



**RESEARCH FOR PLANYC 2.0 SOLID WASTE MANAGEMENT SECTION**

# COMMERCIAL SOLID WASTE MANAGEMENT FOR NEW YORK CITY

INITIATIVE 1 / RATING SYSTEM FOR LOW-WASTE PRODUCTS  
INITIATIVE 2 / CORPORATE AND INSTITUTIONAL CHALLENGES  
INITIATIVE 3 / INDUSTRIAL ECOLOGY

**CAPSTONE THESIS FOR MASTER OF SCIENCE IN SUSTAINABILITY MANAGEMENT / SPRING SEMESTER 2011**

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## EXECUTIVE SUMMARY

Commercial waste accounts for almost 23% of the approximately 47,000 tons of waste produced in New York City (NYC) daily. The residential waste stream is municipally managed and therefore directly under City government control. Construction and Demolition and Fill waste make up a distinct sub-field of waste management. The Commercial waste stream, however, has traditionally been more difficult to target for study due to the sheer number and variety of businesses involved and the lack of definitive data on its composition.

Type of Waste	Percentage	Estimated Daily Tonnage*
Residential	27.71%	12,955
Commercial	22.55%	10,544
Construction, Demolition, and Fill	49.74%	23,258

\* NYC Mayor's Office of Long Term Planning and Sustainability. Internal Report. April 2011

On behalf of the Mayor's Office of Long-Term Planning and Sustainability, this report examines three potential commercial waste management initiatives for inclusion in PlaNYC 2.0; they are: Rating Systems for Low-Waste Products (Reduce); Corporate and Institutional Challenges (Recycle); and Industrial Ecology (Reuse). Each of these initiatives addresses one stage of the commercial waste life cycle and are ordered as such. The Rating Systems for Low-Waste Products Initiative reflects the beginning of the waste life cycle in the buying decisions of governments, businesses and consumers. The Corporate and Institutional Challenges Initiative addresses how waste is disposed and diverted by these groups in commercial settings. Finally, the Industrial Ecology Initiative treats the topic of waste after it is disposed.

### RATING SYSTEMS FOR LOW-WASTE PRODUCTS INITIATIVE

The purpose of a low-waste product rating system is to allow consumers to select products based upon the environmental and ecological impact of those products' waste. In this report, the best product rating system models for a consumer waste source reduction are identified. Existing models and best practices were also assessed to determine the feasibility of NYC government playing a role in establishing and/or encouraging such a rating system and in evaluating consumer procurement practices.

Twelve nationally recognized product rating and labeling systems that evaluate the environmental impact of consumer based products were identified. Using defined criteria, four product rating systems that would best address product waste reduction in NYC were selected: Cradle to Cradle (C2C), Electronic Product Environmental Assessment Tool (EPEAT), Green Seal, and SMART.

To date it appears that no other cities have used rating systems to reduce product waste; however NYC and Chicago both utilize the third party rater, Leadership in Energy and Environmental Design (LEED), to improve the environmental impact of the building infrastructure within the city. NYC previously utilized Green Seal, one of the four preferred rating systems above, as part of a pilot program to reduce the environmental impact of the cleaning products procured by the NYC Procurement Office. NYC has an opportunity to utilize its buying power to decrease the waste generated by product manufactures, and ultimately decrease the amount of waste entering NYC's waste stream and landfills.

Although there is a lack of evidence on established municipal practices for product rating to reduce source waste, Walmart is setting precedent. It recently developed and implemented a product rating system to assess the environmental impact of the products sold within its stores and is requiring the suppliers and manufacturers with whom it contracts to adhere to its rating standards. Walmart is using its buying power to influence product manufacturing process through its product rating system.

NYC can take several long-term and short-term steps to leverage its own buying power and influence. In the short-term, the City could implement a pilot program with the four preferred third-party rating systems described above, to assess the impact of utilizing a product rating system for source waste reduction on contributions to the waste stream. If the pilot program is successful, the City could develop a long-term plan to promote and encourage consumer use of existing product rating systems for source waste reduction through the initiation of a citywide labeling system rather, than developing, and implementation a NYC-specific rating system.

There may be some legislative processes involved in instituting a labeling system which the City would need to address in order to implement these short-term and long-term goals. There is also a risk that stakeholders would not comply with the rating system. In order to encourage greater participation among product manufacturers, distributors, retailers and other stakeholders, the City could provide and formulate incentives to encourage participation. Finally, although the investment in a labeling system is minimal compared to developing a new rating system, in order to ensure a credible and transparent process capable of reducing the amount of product waste entering the waste stream, it will be necessary for the City to incorporate a continuous monitoring process.

## **CORPORATE AND INSTITUTIONAL CHALLENGES INITIATIVE**

Several industries were examined for the level of potential to reduce waste if presented with a Corporate and Institutional Challenge. The industries examined were hospitality, retail, building and property management, and food. It was determined that the focus of the Corporate and Institutional Challenge initiative should be on the food services sector. This sector encompasses both private businesses such as restaurants and supermarkets as well as food services at institutions, and demonstrated the greatest potential for waste reduction due to the volume of food waste produced and the lack of existing challenges for this industry. Model challenges for all industries were examined, and based on this research the following best practices that characterize a successful Corporate and Institutional Challenge were identified: (1) realistic timeframe; (2) easily-identifiable responsible administrator; (3) progress easily measured; (4) clear guidance; (5) attractive, easily understood incentives; (6) comprehensive challenge; and (7) opportunities for sponsorship.

Any Corporate and Institutional Challenge would benefit from a design which takes these best practices into account. The most important among these are the need to provide attractive, easily understood incentives, an easily-identifiable responsible administrator and a comprehensive challenge. In this case, Business Improvement Districts (BIDs) are identified as the preferred administrators. A comprehensive challenge will address overall waste reduction, recycling and recyclable food packaging, and increased organic food waste diversion. Significant incentives for challenge winners could include a visit from the Mayor and the accompanying publicity.



The City can support the implementation of a Corporate and Institutional Challenge, as well as long-term waste reduction and diversion, by: (1) offering technical assistance and capacity building to small businesses for inventory control and waste management strategy development; (2) providing informational resources such as a website or hotline which lists the names of waste reduction consultants and certified waste haulers who accept compost waste and links to written guidance for businesses seeking assistance; (3) partnering with businesses and non-profits which provide technical assistance for waste reduction to provide pro-bono assistance for challenge participants; (4) establishing a business mentoring program whereby businesses successful at reducing waste mentor other businesses; (5) raising awareness among businesses about the right to a waste stream survey from their hauler; and (6) developing the necessary infrastructure to support the composting or organic food waste diversion components of a challenge for long term success.

The primary obstacles to implementation for a Corporate and Institutional Challenge in the food services sector in NYC are: (1) space and design constraints; (2) poor inventory control among some food service establishments; (3) the relatively high cost of compostable food packaging; (4) a lack of technical capacity among owners and operators of food service establishments to develop waste reduction plans; (5) a lack of information and awareness among food service establishments regarding the potential cost savings and the obligation upon waste haulers to conduct waste stream surveys; and, (6) insufficient private and municipal infrastructure to support a large scale challenge involving composting or organic food waste diversion. This final obstacle is addressed in large part by the Industrial Ecology initiative.

## **INDUSTRIAL ECOLOGY INITIATIVE**

In order to understand the opportunities for industrial ecology initiatives in NYC, an analysis of NYC's commercial waste stream was undertaken to recognize areas of opportunity. The commercial sectors contributing to the waste stream were considered through a four-pronged approach: (1) scale/tons of waste; (2) underutilization; (3) legal/regulatory feasibility; and (4) reuse demand. This analysis revealed the sectors of food waste, manufacturing and professional, technical & scientific as the sectors of greatest opportunity.

Addressing manufacturing and professional, technical & scientific waste necessarily means addressing WasteMatch, The City of New York Department of Sanitation's (DSNY) official waste exchange network for these types of commercial waste. This research includes findings on WasteMatch's current status and obstacles to its success which include the following: (1) inadequate funding; (2) no framework for financial sustainability; (3) lack of public awareness; and (4) insufficient exchange coordination. In order to provide best practices by which to help WasteMatch overcome some of its obstacles, an analysis was undertaken on successful industrial ecology programs in NYC and leading US cities. The best practices established include the following: (1) financial self-sustainability; (2) maintaining a physical presence to house materials in transit; and (3) providing pro-active matching. Based on these findings, the City incorporate such practices into NYC's WasteMatch program to increase its use. These practices could be implemented through accepting donated materials and selling them to fund the operations of the program, acquiring a warehouse to house materials while still maintaining the online database for long-term and continuous exchanges, and hiring expert staff to manage the warehouse and facilitate exchanges. Obstacles for implementing this plan include the need for an initial investment by the City to hire staff and purchase a warehouse and the high price of real estate and lack of space to centrally locate a warehouse.

Organic food waste was recognized as another sector of opportunity in which to institute industrial ecology initiatives. NYC has several obstacles hindering the ability to institute an organic food waste recovery program. These obstacles include the capacity to handle NYC's volume of organic food waste because such facilities are space intensive and unpopular, resulting in the common "Not In My Back Yard" (NIMBY) reaction. In addition, the fractured nature of NYC's private waste hauler system does not incentivize large capital infrastructure investments required for organic food waste recovery. In order to find best practices to overcome these obstacles, a study was undertaken of US cities that have instituted organic food waste recovery initiatives—Seattle and San Francisco. San Jose was also considered as a city that is in the process of implementing an organic food waste recovery system. The research findings revealed that the most effective way of implementing organic food waste recovery is through regulations that mandate organic food waste-stream separation and the City contracting with an exclusive waste hauler for organic food waste in NYC. In the absence of regulation, the City could explore initiatives that encourage the use of organic waste processing systems that are not considered by the general public as a nuisance, such as anaerobic digestion and create demand for the end product— compost and fertilizer.

## **FOOD WASTE**

Organic food waste from the food services sector, which accounts for about a third of the over 10,500 tons of commercial waste generated daily, recurs as an area of focus throughout this report. Organic food waste has great potential in that options for reuse are known and available and technologies for recovery facilities have advanced in recent years. The Corporate and Institutional Challenges and the Industrial Ecology initiatives each address this important area from two different angles. The former addresses how organic food waste can be separated and diverted at its source while the latter asks what should be done with that waste once it is collected; challenges address the supply of organic food waste to industry and industrial ecology addresses the demand of industry for that waste. Each question is critical and neither initiative can successfully address organic food waste dilemma without the other.



# 1. INTRODUCTION

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## 1.1 BACKGROUND

This report was prepared at the request of the Mayor's Office of Long-Term Planning and Sustainability to study and provide recommendations on three related waste management initiative to reduce the commercial waste stream of New York City with the intention of examining the feasibility of their potential inclusion in the 2011 update and expansion of PlaNYC. The three waste management initiatives are: Rating Systems for Low-Waste Products, including recyclable products and packaging; Corporate and Institutional Challenges for waste-reduction; and Industrial Ecology. Each of the three initiatives corresponds to one or more of the facets of the City's waste reduction philosophy.

- **Reduce:** Rating systems for low-waste products are systems for consumers and business to use to understand the scale of waste generation associated with a given product based on its rating.
- **Recycle:** In this context, corporate and institutional challenges are competitive programs designed to challenge corporations or institutions to reduce or divert their waste through recycling or organic waste recovery.
- **Reuse:** Industrial Ecology is defined as the practice of using the waste output from one process as the input for another process.

## 1.2 METHODOLOGY

The same overall approach was applied to each of the three topic areas. First, existing models for each of the initiatives were researched and the best practices associated with these models were identified. Next, the feasibility of pursuing such models in NYC was examined as well as the City's role, if any, in implementing such initiatives and the obstacles that would be associated with their implementation.

Research was divided into the three initiatives:



Waste Reduction Categories

The following steps were taken to assess each initiative:

- Researched existing models for each initiative
- Identified the best practices and propose a possible NYC initiative
- Considered the City's potential implementation role
- Determined obstacles to implementation of the initiatives

For each initiative, research was conducted using various sources: online research, interviews with industry professionals and agencies, and site visits, Columbia University faculty and resources. Feedback from the Mayor’s Office of Long-Term Planning and Sustainability also informed the research.



Overall Study Design and Research Methodology

1.3 NEW YORK CITY WASTE

New York City is home to approximately eight million residents, over 200,000 businesses and more than 24,000 restaurants and nonresidential institutions, and consequently, nearly 47,000 tons of solid waste are generated in NYC each day. The DSNY directly manages the waste generated by the City’s residents, public agencies, and nonprofit organizations, which constitutes approximately 28% of the total solid waste generated by NYC. The remaining 72%, waste produced by city’s businesses and construction activities, is hauled by private carting companies<sup>1</sup>.

From 1947 to 2001, NYC handled much of its waste internally; DSNY delivered thousands of tons of waste each day to the Fresh Kills Landfill in Staten Island. With the closure of Fresh Kills in December 2001, waste export became the exclusive waste disposal method for NYC, raising the cost of waste manage-

1 CWMS 2004 and DSNY 2006 Solid Waste Management Plan.

ment significantly<sup>2</sup>. Some of this waste goes to out of state landfills with other waste such as recycled paper traveling as far as China. While meeting immediate needs, the current organization – a predominantly truck-based system that relies on a complicated network of local and out-of-state transfer stations – does not reflect a sustainable or cost-effective long-term disposal strategy for the City. In September 2006, DSNY presented its Final Comprehensive Solid Waste Management Plan in which it proposed an approach with practical methods to substantially reduce the number of miles associated with disposal of the City's waste and reduce the number of trucks needed by increasing the use of rail and barges; it recommended an efficient, reliable, and sustainable structure for NYC's long-term solid waste management.

The City's universal waste reduction and diversion goals can be further advanced through the implementation of the three initiatives described in this report. Some of the waste reduction initiatives described here have the potential to not only reduce the waste stream in the short-term but also present pragmatic, long-term solutions to chronic waste problems as well as reducing energy use, preventing pollution and conserving natural resources through source reduction.

## 1.4 LEGAL AND REGULATORY ENVIRONMENT

Waste in NYC is divided into municipal waste, collected by the DSNY, and commercial waste, collected by private waste hauling companies. Several local, state and federal laws govern waste in NYC<sup>3</sup>. Municipal waste and commercial waste are distinguished by who generates it. Municipal waste is generated by residences, city agencies and departments, and non-profit tax-exempt organizations. Commercial waste is generated by private businesses and for-profit corporations (with the exception of professionals who operate out of residential buildings and pay a special fee to the DSNY for pickup)<sup>4</sup>.

Commercial waste is regulated by the Business Integrity Commission (BIC). The BIC licenses private haulers and self-haulers, and regulates the maximum rates which can be charged by private haulers. BIC was created through Local Law 21 of 2002 originally under the name the Organized Crime Control Commission. The industry was previously regulated by the Trade Waste Commission. Due to the history of organized crime involvement, commercial waste hauling is a highly regulated industry and BIC is also a law enforcement agency. There are presently over 200 licensed waste haulers that can legally collect waste from commercial establishments in NYC<sup>5</sup>. Private haulers collect both recyclable and non-recyclable waste which they transport to transfer stations by truck. Recyclable waste is often further sorted before being distributed to its final destination. The endpoint for waste is typically an out-of-state landfill for most putrescible waste and recycling facilities for recyclables.

The BIC sets maximum rates per volume and per ton for commercial waste. Customers have the right to choose whether they are charged by volume or by weight. The maximum rates for putrescible and recyclable waste are the same. BIC advises businesses to “negotiate with the carter rates for removing recyclable materi-

2 Earth Institute and the Urban Habitat Project, 2001. *Life after Fresh Kills: Moving Beyond New York City's Current Waste Management Plan*. New York: Columbia Earth Institute, Columbia University.

3 NYC Wasteless <<http://www.nyc.gov/html/nycwasteless/html/laws/laws.shtml>>

4 New York City Department of Sanitation, Refuse and Recycling Collection <<http://www.nyc.gov/html/dsny/html/collection/refuse.shtml>>

5 City of New York Business Integrity Commission, Trade Waste <[http://www.nyc.gov/html/bic/html/trade\\_waste/trade\\_waste.shtml](http://www.nyc.gov/html/bic/html/trade_waste/trade_waste.shtml)>

als such as cardboard and high-grade office paper since certain recyclable materials may be valuable,”<sup>6</sup> but it is up to customers to negotiate a lower rate should they choose to do so<sup>7</sup>. Customers may also request that a Waste Stream Survey be conducted to see how much waste they generate over time and opt for a flat fee billing option rather than being billed by volume or weight<sup>8</sup>. Customers may also choose to use any of BIC’s lists of licensed haulers provided that they operate within a 10-block radius of the customer<sup>9</sup>.

In addition to licensing commercial waste haulers, BIC also licenses Trade Waste Brokers. Brokers are companies “authorized to broker agreements between business customers and trade waste removal companies and/or to conduct evaluations of the customers’ waste stream in order to recommend cost efficient means of waste disposal or other changes.”<sup>10</sup> Should customers seek a lower rate from their commercial waste hauler for compostable and recyclable waste, Brokers could negotiate these agreements. Licensed Brokers are often also waste management consultants who can advise businesses on reducing their waste overall.

As a part of its regulation of the commercial waste hauling industry, BIC requires all haulers to annually submit their customer registers listing all of their clients as well as financial statements<sup>11</sup>. Finally, BIC convenes regular meetings of the Trade Waste Advisory Board which consists of representatives from BIC, licensed commercial waste hauling companies, and licensed Brokers.

Although, the City of New York may not be able to closely monitor the activities of all the private haulers that collect commercial waste from businesses,<sup>12</sup> NYC businesses are required to recycle.<sup>13</sup> Title 16, Chapter 3, Subchapter 2, Section 16-306: Private Carter-collected Waste mandates “recycling by businesses and buildings who have their waste collected by a private carter or recycler.”<sup>14</sup> According to DSNY:

**Tenants or occupants of commercial premises** must separate designated recyclable materials from regular trash, following their office or building’s recycling program. Tenants or occupants must notify their employees, customers, and clients of applicable source separation requirements. Businesses must also post signs and/or provide labeled containers for recycling.

**Building management** must set up an on-premise recycling program, including providing containers and posting signs in maintenance areas to inform maintenance of recycling requirements. Building managers must also give tenants and employees written notice of recycling requirements.<sup>15</sup>

DSNY’s Bureau of Waste Prevention Reuse and Recycling provides NYC’s over 200,000 businesses with a “Recycling: It’s not a Choice It’s the Law: A Handbook for NYC Businesses” to clearly outline compliance

6 <[http://www.nyc.gov/html/bic/html/trade\\_waste/customer\\_info\\_recycling.shtml](http://www.nyc.gov/html/bic/html/trade_waste/customer_info_recycling.shtml)>

7 <[http://www.nyc.gov/html/bic/html/trade\\_waste/max\\_rates.shtml](http://www.nyc.gov/html/bic/html/trade_waste/max_rates.shtml)>

8 <[http://www.nyc.gov/html/bic/html/trade\\_waste/customer\\_info\\_billing.shtml](http://www.nyc.gov/html/bic/html/trade_waste/customer_info_billing.shtml)>

9 <[http://www.nyc.gov/html/bic/html/trade\\_waste/customer\\_info.shtml](http://www.nyc.gov/html/bic/html/trade_waste/customer_info.shtml)>

10 City of New York Business Integrity Commission, “Approved Trade Waste Brokers,” February 4, 2011, Accessed on February 21, 2011 Retrieved from <http://www.nyc.gov/html/bic/downloads/pdf/pr/brokersaprprov0909.pdf>

11 City of New York Business Integrity Commission, Trade Waste <[http://www.nyc.gov/html/bic/html/trade\\_waste/rules\\_and\\_regulations.shtml](http://www.nyc.gov/html/bic/html/trade_waste/rules_and_regulations.shtml)>

12 Interview with David Hurd, Director Office of Recycling Outreach and Education (OROE), Plan NYC. on 25 March 2011

13 NYC Wasteless <[http://www.nyc.gov/html/nycwasteless/html/recycling/businesses\\_what.shtml](http://www.nyc.gov/html/nycwasteless/html/recycling/businesses_what.shtml)>

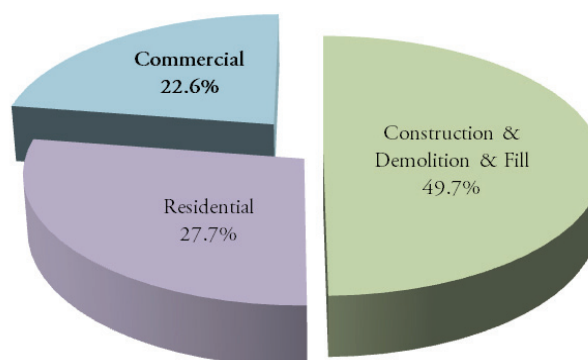
14 <[http://www.nyc.gov/html/nycwasteless/downloads/pdf/laws/recycling\\_rcny.pdf](http://www.nyc.gov/html/nycwasteless/downloads/pdf/laws/recycling_rcny.pdf)>

15 New York City Department of Sanitation, Service Requests <[http://www.nyc.gov/html/dsny/html/contact/requests\\_comm\\_recycling.shtml](http://www.nyc.gov/html/dsny/html/contact/requests_comm_recycling.shtml)>

requirements, help them comply with these regulations and advise them of available resources<sup>16</sup>. These regulations are significant as they provide the context in which waste haulers and businesses that generate commercial waste operate. All businesses can increase their compliance through any of the three initiatives discussed in this report.

## 1.5 COMMERCIAL WASTE<sup>17</sup>

In March 2004, as part of a Commercial Waste Management Study (CWMS) commissioned by the DSNY, data was collected on the commercial waste stream for NYC during the 2002 to 2003 period. As per DSNY rules, the commercial waste analyzed in this study was classified into two major categories and one sub category. These categories and sub-category are: (1) putrescible waste; (2) non-putrescible waste; and (2a) fill material.



### NON-PUTRESCIBLE COMMERCIAL WASTE AND CLEAN FILL MATERIAL

Non-putrescible waste is defined as waste that does not contain organic matter that has a tendency to decompose. It includes but is not limited to, “dirt, earth, plaster, concrete, rock, rubble, slag, ashes, waste timber, lumber, Plexiglas, fiberglass, ceramic tiles, asphalt, sheetrock, tar paper, tree stumps, wood, window frames, metal, steel, glass, plastic pipes and tubes, rubber hoses and tubes, electric wires and cables, paper and cardboard.”

Fill material is a sub-category of non-putrescible waste and is defined as “clean material consisting of earth, ashes, dirt, concrete, rock, gravel, asphalt millings, stone or sand.” Generally, non-putrescible waste and fill material are referred to as construction and demolition (C&D) debris. Residential construction, demolition and renovation waste is not collected by DSNY and is therefore included in commercial non-putrescible waste. Construction and demolition waste and fill are not addressed as part of this report.

C&D waste has historically been made up between 60-70% clean fill and between 30-40% other non-putrescible waste. Data for 2003 C&D waste from the March 2004 CWMS is presented below.

Item	Tons/Year	Tons/Day*
Non-Putrescible C&D	2,691,390	8,626
Fill	5,949,450	19,096
Total C&D	8,640,840	27,695

\* CWMS 2004 and DSNY 2006 Solid Waste Management Plan

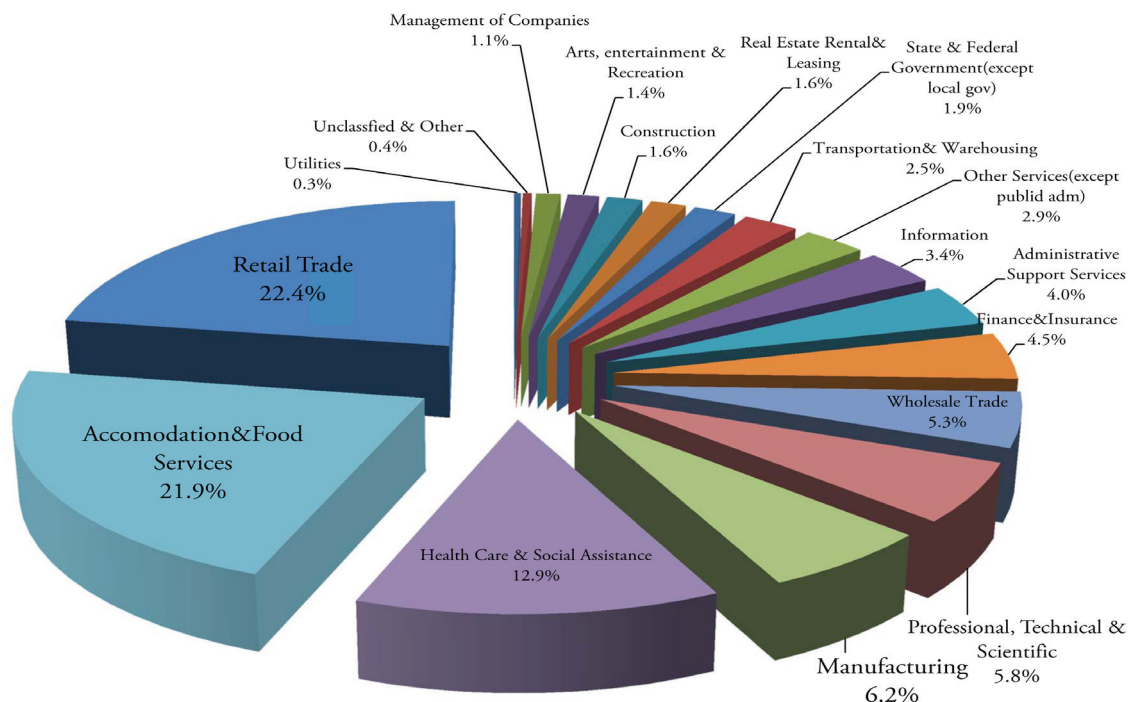
<sup>16</sup> <[http://www.nyc.gov/html/nycwasteless/html/recycling/businesses\\_what.shtml](http://www.nyc.gov/html/nycwasteless/html/recycling/businesses_what.shtml)>

<sup>17</sup> Pie chart based on data from NYC Mayor's Office of Long Term Planning and Sustainability. Internal Report. April 2011.

## PUTRESCIBLE COMMERCIAL WASTE

Putrescible waste is solid waste that contains organic matter that has a tendency to decompose. This waste stream is made up of waste collected mostly from office buildings, hotels, manufacturers, retailers and food service establishments. Putrescible commercial waste is referred to simply as ‘commercial waste’ throughout the rest of this report.

The March 2004 CWMS used three different methods to estimate the amount of commercial putrescible waste generated in NYC during the 2002 to 2003 time period. These methods include: (1) Facilities-Based Estimates; (2) Employment-Based Estimates; and (3) BIC-DSNY Carter Surveys. The Facilities-Based Estimates primarily utilize data from the waste tipped at Transfer Stations within the City. They also include data surveyed from Transfer Stations and out-of-City disposal sites. The Employment-Based Estimates use employment data available for NYC and multiply these figures by business sector-specific waste generation factors to generate estimated waste values. These business sector-specific waste generation factors were obtained through literature reviews and other research. The BIC-DSNY Carter Surveys utilize data from survey responses received from licensed carters. The Facilities Estimates and the Employment-Based Estimates were completed for the year 2002. The BIC-DSNY Carter Surveys were completed for the year 2003. Compared side-by-side, these three methods present fairly consistent tonnage estimates for the total quantity of commercial putrescible waste generated in NYC. These values have been compiled in the table below. More recent data received from the Mayor’s Office of Long-Term Planning and Sustainability also shows a similar trend.



**Composition Breakdown of Putrescible Commercial Waste from  
2004 DSNY Commercial Waste Management Study**



Method	Tons/Year	Tons/Day	% Recycled*
Facilities Estimate (2002)	3,295,677	10,563	31%
Employment-Based Estimate (2002)	3,240,250	10,385	30%
BIC-DSNY Carter Survey (2003)	3,085,000	9,889	27%

\* CWMS 2004 and DSNY 2006 Solid Waste Management Plan

## 1.6 SECTOR FOCUS

Based on the data from DSNY's 2004 Preliminary Waste Characterization Study, presented in the pie-chart on the previous page, it is clear that some sectors present greater opportunities for putrescible commercial waste reduction initiatives than others. The greatest waste generators, as measured by tons per year, are: Retailers (22.4%); Accommodation and Food Services (21.9%); Health Care and Social Assistance (12.9%); Manufacturing (6.2%) and Professional Technical and Scientific (5.8%).<sup>18</sup> Several other industries which lease office space in NYC – Finance & Insurance, Administrative Support Services, Information, Other Services (except Public Administration), and Management of Companies – when taken together, also comprise one of the largest waste-generating sectors (15.9%). Waste generated by the Health Care and Social Assistance sector does not lend itself to recycling and reuse due to the hazardous nature of medical waste. Therefore, the sector focuses for the three initiatives are as below.

Industry	Percentage	Initiatives
Retailers	22.4%	Rating System for Low-Waste Products Corporate and Institutional Challenges
Accommodation and Food Services	21.9%	Corporate and Institutional Challenges Industrial Ecology
Building and Property Management	15.9%	Corporate and Institutional Challenges
Manufacturing and Professional Technical and Scientific	12.0%	Industrial Ecology

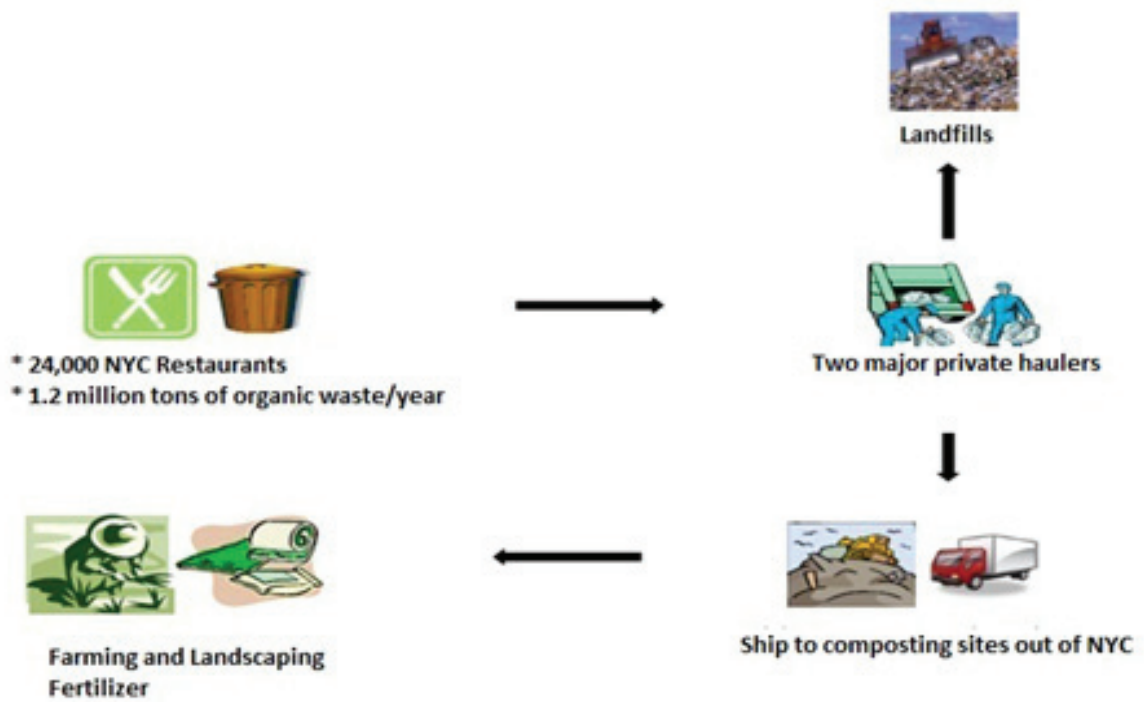
## 1.7 FOOD WASTE

The food waste is treated in great detail as part of both the Corporate and Institutional Challenges initiative and the Industrial Ecology initiative. In addition to the reasons presented above, food services were selected as an area of focus because organic waste represents one of the greatest opportunities for improvement in terms of diversion and reducing the amount of landfill waste. In recent years technology for reuse of organic waste has advanced making this area attractive for renewed consideration by the City. Given the importance of this specific type of waste to each of these two initiatives, the topic of food waste is examined here in greater depth.

According to GrowNYC, a NYC-based environmental non-profit, 17% of NYC's waste stream is com-

<sup>18</sup> CWMS 2004 and DSNY 2006 Solid Waste Management Plan.

prised of food. Recent studies suggest that 97% of food waste ends up buried in landfills.<sup>19</sup> However, organic food waste has shown potential to be reused as a valuable material and the landfill need not be the end of its lifecycle. Several approaches for reuse such as composting, in which food waste is recycled and transformed into fertilizer for farming or gardening, have shown real value. These reuses are discussed as part of the Industrial Ecology initiative. The data below makes a compelling case for why the issue of food waste should be addressed.



**Organic Food Waste Life Cycle**

#### FOOD WASTE GENERATORS

Type of Food Outlets	Number
Restaurants	24,000
Supermarkets, Grocery Stores and Convenience Stores	5,445
Food Wholesales	1,730
Public Schools	1,500
Emergency Feeding Programs	1,000
Food and Beverage Manufacturers	1,000
Green Carts	445
Farmers Markets	120
Community Supported Agriculture (CSAs)	100

<sup>19</sup> J.W. Levis et al, "Assessment of the State of Food Waste Treatment in the United States and Canada" Waste Management, 2010.

Of all commercial food outlets in NYC, restaurants are the most common. According to the New York Department of Health and Mental Hygiene, New York City had about 24,000 restaurants in 2010. Based on statistics published by the City of Los Angeles, an average restaurant disposes of more than 50 tons of organic waste every year.<sup>20</sup> Assuming this rate is consistent across major cities, restaurants in New York City generate about 1,200,000 tons of organic waste annually<sup>21</sup> or about 3,300 tons daily. This waste is in addition to the organic food waste generated by other food service sector businesses in the City. Of the 10,544<sup>22</sup> tons of putrescible commercial waste generated each day, organic waste comprises over a quarter.

The number of food outlets in NYC, categorized by type of establishment from data published by the Bureau of Labor Statistics,<sup>23</sup> are displayed in Table 1. This huge numbers of food outlets is a necessary result of the need to feed over eight million people every day. These data make apparent the scale and complexity of the food waste issue and give a sense of the total number of commercial food waste generators in the City.

## ORGANIC FOOD WASTE TRANSPORT

Currently, only a small portion of the huge quantity of organic food waste generated by NYC restaurants discussed in the previous section ends up at composting facilities; the vast majority is landfilled, as mentioned earlier. Independently, some of NYC's commercial food service establishments have addressed separate disposal of organic food waste through agreements with their private haulers.

