GHG emissions. We currently spend more than \$1 billion a year to manage solid waste including \$300 million to export 3.3 million tons of City-collected waste. These costs are projected to rise exponentially. We must take aggressive steps to make our waste management system more environmentally and economically sustainable.

Our Plan

We must make changes at every stage of our waste system—reducing the amount we generate, reusing more of it, recovering more resources from it, and more efficiently disposing of what we can't eliminate. We must also change how we think about our waste—not as a by-product to be disposed, but as a resource that can generate energy, create jobs, and spur economic development.

The most effective way to minimize the impacts of our solid waste is to reduce the amount of waste we generate. We will encourage individuals to adopt waste prevention practices and promote opportunities for businesses, institutions,

Diversion Rate by Waste Stream



Source: NYC Dept. of Sanitation, NYC Mayor's Office

and individuals to reuse materials. Working with the business community, we will pursue ways to reduce packaging and hazardous materials in products, eliminating waste at its source, and expand product stewardship programs in which manufacturers take responsibility for the disposal of their products.

While we currently recycle approximately half the waste generated in the city, including construction and demolition debris, fill, commercial and residential waste, we can recover even more resources from our wastestream. We will incentivize recycling and make it easier,

more cost-effective, and more accessible. We will develop recognition programs for businesses that reduce their solid waste footprint and continue to encourage new markets for recycled materials.

To reduce the amount of organic material we send to landfills, we will expand opportunities for community-based composting and encourage commercial food waste recovery operations. Advances in technology will also allow us to pursue alternative disposal methods by safely and efficiently converting our waste into a source of clean energy.

Our plan for solid waste:

Reduce waste by not generating it

- 1 Promote waste prevention opportunities
- 2 Increase the reuse of materials

Increase the recovery of resources from the waste stream

- 3 Incentivize recycling
- 4 Improve the convenience and ease of recycling
- 5 Revise City codes and regulations to reduce construction and demolition waste
- 6 Create additional opportunities to recover organic material
- 7 Identify additional markets for recycled materials
- 8 Pilot conversion technologies

Improve the efficiency of our waste management system

- 9 Reduce the impact of the waste system on communities
- 10 Improve commercial solid waste management data
- 11 Remove toxic materials from the general waste stream

Reduce the City government's solid waste footprint

- 12 Revise City government procurement practices
- 13 Improve the City government's diversion rate

Even as we increase recycling rates and generate less waste for disposal, there will always be waste that can't be reused or recycled. We will continue to implement the SWMP and decrease the impacts of our waste management system on local communities.

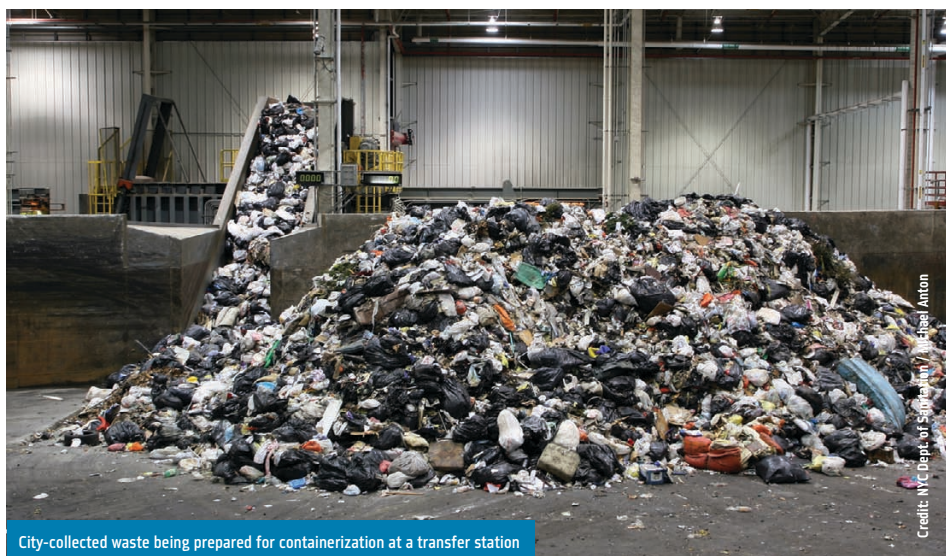
We recognize that to reduce waste generated in the city, we must engage New Yorkers to change their behavior. Through a series of GreenNYC public education campaigns we will educate and empower the public to reduce, reuse, and recycle more.

In asking New Yorkers to reduce their solid waste footprint, City government must lead the way. We will improve diversion at City agencies by improving recycling in our offices and operations. We will seek to minimize waste through informed decisions about the goods we purchase. In short, we will set an example that companies, institutions, and individuals can emulate.

Diverting 75% of our solid waste from landfills will require several actions. We will need to reduce the amount of waste we produce, encourage technologies to recover resources from our waste, encourage new markets for recovered materials, increase recycling at home and in our businesses, and improve our waste management infrastructure. If we do this, we can drastically reduce the impact of our city's waste on taxpayers, the environment, and our communities.

Reduce waste by not generating it

The most effective way to reduce the amount of solid waste generated in the city is to not create it in the first place. This means empowering the public to make choices that reduce their waste and making it easier for businesses and individuals to reuse materials. Targeted public education campaigns will inform the public about opportunities to reduce plastic bottle waste by drinking tap water, to reduce the number of disposable bags in our waste stream by using reusable bags, to reduce paper consumption by opting out of unwanted subscriptions, and to donate reusable goods instead of discarding them. By eliminating waste at its source, we can save energy and reduce GHG emissions and costs to residents, businesses, and the City.