At present, only a handful of private haulers collect organic food waste and transport it to disposal and treatment sites outside the City. The waste hauler that collects the most organic food waste in NYC is Action Environmental Carting<sup>24</sup> which collects between 35 and 40 tons per day. The next largest, IESI, collects about 5 tons per day of commercial food waste. Action transports the organic food waste it collects to the Peninsula Compost Group in Wilmington, Delaware. A few private haulers transport NYC organic food waste to New Milford Farms in Connecticut. The volume of organic food waste send to New Milford Farm is limited due to the cost of transportation<sup>25</sup> and the facility's limited capacity; New Milford is capable of processing only 125 tons per day.

Action Environmental Carting's clients include around 400 restaurants and the Whole Foods Market grocery chain. As part of its service to its clients, Action customized four leak resistant trucks with no compactor and reinforced bottoms specially designed to haul organic food waste. Generally a truck can bear a maximum weight of 13-14 tons of organic food waste. With an estimated 1,200,000 tons per year of organic food waste, it would take approximately 421<sup>26</sup> customized trucks to transfer all of NYC's organic food waste on a daily basis.

## FOOD WASTE AND POLITICAL SUPPORT FOR ITS REDUCTION

The rat population represents a perennial public health problem for NYC. Vermin carry salmonella and

20 City of Los Angeles, Department of Public works, Bureau of Sanitation, Solid Resources Citywide Recycling Division

21 24,000 restaurants x 50 tons per restaurant per year

22 NYC Mayor's Office of Long Term Planning and Sustainability. Internal Report. April 2011.

23 Christine Quinn – FoodWorks 2010

24 Action Environmental Carting, Site Visit Interview

25 Action Environmental Carting, Site Visit Interview

26  $(24,000/300\text{days})/(38\text{tons per day}/ 4 \text{ trucks})$

other bacterial disease,<sup>27</sup> and generate public discontent as well as bad publicity for NYC. Combating the amount of waste left on New York City curbs, especially organic waste could reduce the rat population in NYC. Segregating and properly handling organic waste by diverting it into compost bins or specially designed containers for removal could reduce the rat population significantly by cutting off a source of food for vermin. Proper handling of recyclable waste would also reduce pests since this waste should be free of food residue. Demonstrating reductions in the rat population as an indicator of success for an organic waste reduction and diversion program could garner public support.

### **FOOD WASTE AND ENERGY**

In addition to public health reasons for addressing food waste specifically, it is important to note that food waste is a resource rich in organic material which represents an untapped area for energy production for NYC. Few other types of waste present this kind of opportunity.

## **1.8 ECONOMIC FRAMEWORK**

All of the initiatives discussed in this report require an extensive Cost Benefit Analysis (CBA). However, there are many variables that cannot yet be quantified. The diagram below displays the cost benefit framework used to approach all three initiatives.

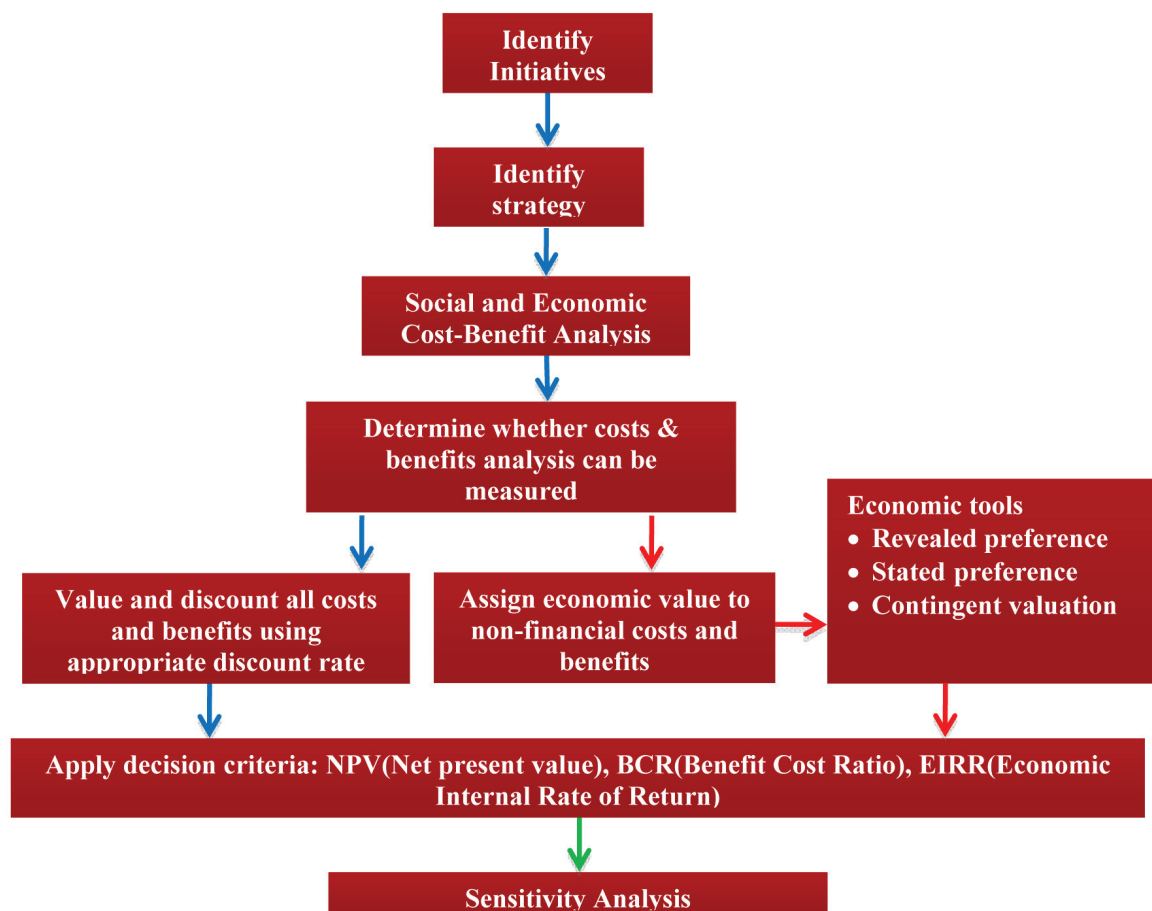
Cost Benefit Analyses (CBAs) calculate overall impacts on wellbeing by assigning dollar values to all components of a situation. CBAs assume that the ways in which people spend their time and money reflect their underlying values and preferences. Decisions to reduce source waste and increase diversion and recycling are based on the willingness of organizations to pay for the necessary changes to do so. In this way, organizations demonstrate their preference for a less wasteful society or for other outcomes that result in a willingness to recycle. Actors are assumed to consistently behave in ways that maximize their profits and wellbeing.

The diagram below outlines the steps necessary to assess the three initiatives and weigh their costs and benefits. When the benefits outweigh the costs, an initiative is financially feasible and implementation is recommended. It can be challenging to assign an exact financial value to social benefits, making environmental decisions particularly difficult.

After determining the specific costs and benefits associated with the initiatives, following the blue arrows in the diagram will lead to a decision point. The blue path assigns values to all of the costs and benefits. If it is not possible to assign financial benefits then the red pathway should be followed. Along the red pathway, monetary values are estimated using economic tools listed in the diagram. Once the costs and benefits are estimated, net present value (NPV) and benefit cost ratio (BCR) calculations can be applied. Finally, a sensitivity analysis can offer insight to any external pressures that could potentially change the value of the initiative outcome.

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27 Dr. Dickson Despommier, Mailman School of Public Health, Columbia University, Interview



## 2. RATING SYSTEMS FOR LOW-WASTE PRODUCTS

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Rating systems have proven to be very effective methods for initiating market transformation. Two of the most recognizable rating and labeling systems in the United States, Energy Star and LEED (Leadership in Energy and Environmental Design), have provided a method for consumers to understand the environmental and ecological impact of products bearing the respective labels. These labels have transformed their respective markets and have influenced the role of manufacturers, distributors, retailers, customers, governments and other stakeholders. These rating systems have demonstrated the inherent opportunity available through government and third party relationships in the transformation of consumer behavior.

This section addresses this opportunity and presents research illustrating the way a third party rating system can influence waste reduction. It identifies the most appropriate model for a consumer source waste reduction rating system which will allow consumers to select products based on information as it relates to the product waste's environmental/ecological impact. It also recommends roles for NYC's government in establishing and/or encouraging such a rating system and evaluates consumer procurement practices as a result. This section follows the organizational structure below.

- Topic Introduction
- Opportunities: Potential Areas for Waste Reduction
- Key Findings and Methodology
- Laws and Other City Government and Third Party Relationships
- Stakeholder Analysis
- Obstacles to Implementation
- Summary of Research and Analysis
- Recommendations

### 2.1 TOPIC INTRODUCTION

As a city striving to be a leader in sustainable practices, NYC has an opportunity to introduce a rating system for low-waste products which assesses and evaluates how product waste is managed throughout the manufacturing and distribution process. Therefore, the Mayor's Office of Long-term Planning and Sustainability is interested in identifying the most appropriate city-level model for a consumer waste-reduction product rating system. A consumer waste reduction product rating system would allow consumers to select products based on information as it relates to the product's environmental and ecological impact, thus reducing the amount of waste delivered to landfills. The aim of this report is to assist NYC to evaluate whether a waste reduction product rating system could be used to divert waste from landfills, and if implemented the best role of the NYC government in implementing the rating system, raising awareness about the system, and evaluating consumer procurement practices. The use of a rating system to decrease source product waste is an opportunity for NYC to utilize its buying power to transform the consumer market within the city and influence the way other metropolitan cities decrease waste through the use of a source waste reduction product rating system. Research suggests that source reduction is the first and most important step in the hierarchy of waste minimization.<sup>28</sup> Source reduction minimizes the use of unnecessary and excess raw

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28 P2 National Pollution Prevention Roundtable,(2009). "Road to Sustainability: Pollution Prevention Progress from 2004 to 2006. Results from the National Pollution Prevention Data Management System". Web Access in Apr, 2011. Retrieved from <<http://www.p2.org/wp-content/road-to-sustainability-2004-20062.pdf>>



materials, reduces waste stream contributions, and thus improves the efficiency and effectiveness of the production process. One form of source reduction is the use of less material for product packaging. Rating systems that evaluate products and their packaging based on their environmental or ecological impact, as well as their present and future potential for recycling and reuse, can help to prevent waste at the source by encouraging and empowering consumers, institutions, and businesses to choose products with fewer waste impacts. Considering the proportion of commercial waste generated by the retail industry, product and distribution packaging waste reduction should be a top priority in any waste stream reduction effort.

Citywide implementation of a labeling system based on product environmental ratings has the potential to dramatically reduce contributions to the waste stream by improving procurement practices with respect to waste outputs. Since reducing waste at its source would relieve some of the burden on the DSNY municipal waste management system, as well as reducing the commercial waste stream and conserving energy and natural resources, there is a powerful incentive for the City to play a role in implementing and advocating such a labeling and rating system. In order for the goal of citywide waste reduction to be realized through public education around a consumer based labeling and rating system, a multipronged approach must be adopted. This goal can only be met with the participation of major stakeholders, including and especially, the City of New York.

Product rating systems often take into account the entire product lifecycle: eco-friendly design, such as using reusable materials, sustainable supply chain management and reduced shipping and distribution packaging, such as using reusable containers for shipping. Given the large market that NYC represents and its influence as a trendsetter for the rest of the country, it is plausible that increased demand from consumers in NYC in response to a rating system for low-waste products could result in companies adopting more sustainable products thereby increasing national demand for low-waste merchandise.

## 2.2 OPPORTUNITIES FOR WASTE REDUCTION

“Source reduction is the preferred option [for DSNY] since it reduces not only ultimate disposal, but also avoids transportation and management costs associated with recycling.”<sup>29</sup> While there are many ways to prevent waste at the source and to encourage the practice of recycling, this research focused on the development of a rating system that evaluates products based on its environmental impacts, or more specifically, its contents’ current and future recyclability. The findings confirmed implementing a product rating system that assesses a products’ impact on NYC’s waste stream can dramatically improve procurement practices by encouraging consumers, institutions, and businesses to prefer purchases with fewer waste impacts, or with greater potential to recycle (see operational definition for more details).

Given that reducing waste at its source can help alleviate the burden on the waste management plan and conserve our natural resources and energy, the municipal government’s involvement is critical. In order for a city-wide waste reduction commitment to be successful a multi-lateral approach that engages the collaborative efforts of all stakeholders-citizens, waste haulers, retailers, manufacturers, and New York City government must be initiated.

29 Cornell Waste Management Institute,(1998) “Roundtable Three. Packaging Waste: Whose Responsibility Is It Anyway?”. Web Access Apr, 201. Retrieved from <<http://cwmi.css.cornell.edu/PDFS/PackWast.pdf>>

## 2.3 KEY FINDINGS AND METHODOLOGY

The table below contains the twelve product rating systems that were assessed, in addition to the Federal Environmentally Preferable Purchasing (EPP) mandate.

Rating Systems	Product Category	LW	NR	EI	SR	RPA	RP	HI	EN
EPEAT	Electronics	✓	✓	✓	✓	✓	✓	✓	✓
C2C	All products except businesses, buildings, or processes	✓	✓	✓	✓	✓	✓	✓	✓
CSI Greenformat	Construction products								
Eco Options	Consumer products	✓	✓	✓	✓	✓	✓	✓	
Energy Star	Electronics		✓	✓	✓				✓
Eco-Rate	Vehicles, electronics, appliances, household items			✓	✓		✓		
GoodGuide	Electronics, appliances, household items, food			✓	✓		✓		
GreenSeal	Building and construction products, household products, hotel and lodging, institutional products, paper products, restaurant and food services, vehicles	✓	✓	✓	✓	✓	✓	✓	✓
SMaRT	Building products, fabric, apparel, textile and flooring	✓	✓	✓	✓	✓	✓	✓	
Green Guard	Building and construction products, household products, furniture, electronics, textile and flooring		✓					✓	
Marine Stewardship Council (MSC)	Seafood		✓	✓				✓	
Sustainable Forestry Initiative (SFI)	Forestry, wood, paper products		✓	✓	✓				
Environmentally Preferable Purchasing (EPP)	Buildings and construction, carpets, electronics, fleets, food services, office supplies, paper	✓	✓	✓	✓	✓	✓	✓	✓

Of the twelve product rating systems that were researched (see Appendix II), the four that are most suitable for assessing source product waste for NYC are Cradle to Cradle (C2C), Electronic Product Environmental Assessment Tool (EPEAT), Green Seal, and SMART. Rating systems were evaluated based on the following criteria:

- **Low waste (LW):** The rating system assesses the amount of waste produced by the product manufacturer and evaluates how the manufacturer decreases the amount of waste produced.
- **National recognition (NR):** The rating system is nationally recognized and an industry standard.
- **Environmental impact (EI):** The rating system evaluates how the production and end product impacts ecosystems.
- **Social responsibility (SR):** The rating system addresses corporate ethics, customer service, and local community interaction.
- **Reduced packaging (RPA):** The rating system assesses if packaging waste is reduced and encourages the use of proper packaging techniques that prevent end-use waste.
- **Recycling potential (RP):** The rating system assesses if the components or end product is recyclable.
- **Health impact (HI):** The rating system assesses the human and environmental health impact of the chemicals and materials used in the product manufacturing process and encourages minimal to zero health impacts from the creation of the end product.
- **Energy Efficiency (EN):** The rating system provides energy reduction criteria and assesses the effectiveness of the energy reduction.

### 2.3.1 CRADLE2CRADLE (C2C)<sup>30</sup>

The C2C framework focusing on environmental, economic, and social criteria using safe materials that can be disassembled, recycled or composted. C2C certification is based on rigorous science, industrial ecology and environmental chemistry designed to analyze the ‘sustainability’ of a product. “It is an innovative approach to sustainability that models human industry on the integrated processes of nature’s biological metabolism – its productive ecosystems – integrated with an equally effective technical metabolism, in which the materials of human industry safely and productively flow within the two metabolisms in a fully characterized and fully assessed way.”<sup>31</sup> The certification takes a comprehensive approach to evaluating the sustainability of products and the practices employed during the manufacturing process. C2C Certification is a point-based, multi-attribute, eco-label that provides either Basic, Silver, Gold, or Platinum certification for rated products. The certification is awarded based on the following five categories of product assessment:

- Material Health
- Material Reutilization
- Renewable Energy Use
- Water Stewardship
- Social Responsibility

The rating assessment applicable to product waste reduction for NYC is Material Reutilization, which aims to eliminate waste through product design, and by encouraging the use of recycled or renewable materials. At the higher levels of certification, manufacturers need to demonstrate how they define and implement a recovery plan for their products. C2C certified products qualify under the Environmentally Preferable Purchasing (EPP) program and the certification is recognized internationally. Some of the third-party partners

30 MBDC, (2008). “Cradle to Cradle® Certification Program Version 2.1.1.” Web Access in Feb, 2011. Retrieved from <[http://mbdc.com/images/Outline\\_CertificationV2\\_1\\_1.pdf](http://mbdc.com/images/Outline_CertificationV2_1_1.pdf)>

31 MBDC, (2008). “Cradle to Cradle® Certification Program Version 2.1.1.” Web Access in Feb, 2011. Retrieved from <[http://mbdc.com/images/Outline\\_CertificationV2\\_1\\_1.pdf](http://mbdc.com/images/Outline_CertificationV2_1_1.pdf)>

that assist with the C2C certification include:

- Forestry Stewardship Council (FSC )
- Green-E Certification
- Global Environmental Management Initiative
- B Corporation
- Social Accountability International SA8000

### 2.3.2 EPEAT<sup>32</sup>

EPEAT is an international “global registry for greener electronics... [it consists of a] criteria for design, production, energy and materials use and recycling with on-going independent verification of manufacturer claims after registration. With more than 3,200 products from 45 manufacturers registered in 41 countries, EPEAT has rapidly become the most comprehensive green electronics registry in existence.” EPEAT evaluates electronic products according to 51 environmental criteria under the following 8 primary performance categories:

- Reduction/elimination of environmentally sensitive materials
- Materials selection
- Design for end of life
- Product longevity/life cycle extension
- Energy conservation
- End of life management
- Corporate performance
- Packaging

“EPEAT’s environmental criteria are contained in a public standard, Institute of Electrical and Electronics Engineers (IEEE) 1680.” The IEEE 1680 Family of Standards is intended to define a measure of environmental leadership in the design and manufacture of electronic products, the delivery of specified services that are associated with the sale of the product, and in associated corporate performance characteristics. EPEAT’s environmental criteria conform to the United States Department of Energy ENERGY STAR® requirements and the European Union’s (EU) Restriction of Hazardous Substances (RoHS) regulations. To qualify for registration as an EPEAT product, a product must conform to 23 required criteria that are subcomponents of the 8 performance categories listed above. Manufacturers can receive an additional ranking of bronze if they satisfy all 23 required criteria, silver if they satisfy all 23 required criteria plus at least 50% of the 28 optional criteria, or gold if they satisfy all 23 required criteria plus at least 75% of the 28 optional criteria.

EPEAT’s registered products reduce the use of primary materials, reduce or eliminate the use of toxic materials, avoid hazardous waste disposal, and reduce household solid waste. EPEAT uses the Electronics Environmental Benefits Calculator (EEBC) to assess the advantages of purchasing EPEAT registered products. This enables the organization to estimate the total reductions in environmental damage, which include

32 EPEAT. Web Access in Feb, 2011. <<http://www.epeat.net/>>

solid waste and hazardous waste, associated with the lifetime use and end-of-life harm of EPEAT registered products purchased.

According to EPEAT's purchases report, from 2006-2009 the estimated solid waste reduction was 109,000 metric tons, which is equivalent to the annual solid waste generation of 55,076 average US households; and the estimated hazardous waste reduction was 329,000 metric tons.<sup>33</sup>

### 2.3.3 GREENSEAL<sup>34</sup>

Green Seal "standards...are based on life cycle research and are developed in an open, transparent, and stakeholder-involved process.... [It] has 30 issued standards that cover over 193 product and service categories" such as building and construction products, cleaning products and services, institutional products, lighting and control products, paint and coating products, paper products, personal care products. The following third-party stakeholders provide oversight of their certification:

- International Organization for Standardization (ISO)
- American National Standards Institute (ANSI)
- Global Ecolabelling Network (GEN)
- US Environmental Protection Agency (EPA)
- Federal Trade Commission
- Consumers Union

"Green Seal certification is not just a 'one-time deal'. Companies establish an ongoing commitment to health and the environment through annual compliance monitoring and work towards continuous improvement." Green Seal uses a "pass or fail" multi-attribute standard that integrates product waste reduction into the overall assessment to issue certifications. The specific standards include:

- Product performance requirements
- Health and environmental requirements
- End of life management
- Packaging requirements
- Labeling requirements

In regards to reducing NYC source waste, the packaging standard considers reduction of materials and specifies products to be recyclable or refillable, and with at least a minimal content of recovered and post-consumer material in it. The end of life management section focuses on consumer education by providing information on available take-back programs, recycling opportunities, and efficient product purchasing to reduce waste. Green Seal offers two programs that can benefit source waste reduction in NYC: the Technical Assistance Partnership, which develops environmentally preferable specifications for products, and the Green Business Programs for Cities, which works with city governments and businesses to help com-

<sup>33</sup> Green Electronic Council, (2009). "Environmental Benefits of 2009 EPEAT® Purchasing. Green IT Rating System's Influence, Impact Continue to Grow." EPEAT. Web Access in Feb, 2011. <<http://www.epeat.net/>>

<sup>34</sup> Green Seal. Web Access in Feb, 2011. <[www.greenseal.org](http://www.greenseal.org)>

munities become more sustainable. The Green Business Programs for Cities has developed a certification program specific to product manufacturers.

#### 2.3.4 SMART<sup>35</sup>

SMaRT is a nationally recognized point-based rating system developed for building products, fabric, apparel, textile & flooring that covers over 80% of the world's products. It aims to reduce redundancy by incorporating different existing leading standards applicable for sustainable products such as:

- EPA
- GreenGuard
- California 1350 VOC
- Federal Trade Commission Environmental Marketing Guides
- Stockholm Treaty Chemical Ban
- Organic Trade Association (OTA) organic products
- Global Reporting Initiative (GRI) Sustainability Reporting Guidelines
- Cleaner and Greener<sup>sm</sup> Certification

SMaRT is a non-industry based, multi-attribute, third-party certified rating system, based on environmental, social, economic, and life-cycle assessment (LCA) criteria. Mike Italiano, the CEO of the Institute for Market Transformation to Sustainability (MTS) noted that, “[SMaRT] was market tested in 2004 by about 30 companies and the State of California, after being approved for State EPP procurement to reduce waste to landfills.”<sup>36</sup> SMaRT reduces product waste to landfills by making it a component of all six of the following assessment criteria:

- Reclamation, Sustainable Reuse & End of Life Management (EOL)
- Safe for Public Health & Environment (PHE)
- Renewable Energy & Energy Reduction (RE&ER)
- Bio-based or Recycled Materials (MATLS)
- Facility or Company Requirements (MFG)
- Innovation in Manufacturing (IM)

Mr. Italiano also noted product waste is reduced due to the point allocation for each of the six assessment areas noted above- “It provides 37 potential points for reuse (EOL), 22 potential points for reduction of 1300 pollutants (PHE), 41 potential points for reduction of climate change pollutants (RE&ER), 28 potential points for recycled content material and at higher levels, organic bio-based with EPA Best Management Practices (MATLS), 5 points for materials reclamation systems (MFG), and 5 points for dematerialization (IM). This is a total of 138 out of a potential 162 points.”<sup>37</sup>

SMaRT has four levels of products certification:

<sup>35</sup> MTS The Institute for Market Transformation to Sustainability. Web Access in Feb, 2011. <<http://www.mts.sustainableproducts.com>>

<sup>36</sup> Interview with Mike Italiano, CEO. Market Transformation to Sustainability. March 13, 2011

<sup>37</sup> Interview with Mike Italiano, CEO. Market Transformation to Sustainability. March 13, 2011

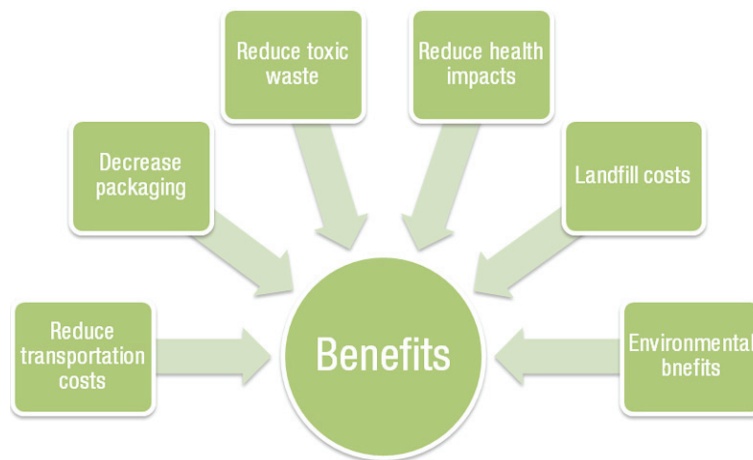


- Sustainable
- Sustainable Silver
- Sustainable Gold
- Sustainable Platinum

As Mr. Italiano stated “At the Gold and Platinum level, SMaRT certification requires mandatory independent global auditing at manufacturing facilities that verifies these waste/pollution reductions. All manufacturers are required to provide a legally binding certification that the information is accurate, not misleading, and has been prepared by qualified environmental professionals. Also, all certified manufacturers are required to publicly disclose the results of their certification.”<sup>38</sup>

## 2.4 COST BENEFIT FRAMEWORK

The Cost Benefit Framework below can be used to analyze implementation of a rating system for low waste products in NYC. The willingness of stakeholder organizations to participate and partner with the City to introduce rating systems will largely depend on the long-term savings they can expect to achieve. Below are some of the economic and social benefits that would result from the introduction of a citywide rating system.



Extensive benefits could result from the successful implementation of a rating system. Reduced transportation costs would result from decreased product packaging and product weight. Suppliers that reuse packaging could reduce their spending on packaging, and eliminate or reduce the non-biodegradable material they send to landfills. If a product is made with as few raw materials as possible, and the materials used are renewable rather than scarce or finite in supply, the product is also likely to be less expensive to make, benefiting both producers and consumers. Financial cost savings will not necessarily result in every instance, however, saving energy and developing a market for renewable resources will make NYC more sustainable and potentially increase cost savings in the long-run. In order to bring long-term perspectives to corporations and small businesses that operate on a quarterly or annual basis, explicit steps should be taken and public resources should be invested to help businesses prioritize long-term gains over short-term gains.

The social benefits that would potentially result from a rating system for low waste products include improved health, namely reduced asthma rates, particularly for NYC residents living along truck routes due to

<sup>38</sup> Interview with Mike Italiano, CEO. Market Transformation to Sustainability. March 13, 2011

a reduction in vehicle emissions as result of there being fewer supply trucks coming into the City and fewer garbage trucks on the road bringing waste out of it.



The implementation of a citywide rating system would require some initial start-up costs. The City would likely incur administrative costs and third-party consulting fees in order to properly prepare for a citywide implementation. At the beginning stages, or during a pilot program, extensive implementation support to be provided in the form of technical assistance would be needed for businesses adopting the rating system. Additional costs associated with legal and regulatory changes needed for the introduction of the rating systems may also be required. Periodic audit costs to evaluate the program's success should also be considered when analyzing the costs associated with this initiative. These are all short-term costs, however, and in the long-run would be outweighed by the benefits associated with a rating system. Once the costs and benefits are identified and quantified, the values should be properly discounted. Once discounted, further analyses such as Net Present Value (NPV), Environmental Initial Rate of Return (EIRR), Benefit Cost Ratio (BCR) and a sensitivity analysis can be applied to provide a more in-depth understanding of the exact financial costs and benefits associated with the initiative.

As mentioned above, investing in changes to reduce material inputs and produce less waste is likely to yield a positive return for businesses in the long-run. The pre-occupation with short-term financial profits, though, can inhibit the adoption of new sustainable practices, some of which require large financial investments up-front but do not recoup the investment until years later.

#### **WALMART COST-BENEFIT CASE STUDY<sup>39 40</sup>**

In 2007, Walmart introduced a sustainability packaging metrics scorecard. This scorecard evaluates the packaging of each of Walmart's products against nine metrics, such as cube utilization (percentage of total space used within a storage area, trailer, or container), recycled content (percentage of recycled material contained within the packaging), and product to package ratio (amount of packaging relative to size of

<sup>39</sup> Walmart. Web Access in Feb, 2011. <<http://www.walmart.com/>>

<sup>40</sup> Walmart. "Global Responsibility Report." Walmart. Web Access March, 2011. <<http://walmartstores.com/Sustainability/7951.aspx>>

product). The metrics and scorecard are also employed to communicate with customers and raise awareness about the environmental footprint of products. The scorecard has been seen as critical in helping Walmart achieve its publicly stated goal of reducing the packaging used by its suppliers 5% between 2008 and 2013. If Walmart reaches its goal, this five-year program is expected to generate \$3.4 billion in savings for the company.

#### **EXAMPLES OF WALMART'S FINANCIAL AND SOCIAL COST SAVINGS<sup>1</sup>**

By reducing the packaging of the Kid Connection product line, one of its private label toy brands, Walmart was able to use 497 fewer containers to ship the toys, resulting in a freight savings of more than \$2.4 million per year. The savings reduced the company's environmental impact by more than 3,800 trees and saved more than 1,000 barrels of oil a year.

When Walmart introduced new low-waste corn-based (PLA) packaging for just four of its produce products (cut fruit, herbs, strawberries, and Brussels sprouts), the change saved the equivalent of 800,000 gallons of gasoline and prevented the emission of over 11 million pounds of GHG.

Traditionally, Walmart bought rotisserie chickens in wax-coated cardboard boxes that were not recyclable. When Walmart switched to uncoated, recyclable corrugated cardboard, it realized savings of \$2.2 million dollars a year from the cost of packaging. It also prevented 2.4 million cases from being sent to landfills and began generating approximately \$245,000 in annual income from the associated recycling. The change also saved 1,700 trees per year.

By "rightsizing" display packaging for its Shower Soothers line, Walmart was able to fit 21 "shippers" to a pallet (instead of just three previously), reducing the number of trucks required to transport them to Walmart stores from 196 to only 28. Additionally, the change reduced the costs by over a quarter of a million dollars in freight charges alone, reduced fuel use by 5,975 gallons, and eliminated over 66 tons of CO<sub>2</sub> emissions.

<sup>1</sup> Walmart. "Global Responsibility Report." Walmart. Web Access March, 2011. <<http://walmartstores.com/Sustainability/7951.aspx>>

## **2.5 LAWS AND OTHER CITY GOVERNMENT AND THIRD PARTY RELATIONSHIPS**

The following case studies present the legislative actions initiated by the NYC government intended to improve the City's environment. Recommendations to NYC involve the development of a pilot program that utilizes third party product raters.

Since 2005, NYC has taken progressive strides towards reducing its impact on the environment, through the enactment of two local laws, Local Law 123 and Local Law 86 of 2005. Both of these laws demonstrate how NYC has supported the use of third party raters. In the case of Local Law 123, the NYC government required the use of the Green Seal Standard, one of the four rating systems selected as a source product waste reducing rating system. The last two case studies regarding the ban of smoking and trans-fat in NYC demonstrate the influence of the NYC government in transforming the US market. These two programs are part of a much larger national campaign, similar to the "green" campaign, to decrease the impact of

tobacco and trans-fats on the health of citizens by taking a pro-active stance on the practices of restaurants and business owners in the City. While financial gain for NYC may be realized by the development of the above initiatives, the real benefit is found in the increase in the quality of life.

### **2.5.1 LOCAL LAW 123 OF 2005 “GREENING OUR CLEANING ACT”<sup>41</sup>**

In 2005, the New York City Council voted Local Law 123 into law. This law created a green cleaning products pilot program within select New York City agencies based on Environmental Purchasing Products (EPP) guidelines. The purpose of the law was to assess the health and cost savings that could be realized by using green cleaning products. The Director of Citywide Environmental Purchasing was responsible for selecting “a product for testing and evaluation in a product category for which an applicable Green Seal standard exists, the director shall, to the extent practicable, direct that the product, at a minimum, meet such Green Seal standard, with the exception of product packaging and concentrate.”

In 2009, the Mayor’s Office for Contract Services (MOCS) “completed the Green Cleaning Pilot Program mandated by Local Law 123. Ten agencies representing 19 test locations participated and agreed that most of the ‘green cleaning’ products tested performed equally or better than currently used cleaning products.” As a result of the Green Cleaning Pilot Program, MOCS implemented a plan to use green cleaning products in City facilities and developed a list of products on its website, “in such categories as general purpose, glass and bathroom cleaners, air fresheners and disinfectants.”

#### **CASE STUDY OF NEW YORK CITY CITYWIDE INDOOR SMOKING BAN<sup>1</sup>**

It was the initial success of the indoor smoking ban enacted by the State of California in 1998 that encouraged other states to implement similar policies. The statewide smoking ban in New York went into effect on April 1st, 2003, which included all enclosed workplaces, bars, restaurants, and construction sites, with the exception of private homes and automobiles, hotel rooms, retail tobacco businesses, private clubs, and outdoor areas of restaurants and bars. However, the State Law specifically stated that City governments may administer more stringent regulation when applicable. In fact, as of February 2nd, 2011, New York City Council has approved to ban smoking in all city parks, beaches, and pedestrian plazas.

<sup>1</sup> New York City Department of Health. Web Access in Feb, 2011. <<http://www.nyc.gov/html/doh/html/home/home.shtml>>

### **2.5.2 LOCAL LAW 86 OF 2005 NEW YORK CASE STUDY ON GREEN BUILDING<sup>42</sup>**

In 2005, the NYC City Council voted Local Law 86 into law. The law requires the use of green building standards and specifically, the third party Leadership in Energy and Environmental Design (LEED) rating system in the construction and renovation of City owned and City funded buildings. The purpose of the law was to decrease NYC’s environmental impact in relation to energy use, air pollution, and water usage. In addition to environmental concerns, the law was also enacted to improve the health of building occu-

<sup>41</sup> City of New York, (2005). “NYC Local Law n. 123”. Web Access in Feb, 2011. Retrieved from <[http://www.nyc.gov/html/mocs/downloads/pdf/epp/LL%20123%20\(552\).pdf](http://www.nyc.gov/html/mocs/downloads/pdf/epp/LL%20123%20(552).pdf)>

<sup>42</sup> City of New York, (2005). “NYC Local Law n. 86”. Web Access in Feb, 2011. Retrieved from <[http://www.nyc.gov/html/dob/downloads/pdf/ll\\_86of2005.pdf](http://www.nyc.gov/html/dob/downloads/pdf/ll_86of2005.pdf)>

pants, to increase the productivity of City workers, and to transform the building market in NYC to align with the green building market developing in other U.S. municipalities including Atlanta, Austin, Boston, Boulder, Chicago, Dallas, Los Angeles, Portland (Oregon), San Diego, San Francisco, San José, and Seattle, “[who] have adopted LEED or have otherwise required that city-owned buildings be built according to green building criteria.”

## CHICAGO LEGISLATION

Green-Buildings Policy. In 2001, Governor Ryan’s Executive Order 11 encouraged energy-efficiency practices for the State’s buildings (State of Illinois 2001). Legislation passed in 2005 (SB 0250) required that new construction of state government facilities use the “best available” energy conservation technologies. Legislation in 2007 required that all executive branch agencies reduce energy consumption by 10 percent within ten years. In 2009 Governor Quinn issued an executive order (No. 7) to establish an energy-efficiency committee to track changes and make recommendations. That year the State also approved the Green Buildings Act. Under the law, all new buildings and renovations over 10,000 square feet that receive State funding are required to have LEED Silver or equivalent certification. (DSIRE 2010).<sup>43</sup>

The case studies above illustrate how both NYC and Chicago have navigated the legal challenges to implement environmental changes through the use of third parties. This research has not revealed any city that has utilized a rating system to reduce product waste. However, Local Law 123 of 2005 has demonstrated existing precedent within NYC for the implementation of rating system to assess package reduction. This law utilized Green Seal to assess most aspects of a product’s sustainability profile except its packaging

## 2.6 OBSTACLES TO IMPLEMENTATION

Product manufacturers, distributors, and retailers represent both the problem and solution to source waste reduction. Without sufficient incentive or legal consequences, manufacturers and retailers are generally unwilling to partake in the process of waste reduction, given that changes to business processes are usually associated with extra costs and manpower. However, this line of thinking has shifted in recent years due to the rise of corporate product and environmental stewardship, Extended Producer Responsibility (EPR) policies, and innovations in technology which have created opportunities for product manufacturers to save money by revising their manufacturing processes to consider recyclability and raw material reduction.

Ultimately a citywide commitment to waste reduction has the potential to be extremely successful with the active participation of the producers. With the introduction of a product rating system, the NYC government has the opportunity to utilize its purchasing power to encourage product manufacturers, distributors, and retailers to produce products with reduced environmental impacts and waste, by introducing products into the NYC market with minimal waste and greater recyclability.

## 2.7 SUMMARY OF RESEARCH AND ANALYSIS

New York City has the potential to benefit from a source waste reduction product rating system. Sixteen product rating systems were identified in the United States that are nationally recognized by their respective

<sup>43</sup> Hess, D., and Hoffmann M. “Building Clean-Energy Industries and Green Jobs Report: States and Cities. The Midwest. Illinois and Chicago”. David J. Hess. Web Access in Apr, 2011. Retrieved from <<http://www.davidjhess.org/BuildingCleanEnergy/Illinois.pdf>>

industries and were assessed based on how they evaluate the environmental and ecological impacts of the products which they rate. Of the sixteen, the four systems suitable to be prototypes for a New York City product rating system are Cradle to Cradle, EPEAT, Green Seal, and SMaRT. Those systems were selected based on the following assessment criteria: low-waste emphasis, environmental impact, social responsibility, reduced packaging, recycling potential, health impact, and national recognition. These systems also provide a comprehensive and consumer-oriented assessment of a product's lifecycle and social responsibility impacts.

1. **Cradle to Cradle** certification is based on rigorous science, industrial ecology and environmental chemistry to provide a comprehensive assessment of the sustainability of the rated product. Its framework focuses on material reutilization by encouraging the use of non-hazardous materials that can be easily recycled or composted as either technical or biological nutrients.

2. **EPEAT** is a comprehensive and internationally recognized registry standard for green electronics and its environmental criteria are contained in the public standard of IEEE 1680. In order for a manufacturer to be rated as EPEAT-Bronze, it must conform to all 23 required environmental criteria. If a product satisfies either 50% or 75% of the 28 optional criteria in addition to the 23 required criteria, it is rated as Silver or Gold respectively.

3. **Green Seal** is known for its third-party review system, including ISO 14020/14024 Standards and American National Standard Institute (ANSI) Requirements. Green Seal is a non-profit, third-party certifier based in the United States, which assesses product sustainability based on product life-cycle analyses. In addition, Green Seal was specified as the product rating required standard in New York City Local Law 123. NYC required that cleaning products purchased by the City be approved under this rating standard.

4. **SMaRT** is a rating system that covers over 80% of the world's consumer products, including building materials, fabric, apparel, and textiles. It assesses product environmental, social, and economic benefits and drawbacks through detailed research and investigation into product supply chains.

The research suggests that the existing third-party rating systems for consumer products are competent and comprehensive, thus the City's objective should be to incorporate these standards into a product source waste reduction rating system specific to NYC. One of the main challenges in effectively reducing consumer waste is the lack of a unified and credible labeling system that solely addresses the waste-related properties of a product. According to Ms. Sarah O'Brien at EPEAT, one of the most notable difficulties in setting up a rating system is raising consumer awareness.<sup>44</sup> Ms. O'Brien acknowledged that a labeling program could be a valuable tool to "get the message out." Therefore, the City may seek to implement a rating system that is a strategic consolidation of the best rating systems that already exist, and to transcribe such a system into a consumer-friendly labeling program that prioritizes products based on their recyclability and waste-reducing capacity. The definitive objective of the system would be to encourage consumers, institutions, and businesses to engage in purchasing practices that result in fewer waste impacts and offer greater potential to be recycled.

<sup>44</sup> Interview with Sarah O'Brien, Responsible for Supporting Purchasers. EPEAT. March 11, 2011



Based on the preliminary assessments, a source product waste reduction rating system is a feasible sustainability initiative for the City, however, additional research and development processes should be conducted. To progress forward with this rating and labeling program, the City may want to do the following: (1) establish objectives; (2) identify criteria and incentives; and (3) launch a pilot program within the City government.

Given that a considerable number of product rating and labeling systems already exist, as a short-term solution, the City initially can choose to incorporate the packaging and product waste reduction criteria of the four recommended rating and labeling systems into its EPP guidelines. For the long-term, the City should develop its own rating system in order to achieve consistency across products and services. The consolidation of the rating systems under one label will raise consumer awareness, which will allow the City to purchase products based upon end-waste reduction. Local Law 123 clearly demonstrates how the implementation of a product rating systems can improve environmental product and procurement practices. By encouraging consumers, institutions, and businesses to prefer purchases with fewer source waste impacts, or with greater potential to recycle, the City will decrease both its impact on the solid waste stream and on landfills.

## 2.8 RECOMMENDATIONS

The research suggests the introduction of long-term and short-term approaches for the City. For the long-term, the City may consider adapting its own Rating System, however, for the short-term the following steps can be implemented immediately:

### 1. ESTABLISH PLAN FOR LONG-TERM OBJECTIVES FOR THE CITY GOVERNMENT

The research suggests that a citywide rating system is feasible, and it is recommend that the City proceed with a strategic consolidation of the four (4) rating systems that have been identified in this report. Prior to implementing its own rating system, the City would benefit from developing a detailed plan that clearly identifies the City's long-term objectives with respect to rating low-waste products should be established to address the following question:

**What are the fundamental – both quantitative and qualitative – objectives the City wishes to achieve through the establishment of a citywide rating and labeling system?**

This question can be broken down into smaller and more manageable parts, such as specific timelines and quantitative milestones. The City should begin this process by consulting with the Department of Sanitation and the waste-diversion objectives described in the 2006 Solid Waste Management Plan. The City can utilize the rating system to focus on the waste stream sector that contributes to excessive product packaging and establish a short-term appropriate goal to reduce the waste in that sector. For long-term objectives, the City should look into establishing a more comprehensive rating and labeling system that addresses issues beyond waste-reduction.

## **2. SELECT AND IDENTIFY CRITICAL RATING CRITERIA AND INCENTIVES**

A relatively inclusive set of criteria was used as the method to select the ‘best practices’ among the existing rating systems, including assessments on low-waste, environmental impact, social responsibility, reduced packaging, recycling potential, health impact, and national recognition. While these criteria have provided a comprehensive understanding of each system, the City may want to “pick-and-choose” among the available criteria and eventually “invent” new criteria. It is important for the resulting system to be tailored to NYC, in order to satisfy the goals established under recommendation 1, it is strongly recommended that the City identify and establish a customized set of standards that focuses on the aspect of waste-reduction specific to NYC.

It is recommended that the City conduct further research on a rating criteria matrix that addresses the environmental impacts and recyclability of rated products. The City should work closely with the recommended four (4) third party rating systems to utilize their expertise and existing database of consumer products and should implement a progressive method of evaluation similar to the process outlined in Local Law 123. For example, one of the basic qualifications to receive the ‘label’ for a product could be that the raw material must consist of 10% recycled materials for the first year, 15% for the second year, and 20% for the third year and so on.

In order to make real progress towards establishing a source waste reduction product rating and labeling system, the overall evaluation process should be transparent and based on scientific findings. It is recommended that the City utilize the applicable EPR principles to negotiate and collaborate with manufacturers to solicit their participation in establishing a rating and labeling system. Finally, it is recommended that the City continue to employ the purchasing principles outlined in the Federal Environmentally Preferable Purchasing (EPP) program. It was found that many existing EPP guidelines could be applied and even integrated as the fundamental framework of the Pilot Program for the City (see recommendation #4 for details).

In conjunction with the evaluation method described above, the City should consider formulating incentives to attract voluntary participation from different stakeholders, including multilateral or bilateral agreements, corporate challenge programs (see initiative 2), or even applicable legislative frameworks. For the time being, these incentives need not necessarily be monetary –businesses also appreciate genuine public recognition. The City can begin by first consulting with practitioners of third party rating systems and manufacturers to determine what are the most effective and practical incentives, and the City could test the efficacy of possible incentives with the pilot program. It is important to note that well-established incentives ensure that the City is not burdened with the micro-management of the overall establishments and implementation of the rating system. Instead, the City would solely be responsible for promoting the system by raising public awareness and encouragements.

## **3. CONDUCT A COST BENEFIT ANALYSIS FOR THE IMPLEMENTATION OF A CITYWIDE RATING SYSTEM**

CBA identifies the cost savings organizations can expect upon the implementation of rating system. In addition to the cost savings, the city will also reduce its environmental footprint and improve the health of local residents. Based on the CBA case studies it was observed that a positive result can be achieved from a rating system and therefore the city should also conduct a CBA to argue a stronger case.

#### 4. LAUNCH A PILOT PROGRAM WITHIN THE NEW YORK CITY GOVERNMENT

While the research has indicated there exist many successful third party rating systems, and NYC has utilized LEED and Green Seal, a specific city-initiated rating system for low-waste products was not found. Most of the existing systems tend to be more inclusive in their overall assessments of environmental impacts and social responsibilities associated with a product. As a result, it was problematic to try to estimate the potential efficacy of a rating system with an emphasis on waste-reduction. Thus, in order to evaluate overall efficacy of the process and long-term influences of the rating and labeling system, it is recommended that the City launch an internal pilot program within the City government.

Mr. Italiano stated that City governments have a significant influence on manufacturers and retailers not because of their ability to establish mandates, but their substantial purchasing powers.<sup>45</sup> Indeed, a pilot program is essential to the successful establishment of a city-wide rating and labeling system in the near future. The NYC government and its associated offices represent a significant portion of the consumer base to retailers and manufacturers. By exercising its purchasing power, the City can have considerable influence over the production processes of consumer products. By implementing a pilot program, NYC can assess how much of an impact its purchasing power can have on market transformation and the pilot should be initiated at a manageable scale to increase its flexibility and adaptability. Additionally, the implementation framework of the program can be easily and quickly adjusted to encourage anticipated outcomes, which can be closely monitored due to its transparent framework.

The pilot program should be designed based on guidelines similar to the “Green Our Cleaning Act” pilot launched under Local Law 123 and should consist of all the components that have been described so far, including establishing objectives, identifying criteria, and deploying and monitoring the actual program. The City should establish a task force to identify the objectives and to identify all the necessary components, such as creating a database of all the consumer products purchased through the City government. The items included in the database can be individually rated either by the existing rating systems identified through the research, or by a new set of rating criteria established by the City specifically targeting source waste-reduction. Once these products are rated, the task force can establish an internal ‘labeling’ scheme based on the ratings and create purchasing guideline to be distributed and followed by all of the participating offices within the City government. The overall result, i.e. the reduction of waste or the lack off, should be closely monitored to determine the efficacy of the program and to carry out any applicable improvements.

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<sup>45</sup> Interview with Mike Italiano, CEO. Market Transformation to Sustainability. March 13, 2011

### 3. CORPORATE AND INSTITUTIONAL CHALLENGES

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A strong case can be made for including a section on Corporate and Institutional Challenges for Waste Reduction and Diversion in PlaNYC 2.0. The optimal challenge would be for corporations and businesses in the food services sector, as well as for food services in institutions. The greatest waste reduction and diversion opportunities are in this sector due to its size and the lack of existing food waste initiatives. Other industries such as hospitality, retail and property management also have potential for corporate challenges. Key findings address all these industries but with an emphasis on food services. Several existing models have been examined for each sector and overall best practices for corporate challenges have been also identified. Obstacles to implementing a challenge are described and recommendations are presented. This section follows the organizational structure below. The Topic Introduction and Methodology subsections provide information on how and why the food industry was selected as the primary area of focus and best practice are introduced. Each industry subsection is organized in the same way.

- Topic Introduction
- Methodology
- Hospitality Industry
  - Opportunities for Waste Reduction
  - Key Findings
  - Obstacles to Implementation
  - Recommendation
- Retail Industry
  - Opportunities for Waste Reduction
  - Key Findings
  - Obstacles to Implementation
  - Recommendation
- Building and Property Management
  - Opportunities for Waste Reduction
  - Key Findings
  - Obstacles to Implementation
  - Recommendation
- Food Sector
  - Opportunities for Waste Reduction
  - Key Findings
  - Obstacles to Implementation
  - Cost Benefit Framework
  - Recommendations

#### 3.1 TOPIC INTRODUCTION

As a part of its update and expansion of PlanNYC, the Mayor's Office of Long-Term Planning and Sustainability is considering the potential for Corporate and Institutional Challenges to reduce businesses' and institutions' contributions to the commercial waste stream. Many such challenges have been researched and evaluated for this report. Best practices and successful case studies as well as challenges and obstacles to their implementation are discussed in detail.

The focus of the Corporate and Institutional Challenge is primarily on businesses and corporations. The reasoning for this emphasis is that the majority of tax-exempt institutions are not subject to the rates of commercial waste haulers but rather have their waste collected by DSNY. As a result they do not form a part of the commercial waste stream and do not have as much of a financial incentive to reduce their waste generation as do those who pay for its removal. Finally, and most importantly, many City institutions already have robust waste-reduction programs. The NYC DOE for example, has a Golden Apple Challenge for public schools in cooperation with DSNY. Likewise, there are several comprehensive challenges already in place for institutions of higher learning in which NYC universities already participate, such as Recycle-Mania. Rather than focus on areas which are already saturated, the emphasis is on those industries for which a corporate challenge can have the greatest impact, and use these already well-established and successful challenges as models applying their lessons to other industries. The exception to this rule is the food service establishments in institutions. Challenges for these aspects of institutions have been decidedly lacking despite the attention paid to recycling.

Based on the commercial waste stream composition data presented in Section 1.6 of the Introduction, the Corporate and Institutional Challenges initiative is focused on the industries which currently generate the most waste and would be most receptive to and potentially benefit most from such an initiative. Therefore the Corporate and Institutional Challenge initiative to reduce the amount of waste going into the commercial waste stream focuses on the following industries and sectors: (1) Food Services and Hospitality, (2) Retailers, and (3) Building Property Managers. The overall emphasis is on Food Services with Hospitality, Retail, and Building Property Management having secondary importance.

Across all sectors, seven general best practices for corporate challenges emerged from the research. These include:

1. **Realistic Timeframe:** The period for a corporate challenge should not be so long as to dissuade participants or result in waning enthusiasm for the challenge. A challenge is meant to demonstrate the advantages of waste-reduction as a way of influencing long-term behaviors indirectly, not enforce it directly.
2. **Easily-Identifiable, Responsible Administrator:** The party responsible for monitoring and judging performance should be clear and acknowledged by all participants.
3. **Progress Easily Measured:** The technical and cost burden of monitoring and measuring the impact of implementing waste reduction measures should be reasonable for participants, especially small businesses. A challenge should provide the tools necessary to monitor performance indicators for that challenge.
4. **Clear Guidance:** The guidelines of the challenge should be simple and understood by all participants. Overly complicated rules will decrease participation and result in confusion and lack of adherence.
5. **Attractive, Easily-Understood Incentives:** To attract participants and ensure optimal performance incentives such as recognition and positive publicity or demonstrable cost savings should be articulated as part of the invitation to the challenge.

6. **Comprehensive Challenge:** A challenge should take into account all forms of waste reduction so as to avoid duplication and simplify challenge participation for participants.

7. **Opportunities for Sponsorship:** Any challenge should take advantage of opportunities for corporate sponsorship.

Finally, across all sectors the EPA's WasteWise challenge emerged as the most ubiquitous corporate challenge. Although faced with its own complications, WasteWise cannot be ignored and often represents the best challenge currently available in a given sector or for a given type of waste. In recognition of its important presence, Appendix III contains a detailed analysis and description of WasteWise. Elsewhere in this document it is treated on a case-by-case basis alongside other challenges.

## 3.2 METHODOLOGY

Based on the data for waste generation by industry, sectors with the greatest opportunities for waste reduction were: (1) Food Services and Hospitality, (2) Retailers, and (3) Building Property Managers. Case studies for the most successful challenges were sought and interviews were conducted with relevant stakeholders including challenge participants, challenge administrators, City agencies, waste reduction consulting companies and waste haulers. Based on these interviews and research, opportunities for waste reduction and the best practices for waste reduction challenges were identified along with obstacles to their implementation. The obstacles and opportunities identified helped to inform the development of recommendations formed around the best practices identified for such challenges.

## 3.3 HOSPITALITY

### 3.3.1 OPPORTUNITIES FOR WASTE REDUCTION

Hospitality is a major NYC industry which is not surprising given the City's position as a business and tourism center. The New York Hotel Association which represents hotel operators in NYC has members who together manage over 70,000 hotel rooms and represent over 250 hotels and over 32,000 employees in the city.<sup>46</sup> Hotels generate approximately 62,000 tons of waste each year, which is 1.5% of all non-residential, non-construction and demolition solid waste in New York City. Most of this waste is paper (51.6%) and food (28.9%).<sup>47</sup> The hospitality industry in combination with the food industry has been identified as the 2nd largest generator of non-residential, non-construction and demolition waste in New York City. In these two sectors combined, it is estimated that an approximate 3.2 tons of waste per employee is generated annually. Another reason the hospitality industry represents an opportunity is because it is very sensitive to consumer perceptions and in some cases is keen on maintaining a "green" image. The American Hotel and Lodging Association's Green Initiative currently recommends the EPA's WasteWise program to its members as a method of tracking their waste stream and waste reduction efforts.<sup>48</sup> Hotels chains also often follow their own independent waste reductions plans. However, there are currently no hospitality industry challenges for waste reduction although waste reduction components are often part of green certification programs.

<sup>46</sup> Hotel Association of New York City Inc. Web. Accessed on March 22nd 2011. <<http://www.hanyc.org/>>

<sup>47</sup> Hotels, NYC's garbage and partnership for Waste Prevention. NYC Department of Sanitation. NYCDEP. Hotel Association. 1999.

<sup>48</sup> American Hotel and Lodging Association, (2011). "Certification programs". Web. Accessed on March 22nd 2011. <<http://www.ahla.com/>>

Given the importance of environmental initiatives to the hospitality industry's public relations efforts, there is great potential for a corporate challenge for hotels in New York City.

### 3.3.2 KEY FINDINGS

#### A. GREEN RATINGS AND CERTIFICATIONS

As mentioned above, there are no waste reduction challenges for hotels at present; hence industry-specific case studies of challenges are not available. However, several voluntary green rating and certification programs hospitality industry offered by various organizations offer insight into the main components of a potential corporate green challenge for this sector, some of which include waste reduction. These programs require certain practices that generally include, water, energy, recycling, cleaning products and other sustainable practices.

- *The Audubon Green Leaf™ Eco-Rating Program*<sup>49</sup> is a straight-forward program with a five-stage process. Properties earn a rating of one to five Green Leafs based on water quality, water conservation, waste minimization, resource conservation, and energy efficiency.
- *Going Green*<sup>50</sup> is the Prince of Wales Foundation International Tourism Partnership (ITP) program. Hotels can use as a starter program to develop energy, water, and waste conservation program.
- *Green Key Global*<sup>51</sup> is a graduated rating system designed to recognize hotels, motels, and resorts that are committed to improving both fiscal and environmental performance.
- *EarthCheck*<sup>52</sup> is a certification program specific to hospitality industry. It is an international benchmarking and certification program based on the principles of sustainable development and provides a framework for managing sustainability programs and monitoring performance and improvement.
- *Green Seal* (discussed in greater depth in the Low-Waste Rating System section of the report) is a science-based nonprofit organization that focuses exclusively on developing environmental standards, and certifying products and operations. Among the services certified by Green Seal are accommodation services.
- *EcoRooms & EcoSuites*<sup>53</sup> is an approval and certification program requiring 100% compliance with certain criteria including recycle receptacles in the guest rooms.

### 3.3.3 OBSTACLES TO IMPLEMENTATIONS

Given the public relations boon that would result from low-waste and green claims, it should not come as a surprise that there are several reasons associated with why such measures are not already

49 Audubon International. "Audubon Green Leaf™ Eco-Rating Program". Web. Accessed March 14th 2010. <<http://www.greenleaf.auduboninternational.org>>

50 International Tourism Partnership. *Going Green. Minimum Standards for a Sustainable Hotel*. Web. Accessed March 22nd, 2011 < <http://www.iblf.org/> >

51 Green Key Global Certification. "Green Key Eco Rating Program Registration". Web. Accessed March 14th 2010. <<http://www.greenkey-global.com/site/program/index.asp>>

52 EarthCheck. "Earthcheck Certification Program" Web. Accessed March 14th 2011. <<http://www.earthcheck.org>>

53 EcoRooms & EcoSuites. *EcoRooms&EcoSuites Eco Membership Criteria*. Web. Accessed March 14th 2011.<<http://www.ecorooms.com>>



in place. Depending on the hotel, there may be several hurdles to overcome in order to implement a waste reduction and recycling challenge.

#### **GRAND HYATT NEW YORK CASE STUDY<sup>1</sup>**

The Grand Hyatt New York is an example of a large hotel (over 1300 rooms and more than 55,000 sq. ft. convention/meeting room space) that has overcome several obstacles to put a robust waste management program in place. The Hyatt composts all food waste generated within the hotel including food waste from its restaurants and banquet hall events. The Hyatt provides separate receptacles at all meeting events and has receptacles stationed in all common areas which are not commonly seen at other NYC hotels. Separation, however, does not occur in the guest rooms themselves. Newspapers from the rooms are separated for recycling by the cleaning staff rather than guests.

The Hyatt believes that one of its best practices is its dedication to training and educating staff on the benefits of waste management practices to not only the Hyatt but to the individual worker and his or her family. Work related changes are therefore met with less resistance than they might be otherwise because the importance of waste management is personalized at the level of the employee. According to Hyatt management, having these practices in place is attractive mostly to the market segment that book blocks of rooms and meeting room facilities for business events. Most often a Request for Proposals (RFP) from an organization seeking to host an event at the hotel will include a section requesting information on waste management practices and corporate social responsibility. Individual customers traveling for personal reasons are more likely to be concerned with comfort, aesthetics and value for price. Customers seeking an environmentally friendly hotel stay however would be able to find information on the Hyatt website about these practices.

<sup>1</sup> Interview with Diana Beltran , Sustainability Committee , Hotel Association of NYC and CSR Manager, Grand Hyatt, NYC

These issues are mostly capacity related and include the lack of designated management to implement and oversee continued operations and training of such a program. The hotel industry also faces significant challenges in a cleaning staff with a high turnover rate. Such a staff requires continuous training in waste separation practices and ongoing monitoring to ensure compliance on each hotel floor. Union influence and push-back against procedural changes in waste handling further complicates instituting additional requirements for sorting at the source and may result in increased waste handling fees for hotels. Another consideration cited by some hotels is that separate wastebaskets for recycling in hotel rooms and suites may present an aesthetic problem. Additionally, the main issues with most certification programs are that it is structured in a paid membership model that relies on self-reporting and auditing. Finally, it should be noted that current NYC recycling laws governing hotel waste exclude waste generated in the guest rooms and suites from typical business recycling requirements, omitting a significant source of the waste generated by hotels.

### 3.3.4 RECOMMENDATION

#### A. CRITERIA FOR A HOSPITALITY INDUSTRY WASTE REDUCTION CHALLENGE

The opportunity for a hospitality industry waste reduction and recycling challenge is apparent in both the potential for large increases in waste diversion rates, as well as in the willingness of this sector to adopt green practices. However, a critical component of any successful challenge will be the designation of an independent administrator responsible for implementing and monitoring the waste reduction challenge, as well as build the capacity of hotel management. The administrator should be clearly identifiable and recognized by and acceptable to all stakeholders, including groups representing hotel owners, operators and employees.

To incentive participation for hotels, the program must have a built-in recognition system for high performing participants, thereby providing hotels with positive PR opportunities. Publicity from such a program could also benefit the City by increasing tourism and attracting more “green minded” tourists. The City could facilitate this recognition program in several ways including a visit from the Mayor or an awards ceremony for the most successful participants.

A further incentive for hotels is that successful programs will ultimately cut operating costs. To ensure continued adherence to waste reduction practices, it will be important to quantify the savings accumulated as a result of the program so that hotels can clearly see the benefit on their balance sheets. According to a Great Forest consultant such saving could be as much as 50% of their previous waste management costs.<sup>54</sup>

## 3.4 RETAILERS

### 3.4.1 OPPORTUNITIES FOR WASTE REDUCTION

New York City, with its huge number of specialty boutiques, flagship stores and even big-box retail chains, sets the standard for the national retail industry and there is great potential to reduce the commercial waste stream by targeting the City’s retail industry. Commercial waste from general and food retailers in NYC is composed primarily of paper, 68% and 57% respectively. Paper and cardboard are easily recyclable if properly handled. In addition, product and distribution packaging makes up more than 50% of the commercial waste stream coming from retailers. The cost to retailers of managing, recycling, and disposing of this waste can be quite high. Reducing waste would increase profits for retailers by cutting down on hauling costs, an important cost-effectiveness gain for retailers who often operate on a thin margin. Also, since waste prevention is as much about what one buys as what one throws away, there is potential for synergies between a corporate challenge for retailers and the labeling and rating system described in the Low Waste Rating System section below.

<sup>54</sup> Interview with Maya Shenkman, Director of Hotel Services. Great Forest, Sustainability Solutions. March 4, 2011

### 3.4.2 KEY FINDINGS

Among the waste-reduction retail challenges that were examined, the most promising are the EPA's WasteWise Resource Conservation Challenge and its WasteWise Transport Packaging, both of which provide good models for the retail trade.<sup>2</sup> The WasteWise program is a voluntary monitoring and reporting agreement into which participants enter with EPA. Participants set their own performance goals under the overall program goals of WasteWise. Specifically, WasteWise promotes waste reduction through waste prevention, recycling, and buying recycled products. Collaborating with NGOs and certification programs, the WasteWise program offers prizes and awards which motivate companies to take part in its challenges. For instance, the American Forest & Paper Association (AF&PA) Recycling Awards recognize outstanding paper recycling efforts and offer a \$2,000 cash prize, original framed artwork, and recognition in local and national media.<sup>55</sup>

#### A. EPA WASTE WISE RESOURCE CONSERVATION CHALLENGE

The Waste Wise Resource Conservation Challenge helps participating members expand their existing waste reduction programs and adopt new, proven strategies. By pledging to the challenge, Waste Wise members are eligible to receive assistance to implement waste reduction activities targeting a specific material or product type. As an incentive they have the potential to be recognized as an environmental leader; for each WasteWise challenge, including its Resource Conservation Challenge, EPA publicly recognizes a Challenge Member of the Year. Currently EPA is focusing on increasing recycling of packaging waste such as paper folding cartons, beverage containers, and shipping containers (e.g., wax corrugated cardboard, pallets, etc.). This area is one of the primary overarching EPA goals aimed at retailers to which they can commit by setting their own individual targets for packaging waste reduction. Hundreds of companies have successfully reduced their commercial waste stream by participating in the program, such as Walmart, 3M, and Office Depot, to name a few. In addition to reducing waste, these companies were able to save on operating costs and benefit from positive publicity as a result of "green" recognition from EPA.

#### B. EPA WASTE WISE TRANSPORT PACKAGING CHALLENGE

EPA's Waste Wise Transport Packaging Challenge was initiated to reduce the amount of transport packaging entering the waste stream. As noted above, transport packaging accounts for a large part of the retail industry's commercial waste stream contribution, making this challenge applicable to retailers industry-wide. Transport packaging is material used to protect or contain merchandise and products as they are moved to the marketplace from point of manufacture to a wholesaler, from a wholesaler to a retailer, within or between wholesale or retail facilities, and, increasingly, directly to customers at their homes. Transport packaging includes cardboard boxes, pallets, wraps, slip sheets, bins, totes, drums, and bags. Items such as bubble wrap, packing peanuts, strapping, and other dunnage that act as filler between primary and transport packaging, or as packaging dividers, are considered secondary packaging and are included in the challenge. Transport packaging does not include boxes, bags, bottles or wraps that directly cover or protect the product and are not used specifically for transporting the product. Thus far, fifty WasteWise Partners have pledged to

<sup>55</sup> American Forest & Paper Association (AF&PA) Recycling Awards, (2011). Retrieved from <<http://paperrecyclingawards.org/>>

commit to transport packaging waste reduction.<sup>56</sup> The goals of this challenge include eliminating unnecessary transport packaging, switching to reusable transport packaging, and reusing incoming packaging for outgoing shipments. The most common goal adopted by participants was to work with suppliers to reduce transport packaging, reflecting the importance to retailers' intent on reducing transport packaging of building partnerships along the supply chain to reduce waste. By committing to the goals under the Transport Packaging Challenge, participant retailers can reduce packaging, labor and disposal costs as well as benefit from EPA's public recognition.

### **3.4.3 OBSTACLES TO IMPLEMENTATIONS**

Many of the successful implementers of WasteWise have been major corporations with significant organizational and management resources at their disposal. Smaller retailers, of which there are many in NYC, may have more difficulty implementing this type of program. Many of the tracking and monitoring tools available on EPA's WasteWise site require technical competencies that may exceed the capacities or resources of small businesses. These same small businesses may also have more difficulty influencing suppliers as their buying power is significantly lower and more local than that of major national retailers. Even major retail chains may have difficulty convincing suppliers to use sustainable transport packaging and principles and, due to the larger and more complex nature of their operations, have more difficulty monitoring progress because of the multiple sites and employees involved, all of whom would require some degree of training to implement the project. Additionally, recyclers and waste haulers often handle only one or two types of recyclable material so a retailer seeking to recycle packaging chosen specifically for its recyclable properties may have difficulty finding a company willing to accept that packaging at the end of its lifecycle, especially if there is a small market or no market for that material.

### **3.4.4 RECOMMENDATION**

#### **A. RETAIL WASTE REDUCTION CHALLENGE**

If the City were to design its own waste reduction challenge for the retail industry, the EPA's Resource Conservation and Transport Packaging Challenges serve as good models. These challenges specifically target paper used for transport packaging (i.e. cardboard boxes and bags), giving them great potential for waste reduction in the retail industry. Alternatively, the City could simply encourage businesses to participate in the existing voluntary EPA challenges and provide technical assistance and capacity building specifically for small businesses as well as some supportive oversight for the reporting requirements of the challenge to ensure all results are captured. The impression conveyed by those interviewed was that most of the difficulties that arise in implementing such challenges result from misunderstandings among stakeholders about the objectives and purpose of the program. The City could facilitate communication among stakeholders participating in such challenges and provide community education on the objectives of the waste reduction challenges to support the efforts made by businesses.

<sup>56</sup> U.S. Environmental Protection Agency, (2010). Transport Packaging Challenge. Retrieved from <<http://www.epa.gov/osw/partnerships/waste-wise/challenge/transport.htm>>

## 3.5 BUILDING AND PROPERTY MANAGERS

### 3.5.1 OPPORTUNITIES FOR WASTE REDUCTION

As of the upcoming fiscal year beginning July 1, 2011 the NYC Department of Finance projects that the city's more than 1 million properties will have an approximate value of \$823.5 billion.<sup>57</sup> Prior to the recession, during fiscal year 2005, New York City housed 602 corporate headquarters and more Fortune 500 companies than any other city in the world. Midtown Manhattan contains the largest central business district in the entire world. As a result, some of the largest property management firms in the world own, operate, develop and manage large portions of the privately held real estate in New York City. The largest of these property management firms are Cushman & Wakefield, the City's largest property management firm with 70 million ft<sup>2</sup> of property managed in the city, Tishman Speyer one of the leading building operators, Silverstein Properties, one of the most active and prestigious property managers with \$10 billion in standing or future projects, and the Rockefeller Group which is engaged by some of the most important properties in NYC. The stakeholders for these property management firms vary from shareholders of the companies, tenants, building maintenance workers, technicians, engineers, out of town visitors to NYC, local government and residents of the city.

Building property management companies represent one of the greatest opportunities for waste reduction in office buildings in New York City. Corporate building tenants generally have one of two leasing arrangements with building property management companies. Companies may enter into an agreement in which they are required to bear the cost of their commercial waste removal directly or they may enter into an agreement in which the building property manager bears the cost of waste removal with the amount included as a part of the rental rate. In the former case, it is in the interest of tenant companies to reduce their waste and divert as much as possible to recycling. In the latter case, although it is not possible to influence direct control over waste reduction, it is clearly to the advantage of the building property management company to divert as much waste as possible into recycling and to train building maintenance and housekeeping staff to segregate recyclable material in order to save on hauling fees. Given that building property managers would receive the largest scale benefit in increasing the diversion rate in managed properties and have the most direct influence over maintenance and housekeeping staff, they are in the best position to collectively impact recycling in NYC's corporate office buildings.