INITIATIVE 1 Promote waste prevention opportunities

In many cases, we generate unnecessary waste without even thinking about it. For example, New York City has high quality drinking water from the tap, yet millions of bottles of water are consumed in the city each year. While water bottles are recyclable, only 13% statewide are actually recycled.

Increasing the availability of tap water and redesigning water fountains to better accommodate reusable water bottles will make it easier for New Yorkers to avoid unnecessary consumption. We will encourage the use of reusable water bottles by installing redesigned water fountains in public spaces and parks. We will educate the public about the benefits of drinking tap water, and we will expand partnerships with non-profit organizations and businesses to increase tap water consumption as an alternative to bottled water.

Another pervasive form of waste we can reduce is the ubiquitous disposable bag. The City collects approximately 5.2 billion plastic and 200 million paper bags each year. These bags represent 3% of our residential waste stream, including street basket collection, and weigh approximately 110,000 tons, costing the City \$10 million a year to export. We estimate that private waste haulers collect another 300 million bags, representing approximately 6,000 tons of waste each year. And the bags that are not captured by our waste collection system clog our waterways and our wastewater treatment systems, get caught in trees, and litter parks and streets. Despite recent laws requiring large retail stores and shopping malls to accept and recycle plastic bags, only a small percentage of plastic bags are recycled through this program.

We will launch a public education campaign to reduce litter, expand the use of reusable bags, and improve awareness of the effects of disposable bags on our environment and communities.

Cutting disposable bag consumption in half could eliminate approximately 58,000 tons from our general waste stream and reduce GHG emissions by approximately 12,000 metric tons.

New Yorkers generate more than 2.5 million tons of paper annually and recycle less than half of what is recyclable. Therefore, we will develop a public education campaign to reduce paper consumption and increase recycling. We will also develop an easily accessible tool for New Yorkers to opt-out of receiving unsolicited mail.

Finally, we will work with the city's 24,000 restaurants and food-related businesses to identify and adopt practices that reduce waste. These could include minimizing packaging for food products and giving customers the option to opt out of receiving all the disposable materials that often accompany take-out food.

INITIATIVE 2 Increase the reuse of materials

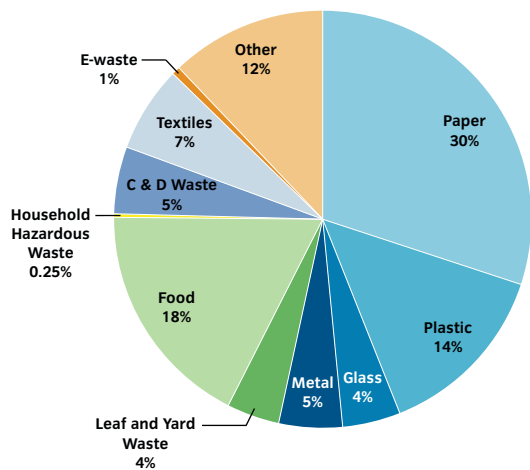
Reusing products and materials is one of the most cost-effective and practical ways to reduce waste. A number of City-funded programs encourage households and businesses to reuse materials.

The NYC WasteMatch program helps businesses and organizations find used or surplus commercial goods and equipment that others no longer need. Since 1997, the program has diverted more than 25,000 tons of materials from landfills.

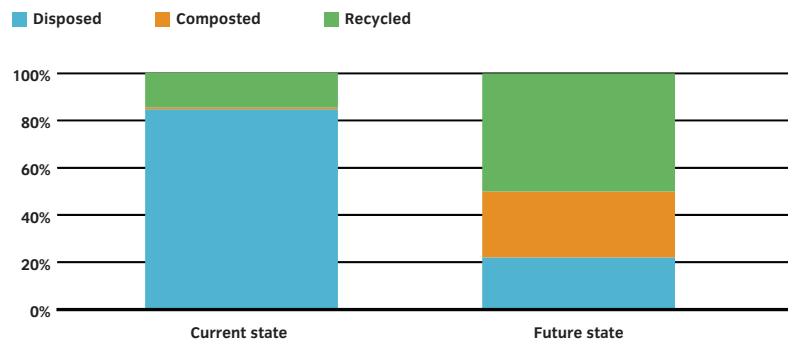
Materials for the Arts provides supplies to thousands of New York City's arts and cultural organizations, public schools, and community arts programs. Since 1997, the program has facilitated the reuse of over 8,000 tons of materials donated by companies and individuals and redistributed to artists and educators.

GrowNYC, a non-profit organization created by the City dedicated to improving the environment, also sponsors "Stop N Swap" community

Residential and Street Basket Waste



Potential for Diversion of Residential and Street Basket Waste



events. These allow individuals to discard unwanted but reusable items, which people may take home for free, whether or not they have brought something in exchange.

One challenge to increasing reuse efforts is the rising cost of storage and transportation of materials. Therefore, online forums to facilitate the reuse of materials are crucial. We will promote and enhance the City's online portal, the NYC Stuff Exchange. This portal offers an exhaustive list of organizations and businesses where residents can donate, buy, or sell gently used items. Through the NYC Materials Exchange Development Program (MEDP), we will continue to foster relationships between reuse organizations, provide capacity building training, and increase public awareness and access to these innovative waste prevention services.

These efforts will divert thousands of tons of waste from landfills and save individuals, non-profits, and schools millions of dollars.

Increase the recovery of resources from the waste stream

We currently recycle half of all waste generated in New York City. A majority of this recycled material, however, is fill and construction and demolition debris. And while one-third of our residential waste stream could be recycled through current curbside collection, less than half of all recyclable materials are properly sorted by residents. In addition, there is no curbside collection of organic materials, such as food and textiles, and only limited collection of yard waste, which together compose nearly a third of our residential waste and could be diverted.

We can increase the amount of our waste that is recycled by expanding the items we designate as recyclable, creating new markets for

recyclables, and making it easier for individuals and businesses to recycle. We can also recognize businesses and institutions for adopting more sustainable waste management practices, including increased diversion rates and the use of recycled materials.

INITIATIVE 3 Incentivize recycling

New Yorkers have long recognized the value of recycling. Recycling was introduced in 1895, when household waste was separated into three categories—food, rubbish, and ash. Food waste was processed into grease for soap products and into fertilizer. Rubbish was sorted to salvage paper and other marketable materials. And ash, along with the nonsalable rubbish, was landfilled.

Today, although recycling can save money or even generate revenue, we are not recycling as much as we could. After 22 years of mandatory residential recycling programs in the city, residents still properly sort less than half of what could be recycled, throwing away valuable materials. Though we have limited information about commercial recycling in the city, we know that most businesses do not capture as much as they could for recycling. In order to further understand commercial recycling and make informed policy decisions, the City has embarked on a study of the entire commercial waste system.

Until this study is complete, we will develop new recognition and award programs or build on existing models such as LEED and the Green Restaurant Association to incentivize businesses and institutions to expand recycling and use recycled and recyclable materials. While many businesses in the city have already recognized the importance of sustainable solid waste practices, these incentive programs would encourage broader adoption of these practices. Leveraging the buying power of local businesses will also help support emerging markets for recycled materials.

We will also set recycling goals for City government and challenge corporations and institutions to meet or exceed those goals. We will recognize standout performance and collect and publish best practices for even broader adoption.

For residential waste, we will pursue strategic reward programs to incentivize household recycling. We know that increasing our residential diversion rates would have a significant impact on GHG emissions and reduce the City's cost of exporting our waste. For example, if we diverted 60% of the amount of paper, metal, glass, and plastic that is already suitable for curbside recycling, we could reduce GHGs by approximately 100,000 metric tons.

In addition, we will improve access to recycling performance information by making it easier to find community board diversion rate data online. This will enable community-based organizations to monitor the effects of their recycling and outreach initiatives. And while we expand recycling awareness, we will also enforce the recently increased penalties for large buildings that don't comply with recycling rules.

INITIATIVE 4 Improve the convenience and ease of recycling

While most New Yorkers want to recycle, the system can sometimes be confusing. There are different rules and bins at home, on the subway platform, and at work. There are detailed rules about what types of plastics can and can't be recycled. Recycling bins on the streets and in parks are scarce. We must make recycling easier and more convenient.

To improve access to recycling and create a more consistent system, we will deploy 500 recycling receptacles in public spaces across the city and seek to increase that number over time. In addition, we will establish recycling in 25% of all City parks.

CASE STUDY

Policies to Incentivize Waste Reduction

Today New Yorkers pay for waste collection through local taxes regardless of how much—or how little—they generate. A growing number of cities have taken a different approach and implemented a fee-based system known as “Pay As You Throw” or “Save As You Throw” (SAYT) that varies based on how much waste a household generates.

In communities with these programs, household trash collection charges are based on the amount thrown away, while recycling collection is free. This creates a direct economic incentive to recycle more and generate less waste. By increasing recycling rates and decreasing disposal volumes, SAYT can have environmental and economic benefits. It’s also fairer: those who generate more, pay more; those who generate less, pay less.

SAYT treats waste collection just like electricity, gas, phone, and other utilities; households pay a variable rate depending on the amount of service they use. As of 2006, 30 of the 100 largest U.S. cities used a SAYT system.

Of course, implementing this approach in New York City, which has a high percentage of high density, multi-family housing, would present special challenges. Although there is no directly comparable U.S. city that has implemented SAYT, other cities may offer lessons.

Seoul, South Korea, with a population of over 10.5 million, instituted a SAYT system in 1995. Trash bags of 20, 50, and 100 liters each are provided for a fee to residents and businesses. Smaller bags cost less than the larger bags. In addition, the cost of disposal varies by district and is based on actual costs which are assessed and passed to residents.

We will review relevant SAYT research as well as the experiences of other densely-populated cities with similar systems to clarify how a SAYT approach might work to incentivize recycling and decrease waste generation in New York City.

Recycling in households, particularly in multi-family residential buildings, is often difficult due to a lack of space to store and sort recyclables. Without this dedicated space, it is challenging for residents or superintendents to keep recycling separated. Many other cities and the Battery Park City Authority require new residential buildings to provide a waste and recycling room. We will work with the City Council to require new multi-family residential buildings to provide sufficient space for recycling receptacles.