### 3.5.2 KEY FINDINGS

#### A. EPA WASTEWIDE AND CUSHMAN & WAKEFIELD

The EPA's WasteWise partnership with Cushman & Wakefield (C&W) provides an encouraging case in which waste reduction measures have been successfully implemented by NYC's largest property management firm. Cushman & Wakefield uses its "Green Practice Policy" to provide a platform to engage tenants (clients) to adopt sustainable approaches to purchasing, construction,

<sup>57</sup> Department of Finance." Web. 20 Feb. 2011. <<http://www.nyc.gov/html/dof/html/home/home.shtml>>

cleaning and solid waste management practices. The platform also provides services that track and monitor progress, calculate results, determine the environmental gains and account for intangible benefits. Bottom line savings and technical assistance are the primary benefits for Cushman & Wakefield of working with the EPA and participating in this program. Industry and company-specific waste audits can assist participating organizations better shape their purchasing and consumption patterns. Higher returns on materials consumed during and post-construction and purchasing cost savings can be achieved based on lessons learned from an audit.

Cushman & Wakefield's "Environmental Challenge" tasks its building and property managers with reducing waste disposal 10% or more by 2012 (compared to a 2008 baseline). The program plan includes guidance for tenants on how to:

- Monitor a building's energy and water consumption and compare it against a benchmark (EPA EnergyStar free online tool);
- Track and report waste disposal in Re-TRAC EPA WasteWise tool (free online)
- Share the collected data with C&W and the EPA's WasteWise.

The C&W challenge recognizes and awards all participants that meet their targets. The most recent C&W challenge had 74 participants with 67 earning 1 or more WasteWise credit by achieving a 10% or greater reduction in waste either through LEED Certification, the use of EnergyStar labels, or through simply increasing waste diversion or decreasing water use. In 2009, average building and property managers at C&W were able to reduce energy consumption by 5.3%, water use by 8.4% and waste disposal by 6.8% down from 2008.<sup>58</sup>

## **B. INTERNATIONAL BUILDING OWNERS AND MANAGERS ASSOCIATION (BOMA) R-STAR**

Another example of an organization successfully working to reduce waste by targeting building a property managers is the International Building Owners and Managers Association (BOMA) which provides office, residential, industrial, multi-unit and retail buildings with ways to track and measure all aspects of a building's inputs and outputs, such as energy, water and waste, and recognizes those that are most sustainable. Based on their adherence to the BOMA R-STAR principles described below, The Outstanding Building of the Year (TOBY) award honors the best commercially managed buildings in the following categories: (1) Corporate facility; (2) Earth;<sup>59</sup> (3) Government building; (4) Historical building; (5) Industrial office park; (6) Medical office building; (7) Building less than 1,000,000 sq. ft; (8) Renovated building; (9) Suburban office park low rise (1-5 stories); (10) Suburban office park mid-rise (6-10 stories); (11) Under 100,000 ft<sup>2</sup>; (12) 100,000-249,999 sq. ft; (13) 250,000-499,999 sq. ft; (14) 500,000-1,000,000 sq. ft.

<sup>58</sup> Cushman & Wakefield - Global Real Estate Solutions "Cushman & Wakefield Signs Sustainability Pact with EPA." Web. 01 Apr. 2011. <<http://www.cushwake.com/cwglobal/jsp/newsDetail.jsp?repId=c22000002p>>

<sup>59</sup> A BOMA building located in the San Francisco/East Bay California area that utilizes multifaceted management practices including commercial recycling programs, energy and water conservation techniques air quality and toxic reduction programs.



## BOMA R-STAR

R- Recycling to reduce and divert solid waste.

S- Submit data to WasteWise portfolio manager.

T- Track progress over time through benchmarking.

A Assess waste reduction performances and take steps to increase recycling.

R- Rate performance by achieving waste wise rating.

S- Share your data with BOMA International and be recognized as one of BOMA's R-STARS.<sup>60</sup>

## C. RECYCLEMANIA FOR BUILDING AND PROPERTY MANAGERS

Although not intended specifically for building and property managers, RecycleMania, a 10-week tournament style challenge for institutions of higher education, offering free monitoring, tracking and measuring tools to calculate progress achieved, has the potential to be adapted for building and property management companies, especially smaller ones with fewer resources. In RecycleMania, participants compete to have the greatest overall reduction in solid waste over the course of the challenge period while also increasing the ratio of recycling waste to putrescible waste.<sup>61</sup> The challenge provides comprehensive lists of recyclables, broken down into sections and categories. All tools and volume to weight conversion factors are free and available online for challenge participants.

### 3.5.3 OBSTACLES TO IMPLEMENTATIONS

One of the main threats identified to successful waste reduction by building property management companies is the distance between those that would benefit from the cost-saving achieved by reducing waste and those that must implement such measures. Waste reduction and diversion are most efficient when they occur at the source. This means that tenants and maintenance and housekeeping staff are the primary implementers of such measures. Building tenants who do not pay for hauling directly and whose rent would be unaffected by cost-savings associated with greater diversion and less overall waste, have little incentive to comply with building and property management company requests. Similarly, housekeeping staff, especially in large office buildings, have little incentive to ensure that the diversion efforts made by eco-conscious tenants are maintained unless incentives and training are provided. Although Action Environmental Carting has stated that it sometimes train housekeeping staff on diversion, this case is likely the exception rather than the rule. Language difficulties and high-turnover are also challenges to providing this type of training.

### 3.5.4 RECOMMENDATION

#### A. BUILDING PROPERTY MANAGEMENT CHALLENGE RECOMMENDATIONS

Based on an analysis of the current situation within the commercial property management industry

60 Building Owners and Managers Association International <<http://www.boma.org/getinvolved/BOMASTARS/Pages/default.aspx>>

61 Recyclemania. "Rules." Web. 02 Apr. 2011. <<http://www.recyclemaniacs.org/rules.htm>>



in NYC, the recommendation to reduce solid waste and increase recycling would be to implement a challenge which incorporates both RecycleMania and the EPA's Waste Wise. For the greatest impact, the challenge could begin with just the 4 largest property management firms, Cushman & Wakefield, Tishman Speyer, Silverstein Properties and the Rockefeller Group, before being implemented citywide. RecycleMania's 10-week challenge and use of the volume to weight conversion factors would provide a gradual and easy transition from current practices for companies new to these measures. A short challenge would be motivating and encourage broad participation while, later, continued use of WasteWise's tracking, monitoring, auditing, targeting better purchasing/consumption habits and national recognition would provide long-term gains and further develop practices initiated during the original challenge, building on that foundation. The combination of the two programs would provide the necessary tools to track and reduce waste while separating and increasing recyclable materials. The previous success of projects implemented by Cushman & Wakefield should be highlighted. Replicating successful projects and challenges has typically resulted in success within the property management industry. Companies that participate will enjoy the instant feedback of tracking results online and the real savings that can be achieved. Finally, recognition provided by the EPA and NYC would present a valuable marketing tool to the winner of such a challenge.

## 3.6 FOOD SECTOR

### 3.6.1 OPPORTUNITIES FOR WASTE REDUCTION

According to the EPA, food waste is the third largest waste stream in the United States. Paper and yard waste come in at numbers one and two respectively. About 31 million tons or 97% of that food waste was sent to landfills or incinerators in 2008 alone.<sup>62</sup> With 24,000 restaurants,<sup>63</sup> over 1,500 public schools serving more than 1.1 million children,<sup>64</sup> and countless supermarkets, bodegas, and various other food service establishments, NYC faces a monumental task with respect to managing its organic food waste. Fortunately, food waste reduction challenges have been successfully implemented in many locations around the United States and with participants from many industries. Using these successful challenges as models, and analyzing their best practices, it is possible to apply these methods and lessons learned to food related businesses in New York City.

In addition to organic food waste, which is discussed in detail in Section 1.6 of the Introduction, the food industry also generates food packaging waste. NYC has a population of more than 8 million people,<sup>65</sup> some of whom rely daily of the availability of prepared food and take-out services. With prepared food comes food packaging and its associated waste. Recent surveys show that fast-food packaging makes up about 20 percent of all litter, with packaging for chip bags, drink

<sup>62</sup> Environmental Protection Agency, (2010). Food Recovery Challenge. <<http://www.epa.gov/osw/partnerships/wastewise/challenge/foodrecovery/index.htm>>

<sup>63</sup> New York City Department of Education (NYCDOE), (2011). About Us. <<http://schools.nyc.gov/AboutUs/default.htm>>

<sup>64</sup> Ibid

<sup>65</sup> United States Census Bureau. Web. Accessed March 22nd 2011. <<http://www.quickfacts.census.gov>>

containers, candy wrappers and other snacks comprising another 20 percent.<sup>66</sup> According to the EPA,<sup>67</sup> 970,000 tons of paper cups (approximately 64 billion cups) and plates and approximately 730,000 tons of plastic plates and polystyrene cups (710,000 tons of which consists of polystyrene or approximately 73 billion cups) are sent to landfills annually. Litter characterization studies have recognized fast-food restaurants as the primary identifiable source of urban litter. Polystyrene was identified as the most abundant form of litter after cigarette-associated litter. Polystyrene unfortunately does not break down in the natural environment and becomes a permanent fixture when littered. Expanded Polystyrene (EPS) also known as Styrofoam® which frequently used in prepared food services for food and beverage packaging alone constitutes half of one percent (0.5%) of NYC's total waste according to the NYC's Department of Sanitation, Bureau of Waste Prevention Reuse and Recycling. Although it seems a small portion of the overall waste, it still represents approximately 90,000 tons of polystyrene on an annualized basis.<sup>68</sup> Diverting the waste associated with prepared food services therefore presents a significant opportunity for waste stream reduction as well.

It soon becomes clear that the food sector presents many opportunities for waste reduction and diversion, as well as for corporate challenges aimed at doing so. The food sector has the potential to reduce and divert waste through several avenues: segregating organic food waste; recycling plastics, metals and glass; reducing the amount of food packaging; and source reduction. These opportunities also represent a level of complexity inherent in the food sector as well as the need for a comprehensive challenge that addresses all these avenues. To add a further level of complexity, the food sector is non-uniform and is comprised of several types of organizations. These include businesses and services as diverse as restaurants and food retail chains, supermarkets and food services at institutions and other organizations.

Given all of the many possible combinations of challenges based on type of organization and type of waste, it was important to consider case studies dealing with all of these types of food service sector waste and establishments mentioned above. However, it was not possible to present all of them here. Therefore, additional case studies may be found in Appendix IV. The case studies that follow are those that are most representative of the identified best practices and which have lessons most applicable to NYC.

### 3.6.2 KEY FINDINGS

#### A. INSTITUTIONAL RECYCLING CHALLENGES: EPA RECYCLEMANIA

RecycleMania is a friendly competition aimed at institutions of higher education for the purpose of promoting waste reduction activities across university and college campuses. The challenge is implemented over a 10-week period, during which participating institutions report on their re-

66 Environmental Leader. Environment & Energy Management News. "2008 Fast Food Industry Packaging Report." Web. Accessed April 1st 2011. <<http://www.environmentalleader.com/2008/05/18/fast-food-packaging-target-of-dogwood-campaign>>

67 Hattam, Jennifer. 'Talkin' Trash: Reduce, Reuse, Rejoice. Accessed March 25, 2011. < [www.sierraclub.org](http://www.sierraclub.org).>

68 Based on 50,000 total tons of waste generated per day.

cycling and other waste data. The data is collected and institutions are ranked based on various criteria described in fuller detail below. Reporting is done on a weekly basis using comprehensive forms and guidelines provided by the EPA. Week to week, participating institutions can monitor their results and compare their performance against other competing institutions. This weekly reporting requirement combined with the public posting of performance data serves as an incentive, encouraging campuses to enhance their efforts in an effort to outperform rival institutions.

RecycleMania first began in 2001 with Ohio State University and Miami State University as the first and only two participants. The graph on the right shows the increase in school participation since 2002 and shows the increase in millions of pounds recycled per year.

#### **RECYCLEMANIA COLLEGE OF STATEN ISLAND – INSTITUTIONAL CASE STUDY<sup>1</sup>**

The College of Staten Island (CSI) is a 206 acre campus with daily waste and recyclables pick up by the New York Department of Sanitation (DSNY). Private haulers also pick up cardboard from CSI at no charge. As with most NYC waste, the majority is exported to landfills. CSI began participating the RecycleMania Challenge in late January 2011 and thus far, has encountered no negative effects of implementing the program. In fact, CSI's 15,000 students and 2,000 staff are excited about participating and are fully involved in the recycling effort. To-date, the staff is pleased with the outcome of the challenge and plans to continue promoting recycling after the RecycleMania challenge ends. At the time of writing, the RecycleMania challenge is in its 8th week and CSI is ranked 2nd overall in the Grand Champion category, indicating that not only is the challenge popular, it is also successful.

In an interview with James Pepe, the Assistant Vice President of Campus Planning and Facilities at CSI, he noted that, since the challenge began, CSI has not seen a decrease in the amount of overall waste being generated on its campus. However, it has seen an increase in the ratio of recyclable waste to non-recyclable waste. This increased diversion ultimately reduces the amount of waste going to landfills. Mr. Pepe also expressed that he felt an important role for the City in waste reduction could be in promoting "culture change" for businesses and institutions.

<sup>1</sup> Interview with James Pepe, Assistant VP of Campus Planning and Facilities at the College of Staten Island

In 2011, 630 colleges and universities in the U.S., Canada, Qatar, and the U.K. participated in the RecycleMania challenge. Participating colleges and universities began tracking and reporting recycling weights for the first week of the ten week tournament on February 6, 2011. Results are continually updated and are posted on the RecycleMania website. There are four titles for which educational institutions compete as well as four targeted material-specific competitions. Participating institutions are automatically considered for each competitive category for which they provide data. For more information on the competitive categories please see the Appendix IV.

RecycleMania currently has two categories for participants, the Benchmark Division and the Competition Division. The Benchmark Division is less formal and does not rank participants. Institutions assigned to this division are typically international, non-degree granting or predominantly online. The Competition Division is for U.S.-based degree-granting schools.

**Pros:** RecycleMania exemplifies best practices for a challenge. RecycleMania is comprehensive; the EPA provides all the necessary forms and supporting material required to implement the challenge. RecycleMania takes place within a realistic timeframe; the 10 week duration is sufficient to monitor performance and see improved results without being burdensome and also makes it possible to implement the challenge once per semester. RecycleMania has a clearly defined administrator; the EPA is the overall challenge administrator and on the institutional level campus planning and facilities offices are the natural administrators. The challenge is easy to initiate and participation by students is simple. RecycleMania also offers ample opportunity for institutional self-promotion; on-campus advertisements and student organization rallies to publicize the challenge serve this dual function. Corporate and community sponsors are a viable option and are also encouraged by the challenge. Finally, and most importantly, the challenge does result in an increased rate of recycling for participating institutions, reducing the amount of waste going to landfills. This alone should qualify RecycleMania as a successful challenge based on the purpose of this overall project.

#### **TALFOURD LAWN ELEMENTARY, JAMAICA HIGH SCHOOL AND P.S. 364 “THE EARTH SCHOOL”**

The city-wide winner of the 2010 Golden Apple Award for the Reduce and Reuse Challenge was Talfourd Lawn Elementary School in Queens. The school implemented a composting project at a classroom level using worm compost bins and encouraged recycling throughout the school through the use of educational materials, reuse practices, donation of materials to other schools, and support from teachers and parents.<sup>1</sup>

Two winners were named for the Golden Shovel Award in 2010. At Jamaica High School in Queens, some science classes used worm bins to compost leftover food. The school also obtained a donation of an outside compost bin from the Queens Botanical Garden to create compost for use in its garden and for indoor plants. The Botanical Garden also provided educational materials and led workshop for students on how to compost properly and to avoid contamination. The second school to win the Master School Composter Award that year was “The Earth School” PS 364. Every classroom and the cafeteria of the school contained a compost bin. The cafeteria was particularly noteworthy, because it used sugar cane food trays, which are fully biodegradable, going well above and beyond the requirements of the challenge.

<sup>1</sup> New York City Department of Sanitation, (2010). “Golden Apple Awards. Elementary division Queens borough & City-wide winner: Talfourd Lawn elementary school.” Retrieved from <[http://www.nyc.gov/html/nycwasteless/downloads/pdf/goldenapple10/GA10\\_RR\\_CW\\_Qns\\_Boro\\_Winner\\_PS50Q\\_Talfourd\\_Lawn\\_Elementary\\_Sch.pdf](http://www.nyc.gov/html/nycwasteless/downloads/pdf/goldenapple10/GA10_RR_CW_Qns_Boro_Winner_PS50Q_Talfourd_Lawn_Elementary_Sch.pdf)>

**Cons:** An obvious con of this challenge with respect to its applicability to the food sector, specifically food services at institutions, is that it does not address organic food waste or packaging in any of its main categories, but rather relegates it to the margins. While composted material may technically be considered “recycled,” for the purposes of the challenge there is no specific primary competitive category for composting. Organic food waste is categorized under the “Targeted Materials” section of RecycleMania. Under this section, the food related materials that can be reported as a part of the weekly data submission are pre and post-consumer food waste, compostable dinnerware, napkins, and utensils, and food waste used as animal feed. However, food waste may

not be counted as recycled as a part of the weekly recycling numbers for the main title categories; rather, participants are encouraged to report separately on food waste as part of food service organics in order to qualify for recognition under Targeted Materials.

## **B. “GOLDEN APPLE AWARDS” AND “GOLDEN SHOVEL AWARDS”**

In 2002, the New York Department of Sanitation created the Golden Apple Award for New York City public schools grades K-12. This challenge has been successfully reducing the waste generated by public schools since its inception. The Golden Shovel Award is a distinct sub-challenge under the Golden Apple challenge and is designed to encourage food waste reduction and composting in schools. Both challenges use incentives such as modest prizes, trophies, and city-wide recognition and bragging-rights for schools to encourage participation. DSNY provides extensive resources for these challenges, particularly the one regarding food waste, so it should be no surprise that these are model challenges for promoting waste reduction.

The Golden Apple Awards consist of three “TrashMasters!” competitions for both public and private schools in New York City. All of the contests are administered by the DSNY Bureau of Waste Prevention, Reuse and Recycling. Participants compete against other schools in their grade division – elementary, intermediate, and high school – to (1) reduce the most waste through reduction and reuse, (2) recycling the most, or (3) best clean up or beautify their school. Golden Apple Award participants with composting programs can also compete for the Golden Shovel Award’s “Master School Composter” title. The NYC Compost Project<sup>69</sup> judges the winners.

**Pros:** Many of the features of the Golden Apple Awards could be applied to challenges for various food industries in New York City; it is comprehensive, has a short duration, and can be easily modified to meet the needs of any particular food-service business. The Golden Apple Awards and Golden Shovel Awards focus on children, so these challenges are simple and easy to implement and complete. The competition also allows for multiple winners in multiple categories; incentivizing students and staff to participate as they perceive there to be real potential for them to win or be named a runner-up. This characteristic of a challenge may hold true for adults as well as children. This program also has great potential for partnerships as well as community participation and support. There is the opportunity for impact beyond the challenge itself since challenges in schools affect not just school staff and students, but also parents and the surrounding neighborhood. Such challenges offer the added bonus of bringing waste reduction awareness to the broader community. Finally, unlike many challenges which focus primarily on recycling, The Golden Shovel Awards are targeted solely at composting. These challenges are supported by advice from the Department of Sanitation’s website on proper composting techniques, and the NYC Compost Project also provides assistance in this area. Finally, and perhaps most importantly, the challenge results in clear increases in recycling and composting at participating schools, diverting waste from landfills.

<sup>69</sup> The NYC Compost Project, a section under the Department of Sanitation created in 1993, provides compost education and outreach to NYC residents, non-profits, and businesses. It has provided assistance to hundreds of community-based composting operations citywide. Funding and oversight come from the Department of Sanitation’s Bureau of Waste Prevention, Reuse and Recycling.

**INTERVIEW WITH OZGEM ORNEKTEKIN, DIRECTOR OF SUSTAINABILITY, DOE<sup>1</sup>**

In an interview with Ozgem Ornektekin, Director for Sustainability at the NYC Department of Education (DOE) it was learned that 50 of NYC's over 1,500 schools applied to take part in the 2010 Golden Apple and Golden Shovel Award challenges. She explained that part of the reason for the relatively low number of participants is that the Department of Sanitation has stopped giving awards to challenge winners, as a result of budget cuts.

She also noted that, unlike P.S. 364, many schools do not have sufficient outdoor space for composting projects or gardens in which to use that compost. The Department of Sanitation does not offer organic waste pickup as for schools in general or as part of the challenge, making vermin a real concern. Ms. Ornektekin noted that the main obstacle to schools that wish to compost for educational and environmental purposes is finding a hauler to remove organic food waste or the compost generated from it. Schools can use some of the compost, but mostly do not have the capacity to handle it all. These obstacles apply equally to businesses in NYC as they do to schools.

Ms. Ornektekin added that the City would need to make any food waste challenge it implements logistically easy for participants. In the case of schools or institutions it would need to provide grants and materials. In the case of businesses, tax breaks could encourage participation. For both businesses and institutions, the infrastructure for compost or food waste efficient pick up services would need to be available for a challenge to succeed.

<sup>1</sup> Interview with Interview with Ozgem Ornektekin, Director of Sustainability NY Department of Education

**Cons:** The website does not clearly state the duration of the challenge. A response received to a question submitted on the Department of Sanitation's website via web-form indicated that the time span for any of the three TrashMasters! contests is not defined. While the flexible time frame is beneficial as it allows the participant to determine the length of the school's participation, the lack of a defined time frame from the administrator could leave participants confused as to how to approach the challenge. In the case of a corporate challenge, the time frame would need to be the same for all participants in order for the competition to be fair and taken seriously by all participants. Similarly, any awards, prizes or incentives promised to winning participants must be honored for the challenge to survive from year to year. In 2009, the Department of Sanitation was unable to provide awards or even trophies to the winners, due to budget cuts. This could certainly affect participation in later years.

Finally, the composting aspect of the Golden Shovel Award would need to be better developed before being applied to a corporate challenge. There is not an independent website for the Golden Shovel Awards, which could be easily overlooked by participants. Since all schools have cafeterias, and therefore generate food waste, small scale composting either indoors or outdoors is a potentially feasible activity for all participating schools. This competitive category could be highlighted by providing the Golden Shovel Award its own dedicated website with more detailed information about the challenge and composting in general. In the case of a corporate challenge, a composting



category could be prominently featured.<sup>70 71 72</sup>

### C. EPA FOOD RECOVERY CHALLENGE

As a part of the EPA's WasteWise Food Recovery Challenge participants reduce, donate, and recycle their food waste to prevent it from ending up in a landfill. Participants conduct comprehensive food waste assessments, implement at least three waste reduction activities, create food waste recovery plans, and report on their progress to EPA which awards and recognizes participants for their achievements.<sup>73</sup> Waste reduction and recovery activities are practices that help businesses reduce waste generation and disposal. The EPA's site has many recommendations on how to accomplish this goal, which include purchasing energy efficient or water reducing kitchen equipment, modifying ordering and purchasing quantities and frequency, tray-less dining, menu modification, reusable service ware, and re-evaluation of production and handling processes.<sup>74</sup> Composting is also mentioned under this category of recommendations, along with a brief introduction to composting methods.

**Pros:** With respect to food waste, the comprehensiveness of the Food Recovery Challenge is unmatched by any other challenge examined. The EPA provides extensive support for the challenge in the form of education and information materials, tracking and monitoring tools, and easy-to-use prepared forms. The EPA's website provides a Waste Food Audit Log, which helps record and track food waste generation and its causes. It also provides a Food Waste Management Cost Calculator, among many other management helpful tools for participants, estimates the cost-competitiveness of alternative methods to food waste disposal. Participation in the EPA's Food Recovery Challenge is very straightforward. To participate, businesses register on the WasteWise website to gain access to the Re-Trac System, which is used for measuring progress. They must also follow the steps mentioned above regarding waste reduction.

**Con:** The Food Recovery Challenge requires a 3 year commitment, which may be prohibitive for some participants. The length of the required time commitment may be daunting to potential participants who are just beginning to consider changing their practices. Additionally, results may not be as apparent as quickly for a long-term challenge, which could be discouraging for some participants, especially novices.

70 Department of Sanitation, (2010). Golden Apple Awards. Elementary division Queens borough & City-wide winner: Talfourd Lawn elementary school. Retrieved from: <[http://www.nyc.gov/html/nycwasteless/downloads/pdf/goldenapple10/GA10\\_RR\\_CW\\_Qns\\_Boro\\_Winner\\_PS50Q\\_Talfourd\\_Lawn\\_Elementary\\_Sch.pdf](http://www.nyc.gov/html/nycwasteless/downloads/pdf/goldenapple10/GA10_RR_CW_Qns_Boro_Winner_PS50Q_Talfourd_Lawn_Elementary_Sch.pdf)>

71 Department of Sanitation, (2010). Golden Apple Awards. High school division. Queens honorable mention: Jamaica high school. Retrieved from: <[http://www.nyc.gov/html/nycwasteless/downloads/pdf/goldenapple10/GA10\\_SR\\_HS\\_Qns\\_Hon\\_Golden\\_Shovel\\_Jamaica\\_High\\_School\\_Part1.pdf](http://www.nyc.gov/html/nycwasteless/downloads/pdf/goldenapple10/GA10_SR_HS_Qns_Hon_Golden_Shovel_Jamaica_High_School_Part1.pdf)>

72 Department of Sanitation, (2010). Golden Apple Awards. Elementary school division. Queens borough winner: The Earth school PS 364. Retrieved from: <[http://www.nyc.gov/html/nycwasteless/downloads/pdf/goldenapple10/GA10\\_RR\\_Elem\\_Man\\_RU\\_Golden\\_Shovel\\_Earth\\_Sch\\_PS\\_364.PDF](http://www.nyc.gov/html/nycwasteless/downloads/pdf/goldenapple10/GA10_RR_Elem_Man_RU_Golden_Shovel_Earth_Sch_PS_364.PDF)>

73 Environmental Protection Agency, (2010). Fine dining returns to the earth. Retrieved from: <<http://www.epa.gov/osw/conserves/materials/organics/food/success/fourseasons.htm>>

74 Environmental Protection Agency, (2010). Activities to reduce and recover food waste. Retrieved from: <<http://www.epa.gov/osw/partnerships/wastewise/challenge/foodrecovery/food-act.htm>>



#### D. COMPOSTABLE FOOD PACKAGING MANDATE IN SAN FRANCISCO

Although there have been no corporate or institutional challenges specifically addressing biodegradable or compostable packaging, several municipalities and counties in the State of California have mandated the use of compostable food packaging products; this option has been tried and tested elsewhere. The advantages and disadvantages are discussed in this section. Food packaging is and will become an important component of future food waste reduction challenges.

Since the early nineties several Californian counties have issued ordinances banning the use of expanded polystyrene (EPS) products in all food services industries. In addition most counties also require that any food packaging offered be made from biodegradable or compostable materials. It is worth noting that larger cities such as San Francisco and Seattle currently have robust municipal composting programs in place that include residential organic waste collection beyond just yard waste. It should also be noted that the cities in California do not face the same space constraints as NYC and therefore can more easily site composting facilities. The City and County of San Francisco passed an ordinance<sup>75</sup> prohibiting use of EPS food service products in 2006. The ban took effect June 1, 2007. The ordinance prohibits City facilities, restaurants, retail food vendors or non-profit food providers, as well as any City-sponsored events offering food from utilizing EPS food containers. The ordinance also requires use of biodegradable/compostable<sup>76</sup> or recyclable disposable food service ware. Any establishment that continues to use banned products and does not offer the required compostable or recyclable alternatives is subject to fine.

**Pros:** Compostable prepared food packaging provides a sustainable alternative to polystyrene, plastic and paper products, representing a significant waste-reduction and diversion opportunity. These types of containers are made from readily renewable sources such as sugarcane fiber, corn and potato and require less energy to manufacture. In addition, they are made from non-toxic or non-pollution causing sources and can be composted. Polylactic acid (PLA), which is derived from corn, is the preferred material of this type due to its compostability characteristics.

**Cons:** Pursuing opportunities for waste reduction is not without its difficulties. Several factors must be in place to establish a successful food container-composting program. The cost of compostable products is still more expensive than standard products.<sup>77</sup> Many of these infrastructure requirements are beyond the scope of a corporate challenge, yet they determine its success in the long run.

75 City of San Francisco Mandatory Recycling and Composting Ordinance. Web. Accessed April 1st, 2011. <[http://www.sfenvironment.org/our\\_programs/topics.html?ti=6](http://www.sfenvironment.org/our_programs/topics.html?ti=6)>

76 It is important to recognize the difference between compostable and biodegradable products. Not all biodegradable products can be composted and products must be clearly distinguished based on their composition. Products must meet ASTM D6400-99 requirements for "compostable plastics" in order to be truly compostable in standard composting facilities. Compostable products also cannot be discarded with recyclables as a part of existing City programs. Compostable plastic contaminates the recyclable plastic waste and therefore requires dedicated handling or should be handled as a part of organic waste where appropriate.

77 Compostable and biodegradable products examples. Web. Accessed April 1st, 2011. EcNow Tech. "EcNow Tech." Web. Accessed on 1 Apr, 2011. <<http://www.ecnowtech.com>>Eco-Products Inc. "Eco-Products Inc." Web. Accessed on 1 Apr, 2011. <<http://www.ecoproductsstore.com>> Earth Shell. "Earth Shell." Web. Accessed on 1 Apr, 2011. <<http://www.earthshell.com/>>Jack's Boxes. "Jack's Boxes." Web. Accessed on 1 Apr, 2011. <<http://jacksboxes.com>>

*Composting Capacity:* There must be composting facilities close enough to NYC that can handle compostable waste in the volumes generated by supermarkets, restaurants and food services in NYC as part of a corporate and institutional challenge.

*Labeling:* All packaging must adhere to the American Society for Testing and Materials (ASTM) requirements for compostability and carry a clearly identifiable logo that categorizes it as compostable. The Compostable label program<sup>78</sup> developed by the US composting council and the Biodegradable Products Institute (BPI) would be ideal for a program like this. Member companies

must have finished products certified as meeting ASTM D6400 or ASTM D6868 before the logo may be used to provide certification of compostability.<sup>79</sup>



#### **FOUR SEASONS HOTEL PHILADELPHIA**

In 2006, the Four Seasons Hotel in Philadelphia conducted a waste audit which resulted in the finding that only three to five percent of the hotel's waste by weight was being recycled. Striving to achieve a higher rate of diversion, the hotel established a kitchen scraps recycling program in partnership with a local composter. At the end of each day, a hotel employee would be responsible for driving any properly sorted organic waste to the composting location. To further reduce costs, the hotel used a truck that operated on biodiesel made from the hotel's recycled cooking oil to transport the food scraps

Although this case could not be perfectly replicated in NYC, due to the lack of local composters and the higher volume of organic waste being produced on a daily basis, this program represents a good example of the potentially symbiotic and cost-effective relationship between hotel food services, restaurants and composters. A study of this program notes that the Four Seasons rents 150 lb. kitchen composting bins at \$40 per month and pays the composter \$35 per ton of organic waste disposed in addition to a monthly service fee. "In total, sending waste for composting is 30 percent cheaper for the hotel than land filling, at just under \$0.04 per pound [for composting] versus \$0.06 cents per pound [for landfilling]. With 240,000 pounds of organic waste from the kitchen each year, that's more than \$4,800 saved annually."

The Four Seasons reported that it saved a grand total of 23%, or 239 tons, of its waste from being sent to landfills, not only through its composting program, but also by instituting other sustainable and responsible business practices. These practices included closely tracking food purchases and inventory, purchasing local ingredients as often as possible, making biodiesel fuel from used cooking oil, using only biodegradable disposable containers, and buying back compost to use on its surrounding property.<sup>1</sup>

<sup>1</sup> U.S. Environmental Protection Agency, (2010). "Fine dining returns to the earth." Web. <<http://www.epa.gov/osw/conserve/materials/organics/food/success/fourseasons.htm>>

<sup>78</sup> United States Composting Council. "Compostable Logo Project" Web. Accessed April 1st, 2011. <<http://www.compostingcouncil.org>>

<sup>79</sup> The Biodegradable Products Institute. <<http://www.bpiworld.org/BPI-Public/Program.html>>

*Separation:* Specially designed bins that clearly distinguish food and compostable items from trash and recycling.

An additional area of concern is the practical implementation of such a program at the locations where the prepared food is sold. Currently there is significant contamination of recyclables due to insufficient space to provide multiple receptacles within food service establishments. To effectively collect compostable food packaging, separate well-marked bins for compostable material would be required. Compostable food packaging containers look nearly identical to conventional plastics; it is nearly impossible to distinguish them unless they are clearly marked. If compostable and recyclable food packaging containers are mixed both streams are contaminated because compostable food packaging containers contain substances that are incompatible with the recycling process. The infrastructure for collecting and hauling the compostable food packaging containers also need to be considered. Currently, other than a few small-scale local programs, the City only composts organic leaves, yard waste, and Christmas trees.<sup>80</sup>

#### **E. PRET A MANGER WASTE DIVERSION PILOT**

Pret A Manger is a leading New York City prepared food retailer. Everyday Pret A Manger prepares sandwiches, soups, salads and beverages in to-go containers for its customers. Hot beverages are served in cardboard cups and cold beverages are served in plastic or glass containers and sandwiches and salads are served in cardboard boxes. At the end of each day 100% of unsold food is donated to City Harvest. In late 2010 the company decided to increase the diversity of the type of materials it recycles to reduce overall solid waste by increasing diversion. Pret A Manger then initiates a pilot-recycling program was at 3 NYC locations in Midtown, Union Square and Lower Manhattan. The pilot ran for an 8-week period. The program's intent was to increase recyclables from the current practice of just plastics and metal cans. The new range of recyclable products includes sandwich boxes, salad boxes, soup containers, coffee cups, bottles and cans.

The pilot was the first "front of the house" recycling program attempted by Pret A Manger. The pilot utilized 3 separate recycling bins (paper packaging, metal and plastic) for customers to discard used packaging products as well as the conventional mixed waste receptacles. In order for the program to operate successfully, every piece of packaging had to be screened to determine the corresponding waste stream into which it would flow and how the used products could be recycled. Pret A Manger worked extensively with its waste hauler to develop an agreement to process the waste separately so as to accurately determine the weight and contamination level of recyclables being diverted. Adapting receptacles to meet the needs of the pilot was a major obstacle. Successfully converting the existing space which housed only two receptacles to hold more units required the company to construct custom bins.