Recycling education is central to improving recycling rates. We already conduct recycling education in many forums, including websites, direct mail, and outreach programs for multi-family buildings and schools. The New York City Housing Authority (NYCHA) has also successfully expanded recycling education by organizing Resident Green Committees, which provide neighbors with specific information about what and how to recycle. Reinforcing the importance of recycling with the 1.1 million children in our public schools is an ideal way to increase recycling at home. We will encourage teachers to incorporate recently created recycling education modules into their curriculum.

INITIATIVE 5

Revise City codes and regulations to reduce construction and demolition waste

The New York City construction industry is one of the largest consumers of materials and generates more than 7 million tons of waste annually. Construction and demolition (C&D) waste consists of the debris generated during the construction, renovation, and demolition of buildings, roads, and bridges. It includes fill such as dirt and rocks, of which nearly all is recycled, and building materials such as concrete, wood, metals, glass, carpets, and furniture, of which less than 40% is recycled. While the New York City construction industry is a leader in recycling C&D debris, it has the potential to recycle and/or reuse even more through improved handling and separation of materials.

Several C&D materials, including old growth lumber, carpet, ceiling tiles, new gypsum, and gypsum tiles, are optimal candidates for recycling. Several recycling options currently exist for carpet, ceiling tiles, and old growth lumber, but there are few or no local resources to effectively recycle clean gypsum scrap that is used for gypsum wallboard. We will work with the business community and the City Council to enact mandatory recycling for certain C&D materials and encourage cost-effective recycling options for these materials.

INITIATIVE 6

Create additional opportunities to recover organic material

Approximately 30% of what we throw away in our homes is organic material. The majority is from food scraps, but also includes leaf and yard waste and textiles, such as used clothes.

On the commercial side, we estimate that organics represent 18% of the total waste stream, the majority of which is food waste from businesses and institutions. Paying to transport these organics to distant landfills is not only expensive due to the high water content of these materials, but it is also a key driver of our GHG emissions. We know that when food is disposed of in a landfill it quickly rots and becomes a significant source of methane.

Yet with proper separation and treatment, food waste can be converted into a valuable resource for agricultural applications and energy generation. Other organic materials, such as leaf and yard waste and textiles, can also be composted or recycled. Diverting organics from the general waste stream could save the City and its businesses millions of dollars by avoiding expensive disposal costs. It could also reduce transportation impacts such as congestion, noise, and air emissions.

Residential organics

New Yorkers have several options to compost their food waste. Many community-based organizations accept food waste for small-scale composting. GrowNYC hosts drop-off locations for organics at select Greenmarkets, and residents with yards can use small containers to compost kitchen scraps along with their yard waste. For nearly 18 years, the City has also operated the NYC Compost Project, which offers outreach and education about composting for residents, non-profit organizations, and businesses at botanical gardens and non-profits in each borough.

We will expand outreach and education efforts, benchmark and quantify current community-based composting efforts, and work with community and government partners to increase the number of available drop-off locations for food waste. In addition, we will launch a grant program for small-scale composting to encourage diversion of food waste.

To capture the roughly 4% of residential waste made up of leaf and yard trimmings, we will reinstate leaf and yard waste collection for composting in the city. This will create a high-quality soil product for use by City agencies and non-profits in parks and natural resource programs.

CASE STUDY

Grease to Fuel

As business winds down at restaurants throughout the city, commercial carters arrive to pick up their waste. But a new kind of waste collector is becoming a more common visitor to restaurants at closing time: commercial grease trucks using long hoses to extract used cooking oil, also known as yellow grease, from kitchens. This burgeoning market is driven by an increasing demand for yellow grease as the base material for a valuable fuel—biodiesel.

Although biodiesel can be made from several feedstocks including soybeans, entrepreneurs in New York City are making it from used cooking oil, harvested from our city's 24,000 restaurants. Biodiesel has substantial environmental benefits. Compared with standard diesel, it creates fewer greenhouse gas, particulate matter, and carbon monoxide emissions, without sacrificing performance. The fuel can fulfill many of our needs—from powering our cars and trucks to heating our buildings.

In 2010, the City passed a local law requiring heating fuel to contain 2% biodiesel by October 2012. With heating oil combustion accounting for nearly 14% of local PM 2.5 emissions, the adoption of biodiesel can help meet our air quality goal.



A yellow grease hauler prepares to collect used cooking oil from a restaurant kitchen

Currently, restaurants and institutions with large kitchens must properly dispose of yellow grease by placing it in the appropriate containers and setting it out on the curb for waste collection, however, some may just dump it down the drain. The grease solidifies in our sewers and can create backups that disrupt service and are expensive to clear.

Companies that collect and process yellow grease into biodiesel have begun turning New York City into a model of sustainable business development

and are helping the city achieve several PlaNYC goals: transforming waste into a valuable commodity, stimulating the local economy, and reducing air pollution and greenhouse gas emissions.

We will also expand composting of leaf and grass clippings generated by our City parks. Specifically, we will install one small-scale composting unit in each borough. We will also expand the use of mowing equipment that mulches leaves and other organic matter so that nutrients seep into the soil.

The City piloted curbside collection for organics in the early 1990s and found that while it did increase diversion rates in lower-density neighborhoods, it was not a cost-effective collection method. Although the disposal costs were lower for organics than refuse, each collection truck only picked up a small amount of organics on their route, which resulted in a high collection cost per ton. Since 20 years have passed, we will reexamine this issue and complete a new study to determine the feasibility of curbside organics recycling.

Textiles, a key component of our organic waste, represent almost 7% of our residential waste stream. Nearly 190,000 tons of textiles are disposed each year. Since 2007, GrowNYC has collected textiles at select Greenmarkets. In Fiscal Year 2009, they collected and recycled approximately 150 tons from almost 20,000 New Yorkers. The City will launch a new public-private partnership to provide 50 new permanent drop-off locations in each borough for textiles that will be reused or recycled.

Commercial food waste

The Hunts Point Food Distribution Center is situated on 329 acres of City-owned property in the Bronx and is the largest food distribution center in the U.S. It generates approximately 27,400 tons of waste per year, roughly 75% of which is organic and all of which is being hauled away in trucks for disposal. The distribution center is an ideal candidate for an on-site organics recovery operation. Such a facility could lower waste disposal costs, generate a clean source of energy, reduce truck traffic and related impacts both locally and regionally, decrease congestion, and reduce air pollution. We will pursue the establishment of an on-site organics recovery facility at the Hunts Point Food Distribution Center.

Yellow grease, which is essentially used cooking oil, is another organic resource in our commercial waste stream with significant value and energy potential. It can be processed locally into biodiesel, a fuel that generates comparatively lower air pollutants and GHG emissions than traditional diesel. However, when it is improperly disposed of in drains, yellow grease solidifies and can clog the sewer system. In Fiscal Year 2010, the City received more than 14,000 sewer back-up complaints.

Because of its potential as a cleaner fuel, yellow grease is now a coveted commodity. Over the last decade, yellow grease has significantly increased in value and entrepreneurial haulers

and biodiesel processors now collect it for free. Today, commercial carters pick up yellow grease from more than half of the city's restaurants.

The City has helped spur this market by requiring that all heating oil used to heat our buildings include a 2% blend of biodiesel. We will continue to support this developing industry through outreach and education to businesses and institutions. We will also streamline the licensing for grease haulers and the permitting process for yellow grease transfer stations.

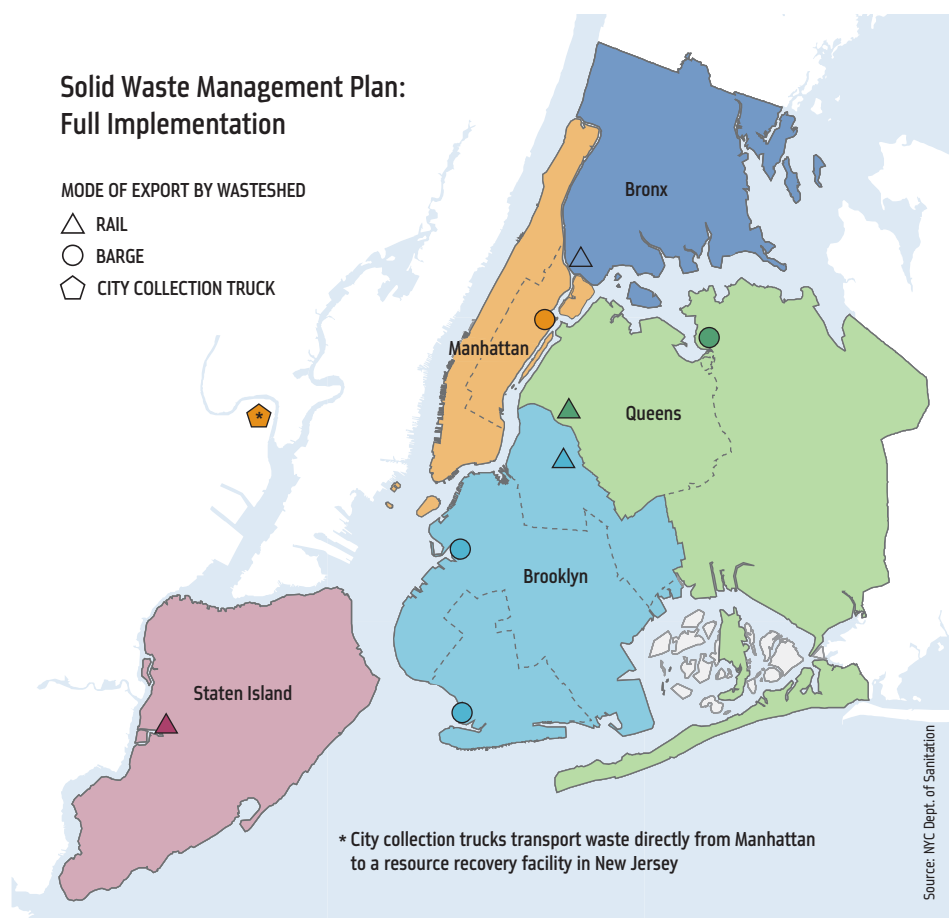
Every year, more than 24,000 restaurants, 5,000 grocery stores, 4,000 hospitals, 5,000 cultural and educational institutions, and numerous hotels and sports arenas, throw away approximately 600,000 tons of food. In many cases, this waste could effectively be separated at its source and diverted from landfills. While some companies and institutions have recognized the growing importance of diverting food waste and the opportunity to be recognized as a "sustainable business," participation in commercial composting efforts remains limited.