Finally, the most critical component of the pilot was to ensure the purity of the waste stream. This meant extensive employee training had to occur in order for the employees to monitor the ways

<sup>80</sup> NYC Wasteless <<http://www.nyc.gov/html/nycwasteless>>

in which customers discarded materials into the receptacles. The proper waste had to make it into the proper bins without cross contamination occurring. The waste also had to meet the standards established in cooperation with the waste hauler in order to properly divert the recyclable materials. By extensively training the staff on proper diversion techniques, the knowledge was easily transferred to customers, improving the success of the pilot.<sup>81</sup>

#### **RETAIL CHAIN INTERVIEW: MANAGER AT PRET A MANGER**

According to a store manager, who did not wish to be identified, customers requested that Pret A Manger provide more recycling bins and options. Prior to the pilot the restaurant only offered plastic and metal recycling. All three pilot restaurants also began sorting organic waste from solid waste within the kitchen. Bins labeled organic or non-organic were placed throughout the back office (kitchen) and organic food waste was diverted. The manager noticed immediate approval from all employees. Although the initiative was only one week old the manager is completely confident that accurate diversion will occur. The manager also believes the back office transition occurred much more smoothly than the front office due to the fact that proper education was provided to all employees.

The front office struggles with cross contamination on a daily basis and the manager attributes the problem to patrons misunderstanding which receptacles to use, lack of education within the recycling field and the rushed lifestyle of New Yorkers. Within the near future, four more Pret A Manger restaurants will begin participating in back office organic diversion with the entire chain expected to join by summer 2011. Action Environmental Carting hauls all of Pret A Manger's waste throughout NYC. Clear blue bags are used for plastic and glass bottles, Clear green bags are used for all organic waste, paper bags are used for all cardboard and paper products and all solid waste is placed in black bags.

The manager feels that offering increased recycling and diverting organic waste from the solid waste stream were natural progressions flowing from the company's business model. The manager also recognized that back office strategies are much easier to implement than front office changes. For successful front office initiatives to work properly, extensive customer interaction with easy to read and color-coded receptacles would be required to avoid contamination. Regulation and the creation of industry-wide color-coded recycling bins across the city was one of the most important ways the manager thought the City could assist in successfully increasing recycling. Although Pret A Manger's business model provided an easy transition to recycle more and divert organic waste the manager thought other restaurants would have to be mandated to do this in order to follow suit.

**Pros:** Solid waste sent to landfills is reduced due to increased diversion of recyclable as well as organic materials. The demand from customers for greater recycling is met so customer satisfaction is increased resulting in potentially greater customer flow and revenue. Pret A Manger is recognized as a first mover within New York City by taking action to divert organic waste out of the solid waste stream.

81 "Global Green USA's Coalition for Resource Recovery: Programs - Food Packaging." Global Green USA's Coalition for Resource Recovery: Waste Reduction, Waste Diversion, Waste Recovery, Recycling and Sustainability in New York City. Web. 04 Apr. 2011. <[http://www.thecorr.org/programs\\_food\\_packaging.php](http://www.thecorr.org/programs_food_packaging.php)>

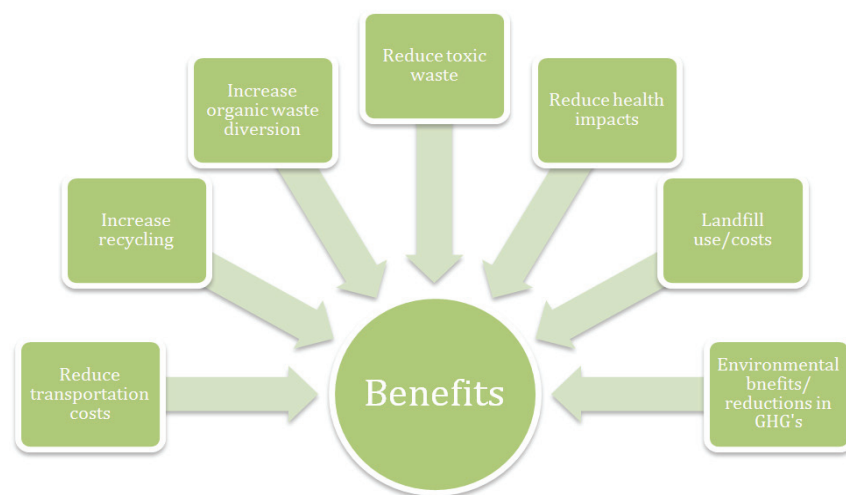
**Cons:** Designing new recycling receptacles is costly and time consuming. Although customers initially spurred the program, recycling contamination from customers poses one of the greatest obstacles for the program. Finally, educating staff and customers takes time and resources.

### 3.6.3 OBSTACLES TO IMPLEMENTATIONS

Several main obstacles which food service establishments may encounter in attempting to implement a citywide Corporate and Institutional Challenge present themselves in the key finds and case studies above. To summarize, they are:

- The lack of technical capacity among owners and operators of food services establishments to develop waste reduction plans.
- Insufficient information and awareness among food service establishments regarding potential costs savings from greater waste diversion and the obligation of haulers to conduct waste stream surveys.
- Space and design constraints for food service establishments in placing receptacles for multiple types of waste.
- The lack of composting or organic waste-to-energy facilities within easy distance of NYC able to accept NYC's food and compostable food packaging waste.
- Marginally higher cost of compostable packaging.
- Lack of effective inventory control measures at food service establishments resulting in loss of stock and greater waste.

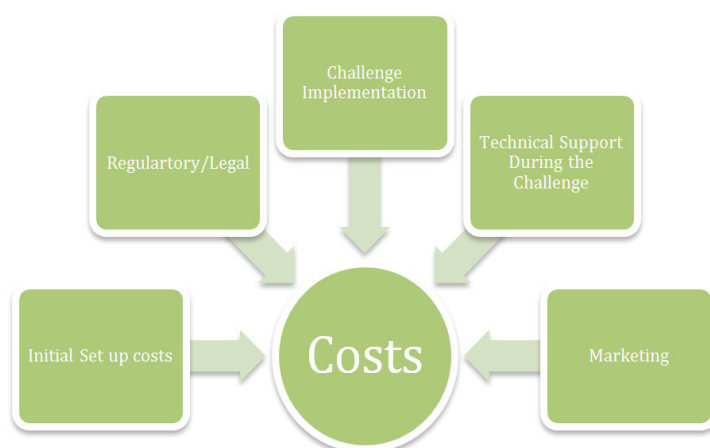
### 3.6.4 COST BENEFIT FRAMEWORK



The Cost Benefit Framework below can be applied to a Corporate and Institutional Challenge for food service establishments. The framework can be used to help potential challenge participants assess whether participation in the program would be beneficial to them and help them determine whether the endeavor is economically viable. In the case of a Corporate and Institutional Chal-

lenge, the willingness of organizations to participate and partner with the City to increase recycling and diversion of organic food waste from the municipal solid waste stream will depend to a large extent on the bottom line savings they can achieve. Below are some of the economic and social benefits that would result from a Corporate and Institutional Challenge.

Several benefits to businesses would result from implementing a corporate reduction. Careful at-source waste stream diversion, namely an increased percentage of material being recycled and organic waste diverted, results in higher value waste stream end products (recyclable material/organic waste) than typical putrescible solid waste. Therefore, improved diversion practices can reduce hauling fees and other associated cost savings for participants. It is not possible to predict the exact value difference between organic food waste and other putrescible solid waste over the long-run since it will depend to a large extent on the market for compostable materials which is largely under developed. Social benefits of waste reduction and diversion include preventing toxic waste from ending up in landfills, which can be achieved by diverting recyclable materials, such as e-waste that have the potential to be toxic if not properly discarded; groundwater contamination can be reduced as a result. Additionally, overall waste reduction, though not necessarily diversion, could result in improved health, namely reduced asthma rates, for NYC residents living along truck routes due to a reduction in vehicle emissions as result of there being fewer garbage trucks on the road bringing waste out the City.



Administrative costs to properly prepare for the challenge will be incurred by the challenge administrator in the period prior to the challenge. Similarly, the administrator of the challenge may incur some marketing or outreach costs to advertise and communicate to targeted participants. At the beginning stages and in the first years of the challenge participants will require implementation support to be provided in the form of technical assistance by either the administrator, the City or third-party partners. An organization with extensive knowledge of waste, recycling and diversion, such as DSNY's Bureau of Waste Prevention, Reuse and Recycling, could provide this initial technical support. For participants, once the initial organizational inertia is overcome and new waste management systems are put in place, there are few ongoing costs of taking part of the challenge.

### **A NYC HOTEL'S CURRENT FULL SCALE RECYCLING PROGRAM<sup>1</sup>**

Action Environmental Carting is currently working with a NYC hotel on implementing a full-scale recycling program that illustrates some of the costs savings businesses could realize by participating in a challenge. Before implementing this program, the NYC hotel already recycled fairly well; they separated bundled cardboard out and placed it on the sidewalk for Action's cardboard recycling truck to pick up each night (typically 1-2 compost totes per night). The hotel now segregates an average of 6-7 totes of organic waste per night, a volume that could increase if more care was taken to ensure proper diversion. Action has noticed that the organic waste has occasionally been contaminated with non-organic materials. At the hotel's main office, paper is not put in clear bags. Currently, bottles and cans are not separated into clear bags and the bottles and cans are taken out in black bags mixed with putrescible solid waste. Every night Action sends three trucks: one trash truck for the black bags, one recycling truck for the bundled cardboard and one compost truck for the food waste. Although 3 trucks come to pick up garbage and recyclables left on the street only 2 are active once they reach the hotel. If the hotel were to separate co-mingled bottles and can, and place them in clear bags, it would realize significant cost savings. Currently all the bottles and cans generated throughout the entire hotel (2 bars, kitchen and all the rooms) are combined with putrescible solid waste in black bags. Below are the cost saving incentives Action offers the hotel to encourage greater diversion. All of these incentives represent potential cost saving benefits for the hotel.

- a. **Use of Clear Bags:** Paper, co-mingled glass, metal, and plastic (GMP), cardboard bundled (pounds per cubic yard for co-mingled bottles and cans = 100 pounds). Incentive: For each additional ton separated, Action deducts \$100 from the monthly rate.
- b. **Organic Compost Recycling Program:** Food scraps, coffee grounds, bread, meats, fish, bones, etc. (pounds per 39 gallons per tote = 80 pounds). Incentive: For each additional ton separated, Action deducts \$20 from the monthly rate.
- c. **Universal Waste:** Electronics, computers, batteries, ballasts, and fluorescent light bulbs. Not in place yet, however Action will have a new program available and pricing coming this spring. Incentive: None with regards to pricing, but reporting on the weights recycled is available at no extra charge.
- d. **Black Bags:** Non-recyclable waste (everything else). Incentive: None.

<sup>1</sup> Interview with Adam Pasquale, Executive Account Manager, Action Environmental Carting. Recycling Program created by Adam Pasquale for Action Environmental Carting, March 2011.

The exact financial costs and benefits of participating in a Corporate and Institutional Challenge will depend largely on the profile of the participant organization and the nature of their waste composition and its volume, the rates already negotiated with haulers, and other variables unique to that organization. As part of the routine monitoring and reporting for the challenge, participants and the administrator will be able to identify and measure actual costs and benefits based on the data collected. Once this data is available the values should be properly discounted. Once discounted, further analyses such as Net Present Value (NPV), Environmental Initial Rate of Return



(EIRR), Benefit Cost Ratio (BCR) and a sensitivity analysis can be applied to provide a more in-depth understanding of the exact financial costs and benefits associated with the initiative.

Although there are a few short-term administrative and organizational costs associated with implementing a challenge, in the long-run such would be outweighed by the benefits associated with such a challenge; a corporate and institutional challenge targeting the food sector is feasible. However, to encourage corporations and institutions in the food sector to increase organic and recyclable diversion from landfills, it will be important to present them with a cost benefit framework that clearly illustrates both the potential financial cost savings available to them as well as the social benefits derived from diversion from landfills. Participants can not only achieve bottom line savings, but also help to reduce environmental degradation. Providing case studies about successes and savings achieved by other challenge participants and highlighting the best practice elements of the challenge will also encourage participation and assist participants with achieving their own waste management goals.

### **3.6.5 RECOMMENDATION**

#### **A. NYC CORPORATE AND INSTITUTIONAL CHALLENGE FOR FOOD SECTOR**

Having examined the extent to which food waste is a problem for NYC, existing challenges and programs that deal with food waste as well as case studies on how individual institutions have implemented them, the question that remains is how NYC can initiate a program to encourage the food sector to reduce waste and increase diversion of recyclables and organic food waste away from landfills. The primary recommendation is that a Corporate and Institutional Challenge targeted at the food sector in NYC is a feasible option. Later recommendations address how other City actions can support the implementation of a challenge.

The ideal challenge would meet the following criteria, based on the best practices defined above:

#### **1. Realistic Timeframe**

A challenge that is too short has the potential to undermine the importance of waste-reduction and does not allow sufficient time to measure changes in behavior or realize cost savings. A longer challenge shows that the City is serious about its commitment to waste reduction and allows enough time for participants to see results. The recommended timeframe for a challenge is six months. Six months is long enough to justify initial investments in new systems and realize cost savings. A longer challenge could be cost-prohibitive due to reporting requirements and prevent participation or result in a loss of interest.

#### **2. Easily-Identifiable, Responsible Administrator**

An important part of any challenge is identifying an agreed upon administrator. One option that would have great potential, especially for the food sector, would be to have Business Improvement Districts (BIDs) administer the challenges in their respective areas and feed data back to a central

City office which would ultimately judge the challenge and provide the award.

New York City has the nation's largest and most comprehensive network of BIDs in the U.S. There are a total of 64 BIDs throughout the five boroughs, which annually invest almost \$100 million worth of programs, services, and publications for members. These organizations are well situated to reach out to local business for such a challenge. This would allow the responsibility of monitoring a large-scale City-wide challenge to be decentralized among smaller sub-sections of the City. Each BID could rally community support, enlist volunteers to monitor progress, and report results upward to the appropriate City office. This tactic removes the burden of monitoring data on progress and other details from the City, after the initial implementation and promotion and roll-out of the challenge is complete. Additionally, BIDs already administer competitions and make awards within their districts, implying they have experience implementing contests. BIDs are also intimately familiar with local businesses and the unique challenges they face. BIDs are deeply invested in improving the public perception of their districts and attracting customers to that area. Labeling businesses in a BID, the most "green" or "sustainable" in the City, could prove a huge publicity benefit.

The City's relationship with BIDs is managed through the NYC Department of Small Business Services which ensures BIDs carry out services efficiently by "liaising with City agencies, promoting best practices and aggregating information about the programs, services and goals of each BID"<sup>82</sup> The Department of Small Business Services also administers the "The Neighborhood Achievement Awards" annually. These awards are given to individuals, businesses and groups who are nominated by other members of the community for recognition in various areas such as building neighborhoods, creating jobs, and opening opportunities for New Yorkers. Awards for waste-reduction could easily be incorporated into this existing program.

From a logistical and cost perspective, an advantage of concentrating businesses participating in a challenge in a single location is that it makes it easier for haulers that collect organic food waste to service the area. In addition it provides the potential for a critical mass of businesses to make sending designated trucks to that area worthwhile. It is also most cost-effective for businesses since businesses within a BID can together negotiate lower rates, benefitting from their collective bargaining power. In this way, sustainable development and economic development can go hand in hand.

### **3. Progress Easily Measured**

Fortunately, as described in the Key Findings section, there are many measurement tools available to help businesses track their waste reduction efforts and for challenge administrators to monitor them. The EPA's WasteWise program has excellent resources for tracking and monitoring which the City could use for its challenge. DSNY has forms and tools that schools have used to implement the Golden Apple and Golden Shovel Awards which could also be adapted for use by businesses.

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<sup>82</sup> NYC Small Business Services, (2011). Help for neighborhoods. <<http://www.nyc.gov/html/sbs/html/neighborhood/bid.shtml>>

#### 4. Clear Guidance

The tools that are available, described above, are accompanied by instructions, guidance, and resources that can be used to inform participants.

#### 5. Attractive Easily Understood Incentives

The Cost Benefit Framework above provides the basis for the City to communicate the incentives associated with participation in a Corporate and Institutional Challenge. While for the most part the challenge will result in financial cost savings, in some cases investments will need to be made. Only individual companies will be able to make that determination. However, by presenting the possible incentives, and understanding the cost advantages, the City can communicate with businesses and encourage them to participate. The Cost Benefit Framework section contains further cost estimates on the potential savings businesses can achieve by reducing waste, increasing diversion, and participating in a challenge.

Finally, the best way that the City can incentivize participation in a Corporate and Institutional Challenge is by publicly recognizing challenge winners. The positive publicity associated with a visit from the Mayor or a citywide award, a Green Apple award perhaps, is one of the best public relations incentives the City can offer participants.

#### 6. Comprehensive Challenge

To be comprehensive with respect to type of waste, a corporate challenge for the food sector should include the following four competitive categories for participants:

- i. Overall Tonnage Reduction
- ii. Recycling Glass, Metals, Plastics Paper (Back-End and Front-End)
- iii. Separating Organic Waste/Compostable Packaging (Back-End and Front-End)
- iv. Use of Currently Recyclable Food Packaging/Reusable Containers

The reason for including the fourth category, “Use of Currently Recyclable Food Packaging/Reusable Containers” is because, although in the long term, entirely compostable packaging is the ideal, in the short term, given the infrastructure that is currently in place, using recyclable food packaging and reusable containers is actually preferable. If there is not the capacity to compost compostable food packaging at present, compostable food packaging will only end up being discarded as part of the landfilled waste stream or, worse, contaminating recyclables. Thus, unless a food service establishment has composting, it would be preferable for them to use packaging that can be recycled under current laws rather than compostable food packaging.

In addition to the challenge being comprehensive with respect to waste, the categories of participants should also be comprehensive. There should be categories for both small and large businesses based on annual revenue and categories for food services at institutions, supermarkets, restaurants, and other food retailers. Not only does having different categories result in fairer competition such that businesses with fewer resources are not competing against those with greater resources, but

also different categories will encourage broader participation and new participants each year if participants feel there is a category specifically intended for them.

## **7. Opportunities for Sponsorship**

A Corporate and Institutional Challenge, especially one that is connected to the business community through BIDs, has enormous potential for sponsorship. Businesses that are already leaders in waste reduction may want to highlight their past achievements and commitment to sustainability by providing sponsorship. Other businesses like those that sell compostable food packaging and reusable containers or buy recycled materials may also want to sponsor a challenge.

### **B. ALTERNATIVE OPTION: PROMOTE EXISTING CHALLENGES FOR THE FOOD SECTOR**

Alternatively, if there are no resources available to initiate a NYC Corporate and Institutional Challenge for the food sector, the City could encourage businesses to participate in existing challenges. The EPA's "Food Recovery Challenge" is an example of a large-scale, long-term challenge applicable to many different types of food-service businesses. EPA's WasteWise addresses recycling and reuse practices applicable to many industries, including this report's target industries: food, retail, corporate, and hospitality. The EPA's challenges benefit from established and effective detailed tracking systems, forms, and informational resources. For example, a synthesis of EPA's WasteWise system and the "Golden Shovel Awards" would provide a valuable framework for a general waste reduction challenge geared specifically towards the food industries in NNYC. A corporate and institutional challenge modeled on those described above after could prove financially beneficial to businesses by reducing their waste removal costs. Additionally, businesses would benefit from the free positive publicity associated with public recognition of their efforts. In the case of public schools, participation in a challenge helps educate a generation of young people about the importance and benefits of recycling and reducing waste.

An added benefit of adopting and promoting the EPA's challenges is that they come with the potential for funding. In fact, the EPA funds many solid waste projects throughout the United States. The EPA's website claims, "Region 5's Solid Waste Program administers a few of EPA's many grant programs. Grant funding is provided to government agencies and non-profit organizations to promote waste reduction and the safe and effective management of solid waste."<sup>83</sup> Even though NYC falls under Region 2 in the EPA, interested parties can still apply for funding, as long as the proposed projects are relevant to Region 5 stakeholders as well. With that in mind, it is possible that projects in NYC having to do with solid waste may have the opportunity to be partially funded by the EPA.

### **C. EDUCATION, TECHNICAL ASSISTANCE AND BUSINESS MENTORING**

Many of the difficulties that businesses and institutions would face in implementing a waste-reduction challenge are related to their capacity to plan and implement waste reduction measures

<sup>83</sup> Environmental Protection Agency, (2010). Solid waste funding. Web. Access Feb, 2011. <<http://www.epa.gov/reg5rcra/wptdiv/solidwaste/funding.htm>>

as well as their lack of knowledge about existing resources and other opportunities at their disposal. Issues such as a lack of inventory control with respect to food inputs, require assistance and capacity building. The Mayor's Office of Long-Term Planning and Sustainability can establish partnerships with organizations that provide such technical assistance to supermarkets, restaurants, and food services to improve their sustainability. An example of this type of organization is the Green Restaurant Association (GRA), a non-profit organization which helps restaurants, manufacturers, distributors, and consumers become more environmentally responsible through its certification process and education on environmentally friendly business practices. A network of sustainability-oriented non-profits can be leveraged to provide education and informational resources to participating food service establishments.

The City could provide a website which lists consultants, non-profits, and other resources for businesses looking to cut waste as part of the challenge. In addition, the City could also provide a hotline, like the very successful 311 hotline, specifically to assist businesses with developing step-by-step waste reduction plans, and other environmentally friendly business plans and strategies. Such a helpdesk could be staffed by a few City consultants or even potentially by pro-bono management consultants. Finally, a direct-mailing "know-your-rights" campaign might also prove helpful, since many businesses do not know that according to BIC they are entitled to a waste stream survey from their waste hauler. Simply increasing awareness about the opportunities available and the potential for cost saving is an obvious but important step and should not be overlooked. In particular, food preparation, cleaning and wait staff, who would be the ones to actually implement at-source waste reduction measures, require training, often in languages other than English. A City produced curriculum for employers to use to train staff on proper handling and diversion of waste has the potential to address the issue at its root.

Finally, the City can also establish a mentoring program such that businesses that are successful at reducing waste can be program mentors and sponsors, advising other businesses on how to improve by sharing lessons learned and best practices. Businesses that are mentors would benefit from being listed as sustainability leaders on City websites and publications, benefiting from a public relations advantage.

#### **D. INVENTORY MANAGEMENT METHODS**

Waste is first and foremost a management inefficiency. Waste-reduction aside, no business wishes to lose valuable inventory, especially food service establishments which often operate on a very thin margin. As a part of technical assistance to food service establishments, advising that they pursue tighter inventory control is essential. Electronic inventory tracking systems are used to reduce waste and increase efficiency in various industries. Inventory tracking also assists in smart purchasing and appropriate use of supplies, analyzing actual inventory levels, spending and predicting future needs. Tracking orders and consumption levels with an inventory tracking system can automatically order required products dependent on sales and consumption patterns. Accurate stocking of inventory is also achieved and a record of all products, from oldest to newest, is easily

accessible. The importance of using a proper electronic inventory tracking system and appliance and equipment management methods are vital to the success of an organization. Tremendous cost savings can be achieved by following simple steps. Excessive waste can cost an organization precious money and time. This type of valuable management support, as well as the incentive provided by cutting costs, is an important benefit, which, if provided to challenge participants, would likely encourage greater participation. Additionally, such assistance could be provided pro-bono by large management consulting firms, resulting in no additional cost to the City.

**E. SUPPORT DEVELOPMENT OF INFRASTRUCTURE FOR COMPOSTING AND COMPOSTABLE FOOD PACKAGING**

In order to support some of the most progressive aspects of a food waste reduction Corporate and Institutional Challenge, such as composting and the use of compostable food packaging, the necessary infrastructure must be in place. No amount of willingness and enthusiasm from participants will result in a successful challenge unless there is a market for and infrastructure supporting diversion of food waste and recyclables. It is for this reason that the following section on Industrial Ecology uses for organic food waste is necessary to make a Corporate and Institutional Challenge a success.

## 4. INDUSTRIAL ECOLOGY

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A strong case can be made for including a section on industrial ecology for Waste Reduction and Diversion in PlaNYC 2.0. Research has shown that the greatest opportunities for an industrial ecology initiative are in the sectors of food, manufacturing and professional, and technical & scientific waste. The City's existing industrial ecology program, WasteMatch, is an initiative operated by DSNY that targets manufacturing, professional, technical and scientific waste, among other types of reusable waste. This section highlights several organizations in NYC and in other large US cities that employ best practices that can be applied to WasteMatch to expand its use and improve its efficacy. Best practices for managing organic food waste in other large US cities have also been researched. Recommendations for implementing industrial ecology initiatives in NYC through WasteMatch and by targeting food waste are presented as well as obstacles to implementing those initiatives. This section follows the organizational structure below.

- Topic Introduction
- Methodology
- Opportunities for Waste Reduction and Reuse
- Manufacturing and Professional Sectors
  - Key Findings from New York City
  - Case Studies and Best Practices from Other US Cities
  - Cost Benefit Framework
  - Obstacles to Implementation
  - Recommendations
- Food Sector
  - Key Findings from Other US Cities
  - Cost Benefit Framework
  - Obstacles to Implementation
  - Key Findings Recommendations

### 4.1 TOPIC INTRODUCTION

Industrial ecology can be described as the study of how businesses and manufacturers can enhance environmental and economic performance through collaboration in the management of waste, energy, water and raw materials.<sup>84</sup> The emphasis is on a closed loop. In short, one business's waste becomes another business's resource. Through the practice of industrial ecology, waste is upgraded to be an input in production rather than down-graded to landfills. Industrial ecology practices in NYC can decrease the amount of waste being sent to landfills as well as decreasing the cost of material inputs used in production.

In order to narrow the scope and sharpen the focus of this report, the following approach to industrial ecology was taken: (1) best practices and case studies regarding industrial ecology were evaluated and private and not-for-profit organizations that are implementing these practices within NYC were researched; (2) best practices and case studies in other US cities of similar size were also evaluated; and (3) the City's potential role in ensuring the success of such programs was determined.

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<sup>84</sup> Environment, Local Governments for Health and the. Industrial Ecology - Local Hazardous Waste Management Program in King County. 2011. Web access April 2011 <<http://www.lhwmp.org/home/BHW/industrial-ecology.aspx>>



## 4.2 METHODOLOGY

In order to approach the topic of industrial ecology, information about the commercial waste stream was gathered to establish a foundation of understanding based on metrics. The March 2004 CWMS discussed in the Introduction provided the most recent and comprehensive source of information on the detailed characteristics of the commercial solid waste stream. Therefore, the Employment-Based Estimate of the March 2004 CWMS was used in order to examine tonnage of waste generated by specific business sectors. In order to select sectors of greatest opportunity for implementing an industrial ecology initiative, sectors were considered based on four specific criteria below.

1. **Scale/tonnage of waste** – The first criteria applied was scale of the waste stream. The largest contributors to waste are where there the greatest opportunity to reduce waste going to landfills lies. The greatest commercial waste generators are those discussed in Section 1.5 of the Introduction.

2. **Overlooked Opportunities** – Non-putrescible commercial waste (C&D and Fill) is already the primary target of a current City Task Force. Therefore, although it is one of the largest sources of commercial waste, it was not chosen as a sector of focus. Similarly, materials or sectors that are already the object of successful reuse or recycling initiatives are not discussed. These materials include paper (cardboard, newspapers, office paper, etc.), metals, and some plastics that are already widely recycled. Instead, opportunities that have not yet been exploited are given greater emphasis. The Retail Trade is already addressed in great depth by the Rating Systems for Low Waste Products initiative as well as by the Corporate and Institutional Challenges initiative and so is not treated in this section.

3. **Legal/Regulatory Feasibility** – In order for there to be opportunities for industrial ecology initiatives, legal processes and regulatory obstacles cannot be so great as to make them infeasible. Specifically, issues of hazardous, toxic, or biological waste are not discussed. Health Care & Social Assistance waste could not feasibly be taken up for the purposes of this report due to the unique issues surrounding biological waste.

4. **Reuse Demand** – Industrial Ecology involves the reuse of material outputs from production processes. Therefore, there must be demand for the waste material in the marketplace. There are certain necessary characteristics for waste to be reusable.

- a. Material must be in good enough condition to be reused.
- b. There must be another industry willing and able to acquire the material.
- c. The value of the material must be great enough to justify the effort associated with its diversion from the waste stream and its associated costs.

## 4.3 OPPORTUNITIES FOR WASTE REDUCTION AND REUSE

Many NYC businesses and industries have great potential for industrial ecology initiatives. Based on the selection criteria described above, Food Services, Manufacturing and Professional, Technical & Scientific are the sectors of greatest opportunity. Given recent advances in organics recovery and reuse, organic food waste offers one of the most potentially beneficial opportunities for diversion from landfills.

Research and interviews with industry experts revealed that there are several industrial ecology initiatives in

NYC designed to facilitate the exchange of materials in these sectors. In addition to WasteMatch, a program run by DSNY, there are a number of programs run by private, public-private and non-profit organizations.

## 4.4 MANUFACTURING AND PROFESSIONAL SECTORS

### 4.4.1 KEY FINDINGS FROM NEW YORK CITY

Analysis of existing NYC initiatives is separated into two sections. The first considers ways in which WasteMatch can be improved. WasteMatch is the focal point because it has been serving as the City's primary materials exchange network and it has potential for improvement. It is a City program with a strong support team and expertise in industrial ecology programs. Therefore, seeking ways in which to improve the system already in place is more practical than developing a brand new program. The second part of this analysis examines other NYC programs and identifies their best practices. This analysis provides an underlying understanding of what is needed to run a successful program in NYC and looks for ways in which the City can adopt these practices, either to run its own programs or support private and nonprofit organizations.

#### **RECYCLED PLASTICS TO RAILROAD TIES<sup>1</sup>**

Historically, railroad ties have been made from wood that was treated to withstand weather deterioration. More recently, concrete ties have become a strong competitor to wood in the rail industry. Currently, several manufacturers including AXION International, Inc, Corporation RTI, and TieTek produce plastic railroad ties from recycled post-consumer or post-industrial plastic. Each tie requires 200 pounds of plastic, the equivalent of 1,200 plastic bottles, which means there is great demand for recycled plastics.

The unique advantage of the plastic railroad ties industry is its ability to process mixed plastics that are otherwise not usable for other manufacturers. This includes the #3-7 containers, other PVC, other plastic containers and polystyrene, plastics currently not collected by DSNY from municipal waste<sup>1</sup>. These plastics are generally more difficult for recyclers, handlers, or producers of plastic waste streams to recycle or sell. Mixed plastic has a lower market price compared to separated plastics. This is due to the nature of the manufacturing industry that some products can only be produced from single or uncontaminated plastic. The enormous replacement market for ties among the NYC's subway system poses a great opportunity for NYC involvement. A mile of track uses approximately 3000 railroad ties and currently, NYC's subway system is made of 842 miles of track. The City can introduce the manufacturers who use this technology to private haulers. The City can also recommend the adoption of plastic railroad ties for use in NYC rail lines.

<sup>1</sup> David M. Muchnick, Stephen A. Hammad, Joan Byron, E. Gail Suchman. The Oak Point Eco-Industrial Park: A sustainable Economic Development Proposal for the South Bronx. Proposal. New York: Sustainable South Bronx and Green Worker Cooperatives, 2007.

### A. WASTEMATCH

WasteMatch is a program that uses an online exchange to facilitate the trade of goods that would otherwise contribute to the landfill waste stream.<sup>85</sup> WasteMatch was founded in 1997 and is funded by the NYC Department of Sanitation Bureau of Waste Prevention Reuse and Recycling. WasteMatch's sister program,

<sup>85</sup> NYC WasteMatch. About. Retrieved March 21, 2011, from <<http://www.wastematch.org/about>>

NYC Materials Exchange Development Program (MEDP), provides technical support, networking, development and research services to organizations that focus on material reuse.<sup>86</sup> They are operated jointly with the assistance of the City College of New York (CCNY). See Appendix V for more detailed information about the program.

**Pros:** Since April 1, 1998 WasteMatch has diverted over 1.1 million tonnes of materials from landfills and achieved an estimated total cost savings of approximately \$5.2 million. WasteMatch has 4,518 members who have conducted over 4,000 exchanges.

**Cons:** WasteMatch currently faces many obstacles that have prevented it from being utilized to its fullest potential:

1. **Funding** – WasteMatch may be vulnerable whenever budgets are reconsidered.<sup>87</sup>
2. **Financial Self-Sustainability** – WasteMatch is not self-sustaining financially because it does not have an income stream; they act as a third party matching two organizations, without gaining a commission.<sup>88</sup>
3. **Public Awareness** – WasteMatch is under-promoted and unknown to many potential customers and users. As of March 2011, the database had 44 posts for wanted and available materials.<sup>89</sup>
4. **Coordination of Matching** – Difficulty coordinating and financing the transportation and shipping of the products deters buyers and sellers from participating in the program.<sup>90</sup>

**WASTEMATCH SUCCESSES<sup>1</sup>**

1. Watkins Poultry Merchants was in need of polyethylene containers (PE) and was matched with a smoked fish company that had accumulated PE containers that was once used to hold salt brine salmon.

2. A church undergoing renovations received free items from WasteMatch users including two commercial kitchen ranges from a law firm, tables, linens and chairs from a closing restaurant, and office furniture from a publishing company.

All of these materials were diverted from the landfill and helped a small business and a local non-profit.

1 NYC WasteMatch. Success Stories. Web access March 21, 2011. <[http://www.wastematch.org/exchange/?content=article.list;article\\_group\\_id=1](http://www.wastematch.org/exchange/?content=article.list;article_group_id=1)>

**BEST PRACTICES OF CURRENT NYC INDUSTRIAL ECOLOGY INITIATIVES**

Many organizations within NYC have taken initiative and begun their own reuse and recycling programs. This section focuses on three successful programs, detailing why these organizations succeeded in address-

86 Based on Interview with MEDP and WasteMatch on March 28, 2011

87 Interview notes with Robert Lange, Director, NYDS on March 4, 2011

88 Interview notes with Justin Green, Director BIG!NYC on March 24, 2011

89 NYC WasteMatch. Our Services Web access March 21, 2011. <<http://www.wastematch.org/services>>

90 Interview notes with Peggy Grayson, Administrator, Western Central New York Materials Exchange on February 28, 2011

ing their main challenges. These programs were chosen because they are all large reuse organizations based solely in NYC, each targets a different industry, and each has a different funding model. In addition, research and discussions with experts revealed that these programs were widely and consistently recognized as model reuse organizations.

	<b>BIG! NYC*</b>	<b>FilmBiz**</b>	<b>MFTA***</b>
<b>Specialization</b>	Building deconstruction materials	Entertainment/Film industry	Art supplies
<b>Warehouse Space</b>	Donors: drop off goods Recipients: purchase materials	Donors: drop off goods Recipients: purchase materials/rent props	Donors: drop off goods Recipients: pick up donated materials
<b>Economic Incentive</b>	Donors receive a tax deduction, and they also avoid storage, hauling and tipping fees	Donors receive a tax deduction, and they also avoid storage, hauling and tipping fees	Donors receive a tax deduction, and they also avoid storage, hauling and tipping fees
<b>Funding</b>	Some support from the Empire State Development	Minimal state funding, mostly self-funded	Fully funded by the City and receives supplemental funding from Friends of MFTA
<b>Full-Time Experienced Staff</b>	Director has construction and deconstruction experience and staff of 14	Founder comes from middle management in the film industry and staff of 12	Director educated in arts education and staff of 14
<b>Public Awareness</b>			Well-known organization in NYC because they have coupled their mission with education

\* Interview with Justin Green,, Director BIG!NYC on March 24, 2011

\*\* Interview with Eva Radke , Founder FilmBiz on March 24, 2011

\*\*\* Interview with Harriet Taub, Director MFTA on March 29, 2011

It should be noted that this is by no means a complete survey of the reuse organizations in NYC. The reuse sector is a diverse industry, including church programs, charities and homeless services, and for-profit, non-profit and government organizations. A complete sector assessment report of the forty reuse organizations<sup>91</sup> within NYC, conducted by MEDP in the fall of 2008, can be found at: [http://www.nycmedp.org/pdf/MEDP\\_Sector\\_Assessment\\_Report\\_\(sec\).pdf](http://www.nycmedp.org/pdf/MEDP_Sector_Assessment_Report_(sec).pdf). The report concluded that:

“[A]n abundance of unwanted materials and volunteer assistance, coupled with the advantage of fulfilling a unique niche make the reuse sector capable of growth. The study also found that the irregular nature of reusable materials in the waste stream, lack of public awareness about reuse opportunities, competition for funding, and difficulty in finding affordable operating space and transportation, constitute the challenges facing the sector.”<sup>92</sup>

91 Reuse organizations are: (1) offer reuse-based services, (2) located within NYC, and (3) service NYC residents and/or business. Only 34 organizations agreed to participate in the survey

92 NYC MEDP: The Sector Assessment Project. Fall 2008. Retrieved from <[http://www.nycmedp.org/pdf/MEDP\\_Sector\\_Assessment\\_Report\\_\(sec\).pdf](http://www.nycmedp.org/pdf/MEDP_Sector_Assessment_Report_(sec).pdf)>

In the near future, MEDP plans to offer services to help these organizations meet the challenges and ultimately help the materials exchange and reuse sector within NYC grow which include: training seminars, guidance documents, information dissemination and networking opportunities. MEDP acknowledges that working and collaborating with reuse industries, that have a vast amount of experience with both the communities and materials that they work with, is a critical step that is needed to increase the utilization of reuse organizations within NYC.<sup>93</sup>

**Pros:** An analysis of three organizations: Build it Green!NYC (BIG!NYC), Film Biz Recycling (FilmBiz), and Materials for the Arts (MFTA) reveals that similar business practices have led to their success. This chart identifies those best practices. For further information about each organization and their best practices, see Appendix V.

**Cons:** Many current limitations of the different reuse initiatives within NYC were recognized. They include:<sup>94</sup>

1. **Funding and Data Management** – Many of these organizations rely on City funding for their operations, yet there is limited funding, and this is further hindered by the organizations' lack of resources to track the necessary data needed to apply for grants. City funding is contingent upon the organization tracking their role in improving the City - socially, economically and environmentally, but many of the reuse organizations are small and do not have the means to track this information. Also, due to the diversity and quantity of materials, it is difficult to quantify and qualify all of the materials and their value in contract to the resources used to facilitate its exchange, and thus it is hard to quantify the benefits of the organizations.
2. **Transportation and Logistics** – The logistics of moving materials from donors to recipients is difficult for small organizations to tackle, and it is exacerbated in NYC, due to space constraints, labor costs and congestion. Therefore, many materials with the potential to be reused end up in landfills.
3. **Policy** – There is no policy in place that incentivizes waste producers to send their materials to reuse organizations, rather than sending it to landfills.<sup>95</sup>

#### 4.4.2 CASE STUDIES FROM OTHER U.S. CITIES

Three major US cities were selected for this study as being national leaders in their approaches toward commercial waste diversion and mitigation. Austin, San Francisco, and Seattle were chosen for their best practices and for their diverse tactics in managing and minimizing commercial waste streams. The selection criteria for comparable cities with best practices included a requirement that each city have a population in excess of 500,000 persons.<sup>96</sup> And that each city acts as a major metropolitan hub that hosts densely populated urban centers. Of the three cities selected, each has announced its intentions of achieving zero-waste

<sup>93</sup> Interview with MEDP and WasteMatch on March 28, 2011

<sup>94</sup> Interview with MEDP and WasteMatch on March 28, 2011

<sup>95</sup> Aside from a tax deduction for donated items.

<sup>96</sup> US Census. US Census 2010. Web access March 2011. <<http://2010.census.gov/2010census/>>

in the near to medium term. In their efforts toward attaining zero-waste levels, these cities have taken multi-pronged approaches to address all aspects of the waste stream. Aside from metal, glass, plastic, and food waste, these cities have developed unique systems to assist businesses in minimizing their landfill-directed waste by use of Industrial Ecology and other means.

## A. AUSTIN

The city of Austin was selected as a leader not for its existing rules, but rather for its aggressive educational and reporting initiatives. In addition, Austin made rapid strides toward significant waste diversion in 2009 when it adopted the U.N. Urban Environmental Accord's goal to reduce the per capita solid waste disposal to landfills by 20% by the year 2012 and reach zero waste by 2040.<sup>97</sup>

### Austin's Solid Waste Management Best Practices:

1. **Education** – Though it has stated a goal of zero-waste, Austin has not mandated the regulations, such as compulsory organic waste collection, that other cities with that goal have instituted. Instead, it has opted for an awareness mandate. The city requires businesses and commercial operators in Austin must begin to file a recycling Plan with Solid Waste Services. The ordinance further requires that all new employees be informed of the recycling program, and that employees must be educated about the program annually.<sup>98</sup>
2. **Reporting** – The city also requires that a volume report of recycling be filed quarterly, which can be filed by the hauler, to ensure that businesses are complying with extant recycling rules.<sup>99</sup>
3. **Proactive Assistance to Businesses** – Another of Austin's programs that it has championed in order to encourage waste diversion is the Solid Waste Service's Waste Assistance Reduction Program (WRAP). WRAP offers businesses waste assessments including an onsite confidential review of daily operations and of waste inventory, free of charge.<sup>100</sup> Program staff will provide recommendations on best practices as to how decrease accumulated and generated waste. The program will assist in identifying recycled material markets and it will advise on technical issues.<sup>101</sup>

97 Services, City of Austin Solid Waste. City of Austin Zero-waste Plan. January 2009. Web access April 2011 Retrieved from <[http://www.ci.austin.tx.us/sws/downloads/zerowaste\\_plan.pdf](http://www.ci.austin.tx.us/sws/downloads/zerowaste_plan.pdf)>

98 City of Austin Solid Waste Services . Commercial\_recycling\_ordinance.htm. Web access April 2011 <[http://www.ci.austin.tx.us/sws/commercial\\_recycling\\_ordinance.htm](http://www.ci.austin.tx.us/sws/commercial_recycling_ordinance.htm)>

99 City of Austin Solid Waste Services . Commercial\_recycling\_ordinance.htm. Web access April 2011 <[http://www.ci.austin.tx.us/sws/commercial\\_recycling\\_ordinance.htm](http://www.ci.austin.tx.us/sws/commercial_recycling_ordinance.htm)>

100 City of Austin Solid Waste Services. [http://www.ci.austin.tx.us/sws/commercial\\_wrap.htm](http://www.ci.austin.tx.us/sws/commercial_wrap.htm). Web access April 2011 <[http://www.ci.austin.tx.us/sws/commercial\\_wrap.htm](http://www.ci.austin.tx.us/sws/commercial_wrap.htm)>

101 City of Austin, Solid Waste Service. City of Austin- Waste Assessment. Web access April 2011 <[http://www.ci.austin.tx.us/sws/commercial\\_wrap\\_assessment.htm](http://www.ci.austin.tx.us/sws/commercial_wrap_assessment.htm)>

### **BY-PRODUCT SYNERGY**

Using a multi-industry collaborative framework developed by the US Business Council for Sustainable Development, the goal of By-Product Synergy is to identify and realize opportunities for innovation and cost savings. Network members work together to identify new market opportunities for waste products, find lower cost local feed stocks, and reduce costs and risks associated with wastes. Participating companies receive technical assistance and annual site waste assessments, which the group documents and includes in its matching database. By proactively matching by-products of members, rather than by allowing companies to enter postings on a case to case basis, the organization is able to achieve a higher rate of efficiency. Part of the success of the program has been attributed to the broadening of the scope of searches beyond traditional matching partners facilitated by program operators.<sup>1</sup> ranges from a law firm, tables, linens and chairs from a closing restaurant, and office furniture from a publishing company.<sup>1</sup>

<sup>1</sup> Based upon Interview with Debra Taevs. Deputy Director, Pacific Northwest Pollution Prevention Resource Center (PPRC) on April 12, 2011

## **B. SAN FRANCISCO**

Long lauded as the municipal leader in waste diversion, San Francisco continues to lead the nation in this category. Along with the city's 75% waste diversion goal for 2010 which it actually exceeded by 2% in that year, the city has targeted year 2020 for zero waste.<sup>102 103</sup>

### **San Francisco Waste Management Best Practices:**

1. **Targeting of all parts of the waste stream** – To achieve that goal, the city has adopted a holistic approach to waste mitigation.
2. **Exclusive Contracting** – To reach its lofty target, San Francisco has contracted exclusively with Recology, an employee-owned company that specializes in environmentally-sensitive waste management. Recology provides pick up for landfill waste, recycling, and compost-directed organic waste for residential and commercial buildings.
3. **Waste removal pricing model favoring recycling/reuse** – To encourage the separating of waste types, San Francisco has created a pricing structure for commercial waste generators which allows for discounts of up to 75% for recycling and organic waste hauling versus standard garbage hauling.<sup>104</sup>
4. **Strict Regulatory Mandates** – There are strict compliance codes for businesses to separate recycling from landfill directed waste mandated under the Mandatory Recycling and Composting Or-

<sup>102</sup> SFEnvironment.org. <http://www.sfenvironment.org/downloads/library/200200702.pdf>. 2002. Retrieved from <<http://www.sfenvironment.org/downloads/library/200200702.pdf>>

<sup>103</sup> SFEnvironment.org. SF Attains 77 Percent Recycling. 27th August 2010. Web access April 2011 <[http://www.sfenvironment.org/our\\_sfenvironment/press\\_releases.html?topic=details&ni=640](http://www.sfenvironment.org/our_sfenvironment/press_releases.html?topic=details&ni=640)>

<sup>104</sup> Recology. Recology waste zero. Web access 31 March 2011 <<http://sunsetsavenger.com/commercialRates.htm>>



dinance (Ordinance No. 100-09). That ordinance was the first of its kind in the US. It dictates that small businesses can be assessed a fine of \$100 and large businesses \$1,000 for non-compliance.<sup>105</sup>

**5. Investment in user-friendly tools** – To further facilitate maximum waste diversion rates, San Francisco has also invested heavily in waste matching systems and in educational programs. The city's extensive waste website section includes various calculators and tools for businesses to readily access all relevant information. One of the novel tools on the [www.sfenvironment.org](http://www.sfenvironment.org) website is a hosted waste matching service known as EcofindRRR. The sortable EcofindRRR database, which appears as a module on nearly every [www.sfenvironment.org](http://www.sfenvironment.org) webpage, allows waste generators and waste users to exchange goods to prevent waste from reaching landfills.

## C. SEATTLE

The city of Seattle has been on the forefront of waste reduction issues for several decades and it has recently targeted food waste as one of the most easily addressed commercial waste issues as the Northwest has among the highest costs for solid waste disposal in the US.<sup>106</sup>

### Seattle Commercial Waste Management Best Practices:

**1. Education & Outreach** – To ensure that implemented programs are successful, the city has hired community emissaries who are fluent in languages predominant in various city neighborhoods.<sup>107</sup> The city has also invested in campaigns in ethnic and underserved communities using print media, translated materials, and community presentations.<sup>108</sup> Also provided by the city is a dedicated Industrial Ecology (IE) web page, [www.lhwmp.org/home/BHW/industrial-ecology](http://www.lhwmp.org/home/BHW/industrial-ecology). In that section, the agency details the benefits of employing IE systems and it provides definitions and links to international partners.

**2. Investment in user friendly tools** – To encourage commercial enterprises to recycle and reuse materials, Seattle provides a range of resources to businesses, many of which are publicized on the Seattle Public Utilities website, the agency under whose auspices waste management falls in Seattle. The all-encompassing IE resource that Seattle and King County operate for businesses looking to engage in IE is the Industrial Materials Exchange, (IMEX). IMEX is a large, free, exchange which allows participants throughout the Pacific Northwest to list and sort materials. IMEX is designed to assist businesses find markets for their waste, surplus materials, and by-products.<sup>109</sup>

**3. Proactive Assistance to Businesses and Co-operation with the Business Community** – Working with the city's four franchised waste haulers, the Resource Venture program, a service of Seattle

<sup>105</sup> [sfenvironment.org.ssf\\_mandatory\\_recycling\\_composting\\_ordinance](http://www.sfenvironment.org/downloads/library/sf_mandatory_recycling_composting_ordinance.pdf). Web access April 2011 Retrieved from <[http://www.sfenvironment.org/downloads/library/sf\\_mandatory\\_recycling\\_composting\\_ordinance.pdf](http://www.sfenvironment.org/downloads/library/sf_mandatory_recycling_composting_ordinance.pdf)>

<sup>106</sup> Resource Venture. <http://www.resourceventure.org/green-your-business/waste-prevention-recycling/food/food-recycling-collection>. Web access April 2011 <<http://www.resourceventure.org/green-your-business/waste-prevention-recycling/food/food-recycling-collection>>

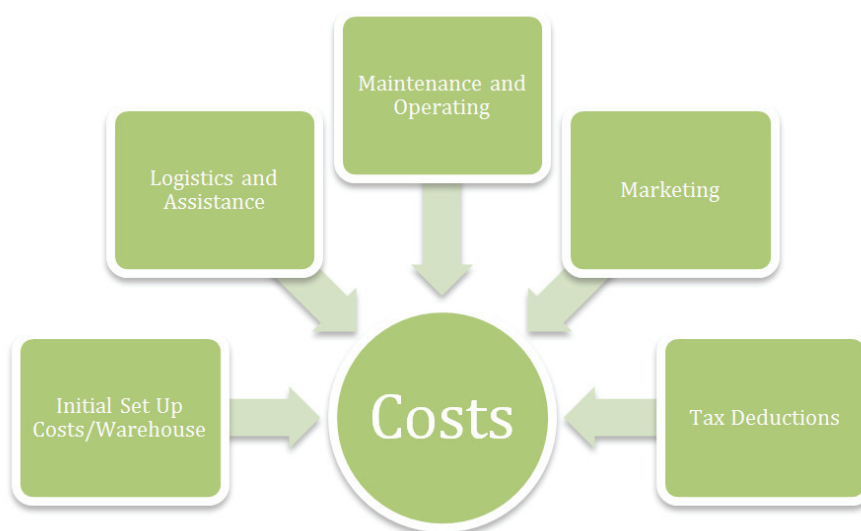
<sup>107</sup> Interview with Kelly Rula, Project Assistant, Cascadia Consulting on March 04, 2011

<sup>108</sup> Seattle, City of. City of Seattle 2009 Recycling Rate Report. Seattle: City of Seattle, 2010

<sup>109</sup> City of Seattle. Seattle Public Utilities Commercial Recycling. Web access April 2011 <<http://www.ci.seattle.wa.us/util/Services/Recycling/CommercialRecycling/index.asp>>

Public Utilities (SPU), the city offers assistance, waste matching tools, and education to businesses to ensure that conservation and waste mitigation goals are met. To increase the impact of local commercial waste mitigation programs, Seattle created Seattle-King County Industrial Ecology Roundtable which includes representatives from seven city, county and national agencies.<sup>110 111</sup>

#### 4.4.3 COST BENEFIT FRAMEWORK



The Cost Benefit Framework below can be applied to most industrial ecology programs and WasteMatch for manufacturing waste. The framework can be used by the City to assess which recommendation to adopt and what resources to dedicate to the programs. As indicated by Materials for the Arts' (MFTA) success, it is likely that the benefits will outweigh the costs. The city currently invests about \$1.2 million per year in MFTA but the program receives over \$7 million worth of donated materials per year.<sup>112 113</sup> Any cost benefit framework must also take into account the savings that donating parties receive from the program, namely tax deductions and reduced avoided hauling fees or tipping costs.

Other benefits associated with implementing a more robust industrial ecology program are the creation of new industry and new jobs for those involved in operating the program and for entrepreneurs who see an opportunity to reuse the materials and 'upcycle' them (e.g. use the discarded materials to create new products). Such a program will also save New Yorkers money by allowing them to purchase serviceable materials at a discounted price because they are used or unwanted by their producers. The clear social benefit would be a smaller environmental impact for manufacturers in NYC.

110 Environment, Local Governments for Health and the. Industrial Ecology - Local Hazardous Waste Management Program in King County. 2011. Web access April 2011 <<http://www.lhwmp.org/home/BHW/industrial-ecology.aspx>>

111 NBIS. NBIS.org/nbisresources/byproduct\_synergy. Retrieved from <[http://nbis.org/nbisresources/byproduct\\_synergy/bpsnw\\_information\\_jan09.pdf](http://nbis.org/nbisresources/byproduct_synergy/bpsnw_information_jan09.pdf)>

112 Materials for the Arts. About Us. Web access March 28, 2011 <<http://www.mfta.org/aboutus.html>>

113 Interview with Harriet Taub, Director MFTA on March 29, 2011

As presented above, the costs associated with implementing an industrial ecology program in NYC are fewer than the benefits, but they should still be considered. The costs include the purchase cost of warehouse space, and the maintenance and operation costs of such a facility. MFTA spends \$900,000 a year on renting and operating its warehouse, this accounts for about 75% of the funds allocated to them by City government.<sup>114</sup> Other costs include staffing and labor costs, marketing, and technical assistance services to help donors donate materials.

#### 4.4.4 OBSTACLES TO IMPLEMENTATION

There are several current challenges that the reuse industry in NYC faces. These are obstacles that the City must consider as a part of implementing any of the recommendations in the following section.

1. **Scarce Resources:** There are few City resources and little funding available for reuse initiatives at present. In fact, WasteMatch has seen its funding cut in recent years. If a warehouse is to be purchased or funding is to be provided to help non-profit organizations start up reuse initiatives, this funding obstacle must be overcome. However, once operational, these programs should become self-sustaining, and require no City resources, making this a one-time issue.
2. **Space:** NYC is limited in space, so it may be difficult to locate a warehouse within its borders. In addition, the warehouse should be conveniently located to allow donors and recipients to use the services.
3. **Staffing:** Additional staffing is needed to make these programs run efficiently, especially to run and manage a warehouse. Suitable management to run the nonprofit organizations with industry expertise may also be difficult to find.

#### 4.4.5 RECOMMENDATIONS

##### A. PRIMARY RECOMMENDATION

Expand WasteMatch's scope and capabilities while maintaining the website for long-term and continuous exchanges and wanted materials

1. **Expand Warehouse Space** – The City should follow the footsteps of BIG!NYC and Film Biz and set up a warehouse where donated items can be dropped off. This allows individuals to discard of their materials when they want to, rather than waiting for a response from WasteMatch. WasteMatch may be able to use underutilized warehouse space owned or operated by the City. Otherwise, WasteMatch will probably require some capital upfront which may take the form of a loan to pay for warehouse space until it can become self-sustaining.
2. **Increase Funding** – By increasing its scope to include the sale of donated materials, WasteMatch can help fund itself. Donors will also receive a tax deduction, giving them an incentive to donate. WasteMatch should sell some of the donated items to cover its operating costs, donate them to

<sup>114</sup> Interview with Harriet Taub, Director MFTA on March 29, 2011

other nonprofit organizations or provide discounted deals to small business and green projects.

**3. Staffing and Proactive Matching** – Staff the warehouse with an experienced director and full time staff. Staff member(s) should help facilitate exchanges and locate buyers and donors for materials. This will make the exchange more effective and will identify new organizations that could benefit from the system.

**4. Maintain WasteMatch's Online Database** – The online database should be maintained for long-term and continuous exchanges, such as wood scraps and PET containers. It should also be maintained for items that should go directly from the buyer to seller/donor, where the seller/donor does not want to transport the materials, or if the seller wants to sell the materials instead of donate them. In addition, the online exchange should be a place where people post wanted items for the staff. This will aid the staff in making exchanges and will eliminate the need for organizations to go to the warehouse if they are looking for particular items.

## **B. SECONDARY RECOMMENDATIONS**

If the City chooses not to implement the primary recommendation, there are a number of alternative options that the City could also adopt.

**1. Export Materials** – Allow WasteMatch to supplement its funding by entering into agreements with their members that allow them to purchase (for a price or for free) any of the materials that have taken longer than a certain amount of time to place. These procured materials could then be sold to recycling centers, likely in China and India, where there is demand. Although reuse and recycling is not the intent of this program, recycling the unsold materials could provide WasteMatch an income stream while also ensuring that these materials still do not enter the waste stream. In order to implement this, WasteMatch will need to: (1) increase its users so to have enough materials sell, (2) enter into contracts with their members to allow for these exchanges, (3) identify and develop relations with recyclers that will purchase the materials, and (4) deal with the transportation and handling of the materials.

**2. Public Awareness** –WasteMatch could be better utilized if it well publicized and many organizations do not know that they have an alternative to disposing of their still usable materials. For WasteMatch to be successful it is important that it reach a critical mass of users. Currently, there is no incentive for individuals and organizations to use WasteMatch over Craigslist. The City should provide information to companies and nonprofit organizations when they register with the State, incorporate information about WasteMatch in the recycling campaign for those products that cannot be recycled, and find other means to educate the public about WasteMatch so that it becomes a go-to database for organizations that are looking to procure or discard of materials. The City can also require that all of its agencies use WasteMatch so that they can lead by example and increase the user-base.

**3. Encourage the development of non-profit organizations or contract out the task of promot-**

**ing reuse to private and nonprofit organizations. These organizations should target particular industries and be managed by ex-industry personal**

a. **Target Specific Industries** – Both Film Biz and BIG are successful because they narrowed their focus to a particular industry and within that focused solely on reselling or renting donated items. ReBuilders Source (“ReBuilders”) in the Bronx did not follow this business plan and for that reason failed.<sup>115</sup> ReBuilders focused on one industry—waste from construction and demolition, but it was also a coop that employed and trained unemployed individuals. Resources were spent on training inexperienced employees, rather than on procuring donations and selling items.

b. **Hire management personnel from that particular industry** – Film Biz attributes its success to its management that came from the film industry. Eva Radke, the founder, worked in the film and commercial business for 15 years before she started her nonprofit organization. This background proves to be invaluable because she understands where most of the waste comes from, knows how to target the industry to repurchase its “waste,” and is able to use networking and to increase her clientele.<sup>116</sup>

**4. Expand MEDP to allow the organization to provide more opportunities for collaboration, sharing resources and materials for reuse organizations, and set up a reuse sector transportation program<sup>117</sup>**

a. **Expand MEDP** – Currently, MEDP provides services to the reuse organizations throughout NYC, and expanding MEDP would allow it to reach more organizations and provide better support. Such services include promoting the reuse organizations’ activities, and development support to help the reuse organizations work together to expand their capacity and reach more donors and recipients. The ultimate goal of these services is to help these organizations secure a funding base and gain support from other organizations within the reuse sector.

b. **Transportation Program** – One of the challenges for most of these organizations is the logistics and financing of transporting donated materials from donors to the warehouse or recipients. A reuse sector transportation program would allow smaller organizations to expand their programs by being able to receive and redistribute more materials. In addition, this will help larger organizations deal with overflow and mismatched donations by coordinating with other reuse organizations that could accept these items. This could be done setting up a dedicated trucking service or by incentivizing commercial trucking companies to donate or “buy in” some time to support the reuse sector.

<sup>115</sup> Interview with Justin Green, Director BIG!NYC on March 24, 2011

<sup>116</sup> Interview with Eva Radke, Founder FilmBiz, on March 24, 2011

<sup>117</sup> Interview with MEDP and WasteMatch on March 28, 2011

## 4.5 FOOD SECTOR

### 4.5.1 KEY FINDINGS FROM OTHER U.S. CITIES

**Pros:** NYC can learn from other US cities that have benefited from organic food waste recovery. The chart below identified the key attributes that make each model city's food waste management successful.

	San Francisco	Seattle	San Jose**
<b>Mandatory Organic Food Waste Recovery</b>	Yes Requires all residents, businesses and restaurants to compost	Yes Requires only quick-service restaurants	No
<b>Mandatory Compostable Food Packaging</b>	Yes	Yes Requires food service establishments to use compostable or recyclable single-use food packaging	No
<b>Exclusive Haulers/Hauler Contracts</b>	Yes One exclusive hauler	Yes Four exclusive haulers	Yes
<b>Exclusive Composter Arrangement</b>	Yes	Yes	Yes
<b>Aerobic* Digestion/Composting</b>	Yes	Yes	No
<b>Anaerobic* Digestion</b>	Yes	No In the permitting stages for an anaerobic digester	Yes The Environment Service Department in San Jose suggested that an anaerobic digester
<b>End Use</b>	Quality and products suitable for farming use	Quality and products suitable for farming use	Not available
<b>Comments</b>	Composting tipping fee lower than mixed waste tipping fee for businesses thereby providing an incentive	Seattle's compostable food packaging law has been effective at preventing the contamination issues in organic food waste, which helps ensure the quality of the composting end products	According to San Jose's ESD, anaerobic digestion will allow the city to generate renewable energy, reduce odor and greenhouse gases (GHGs), and promote green technology innovation

\* Anaerobic digestion and aerobic digestion are technologies that convert organic food waste into energy and fertilizer. See Appendix V.

\*\* The information is based on proposed regulations, not yet adopted.

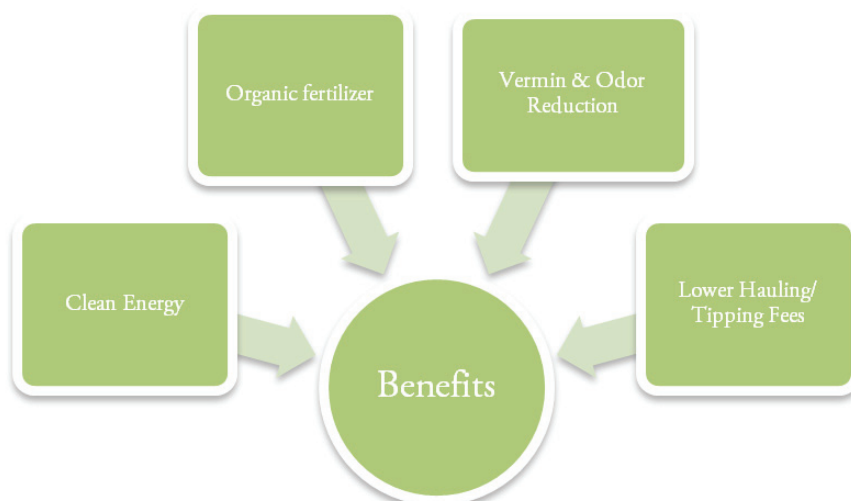
### **HUNTS POINT FOOD DISTRIBUTION CENTER PLAN<sup>1</sup>**

The Hunts Point Food Distribution Center in the Bronx is located on land owned by the City of New York, and is composed of parcels of land leased to over twenty tenants, including the New York City Terminal Market and the Fulton Fish Market. The Terminal Market and Fulton Fish Market generate approximately 27,400 tons of waste per year or about 111 tons per day, roughly three-quarters of which is biodegradable. While this material could be a valuable input for an organics recovery operation, the tonnage is at the low end of the range required for a facility to be economically feasible. Anaerobic digestion, which produces biogas or electricity as by-products, would be an optimal technology to introduce at Hunt Point; it is both technically and economically feasible. To handle the 24,480 tons of organic waste generated annually, the estimated cost of an appropriately sized anaerobic digestion facility would cost between \$9,406,500 and \$9,906,500, while the annual operating costs would range from \$1,381,850 to \$1,831,850. The savings on tipping fees for a facility using anaerobic digestion could range between \$61 – \$83/ton, while the collection cost would be at \$26/ton.

<sup>1</sup> DSM Environmental Services, Inc. <http://www.nycedc.com/ProjectsOpportunities/CurrentProjects/Bronx/HuntsPointVisionPlan/Documents/HPOrganicsRecoveryFeasibilityStudy.pdf>. 5th December 2005. Retrieved from <<http://www.nycedc.com/ProjectsOpportunities/CurrentProjects/Bronx/HuntsPointVisionPlan/Documents/HPOrganicsRecoveryFeasibilityStudy.pdf>>

#### **4.5.2 COST BENEFIT FRAMEWORK**

There would be many benefits associated with increased organic food waste recovery in NYC. Social benefits to NYC include public health gains resulting from fewer vermin and reduced odor. Private benefits include cost savings for businesses. Landfill tipping fees are higher than fees charged by composting facilities. Peninsula Composting Group in Wilmington, Delaware charges \$45/ton of organic waste while three landfill sites<sup>118</sup> in Delaware have a landfill fee as high as \$80/ton.<sup>119</sup> Were organic food waste collected regularly alongside other waste and were there sufficient capacity to handle all of the organic food waste from NYC, businesses would be inclined to divert their organic food waste away from landfills and towards composting to decrease the cost of waste hauling services.



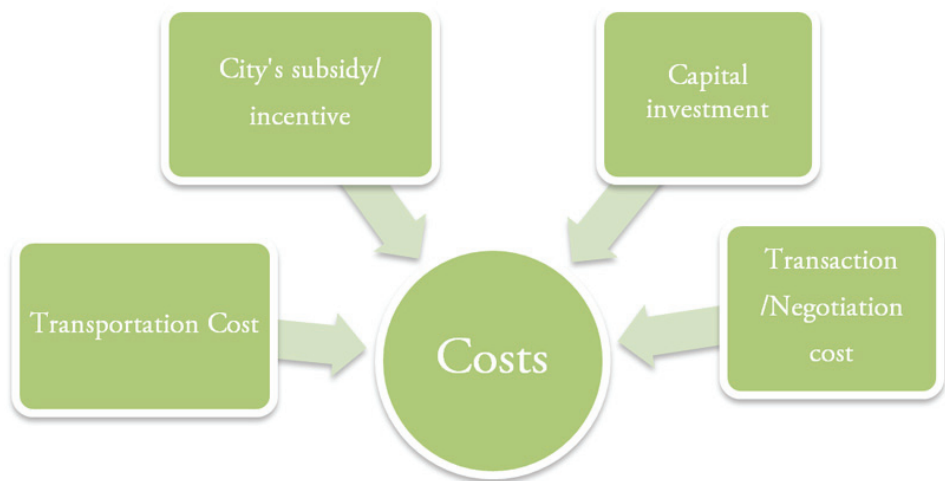
<sup>118</sup> Cherry Island Landfill, Sandtown Landfill and Jones Crossroads Landfill

<sup>119</sup> DSWA, DSWA Facilities – Cherry Island Landfill. Web access March 2011 <[http://www.dswa.com/facilities\\_nswmc.asp](http://www.dswa.com/facilities_nswmc.asp)>



On a larger scale, the direct benefits of organic food waste recovery are organic fertilizer made from compost, biogas and the electricity that could be produced from it, should organic food waste be used for renewable waste-to-energy projects by the City. The revenue from the volume of compost that could be generated by the organic food waste diverted from NYC restaurants is approximately 720,000 tons/year or 18 million dollars per year.<sup>120</sup> According to Hunts Point Food Distribution Center Plan, the value of the electricity that could be generated from a waste-to-energy project is estimated to be \$126.63 / ton<sup>121</sup> of organic waste, thus the potential electricity generation from 1,200,000 tons of NYC restaurant waste could be 151,960 Megawatt-hours<sup>122</sup> or \$12,156,862.<sup>123</sup>

The costs to consider for an industrial ecology initiative for organic food waste include the potential need for more garbage trucks on the road if separate trucks must be used for organic food waste; however, it is likely this effect will be offset by a reduction in trucks hauling other mixed putrescible commercial waste. Additionally, if organic food waste facilities for composting or waste-to-energy are located in or around NYC, trucking costs might also ultimately be reduced. Currently trucks hauling organic food waste load food waste directly at food service establishments and drive directly to composting facilities. The estimated number of trucks required for an organic food waste hauling fleet to collect waste from all NYC restaurants is 421 trucks.<sup>124</sup>



Should the City choose to invest in an organic food waste treatment facility, the capital investment could potentially be off-set by grants from Federal agencies such as the EPA or Department of Energy. Based on the Hunts Point Food Distribution Center Plan, anaerobic digestion development could cost about \$384.25/ton<sup>125</sup> or \$461,102,941 for 1,200,000 tons of restaurant organic waste. The City could also encourage the private companies to invest in an organic food waste treatment facility by providing an incentive or subsidy, or helping private companies apply for Federal or State grants to build and operate a facility.

120 1,200,000 annual restaurant food waste x 60% x 25 dollars/organic waste

121 (248,000USD /0.08USD/KWH)/(24,480 tons)

122 (126.63 x 1,200,000 tons)/1,000

123 (151,960,000 KWH) X (USD 0.08)

124 (24,000x50/300days)/(38tons per day/ 4 trucks)

125 (9,406, 500 USD)/(24,480 tons)

There would be negotiation and transaction costs associated with the City playing this type of role. After the cost and benefit items are identified and quantified, they should be valued and discounted, resulting in decision indicators: NPV, EIRR, BCR etc. Next a sensitivity analysis should be conducted to highlight the effects of changes in the context on key decision indicators as a result of changes in these inputs.