Approximately 12,000 tons of food waste per year in the city, including waste from Yankee Stadium and Citi Field, is currently sent to commercial processing facilities for composting and resource recovery. However, these sites are located far outside the city, with the closest more than 150 miles away. The lack of commercial processing facilities in close proximity to the

Solid Waste Management Plan: Full Implementation

MODE OF EXPORT BY WASTESHED

- △ RAIL
- BARGE
- ⬠ CITY COLLECTION TRUCK



city poses a challenge to fostering the market for commercial food waste recovery. We will promote commercial organics recovery as part of our proposed business recognition and award program to encourage sustainable solid waste management practices.

New technologies have the potential to reduce the impacts created by the traditional disposal of our commercial food waste. On-site dewatering units can remove the water from food waste and use odorless aerobic digestion in which bacteria eat food scraps. This process significantly reduces the weight and volume of food waste. These units can substantially reduce collection truck trips, in turn reducing air and noise pollution, GHG emissions, and congestion.

There are currently several dewatering pilot programs underway in the city, including one at a large Manhattan department store. We will continue to evaluate pilots of new technologies and encourage businesses and institutions to adopt them as a means to increase diversion rates.

Biosolids

New York City produces approximately 450,000 tons of biosolids from its wastewater treatment plants every year. While these biosolids are generally landfilled, they also can be harnessed as an energy source either directly or indirectly for heat, transportation fuel, or power production. Since sludge is organic material, it may also be used as fertilizer or soil conditioner for parks, farms, lawns, and golf courses, and in asphalt-paving mixes. We will pursue sustainable and economical opportunities to process and market sludge for beneficial reuse through pilot projects and partnerships with utilities and private investors.

INITIATIVE 7

Identify additional markets for recycled materials

When the City began mandatory curbside recycling in 1989, plastic recycling had just begun to emerge. In response to legislation being implemented in municipalities and states across the nation, the plastics industry developed sorting technologies to separate and process the diverse types of plastics collected and make new products out of them.

Decisions about what is mandated to recycle is largely based on the market—we designate those materials for which there is an established and relatively constant demand. Today, nearly a third of our residential waste stream is designated

as recyclable through curbside collection. This includes paper and cardboard, metal and glass containers, and plastic bottles and jugs. Only 2% of our entire residential waste stream is comprised of plastics designated for curbside collection. However, 11% is comprised of other types of plastics, including types that are more difficult to recycle and have limited or no markets. As recycling technologies and markets evolve, we will revisit the expansion of plastics designated for recycling and work to encourage markets for plastics that aren't currently collected.

Some of our greatest potential for recovering materials from the waste stream comes from the dredge material excavated from our harbor and the detritus from road work. We already recycle more than 45% of the asphalt removed when fixing a road, at City-owned recycling plants, and turn it into new asphalt to repave our streets and fill potholes. While we are experimenting with the use of even higher concentrations of recycled asphalt in our streets, we will also encourage its use in city construction projects.

Regionally, we dredge 4.49 million cubic yards of material a year from our harbors to maintain navigation channels and provide access to waterfront businesses. This material could be used in multiple applications instead of being landfilled. This type of beneficial reuse and recycling would conserve raw materials in quarries, reduce energy use and pollution from

transportation, and reduce construction costs. We will encourage applications for the local beneficial reuse of dredge material.

INITIATIVE 8

Pilot conversion technologies

The SWMP sets out a clear path to reduce the GHG impact of exporting our waste by shifting from truck transport to barge and rail. A more equitable distribution of waste volumes at transfer stations means that collection trucks travel fewer in-city miles. The results are improved air quality and the benefits of lower congestion.

Even with these changes, we still rely largely on landfills for disposal. In order to identify alternative disposal methods that further reduce methane emissions and transportation impacts, we have studied new and emerging technologies that convert solid waste into either electricity or fuel that can then be sold as a revenue-generating product. These alternatives must be part of a citywide solid waste strategy that includes robust recycling programs.

Conversion technologies are used in Europe and Asia and are gaining greater appeal in the United States. Two specific technologies, anaerobic digestion and thermal processing, are the most widely used and have the greatest potential for commercial applicability in New York City.



Loading containerized waste onto railcars at the City's Staten Island transfer station

Credit: NYC Dept. of Sanitation/Michael Anton

Transportation Modes for City-Collected Waste

MODE OF TRANSPORT FROM CITY	CURRENT	FUTURE
Rail	32%	41%
City collection truck	23%	12%
Long-haul truck	45%	0%
Barge	0%	47%

Source: NYC Dept. of Sanitation, NYC Mayor's Office

Anaerobic digestion uses microorganisms to break down waste. It produces a biogas that can be combusted to generate electricity and a compost that can be used as a soil enhancer and fertilizer. Thermal processing technologies use heat to process solid waste and produce a synthesis gas ("syngas") that is then combusted to produce electricity.

Compared to landfilling or conventional waste-to-energy technology such as incineration, these new conversion technologies could offer economic and environmental advantages. Combustion of a gas as part of anaerobic digestion or thermal processing produces less air pollution, particularly dioxins and heavy metals, than the incineration of solid waste. Because the end-products could be beneficially reused and sold, these technologies could result in significantly less waste being disposed in landfills, reducing GHG emissions. Finally, with pre-processing equipment to recover recyclable items from the waste stream, these technologies would complement the City's curbside recycling program and increase diversion rates.