#### 4.5.3 OBSTACLES TO IMPLEMENTATION

**1. Lack of facilities with the capacity to handle NYC's commercial organic food waste:** Peninsula can accept approximately 160,000 tons per year of source separated organic food waste,<sup>126</sup> compared to roughly 1.2 million tons of organic waste from restaurants alone. In order to increase organics recovery capacity, there is a need for more food waste facilities or larger capacities at current facilities.

**2. Not In My Back Yard (NIMBY) opposition and limited space in NYC to Locate Food Waste Recovery Facilities that are located far from the City:** The organic food waste that is recovered in NYC is ultimately transported to Peninsula in Wilmington, Delaware because there are no closer and more easily accessible facilities able to accept the waste. Therefore, the transportation cost to private haulers is relatively high compared to hauling solid waste. NYC has no composting site located within the City that can handle large amounts of organic food waste. This is due to the inherent lack of space in NYC and the NIMBY effect.

**3. The highly competitive nature of NYC's commercial waste hauling industry results in fractured organization amongst haulers and a lack of leadership in driving commercial investment in composting and reuse infrastructure:** NYC's waste management system is not divided amongst different haulers, transfer stations and out-of-state landfills and waste treatment facilities. At present the City does not exercise direct oversight or play a role to unify and rationalize these processes. Thus, a centralized solution is difficult to achieve due to the sheer number of parties involved<sup>127</sup> and the fact that there is no responsibility assigned to any specific party. Without a centralized solution, resources are scattered and there is less economy of scale. This is especially important because composting and reuse infrastructure has a high startup cost, so a party will only invest if the risk is minimized.

#### 4.5.3 RECOMMENDATIONS

##### A. PRIMARY RECOMMENDATIONS

**1. Encourage the development of organic food waste recovery facilities that use anaerobic digestion or other technologies—**Encouraging organic food waste recovery facilities to use anaerobic digestion or other clean technologies can mitigate some of the NIMBY issues surrounding composting facilities allowing them to expand their capacity. Anaerobic digestion processes are implemented in closed environments, controlling the unpleasant odors typically associated with composting facilities.<sup>128</sup> Also, the technology yields valuable byproducts such as biogas, which can be used for energy generation.

<sup>126</sup> Wilmington Organic Recycling Center. Peninsula Composting Group. Web access 24 March 2011 <<http://www.peninsulacompostcompany.com/facilities/WORC.html>>

<sup>127</sup> Interview with David Hurd, Director Office of Recycling Outreach and Education (OROE), Plan NYC. on 25 March 2011

<sup>128</sup> Mark A. Moser. "Anaerobic Digesters Control Odors, Reduce Pathogens, Improve Nutrient Manageability, Can be Cost Competitive with Lagoons, and Provide Energy Too!" Retrieved from <[http://www.epa.gov/agstar/documents/lib-man\\_man.pdf](http://www.epa.gov/agstar/documents/lib-man_man.pdf)>

**2. Market Compost to Bridge the Gap Between Composting Demand and Supply** —The City could incentivize and encourage farmers, residents, and other individuals or organizations that demand compost and fertilizers to purchase the compost from composting facilities that receive organic food waste from NYC. This will create demand for the end product, which will provide an additional incentive to the involved parties to build composting facilities in or near NYC.

## **B. SECONDARY RECOMMENDATIONS**

**1. Conduct an In-Depth Study of Commercial Waste with Cost Benefit Analysis** – Understanding NYC's commercial waste stream will assist NYC to plan and implement any of these initiatives. A comprehensive cost benefit analysis would help to inform a range of decisions from setting the proper hauling fees to picking the right technology solutions.

**2. Cooperate and Enter into an Exclusive Hauling Contract with Hauler(s) for a Public-Private Organic Food Waste Recovery Pilot Program**—Entering into an exclusive contract with a hauler would allow the hauler to invest in composting infrastructure by reducing the risk associated with such investments. An exclusive citywide contract for hauling organic food waste would stabilize hauling prices and reduce the risk associated with uncertainty of supply by ensuring a waste stream.

**3. Mandate That All Food Service Establishments Separate Organic Food Waste** – Requiring proper sorting and diversion of organic food waste would achieve two goals: ensuring that composting facilities have a sufficient supply of organic food waste to run their operations effectively; and preventing contamination, which will increase efficiency and produce a higher quality compost end product. This recommendation represents a far more extreme approach than the Corporate and Institutional Challenge in Section 3 to encourage diversion and should be considered only if other measures fail.

## 5. STAKEHOLDER ANALYSIS

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As with all initiatives, should the City of New York adopt any of the recommendations for commercial waste reduction detailed in this report, the roles of various stakeholders and their potential reactions to implementation should be considered. There is a wide range of stakeholders, both formal and informal, who contribute to the production, collection, and overall management of commercial waste in New York City. For the purposes of this report, the stakeholder focus is on the roles of the DSNY, NYC citizens, and affected businesses in the successful implementation of the three waste reduction initiatives.

- The **City of New York** is the central stakeholder in all of these initiatives. For City government officials and agencies, reductions in the commercial waste stream would result in less wear and tear on City streets and fewer garbage trucks driving through City neighborhoods. The City also has the potential to benefit from these waste reduction initiatives by furthering its reputation as a pro-active environmentally-friendly and sustainable city. In order for these initiatives to succeed, the City must take an active role in coordinating these initiatives. The size of the role it plays varies depending on the initiative and has been described in greater detail in the preceding sections.

- **DSNY** is the world's largest sanitation department, with over 7,500 uniformed workers and 2,000 civilian workers who are responsible for collecting over 12,000 tons of residential and institutional refuse and recyclables per day.<sup>129</sup> In addition to the recent deployment of the Solid Waste Management Plan, DSNY has contributed to the City's waste reduction efforts with several initiatives such as the NYC City Sen\$e Project, the NYC Wasteless Business Project, MEDP and WasteMatch. Given its responsibilities and authorities, the DSNY clearly has an important role in any NYC waste reduction initiative both as a supporter and beneficiary.

- **NYC citizens** are responsible for generating over 12,000 tons of residential waste each day<sup>130</sup> and citywide commercial waste reduction initiatives will only be effective with New Yorkers' participation, beginning with their consumption behaviors. By demanding low-waste products or products made with recycled materials, every citizen can be a supporter, participant, and eventually a beneficiary of the NYC's commitment to reduce waste. As necessary contributors to the success of the front-end component of a successful Corporate and Institutional Challenge, consumers may prove to be resistant participants especially when being asked to adjust their behavior. Over a longer period of time, New Yorkers and commuters will likely adapt to and comply with the new waste diversion practices of businesses and institutions. Consumers, citizens, and commuters can benefit from more sustainable products as well as from a sense of well-being and pride associated with belonging to and participating in NYC's environmental sustainability efforts.

### COMMERCIAL AND SECTOR-SPECIFIC STAKEHOLDERS

- **Commercial Waste Haulers and Trade Waste Brokers** are stakeholders deeply invested in the outcome of any of the initiatives presented in this report. On the one hand, they may be resistant to the ultimate goal of waste reduction since it may reduce their business revenue if the overall weight and volume of waste decreased without rates increasing. However, since properly segregated recyclables, especially paper, are val-

<sup>129</sup> Department of Sanitation New York City. (2011). About DSNY. Web access <<http://www.nyc.gov/html/dsny/html/about/about.shtml>>

<sup>130</sup> "Henningson, Durham & Richardson Architecture and Engineering, P.C. and its Subconsultants, (2004). "Commercial Waste Management Study", Volume II, Commercial Waste Generation and Projections, March 2004, Accessed on 21 Feb, 2011. Retrieved from <<http://nyc.gov/html/dsny/downloads/pdf/swmp/swmp/cwms/cwms-ces/v2-cwgp.pdf>>

ued and sought after in the global marketplace at present, increased diversion could be an aspect they may support. Similarly, as landfilling fees increase overtime, there is potential for greater profitability from the sale or at least no-cost dumping of diverted materials like recyclables and organic food waste than there is in regular mixed solid waste.

Non-profit and for-profit environmental consulting firms are stakeholders that can benefit from waste reduction initiatives by offering their services to businesses participating in Corporate and Institutional Challenges or in Industrial Ecology exchanges. They can provide their services pro-bono on a volunteer basis or for a fee depending on their goals and perceived long-term advantage.

- **Hospitality Industry stakeholders** are hotel owners, operators, guests, workers and the unions that represent them. The most important concern for hotel owners and operators are the costs associated with instituting waste reduction initiatives; very few hotels will go beyond what is required by law unless challenged to do so. Hotels typically prefer that information pertaining to their waste management practices remain confidential and are reluctant to share information on their performance as it relates to waste generation and energy use. Local Law 84, which will take effect on May 1, 2011, requires large hotels (buildings of 50,000sq. ft. or more) to benchmark energy use going forward. Initiatives like a voluntary Corporate and Institutional Challenge that require them to share waste management information will most likely attract only those hotels with good waste management practices already in place. Hotel workers, another key group, are represented by several different unions depending on their positions; the most prevalent is Local 6: The Hotel, Bartenders and Club Employees Union. Workers and their unions may be resistant to initiatives they construe as additional work.

- **Retail Trade stakeholders** in NYC are retail business owners and their employees, wholesale suppliers and consumers of retail goods, New Yorkers and visitors alike. Like most business owners, the factors which will incentivize and motivate retailers are the potential for cost-savings and an improved image as a result of engaging in sustainable practices. Consumers are motivated by low prices on the one hand and by their purchasing values on the other. Depending on their preferences, consumers may be motivated to purchase products from retailers actively engaged in reducing waste. Wholesalers will be motivated to meet the demand of their customers, the retailers, for products with less transport packaging provided that costs are lowered or that any additional cost of doing so are not transferred to them.

- **Building and Property Management sector stakeholders** are NYC building and property Management firms and their employees, tenants of their properties, and housekeeping and maintenance staff for those buildings and properties. Like most business owners, the factors which will incentivize and motivate building and property managers are the potential for cost-savings and an improved image as a result of engaging in sustainable practices. For tenants the primary concern is low rent rates. Tenants may also prefer that a building has good waste management practices for reasons relating to pest control. Tenants, especially those whose business' reputation or mission is based in sustainability, may also prefer a building management company which actively pursues waste reduction measures. Some tenants could resist waste diversion requirements imposed by building management but given the legal requirements around waste diversion, this is most likely to manifest itself through lack of compliance rather than open disagreement. Finally and

most importantly, the housekeeping and maintenance staff for buildings and properties and the unions that represent them are essential stakeholders whose buy-in is crucial for effective implementation of at-source waste diversion measures. It is likely that housekeeping and maintenance staff would resist added responsibility for waste segregation, if proper education, training or incentives are not provided. Training and education do have the potential to be effective based on the anecdotal evidence available.

- **Food Sector stakeholders** include owners and operators of food services establishments, their employees and staff, and organic waste processors. Owners and operators of food service establishments are motivated by the opportunity to cut costs by reducing losses resulting from poor food inventory control and lower hauling fees. These stakeholders may also seek positive publicity. Employees can benefit from a morale boost associated with working in an environmentally friendly environment, and potential training opportunities. Participating in a workplace competition and potentially receiving incentives provided by management for good performance are other factors in favor of the challenge for employees. Employees and staff of food service establishments, however, are likely to be reluctant to add more tasks to their workload, especially if they do not adequately understand the reasons and do not understand the positive effects of their efforts.

- **Institutional stakeholders** are school and university administrators who are motivated by many of the same factors as other businesses. Cutting costs and achieving recognition among peers and the broader community are important motivations for administrators, as well as any awards or financial incentives provided, especially as part of a Corporate and Institutional Challenge initiative. Organizing students and staff around a common goal can also be an important community-building tool for administrators. Teachers and staff may find educational opportunities for students in such challenges and be motivated by the opportunity for practical learning. Teachers and staff, however, are also most likely to be the responsible parties for ensuring that waste is diverted in the classroom and cafeteria and for monitoring student participation. Unless this added work is recognized and does not detract from preparation period time, class time, or go beyond the school day, it should not encounter significant resistance from teachers and staff. Students and parents are the final stakeholders in institutional challenges and are its main participants. More often than not students will be happy to participate. In the case of young students, some parents may welcome the opportunity to teach their children about waste and environmental stewardship, while others might resent being compelled to participate.

## 6. CONCLUSION

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An integration of the three initiatives described here – Rating Systems for Low Waste Products, Corporate and Institutional Challenges, and Industrial Ecology – presents a holistic vision of waste management tailored to commercial waste. By reducing waste at its source through smarter purchasing decisions, recycling and diverting recyclable and organic waste at its point of use, and reusing waste that has been thus diverted, it is possible to reduce the amount of waste going to landfills and the overall amount of commercial waste generated by New York City. Existing models and best practices for each initiative, including specific case studies, have been identified and described and recommendations for next steps, along with the obstacles to their implementation, have been provided. Conclusions specific to each initiative are summarized below along with a special section on conclusions specific to the food sector.

At this point, further research and analysis are required to quantify the exact potential waste diversion rate increases, overall amount of waste reduction, and the associated cost-savings to the City resulting from adopting these initiatives; preliminary estimates, are found in the Cost Benefit Framework sub-sections of each initiative. An in-depth costing study would be best conducted after the findings of the ongoing waste characterization study become available. The results of this study would establish a baseline against which to measure the success of these initiatives. In the meantime, inclusion of these initiatives in PlaNYC 2.0 is a promising start to reducing the commercial waste stream.

### RATING SYSTEMS FOR LOW-WASTE PRODUCTS

NYC has the opportunity to reduce its waste through a source waste reduction product rating system. A pilot program that uses third-party product raters, like the ones discussed above, to assess source waste reduction through packaging would allow the city to determine the efficacy of utilizing a product rating system to decrease waste. Based on the results of the pilot program, the City could then develop short and long-term objectives for implementing a rating system. This approach is consistent with existing City government practices and harmonizes with two new pieces of legislation for 2011. The first proposes packaging reduction guidelines for City agency contractors. The second, Resolution 0628-2011, calls upon the New York State Legislature to regulate the amount and type of packaging used to encase goods procured by the State and its localities. A similar earlier pilot program, established through the “Greening Our Cleaning Act,” successfully utilized the Green Seal rating system to select environmentally-friendly cleaning products. That pilot concluded that Green Seal products were viable alternatives to those previously procured, setting precedent for using third party raters to assess environmentally-friendly procurement. Building upon the success of the “Greening Our Cleaning Act” pilot, the City could easily replicate the structure and leverage relationships developed previously for a similar pilot evaluating product packaging, while using lessons learned from the prior program to inform the development and implementation of the new one.

### CORPORATE AND INSTITUTIONAL CHALLENGES

Corporate and Institutional Challenges have been demonstrated to successfully reduce the waste generated by participants, especially when challenges reflect the seven best practices described above. Among the sectors examined – Hospitality, Retail, Building and Property Management, and Food – NYC could particularly benefit from a waste reduction challenge that targets the food services sector. This sector represents a great opportunity for waste reduction due to its volume, and therefore potential for diversion from landfills, and the lack of existing challenges for this sector in NYC. To realize the full benefit of such a challenge, the



City could provide incentives for challenge winners, enhance the waste management capacity of businesses, and support infrastructure to accommodate organic waste hauling and composting. Measures such as compostable prepared food service containers could be considered only once such infrastructure is in place; in the interim, a challenge should require participants serve prepared food containers recyclable under NYC's current program. The Hospitality, Retail and Building and Property Management sectors could also be considered for waste reduction challenges. Many businesses in these sectors already participate in challenges or recycle in accordance with City regulations; however, a challenge could improve the diversion rate in all these sectors.

## INDUSTRIAL ECOLOGY

The two sectors which offer the greatest opportunity for Industrial Ecology programs are the manufacturing and professional sectors and the food sector. The City's official materials exchange program, WasteMatch, targets manufacturing and commercial materials suitable for reuse. The WasteMatch program could improve and increase the amount of waste traded and diverted through its website by integrating several best practices utilized by other organizations within and outside of New York City. Implementation of these best practices would include providing WasteMatch with a physical presence, namely warehouse space for materials and a full time dedicated warehouse staff. A physical presence would also allow WasteMatch achieve economic stability and become self-sustaining by funding itself through the receipt and sale of donated materials. The proposed WasteMatch staff could also offer consulting services to businesses so as to pro-actively link material donors and recipients. In the food sector, the primary material output for reuse is organic food waste. Best practices from other large US cities suggest that for industrial ecology programs that use organic food waste as an input to be effective, there is a need for regulation mandating food waste diversion. Other cities have also exclusive contracted the sale of this waste to specific haulers and facilities. Such mandates support industry ecology by reassuring the private sector that any investments in organic food waste recovery will be recouped, thereby supporting the market for organic food waste. The City can also support organic food waste recovery by helping to create demand for the end product of such industrial ecology measure, i.e. compost.

## FOOD WASTE

As can be seen from the sections on the Corporate and Institutional Challenges initiative and the Industrial Ecology initiative as well as from the Sections 1.5 and 1.6 of the Introduction, food waste presents a challenging waste management puzzle which raises a chicken-and-egg question. On the one hand, for a successful Corporate and Institutional Challenge directed at the food services sector that has organic food waste diversion as a central feature, there must be an infrastructure in place to support the collection and disposal of organic food waste. On the other hand, for an Industrial Ecology initiative which uses organic food waste as the input to work, there must be a ready supply of organic food waste available to the industries that would use it in order for them to invest in new facilities in and around New York. Intervention on the part of the City would be required to break this current holding pattern. One way to do this is to announce plans for a phased-in schedule for an organic food waste diversion mandate to allow time for businesses and industries to adequately prepare for such a time and put the necessary systems in place on their own. In addition to presenting some of the greatest opportunities, organic food waste also presents one of the most challenging and complex targets for waste diversion and reuse initiatives.

## 7. APPENDICES

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### APPENDIX I: BIBLIOGRAPHY AND INTERVIEW LIST

#### BIBLIOGRAPHY

America for Nonsmokers' Rights. Web. Access in Feb, 2011. <[www.no-smoke.org](http://www.no-smoke.org)>.

American Forest & Paper Association, (2011). "American Forest & Paper Association Recycling Awards." Web. <<http://paperrecyclingawards.org/>>

American Hotel and Lodging Association, (2011). "Certification programs". Web. Accessed on 22 Mar, 2011. <<http://www.ahla.com/>>

Audubon International. "Audubon Green Leaf™ Eco-Rating Program". Web. Accessed on 14 Mar, 2010. <<http://www.greenleaf.auduboninternational.org>>

Austin, City of. March 2011 [http://www.ci.austin.tx.us/sws/commercial\\_wastesmart.htm#partners](http://www.ci.austin.tx.us/sws/commercial_wastesmart.htm#partners). <[http://www.ci.austin.tx.us/sws/commercial\\_wastesmart.htm#partners](http://www.ci.austin.tx.us/sws/commercial_wastesmart.htm#partners)>.

Austin, City of . Solid Waste Services. [Commercial\\_recycling\\_ordinance.htm](http://www.ci.austin.tx.us/sws/commercial_recycling_ordinance.htm). April 2011 <[http://www.ci.austin.tx.us/sws/commercial\\_recycling\\_ordinance.htm](http://www.ci.austin.tx.us/sws/commercial_recycling_ordinance.htm)>.

Benmar, C., (2010). "How Chicago Became the City of Green Shoulders." Cities of the Future. Web. Access in Mar, 2011. <<http://www.grist.org/article/2010-08-31-how-chicago-became-the-city-of-green-shoulders>>.

Biodegradable Packaging Institute. "The Compostable Label". Web. Accessed on 22 Mar, 2011. <<http://www.bpiworld.org/BPI-Public/Program.html>>

Build It Green! NYC. Build It Green! History. Web Access Mar 2011. <<http://www.bignyc.org/history>>.

Build It Green! NYC. How Does It Work?. Web Access Mar 2011. <<http://www.bignyc.org/how%20does%20it%20work>>.

Build It Green! NYC. How To Donate. Web Access Mar 2011. <<http://www.bignyc.org/how-to-donate>>.

Build It Green! NYC. What We Do. Web Access Mar 2011. <<http://www.bignyc.org/whatwedo>>.

Building Owners and Managers Association (BOMA) International., (2011). "BOMA STARS." Web. <<http://www.boma.org/getinvolved/BOMASTARS/Pages/default.aspx>>

Business Integrity Commission, (2011). "Approved Trade Waste Brokers," February 4, 2011, Accessed on 21 Feb, 2011. Retrieved from <<http://www.nyc.gov/html/bic/downloads/pdf/pr/brokersaprov0909.pdf>>

California Department of Resources Recycling and Recovery. <http://www.calrecycle.ca.gov/Markets/>. March 2011 <<http://www.calrecycle.ca.gov/Markets/>>.

California Department of Resources Recycling and Recovery, (2004). "Environmentally Preferable Purchasing Policy City of Berkeley." Web Access Mar, 2011. <<http://www.calrecycle.ca.gov/BuyRecycled/Policies/>>.

California Department of Resources Recycling and Recovery. Web Access in Mar, 2011. <<http://www.calrecycle.ca.gov/ReduceWaste/>>.

Cedar Grove. Technology. 31 March 2011 <[http://www.gogreenscene.com/cg\\_systems.asp](http://www.gogreenscene.com/cg_systems.asp)>.

Chen, C. "Design for the Environment: A Quality-Based Model for Green Product Development" *Management Science* 47.2 (2011): 250-63.

Chernev, A. "Jack of All Trades or Master of One? Product Differentiation and Compensatory Reasoning in Consumer Choice." *The Journal of Consumer Research* 33.4 (2007): 430-444.

Chicago Climate Action Plan, (2010) "Chicago Climate Action Plan. Our City. Our Future". Web Access in Apr, 2011. Retrieved from <<http://www.chicagoclimateaction.org/filebin/pdf/finalreport/CCAPREPORT-FINALv2.pdf>>.

Chicago Climate Action Plan. Web Access in Apr, 2011. <<http://www.chicagoclimateaction.org/pages/waste/15.php>>.

Chicago, City of. (2008). "Chicago among Five Municipal Pioneers Tackling Waste by Controlling Unwanted Mail and Phone Books". Web Access in Apr, 2011. <[http://www.cityofchicago.org/city/en/depts/doi/provdrs/waste\\_mang/news/2011/mar/chicago\\_tacklingwastebycontrollingunwantedmailandphone-books.html](http://www.cityofchicago.org/city/en/depts/doi/provdrs/waste_mang/news/2011/mar/chicago_tacklingwastebycontrollingunwantedmailandphone-books.html)>.

Coalition for Resource Recovery. "Overview of CoRR Programs" Web. Accessed on 4 Mar, 2011. <<http://www.thecorr.org>>

Construction Specification Institute. Green Format. Web Access in Feb 2011. <[www.greenformat.com](http://www.greenformat.com)>.

Cornell Waste Management Institute, (1998) "Roundtable Three. Packaging Waste: Whose Responsibility Is It Anyway?". Web Access Apr, 2011. Retrieved from <<http://cwmi.css.cornell.edu/PDFS/PackWast.pdf>>.

County, Local Hazardous Waste Management Program in King County. *Industrial Ecology*. April 2011 <<http://www.lhwmp.org/home/BHW/industrial-ecology.aspx>>.

Crane, A. "Unpacking the Ethical Product." *Journal of Business Ethics* 30.4 (2001): 361-373.

- Culver, A., (2004). "Return to Vendor: A Solution to Obsolete Computer Equipment." INFORM \_ Building Environmental Literacy. Web Access in Mar 2011. <<http://www.informinc.org>>.
- Damiano Beltrami. "Turning French Fries Green and Growing Profitable, Too" The Huffington Post, 5 May 2011. 24 March 2011<[http://www.huffingtonpost.com/2011/02/03/turning-french-fries-gree\\_n\\_818452.html#s235137](http://www.huffingtonpost.com/2011/02/03/turning-french-fries-gree_n_818452.html#s235137)>
- Danneels, E. "The Dynamics of Product Innovation and Firm Competences." Strategic Management Journal 23.12 (2002): 1095-1121.
- David M. Muchnick, Stephen A. Hammad, Joan Byron, E. Gail Suchman. The Oak Point Eco-Industrial Park: A sustainable Economic Development Proposal for the South Bronx. Proposal. New York: Sustainable South Bronx and Green Worker Cooperatives, 2007.
- Department of Sanitation New York City. Web Access in Apr 2011 <<http://www.nyc.gov/html/dsny/html/about/about.shtml>>.
- DSM Environmental Services, Inc. <http://www.nycedc.com/ProjectsOpportunities/CurrentProjects/Bronx/HuntsPointVisionPlan/Documents/HPOrganicsRecoveryFeasibilityStudy.pdf>. 5th December 2005. Retrieved from <<http://www.nycedc.com/ProjectsOpportunities/CurrentProjects/Bronx/HuntsPointVisionPlan/Documents/HPOrganicsRecoveryFeasibilityStudy.pdf>>.
- Earth Institute and the Urban Habitat Project, (2001). "Life after Fresh Kills: Moving Beyond New York City's Current Waste Management Plan." New York: Columbia Earth Institute, Columbia University.
- EarthCheck. "Earthcheck Certification Program" Web. Accessed on 14 Mar, 2011. <<http://www.earthcheck.org>>.
- Eco-Rate. Web Access Feb, 2011. < <http://www.ecorate.com/>>.
- EcoRooms & EcoSuites. EcoRooms&EcoSuites Eco Membership Criteria. Web. Accessed on 14 Mar, 2011. <<http://www.ecorooms.com>>.
- Efficient Collaborative Retail Marketing (ECRM). Wal-Mart Stores, Inc. Package Modeling. Web Access in Feb, 2011. <[http://www.ithumbprint.com/presentations/Wal\\_Mart\\_Stores\\_Web\\_Cast\\_files/v3\\_document.htm](http://www.ithumbprint.com/presentations/Wal_Mart_Stores_Web_Cast_files/v3_document.htm)>.
- Electronic Product Environmental Assessment Tool (EPEAT). Web Access in Feb, 2011. <<http://www.epeat.net/>>.
- EnergyStar. Web Access Feb, 2011. <[www.energystar.gov](http://www.energystar.gov)>.

Environmentally Preferable Purchasing (EPP). Web Access in Feb, 2011. <<http://www.epa.gov/epp/>>.

Extended Producer Responsibility: A Guidance Manual for Governments. N.p.: OECD, 2001.

Farrell, M, (2004). "Composting at the world's largest natural foods supermarket chain." *BioCycle*. November 2004, Vol.45. No.11: 27. Web. <[http://www.jgpress.com/archives/\\_free/000309.html](http://www.jgpress.com/archives/_free/000309.html)>.

Film Biz Recycling. FAQs. Web Access Mar 2011. <<http://www.filmbizrecycling.org/faqs/>>.

Film Biz Recycling. History. Web Access Mar 2011. <<http://www.filmbizrecycling.org/who-we-are/history/>>.

Film Biz Recycling. Services. Web Access Mar 2011. <<http://www.filmbizrecycling.org/what-we-do/services/>>.

Foland, Denise. Washington: Seattle's Cedar Grove Composting Facility. 31 March 2011 <<http://www.sustainableplastics.org/early-adopters/seattles-cedar-grove-composting-facility>>.

Galietti, Greg. Action Environmental Services, Interview by Hsiaolan Mu. 25 March 2011.

Global Green USA, (2011). "Global Green USA's Coalition for Resource Recovery: Programs - Food Packaging." Global Green USA's Coalition for Resource Recovery: Waste Reduction, Waste Diversion, Waste Recovery, Recycling and Sustainability in New York City. Web. Accessed on 04 Apr, 2011. <[http://www.thecorr.org/programs\\_food\\_packaging.php](http://www.thecorr.org/programs_food_packaging.php)>.

GoodGuide. Web Access in Feb, 2011. <[www.goodguide.com](http://www.goodguide.com)>.

Government Law Center of Albany Law School, (2006). "The Procurement Stewardship Act - Opportunity for Reform." New York State Office of General Services. Web Access in Apr, 2011. Retrieved from <<http://www.ogs.state.ny.us/purchase/FocusGroupReport.pdf>>.

GrassRoots Recycling Network. Web Access in Mar, 2011. <<http://www.grrn.org/>>.

Great Forest Sustainability Solutions. "Great Forest Waste and Recycling Consulting". Web. Accessed on 1 Mar, 2011. <<http://www.greatforest.com>>

Green Alliance, (2002). "Creative Policy Package for Waste (undated): Lessons for the UK.". Web Access in Mar, 2011. Retrieved from <<http://www.greenalliance.org.uk/uploadedFiles/Publications/CreativePolicyPackagesforWasteOverview.pdf>>.

Green Alliance,(2005) "Return to Sender - Producer Responsibility and Product Policy. Summary Report.". Web. Access in Feb, 2011. Retrieved from <[http://www.greenalliance.org.uk/uploadedFiles/Our\\_Work/ReturnToSenderSummary.pdf](http://www.greenalliance.org.uk/uploadedFiles/Our_Work/ReturnToSenderSummary.pdf)>.

Green Electronic Council, (2009). "Environmental Benefits of 2009 EPEAT® Purchasing. Green IT Rating System's Influence, Impact Continue to Grow." EPEAT. Web Access in Feb, 2011. <<http://www.epeat.net/>>.

Green Key Global Certification. "Green Key Eco Rating Program Registration". Web. Accessed on 14 Mar, 2011. <<http://www.greenkeyglobal.com/site/program/index.asp>>

Green Restaurant Association. "Green restaurant certification 4.0 standards." Web. <<http://www.dinegreen.com/restaurants/standards.asp>>

Green Restaurant Association. "Six reasons to become a certified green restaurant." Web. <<http://www.dinegreen.com/restaurants/benefits.asp>>

Green Seal. Web Access in Feb, 2011. <[www.greenseal.org](http://www.greenseal.org)>.

GREENGUARD. Web Access in Feb, 2011. <[www.greenguard.org](http://www.greenguard.org)>.

GreenSpec. Web Access in Feb, 2011. <<http://www.buildinggreen.com>>.

Grove, Cedar. Our Services. 29 March 2011 <[http://www.gogreenscene.com/cg\\_systems.asp](http://www.gogreenscene.com/cg_systems.asp)>.

Hattam, Jennifer. "Talkin' Trash: Reduce, Reuse, Rejoice". Web. Accessed on 25 Mar, 2011 at <[www.sierra-club.org/sierra/200511/tr1.asp](http://www.sierra-club.org/sierra/200511/tr1.asp)>

Henningson, Durham & Richardson Architecture and Engineering, P.C. and its Subconsultants, (2004). "Commercial Waste Management Study," Volume II, Commercial Waste Generation and Projections, March 2004, Accessed on 21 Feb, 2011. Retrieved from <<http://nyc.gov/html/dsny/downloads/pdf/swmp/swmp/cwms/cwms-ces/v2-cwgp.pdf>>

Henningson, Durham & Richardson Architecture and Engineering, P.C. and its Subconsultants, (2004). "Commercial Waste Management Study," Volume II, Commercial Waste Generation and Projections, March 2004, Accessed on 21 Feb, 2011. Retrieved from <<http://nyc.gov/html/dsny/downloads/pdf/swmp/swmp/cwms/cwms-ces/v2-cwgp.pdf>>

Hess, D., and Hoffmann M. "Building Clean-Energy Industries and Green Jobs Report: States and Cities. The Midwest. Illinois and Chicago". David J. Hess. Web Access in Apr, 2011. Retrieved from<<http://www.davidjhess.org/BuildingCleanEnergy/Illinois.pdf>>.

Home Depot U.S.A., Inc. The Home Depot Eco Options. Web Access in Feb, 2011. <<http://www.home-depot.com>>.

Jepson Prairie Organics. Compost Process. Web Access 31 March 2011 <<http://www.jepsonprairieorganics.com/compostprocess.htm>>.

Environment, Local Governments for Health and the. Industrial Ecology - Local Hazardous Waste Management Program in King County. 2011. Web access April 2011 <<http://www.lhwmp.org/home/BHW/industrial-ecology.aspx>>

Langston, Jennifer. Seattle Pi local. 19 September 2008. 29 March 2011 <[http://www.seattlepi.com/local/379713\\_organics19.html](http://www.seattlepi.com/local/379713_organics19.html)>.

Lees, Z., D. Watson, and G. McLare, (2009). "Producer Responsibility and Consumer Awareness." Republic of South Africa\_Environmental Affairs Department. Web Access in Mar, 2011. Retrieved from <[http://www.wastepolicy.co.za/nwms/sites/default/files/EPR\\_consumer\\_awareness.pdf](http://www.wastepolicy.co.za/nwms/sites/default/files/EPR_consumer_awareness.pdf)>.

Levis, J.W. M.A. Barlaz, N.J. Themelis, and P. Ulloa "Assessment of the State of Food Waste Treatment in the United States and Canada" Waste Management, 2010

Loeser/Evelyn Erskine. "Mayor Bloomberg Signs Legislation to Promote the Use of Clean Heating Oil". News From the Blue Room. 24 March 2011 [http://www.nyc.gov/portal/site/nycgov/menuitem.c0935b9a57bb4ef3daf2f1c701c789a0/index.jsp?pageID=mayor\\_press\\_release&catID=1194&doc\\_name=http%3A%2F%2Fwww.nyc.gov%2Fhtml%2Fom%2Fhtml%2F2010b%2Fpr358-10.html&cc=unused1978&rc=1194&ndi=1](http://www.nyc.gov/portal/site/nycgov/menuitem.c0935b9a57bb4ef3daf2f1c701c789a0/index.jsp?pageID=mayor_press_release&catID=1194&doc_name=http%3A%2F%2Fwww.nyc.gov%2Fhtml%2Fom%2Fhtml%2F2010b%2Fpr358-10.html&cc=unused1978&rc=1194&ndi=1)

Los Angeles, City of. Department of Public works, Bureau of Sanitation. "Restaurant Food Waste Recycling." Accessed in Feb, 2011. Retrieved from <[http://www.lacitysan.org/solid\\_resources/pdfs/FoodWaste.pdf](http://www.lacitysan.org/solid_resources/pdfs/FoodWaste.pdf)>

Los Angeles, City of. "Zero Waste Plan. Solid Waste Integrated Resources Plan." Web Access in Apr, 2011. Retrieved from <<http://www.zerowaste.lacity.org/files/info/goals/Goals%20from%20early%20outreach.pdf>>.

Mark A. Moser. "Anaerobic Digesters Control Odors, Reduce Pathogens, Improve Nutrient Manageability, Can be Cost Competitive with Lagoons, and Provide Energy Too!" 27 March 2011 Retrieved from <[http://www.epa.gov/agstar/documents/lib-man\\_man.pdf](http://www.epa.gov/agstar/documents/lib-man_man.pdf)>

Massachusetts Department of Environmental Protection, (2007). "fact sheet: Supermarket Recycling Program Certification." Retrieved from <<http://www.mass.gov/dep/recycle/reduce/smfacts.pdf>>

Materials for the Arts. About Us. Web Access March 2011. <<http://www.mfta.org/aboutus.html>>.