We will analyze opportunities to use new conversion technologies as commercially-viable alternatives to landfilling. In addition, we will solicit proposals to pilot these technologies in New York City for the disposal of our solid waste.

Improve the efficiency of our waste management system

The SWMP provides a roadmap for the sustainable management of the waste and recyclables generated in New York City. It addresses the management of City-collected waste from households, non-profit institutions, government agencies, and public spaces, as well as commercial waste collected by the private carting industry.

INITIATIVE 9 Reduce the impact of the waste system on communities

Over the past 30 years, a small number of communities in the city have borne the brunt of impacts from our waste management system. Those most affected live in neighborhoods in close proximity to high concentrations of transfer stations where thousands of tons of waste are transferred from collection trucks to long-haul trucks or railcars.

To address these impacts, the City worked with the City Council, environmental advocates, environmental justice organizations, and affected communities to develop the SWMP. A central tenet of the SWMP is borough equity—that each borough manage collection and export of the waste that is generated within its boundaries. The SWMP also set a goal of exporting the majority of City-collected waste by rail and barge, eliminating the need for long-haul trucks. This will reduce the noise, pollution, and congestion caused by the long-haul trucks exporting waste out of the city.

The SWMP leverages existing and new infrastructure to maximize the use of the city's waterways and rails to move waste off our streets and highways. As part of the SWMP, the City will use long-term contracts with private waste haulers to manage the export and disposal of City-collected waste from specific sites in each borough.

To date, we have signed long-term contracts for the export of waste by rail from Staten Island, the Bronx, and northern Brooklyn, representing more than 30% of waste collected by the City. By 2013, we will substantially complete the construction of two key marine transfer stations for exporting waste out of the city by barge. The City's collection fleet has also significantly improved emission controls, and more

stringent regulations have decreased the public health and environmental impacts from existing transfer stations.

The SWMP also reduces the impacts of recycling collection and infrastructure. The Sims Municipal Recycling Facility at the South Brooklyn Marine Terminal, which will open by 2013, will facilitate the expansion of barge transport for recyclables throughout the city. This facility will reduce City collection truck traffic by approximately 230,000 miles per year.

To reduce the environmental impacts of commercial waste management, the long-term contracts identified through the SWMP will facilitate export of commercial waste by rail and barge. Specifically, our long-term contracts at the marine transfer stations will include pricing incentives to attract commercial waste carters. Several of the long-term contracts at transfer stations with rail access also require that all commercial waste processed at those locations be exported by rail. In addition, we will work with other private transfer stations to facilitate greater access to rail and barge infrastructure.

INITIATIVE 10 Improve commercial solid waste management data

New York City generates more than 3 million tons of commercial waste a year, approximately 40% of which is recycled. One of the major obstacles to decreasing impacts from the commercial waste system and increasing diversion of commercial waste is our limited insight into its organization and management. While the City's 2004 commercial waste characterization study provided some baseline information, we still lack a detailed picture of how private carters operate.

CASE STUDY

South Brooklyn Marine Terminal Recycling Facility

Since the beginning of our curbside household recycling program in the late 1980s, the City has relied on short term contracts with private companies to receive, process, and market our recyclables. While the contracts provided a certain amount of flexibility in the early days of the recycling program, the short duration of the agreements limited private sector investment in infrastructure and resulted in significant fluctuations in the program's costs. To ensure greater economic security for the recycling program and incentivize investment in recycling infrastructure, the City signed a long-term contract with Sims Metal Management in September 2008 to handle approximately 250,000 tons per year of City-collected metal, glass, and plastic, and a portion (150,000 tons per year) of City-collected mixed paper.

In October 2010, the City, in partnership with Sims, broke ground on a new, state-of-the-art recycling facility at the South Brooklyn Marine Terminal in Sunset Park, Brooklyn that will transform how the City's recyclables are managed. The City is investing more than \$48 million in revitalizing the waterfront site and Sims is investing \$44 million to



A rendering of the new Sims recycling facility at the South Brooklyn Marine Terminal

create the new 100,000 square foot facility, which will include processing and storage buildings as well as a Visitor Education Center where school groups and visitors can learn about recycling.

In line with the City's Solid Waste Management Plan, the new facility will allow us to reduce our reliance on truck transport by using barges at the Marine Terminal. Brooklyn recycling collection trucks will need to travel shorter distances between collection locations and recycling

facilities. Sims will also be able to expand its barge-based transport system, receiving recyclables by barge instead of truck from the Bronx and Queens. The facility will eliminate over 260,000 in-city vehicle miles traveled by City recycling collection trucks annually. These changes will reduce roadway congestion and associated noise and air emissions, create 100 new jobs by 2013, and enhance the efficiency and economics of the City's recycling program.

We know anecdotally that the city's 150 commercial waste carter companies develop their routes based on their respective customer needs and locations. As a result, a vast fleet of commercial trucks often drive long distances to pick up waste from a constellation of customers across the city.

To further understand this system, we will conduct a comprehensive study of commercial waste collection, focused on the logistics, types, and quantity of commercial waste collected throughout the city. Based on our findings, we will work with the private carting industry to develop recommendations to decrease impacts, increase commercial recycling, and identify potential efficiencies.

We will also improve access to more detailed information about private carters and their disposal practices. Businesses can then make more informed decisions based on how their waste would be managed and disposed. We will work with the commercial waste industry to make this information more accessible through outreach and an enhanced website.

INITIATIVE 11

Remove toxic materials from the general waste stream

Though a decidedly small portion by weight—less than 1% of the residential waste stream—toxic materials represent one of the most substantial threats to the environment and public health and safety in our garbage. Toxins such as lead can leach and leak when landfill liners fail, damaging aquifers below. When burned, they can release harmful particles into the air. Ignitable wastes such as solvents and corrosive wastes such as acids can injure sanitation workers.

Household Hazardous Waste (HHW) includes paint, batteries, automotive fluids, and mercury-containing devices such as thermostats. Many New Yorkers do not know that these items shouldn't go out with their regular trash. We send more than 9,000 tons of HHW to landfills every year. To properly handle more HHW, we will expand opportunities for the public to drop-off these materials, including an annual event in every borough.

We estimate that nearly 30% of HHW is composed of paint that is disposed of in the general waste stream. In 2010, the City established a pilot program for paint manufacturers and retailers to

voluntarily take back paint. We will complete the pilot program and evaluate expanding it to a city-wide industry paint stewardship program.

Electronic waste or "e-waste," from computers to cell phones, contains both high-value recyclable materials such as gold and copper and highly toxic items such as lead and bromide fire retardants. The State's new e-waste law requires manufacturers to collect and recycle or reuse e-waste. In 2015, disposing e-waste in the general waste stream will be illegal. Through education and outreach, we will improve the public's awareness of and participation in e-waste recycling programs, diverting these products from landfills.

Both the e-waste law and the paint stewardship program are based on the premise that manufacturers are best equipped to handle products at the end of their useful lives. Also known as product stewardship, these programs encourage manufacturers to plan for disposal issues when designing their products and to reduce the disposal costs to local governments. We will explore product stewardship policies for other toxic products that place a significant burden on our waste management system.



A sanitation worker loading cardboard into a City collection truck

Credit: NYC Dept. of Sanitation

Reduce the City government's solid waste footprint

If New York City intends to be a leader in solid waste management practices, City government must be at the forefront. With more than 300,000 employees and more than 300 million square feet of real estate, we estimate City agencies generate roughly 200,000 tons of waste every year. There is great potential for improvement.

INITIATIVE 12 Revise City government procurement practices

The City currently spends approximately \$2.2 billion on goods every year, ranging from paper to computer monitors to public school food trays. In January 2007, the City began implementing environmentally preferable purchasing (EPP) laws that require agencies to consider the human health and environmental impacts of goods in procurement decisions.

This EPP program addresses waste generation, energy and water use, GHG emissions, indoor air quality, recycled and reused content, and the presence of hazardous substances. In order to ensure that the EPP program comprehensively

addresses solid waste management considerations, we will develop best practices for procurement and work to incorporate these into the EPP rules.

In the short-term, we will establish packaging reduction guidelines for City contracts and improve agency accountability for the solid waste impacts of products we purchase. We will also create incentives for vendors to recover and reuse products when they are no longer in use. These actions will not only reduce our solid waste footprint but also reduce agency expenditures.

INITIATIVE 13 Improve the City government's diversion rate

One of the biggest challenges to reducing solid waste generated by City government is a lack of information. City offices are housed in a combination of private and public buildings. This means that some of our waste is collected by private carters as part of regular commercial collection routes, and some of it is collected by the City, integrated with residential collection routes. Since each building and agency doesn't track the amount of waste generated, we are unable to accurately measure and monitor our solid waste footprint.

We will develop a pilot program to measure solid waste generation at targeted City-owned buildings and develop a baseline for how much waste is generated by City agencies. Once we are able to benchmark our waste generation and identify opportunities in our procurement practices for improvement, we will set targets to increase our diversion rate.

We have already made strides toward this goal. With 1.1 million students and more than 1,000 schools, the City is tackling recycling in our education system on a comprehensive scale. By 2013, every public school will have a sustainability plan that identifies a strategy for greening its operations and maintenance and includes a clear recycling plan. Along with the plan, each school will designate a sustainability coordinator. This person will be responsible for leading recycling efforts, educating teachers, and ensuring that students are following recycling rules.

One strategy to increase diversion rates for City buildings and operations is to identify products that are used in large volumes and sponsor design competitions to develop alternative products that are more easily recycled and/or have fewer toxic materials. Working with the significant design and engineering talents in New York City, we will drive innovation in packaging design and product materials.

Another way to improve our diversion rate is to create financial incentives for government agencies to decrease their solid waste generation. Long-term, we will hold agencies accountable for waste generation and give credit to those that are taking quantifiable steps to reduce their solid waste footprint. Motivating agencies to reduce the City's costs by benefiting from the savings will create a strong financial incentive for those agencies to increase recycling rates and decrease solid waste generation.

Conclusion

New York City has the opportunity to significantly reduce the environmental and economic impacts of the solid waste management system by changing consumer behavior, improving infrastructure, investing in new technologies, and increasing recycling. Through individual actions and shifts in the operations of institutions and businesses, we can reach our goal of increasing diversion from landfills to 75% by 2030. Implementing these strategies will also reduce GHG emissions by 1 million metric tons, decreasing the share of the city's GHG emissions from solid waste management, and reducing the impacts of the system on our communities.