Materials for the Arts. Direct Donation. Web Access March 2011. <[http://www.mfta.org/donors\\_direct\\_donations.html](http://www.mfta.org/donors_direct_donations.html)>.

Materials for the Arts. Friends of Materials of the Arts. Web Access March 2011. <<http://www.mfta.org/foma.html>>.



- Materials for the Arts. Material Donors. Web Access March 2011. <<http://www.mfta.org/donors.html>>.
- Materials for the Arts. Recipients. Web Access March 2011. <[http://members.mfta.org/recipient\\_list/](http://members.mfta.org/recipient_list/)>.
- Materials for the Arts. Recipients-Do I Qualify. Web Access March 2011. <[http://www.mfta.org/recipients\\_doiqualify.html](http://www.mfta.org/recipients_doiqualify.html)>.
- Marine Stewardship Council. MSC.. Web Access in Feb, 2011. <<http://www.msc.org/>>.
- McDonough Braungart Design Chemistry. MBDC, (2008). "Cradle to Cradle® Certification Program Version 2.1.1.". Web Access in Feb, 2011. Retrieved from <[http://mbdc.com/images/Outline\\_CertificationV2\\_1\\_1.pdf](http://mbdc.com/images/Outline_CertificationV2_1_1.pdf)>.
- McDonough Braungart Design Chemistry. MBDC. Web Access in Feb, 2011. <<http://www.mbdc.com/>>.
- Nader, Nadine. "Memorandum." 17 March 2011. City of San Jose Capital of Silicon Valley. 28 March 2011 Retrieved from <[http://www.sanjoseca.gov/clerk/Agenda/20110405/20110405ed\\_x.pdf](http://www.sanjoseca.gov/clerk/Agenda/20110405/20110405ed_x.pdf)>.
- National Biodiesel Board. "Big Apple" takes a bite out of air pollution. National biodiesel Board. 24 March 2011< [http://www.biodiesel.org/news/pressreleases/20100817\\_BigAPple.htm](http://www.biodiesel.org/news/pressreleases/20100817_BigAPple.htm)>
- Network for Business Innovation and Sustainability (NBIS). NBIS.org/nbisresources/byproduct\_synergy. April 2011 <[http://nbis.org/nbisresources/byproduct\\_synergy/bpsnw\\_information\\_jan09.pdf](http://nbis.org/nbisresources/byproduct_synergy/bpsnw_information_jan09.pdf)>.
- New York City. Business Integrity Commission. "Billing." Web. Accessed in Feb, 2011. <[http://www.nyc.gov/html/bic/html/trade\\_waste/customer\\_info\\_billing.shtml](http://www.nyc.gov/html/bic/html/trade_waste/customer_info_billing.shtml)>
- New York City. Business Integrity Commission. "Customer Info." Web. Accessed in Feb, 2011. <[http://www.nyc.gov/html/bic/html/trade\\_waste/customer\\_info.shtml](http://www.nyc.gov/html/bic/html/trade_waste/customer_info.shtml)>
- New York City. Business Integrity Commission. "Maximum Rates." Web. Accessed in Feb, 2011. <[http://www.nyc.gov/html/bic/html/trade\\_waste/max\\_rates.shtml](http://www.nyc.gov/html/bic/html/trade_waste/max_rates.shtml)>
- New York City. Business Integrity Commission. "Recycling." Web. Accessed in Feb, 2011. <[http://www.nyc.gov/html/bic/html/trade\\_waste/customer\\_info\\_recycling.shtml](http://www.nyc.gov/html/bic/html/trade_waste/customer_info_recycling.shtml)>
- New York City. Business Integrity Commission. "Rules and Regulations." Web. Accessed in Feb, 2011. <[http://www.nyc.gov/html/bic/html/trade\\_waste/rules\\_and\\_regulations.shtml](http://www.nyc.gov/html/bic/html/trade_waste/rules_and_regulations.shtml)>
- New York City. Business Integrity Commission. "Trade Waste." Web. Accessed in Feb, 2011. <[http://www.nyc.gov/html/bic/html/trade\\_waste/trade\\_waste.shtml](http://www.nyc.gov/html/bic/html/trade_waste/trade_waste.shtml)>

New York City, (2002). "NYC Local Law n. 47". Web Access in Feb, 2011. Retrieved from <<http://www.nyc.gov/html/doh/downloads/pdf/smoke/tc6-unofficial.pdf>>.

New York City, (2005). "NYC Local Law n. 86". Web Access in Feb, 2011. Retrieved from <[http://www.nyc.gov/html/dob/downloads/pdf/ll\\_86of2005.pdf](http://www.nyc.gov/html/dob/downloads/pdf/ll_86of2005.pdf)>.

New York City, (2005). "NYC Local Law n. 123". Web Access in Feb, 2011. Retrieved from <[http://www.nyc.gov/html/mocs/downloads/pdf/epp/LL%20123%20\(552\).pdf](http://www.nyc.gov/html/mocs/downloads/pdf/epp/LL%20123%20(552).pdf)>.

New York City Council, (2010). "FoodWorks: A Vision to Improve NYC's Food System." Nov, 2010. Accessed in Feb, 2011. Retrieved from <[http://council.nyc.gov/html/food/files/foodworks\\_full-report\\_11\\_22\\_10.pdf](http://council.nyc.gov/html/food/files/foodworks_full-report_11_22_10.pdf)>

New York City Council, (2011). "Int. No. 461". Web Access in Apr, 2011. <<http://legistar.council.nyc.gov/LegislationDetail.aspx?ID=828459&GUID=2F1A516E-9F9D-4A98-8154-2DD4DAC398E3&Options=ID|Text|&Search=INT+0461-2011>>.

New York City Council, (2011). "Res 0627 2011". Web Access in Apr, 2011. <<http://legistar.council.nyc.gov/LegislationDetail.aspx?ID=828456&GUID=E1BA126E-CF31-44E1-B43C-82EB60439628&Options=&Search>>.

New York City Department of Education (NYCDOE), (2011). "About Us." Web. <<http://schools.nyc.gov/AboutUs/default.htm>>

New York City Department of Finance, (2011). Department of Finance. Web. Accessed on 20 Feb, 2011. <<http://www.nyc.gov/html/dof/html/home/home.shtml>>.

New York City Department of Health. Web Access in Feb, 2011. <<http://www.nyc.gov/html/doh/html/home/home.shtml>>.

New York City Department of Sanitation, (1990). "New York City MSW Composting Report: Appendix A - Waste Characterization for Composting Pilot Study." Retrieved from <<http://home2.nyc.gov/html/nycwasteless/downloads/pdf/mswcrappa.pdf>>

New York City. Department of Sanitation (2006). "Comprehensive Solid Waste Management Plan". Web Access in Mar, 2011. <<http://www.nyc.gov/html/dsny/html/swmp/swmp.shtml>>.

New York City Department of Sanitation, (2010). "Golden Apple Awards. Elementary division Queens borough & City-wide winner: Talfourd Lawn elementary school." Retrieved from <[http://www.nyc.gov/html/nycwasteless/downloads/pdf/goldenapple10/GA10\\_RR\\_CW\\_Qns\\_Boro\\_Winner\\_PS50Q\\_Talfourd\\_Lawn\\_Elementary\\_Sch.pdf](http://www.nyc.gov/html/nycwasteless/downloads/pdf/goldenapple10/GA10_RR_CW_Qns_Boro_Winner_PS50Q_Talfourd_Lawn_Elementary_Sch.pdf)>

New York City Department of Sanitation, (2010). "Golden Apple Awards. Elementary school division. Queens borough winner: The Earth school PS 364." Retrieved from <[http://www.nyc.gov/html/nycwasteless/downloads/pdf/goldenapple10/GA10\\_RR\\_Elem\\_Man\\_RU\\_Golden\\_Shovel\\_Earth\\_Sch\\_PS\\_364.PDF](http://www.nyc.gov/html/nycwasteless/downloads/pdf/goldenapple10/GA10_RR_Elem_Man_RU_Golden_Shovel_Earth_Sch_PS_364.PDF)>

New York City Department of Sanitation, (2010). "Golden Apple Awards. High school division. Queens honorable mention: Jamaica high school." Retrieved from <[http://www.nyc.gov/html/nycwasteless/downloads/pdf/goldenapple10/GA10\\_SR\\_HS\\_Qns\\_Hon\\_Golden\\_Shovel\\_Jamaica\\_High\\_School\\_Part1.pdf](http://www.nyc.gov/html/nycwasteless/downloads/pdf/goldenapple10/GA10_SR_HS_Qns_Hon_Golden_Shovel_Jamaica_High_School_Part1.pdf)>

New York City Department of Sanitation, (2011). "Golden Apple Awards." Web. <[http://www.nyc.gov/html/nycwasteless/html/recycling/schools\\_goldenapple.shtml](http://www.nyc.gov/html/nycwasteless/html/recycling/schools_goldenapple.shtml)>

New York City Department of Sanitation, (2011). "Golden Apple Awards." Web. <[http://www.nyc.gov/html/nycwasteless/html/recycling/schools\\_goldenapple.shtml](http://www.nyc.gov/html/nycwasteless/html/recycling/schools_goldenapple.shtml)>

New York City Department of Sanitation. "Laws and Directives." Web. Accessed in Feb, 2011. <<http://www.nyc.gov/html/nycwasteless/html/laws/laws.shtml>>

New York City Department of Sanitation. "NYC Business Recycling: What to Recycle." Web. Accessed in Feb, 2011. <[http://www.nyc.gov/html/nycwasteless/html/recycling/businesses\\_what.shtml](http://www.nyc.gov/html/nycwasteless/html/recycling/businesses_what.shtml)>

New York City Department of Sanitation. "Refuse and Recycling Collection." Web. Accessed in Feb, 2011. <<http://www.nyc.gov/html/dsny/html/collection/refuse.shtml>>

New York City Department of Sanitation. "Rules of the City of New York - Title 16: Department of Sanitation." Accessed in Feb, 2011. Retrieved from <[http://www.nyc.gov/html/nycwasteless/downloads/pdf/laws/recycling\\_rcny.pdf](http://www.nyc.gov/html/nycwasteless/downloads/pdf/laws/recycling_rcny.pdf)>

New York City Department of Sanitation. "Service Requests." Web. Accessed in Feb, 2011. <[http://www.nyc.gov/html/dsny/html/contact/requests\\_comm\\_recycling.shtml](http://www.nyc.gov/html/dsny/html/contact/requests_comm_recycling.shtml)>

New York City Mayor's Office of Contract Services. Web Access in Apr, 2011. <<http://www.nyc.gov/html/mocs/html/programs/epp.shtml>>.

New York State Department of Health, (2009). "Clean Indoor Air Act Section 1399". Web Access in Mar, 2011. Retrieved from "<<http://www.health.ny.gov/regulations/>>.

Northwest, By-Products Synergy. [pprc.org/synergy](http://www.pprc.org/synergy). April 2011 <<http://www.pprc.org/synergy>>.

New York City. NYC Materials Exchange Development Program, (MEDP) "The Sector Assessment Project." NYC MEDP. Web Access Mar 2011. Retrieved from <[http://www.nycmedp.org/pdf/MEDP\\_Sector\\_Assessment\\_Report\\_\(sec\).pdf](http://www.nycmedp.org/pdf/MEDP_Sector_Assessment_Report_(sec).pdf)>.

New York City Small Business Services, (2011). “Help for neighborhoods.” Web. <<http://www.nyc.gov/html/sbs/html/neighborhood/bid.shtml>>

New York City WasteMatch. About. Web Access Mar 2011. <<http://www.wastematch.org/about>>.

New York City WasteMatch. Exchange Home. Web Access Mar 2011. <<http://www.wastematch.org/exchange>>.

New York City WasteMatch. Our Services. Web Access Mar 2011. <<http://www.wastematch.org/services>>.

NYC WasteMatch. Success Stories. Web access March 21, 2011. <[http://www.wastematch.org/exchange/?content=article.list;article\\_group\\_id=1](http://www.wastematch.org/exchange/?content=article.list;article_group_id=1)>

New York City WasteMatch. Success Stories. Web Access Mar 2011. <[http://www.wastematch.org/exchange/?content=article.view&article\\_id=42;article\\_group\\_id=1](http://www.wastematch.org/exchange/?content=article.view&article_id=42;article_group_id=1)>

New York City WasteMatch. Welcome Page. Web Access Mar 2011. <<http://www.wastematch.org>>.

Ohio University, (2010). “Waste.” Web. <<http://www.ohio.edu/sustainability/Compost.htm>>

Ohio University, (2011). “Focus on Ohio.” Web. <<http://www.ohio.edu/focus/>>

Organics, Jepson Prairie. Jepson Prairie Organics. 28 March 2011 <<http://www.jepsonprairieorganics.com/index.htm>>.

P2 National Pollution Prevention Roundtable,(2009). “Road to Sustainability: Pollution Prevention Progress from 2004 to 2006. Results from the National Pollution Prevention Data Management System”. Web Access in Apr, 2011. Retrieved from <<http://www.p2.org/wp-content/road-to-sustainability-2004-20062.pdf>>.

Philadelphia Recycling Rewards. Web Access in Apr, 2011 <<http://www.phillyrecyclingpays.com/recycling-rewards-detail.asp>>

Pohlenz, J., and J. Sackett, (2009). “Green Space Today’s Legal Corner: Querrey & Harrow’s Green LawLink: The Chicago “Green” Code” Green Space Today. Web Access in Apr, 2011. <<http://www.greenspacetoday.com/green-guide/green-space-today-s-legal-corner-querrey-harrows-green-lawlink-chicago-green-code>>. Recology. commercial compost collection program. 28 March 2011 <<http://sunsetscavenger.com/commercialCompost.htm>>.

Recyclemania, (2011). “Rules.” Recyclemania. Web. Accessed on 02 Apr, 2011. <<http://www.recyclemaniacs.org/rules.htm>>

Resource Venture. <http://www.resourceventure.org/green-your-business/waste-prevention-recycling/food/food-recycling-collection>. Web access April 2011 <<http://www.resourceventure.org/green-your-business/waste-prevention-recycling/food/food-recycling-collection>>.

Resource Venture. Resource Venture. Web access 29 March 2011 <<http://www.resourceventure.org/food-pluscompostables>>.

Resource Venture. Seattle commercial waste and recycling 101. Web access 31 March 2011 <<http://www.resourceventure.org/seattle-commercial-waste-and-recycling-101>>.

Richardson, K, (2010). "Chicago Takes the LEED in Eco Building." Cities of the Future. Web Access in Apr, 2011 < <http://www.grist.org/article/2010-08-30-chicago-takes-the-leed-in-eco-building/>>.

San Francisco, City and County. City and County of San Francisco Construction and Demolition Debris Recovery Program Ordinance No. 27-06. 2006. April 2011 Retrieved from <<http://www.sfenvironment.org/downloads/library/canddinformation.pdf>>.

San Francisco, Mayor's Office [http://sfmayor.typepad.com/sf\\_mayor/2010/08/mayor-newsom-announces-san-franciscos-waste-diversion-rate-at-77-percent-shattering-city-goal-and-national-recycling-reco.html](http://sfmayor.typepad.com/sf_mayor/2010/08/mayor-newsom-announces-san-franciscos-waste-diversion-rate-at-77-percent-shattering-city-goal-and-national-recycling-reco.html). April 2011 <[http://sfmayor.typepad.com/sf\\_mayor/2010/08/mayor-newsom-announces-san-franciscos-waste-diversion-rate-at-77-percent-shattering-city-goal-and-national-recycling-reco.html](http://sfmayor.typepad.com/sf_mayor/2010/08/mayor-newsom-announces-san-franciscos-waste-diversion-rate-at-77-percent-shattering-city-goal-and-national-recycling-reco.html)>.

San Fransisco. SFEnvironment. EcofinderRRR App. 2009. Web access April 2011 <[http://www.ecofinder-app.com/ecofinder\\_release.html](http://www.ecofinder-app.com/ecofinder_release.html)>.

San Francisco.SFEnvironment. <http://www.sfenvironment.org/downloads/library/200200702.pdf>. 2002. April 2011 Retrieved from <<http://www.sfenvironment.org/downloads/library/200200702.pdf>>.

San Francisico SFEnvironment. [sf\\_mandatory\\_recycling\\_composting\\_ordinance](http://www.sfenvironment.org/downloads/library/sf_mandatory_recycling_composting_ordinance.pdf). April 2011 Retrieved from <(http://www.sfenvironment.org/downloads/library/sf\_mandatory\_recycling\_composting\_ordinance.pdf) >.

San Fransisco. SFEnvironment.org. SF Attains 77 Percent Recycling. 27th August 2010. April 2011 <[http://www.sfenvironment.org/our\\_sfenvironment/press\\_releases.html?topic=details&ni=640](http://www.sfenvironment.org/our_sfenvironment/press_releases.html?topic=details&ni=640)>.

San José, City of. Environmental Services Department,(2008) "Integrated Waste Management - ZERO WASTE Strategic Plan.". Web Access in Mar, 2011. Retrieved from <<http://www.sjrecycles.org/PDFs/ZeroWasteStrategicPlan.pdf>>.

Santos, F. (2011). "For Schools, Free Art Supplies, and Much More". New York Times. New York. February 28, 2011

Scavenger, Recology Sunset. Recology SF Artist in Residence Program. April 2011 <<http://sunsetscavenger.com/AIR/>>.

Science Applications International Corporation, (2000). "Survey on Waste Prevention Programs in Major U.S. Cities, States and Counties." New York City. Web Access in Mar, 2011 <<http://www.nyc.gov/html/nycwasteless/downloads/pdf/wp-reports/wpr02.pdf>>.

Scientific Certification System. Web Access in Mar, 2011. <[www.scscertified.com/programs/Home\\_Depot/](http://www.scscertified.com/programs/Home_Depot/)>.

SCRAP. SCRAP FAQ. Web access April 2011 <<http://www.scrap-sf.org/about/faq>>.

SCRAP. SCRAP Mission and History. Web access April 2011 <<http://www.scrap-sf.org/about/mission-history>>.

Seattle Public Utilities. Seattle Public Utilities Commercial Recycling. Web access April 2011 <<http://www.ci.seattle.wa.us/util/Services/Recycling/CommercialRecycling/index.asp>>.

Seattle, City of. City of Seattle 2009 Recycling Rate Report. Seattle: City of Seattle, 2010.

Seattle, City of. City of Seattle City Clerk's Onlin Information. 28 July 2008. 29 March 2011 <<http://clerk.ci.seattle.wa.us/~scripts/nph-brs.exe?s1=&s2=&s3=116250&s4=&s5=&Sect4=and&l=20&Sect2=THESON&Sect3=PLURON&Sect5=CBOR1&Sect6=HITOFF&d=CBOR&p=1&u=%2F%7Epublic%2Fcbor1.htm&r=1&f=G>>.

Services, City of Austin Solid Waste. City of Austin Zero-waste Plan. January 2009. April 2011 Retrieved from <[http://www.ci.austin.tx.us/sws/downloads/zerowaste\\_plan.pdf](http://www.ci.austin.tx.us/sws/downloads/zerowaste_plan.pdf)>.

Services, City of Austin Solid Waste. [http://www.ci.austin.tx.us/sws/commercial\\_wrap.htm](http://www.ci.austin.tx.us/sws/commercial_wrap.htm). April 2011 <[http://www.ci.austin.tx.us/sws/commercial\\_wrap.htm](http://www.ci.austin.tx.us/sws/commercial_wrap.htm)>.

Services, City of San Jose Environmental. Construction & Demolition Recycling: What is CDDD. April 2011 <<http://www.sjrecycles.org/construction-demolition/cddd.asp>>.

Skilling, J., (2001) "Coming clean: Who pays for PC recycling?" ZD Net. Web Access in Apr, 2011. <<http://www.zdnet.com.au/coming-clean-who-pays-for-pc-recycling-120221085.htm>>

South Carolina Budget and Control Board\_Materials Management Office, (2009) "Statement of Policy - State of South Carolina Environmentally Preferred Purchasing Policy.". Web Access in Apr, 2011. Retrieved from <<http://www.mmo.sc.gov/MMO/SignedGPIPolicyandStandards-Final.pdf>>.

Starbucks Corporation, (2011). "Recycling & Reducing Waste." Web. Accessed on 29 Mar, 2011. <<http://www.starbucks.com/responsibility/environment/recycling>>

State of California. "The California Integrated Waste Management Act (AB 939, Sher, Chapter 1095, Statutes of 1989 as amended [IWMA])." 1989.

Sunset Scavenger. Recology waste zero. 31 March 2011 <<http://sunsetscavenger.com/commercialRates.htm>>.

Sustainable Forestry Initiative. Web Access in Feb, 2011. <[www.sfiprogram.org](http://www.sfiprogram.org)>.

Sustainable Packaging Coalition. Web Access in Feb, 2011. <<https://www.sustainablepackaging.org>>.

Tam, Laura. "Toward Zero Waste." 1 February 2010. Recology. 31 March 2011 Retrieved from <[http://www.recology.com/press\\_room/articles/pdf/2010/2.1.10.Model.Recycle.Policies.in.SF.SPUR.pdf](http://www.recology.com/press_room/articles/pdf/2010/2.1.10.Model.Recycle.Policies.in.SF.SPUR.pdf)>.

The Institute for Market Transforamtion to Sustainability. (MTS). Web Access in Feb, 2011. <<http://www.mts.sustainableproducts.com>>.

United Sates Environmental Protection Agency, (2006). "WasteWise Partner Forum - Awards and Reporting." Retrieved from <<http://www.epa.gov/osw/partnerships/wastewise/events/pubs/pfaward.pdf>>

United Sates Environmental Protection Agency, (2010). "Activities to reduce and recover food waste." Web. <<http://www.epa.gov/osw/partnerships/wastewise/challenge/foodrecovery/food-act.htm>>

United Sates Environmental Protection Agency, (2010). "Fine dining returns to the earth." Web. <<http://www.epa.gov/osw/conservematerials/organics/food/success/fourseasons.htm>>

United Sates Environmental Protection Agency, (2010). "Food Recovery Challenge." Web. <<http://www.epa.gov/osw/partnerships/wastewise/challenge/foodrecovery/index.htm>>

United Sates Environmental Protection Agency, (2010). "Shopping for Change: MassDEP Supermarket Recycling." Retrieved from <<http://www.epa.gov/osw/conservematerials/organics/food/success/ma-shop.htm>>

United Sates Environmental Protection Agency, (2010). "Solid waste funding." Web. <<http://www.epa.gov/reg5rcra/wptdiv/solidwaste/funding.htm>>

United Sates Environmental Protection Agency, (2010). "Success Stories: Banking | WasteWise | US EPA." Web. Accessed on 02 Apr, 2011. <<http://www.epa.gov/osw/partnerships/wastewise/success/banking.htm>>



United States Environmental Protection Agency, (2010). "Success Stories: Retailers | WasteWise | US EPA." Web. Accessed on 02 Apr, 2011. <<http://www.epa.gov/osw/partnerships/wastewise/success/retail.htm>>

United States Environmental Protection Agency, (2010). "Success Stories - Banking, Bank of America-Charlotte, NC." 14 Apr. 2010. Web. Accessed on 24 Feb, 2011. <<http://www.epa.gov/epawaste/partnerships/wastewise/success/banking.htm>>

United States Environmental Protection Agency, (2010). "Transport Packaging Challenge." Web. <<http://www.epa.gov/osw/partnerships/wastewise/challenge/transport.htm>>

United States Environmental Protection Agency, (2010). "Waste Reduction Model." Web. <[http://www.epa.gov/climatechange/wycd/waste/calculators/Warm\\_home.html](http://www.epa.gov/climatechange/wycd/waste/calculators/Warm_home.html)>

United States Environmental Protection Agency, (2011). "Cushman & Wakefield Signs Sustainability Pact with EPA." Cushman & Wakefield - Global Real Estate Solutions. Web. Accessed on 01 Apr. 2011. <<http://www.cushwake.com/cwglobal/jsp/newsDetail.jsp?repId=c22000002p>>

United States Environmental Protection Agency, (2011). "Cushman & Wakefield Signs Sustainability Pact with EPA." Cushman & Wakefield - Global Real Estate Solutions. Web. Accessed on 01 Apr. 2011. <<http://www.cushwake.com/cwglobal/jsp/newsDetail.jsp?repId=c22000002p>>

United States Environmental Protection Agency, (2011). "Waste Wise/Conservation." Web. <<http://www.epa.gov/epawaste/partnerships/wastewise/index.htm>>

United States Environmental Protection Agency, (2011). "WasteWise Awards | Wastes - Partnerships | US EPA." US Environmental Protection Agency. Web. Accessed on 01 Apr. 2011. <<http://www.epa.gov/osw/partnerships/wastewise/events/2008awards.htm>>

United States Green Building Council. "Project Certification". Web. Accessed on 1 Apr, 2011. <<http://www.USGBC.org>>

University of California, Santa Barbara, (2000). "An Assessment of the U.S. EPA Voluntary Partnership Program: WasteWise." Retrieved from <[http://www2.bren.ucsb.edu/~keller/courses/GP\\_reports/WasteWise\\_final.pdf](http://www2.bren.ucsb.edu/~keller/courses/GP_reports/WasteWise_final.pdf)>

URS Corporation, Herrera Environmental Consultants, Inc., Norton-Arnold Company, (2007) "Seattle Solid Waste Recycling, Waste Reduction, and Facilities Opportunities." Seattle City Council. Web Access in Mar, 2011. Retrieved from <[http://www.seattle.gov/util/groups/public/@spu/@usm/documents/webcontent/spu01\\_002544.pdf](http://www.seattle.gov/util/groups/public/@spu/@usm/documents/webcontent/spu01_002544.pdf)>.

United States Census 2010. US Census 2010. 2010. March 2011 Retrieved from <<http://www.census.gov/compendia/statab/2011/tables/11s0020.pdf>>

Walmart. Web Access in Feb, 2011. <<http://www.walmart.com/>>.

Walmart. "Global Responsibility Report." Walmart. Web Access March, 2011. <<http://walmartstores.com/Sustainability/7951.aspx>>.

Wilmington Organic Recycling Center. Peninsula Composting Group. 24 March 2011 <<http://www.peninsulacompostcompany.com/facilities/WORC.html>>

World Commission on the Ethics of Scientific Knowledge and Technology, (2005). "The Precautionary Principle." UNESCO. Web Access in Apr, 2011. Retrieved from <<http://unesdoc.unesco.org/images/0013/001395/139578e.pdf>>

## INTERVIEWS

Name	Title	Organization	Date
Adam Pasquale	Executive Account Manager	Action Environmental Carting	2/25/2011
Amy Marpan	Dir. Recycling Services	Great Forest	3/3/2011
Annie White	Director	Coalition for Resource Recovery (CORR), New York	3/4/2011
Benjamin Rose, Adanna Roberts, et al.		NYC WasteMatch and NY MEDP	3/28/2011
Brenda Grober	Environmental Services Unit	Empire State Development (for NERC)	3/2/2011
Christine Chase	Environmental Scientist II	Green Seal, Inc.	3/15/2011
David Hurd	Director	Office of Outreach and education	3/21/2011
Debra Taevs	Deputy Director	Northwest Pollution Prevention Resource Center (PPRC)	4/12/2011
Dehran Duckworth	Sales Manager	Tri-State Biodiesel	3/2/2011
Diana Beltran	Sustainability Committee, Hotel Association of NYC	Hyatt New York	4/5/2011
Dickson Despommier	Professor of Environmental Health	Mailman School of Public Health	3/10/2011
Eva Radke	Founder	FilmBiz Recycling	3/24/2011
Greg Galietti	Director of Transfer Stations	Action Environmental Carting	2/25/2011
Harriet Taub	Director	Materials for the Arts	3/29/2011

Name	Title	Organization	Date
James Pepe	Assistant VP of Campus Planning and Facilities at the College of Staten Island	RecycleMania	
Jeff Anderson	Program Manager	City of San Jose Garbage and Recycling Services	3/4/2011
John Okun		Filco Carting	3/14/2011 3/24/2011
Josh “Shuki” Cohen	Founder, CEO	Junkluggers	3/31/2011
Justin Green	Director	Build It Green	3/24/2011
Kathleen Callahan	Assistant Professor of Professional Practice	SIPA	3/28/2011
Kelly Rula	Project Assistant	Cascadia Consulting Group	3/4/2011
Maria Osorio	NYC Mayor’s Office	Mayor’s Office of Contract Services	3/24/2011
Maya Shenkman	Dir. Hotel Services	Great Forest	3/4/2011
Mike Italiano	CEO	Market Transformation to Sustainability SMaRT	3/13/2011
Nellson Widell	Marketing and Sales Director, Co-Founder	Peninsula Composting Group	3/29/2011
Ozgem Ornektekin	Dir. of Sustainability NY Dept. of Education		3/15/2011
Peggy Grayson	Administrator	Western/Central NY Materials Exchange	2/28/2011
Philip Silva	Owner	Ectone Projects	3/22/2011
Robert Lange	Director	New York Department of Sanitation (DSNY)	3/4/2011
Sarah O’Brien	Responsible for Supporting Purchasers	EPEAT	3/11/2011
Shane Nelson	Waste Resources	EPA Region 2	3/21/2011
Steven Mojo	Director	Biodegradable Products Institute	3/20/2011
Susan Thoman	Director, Business Development	Cedar Grove Composting	3/31/2011
Tish Tablan	Project Manager	MBDC_C2C	3/22/2011
Tristram Coffin	Green Mission Specialist, NA Region	Whole Foods Market	3/28/2011
Anonymous	Manager	Pret A Manager	3/25/2011

## APPENDIX II: ANALYSIS OF ALTERNATIVE PRODUCT RATING SYSTEMS

### GREENSEAL<sup>131</sup>

GreenSeal deals with the construction and hospitality industries. It rates building and construction products, cleaning products and services, company certification, hotel and lodging, institutional products, lighting and control products, paint and coating products, paper products, personal care products, restaurant and food services, vehicles and vehicle maintenance. It is a certification and labeling system with national recognition, with exception made for product that meets American Society for Testing and Materials (ASTM) standards. It complies with ISO 14020/14024 standards, American National Standards Institute (ANSI), Consumers Union, US Environmental Protection Agency (EPA), federal Trade Commission, Global Eco-labeling Network's Internationally Coordinated Eco-labeling System (GENICES), and LEED. It has a 6 months implementation time and the certification path includes a preliminary certification request, an application submission, an evaluation, an on-site audit, a certification and an on-going monitoring. It has an overall cost that ranges from \$3,000 to \$10,000.

**Advantages:** It has a life cycle approach; stakeholders are involved in the standard development process; it is a science-based program; and the product list is updated weekly.

**Disadvantages:** It is developed by an independent non-profit organization; it is not internationally recognized, although it complies with International Organization for Standardization(ISO); it has a business to business approach (i.e.: the consumer has to call the manufacturer to know where particular product is sold).

*NOTE:* Green Seal is developing and testing GS-C1 Pilot Standard for Product Manufacturers. This Pilot program looks at a company's products and business practices in their totality. Rigorous requirements include the following areas: Transparency and accountability at the corporate level; aggressive goals, actions and achievements in major social and environmental impact areas; effective and accountable supplier management practices; scientific life-cycle assessments on key product lines; and ambitious requirements for third-party certification of the company's products. Bronze, Silver, Gold ratings.

### SMaRT<sup>132</sup>

SMaRT deals with the interiors and construction industries. It rates building products, fabric, apparel, and textile & flooring. It is a certification system (silver, gold, platinum) with national recognition. It complies with ANSI, FSC, green e-power, GreenGuard, ISO. Its implementation time varies and the certification path includes the submission of a completed application pass; a data audit; the execution of a legally binding certification to confirm that the data are accurate and not misleading, and that qualified professionals were used; the publication of a summary of the certification on their web site; the passing of an outside third party audit; and the renewal of the certification every three years. It has an overall cost that ranges from \$7,500 to \$10,000.

**Advantages:** It reduce redundancy in the rating systems; it addresses the entire supply chain as it looks at

<sup>131</sup> Green Seal. Web Access in Feb, 2011. <[www.greenseal.org](http://www.greenseal.org)>.

<sup>132</sup> MTS The Institute for Market Transformation to Sustainability. Web Access in Feb, 2011. <<http://www.mts.sustainableproducts.com>>.

environmental, social, and economic benefits, it is based on life cycle assessment (LCA) principles, and it provides benchmarks for continuous improvement and innovation.

**Disadvantages:** The products are independently certified, and it is not internationally recognized.

### **GREEN GUARD<sup>133</sup>**

Green Guard deals with the interiors and construction industries, in particular residential buildings, commercial buildings, and schools. It rates adhesives and sealants, air filters, building materials, cabinetry, ceiling systems, children's products, cleaning and maintenance products and systems, commercial office furniture, countertops, doors and millwork, educational furniture, educational supplies, electronics- print device, electronics - consumer and office, electronics - medical devices, flooring, floor finish, insulation, lighting, mattresses and bedding, paints and coatings, panels- free standing and wall, residential furniture, textiles, visual display products, wall coverings and finish, window treatments. It is a certification system with international recognition. It complies with ANSI, SDO, ASHRAE 189.1, international Green Construction Codes, LEED. Its implementation time varies and the certification path includes the initiation from a manufacturer of the intent to certify; the development of a certification plan; a certification compliance tests; the submission of a final certification compliance package to GEI (Greenguard Environmental Institute); the award of the certification; an annual re-certification; and quarterly quality monitoring to ensure ongoing compliance. It has an overall cost that ranges from \$10,000 to \$40,000.

**Advantages:** Its scientific rigor is based on best practice guidelines (GEI), and it is a third party certification.

**Disadvantages:** It is limited to indoor air quality, and it only addresses manufacturers.

### **GOOD GUIDE<sup>134</sup>**

Good Guide deals with retail, manufacturers, hospitality, and food industries. It compares electronics, appliances, household items and food. Good Guide is a consumer-based product comparison website and mobile applications system with national recognition. It complies with existing manufacturer's environmental stewardship (when applicable). It does not have an implementation timeframe as it does not rate products, but it provides instant accessibility for consumers. The comparison path includes products and companies identification; and health, environment, and social impacts characterization. There is no cost for manufacturers/retailers to be rated, as well as for consumers to obtain the information.

**Advantages:** It provides consumers with detailed and unique information on everyday products; the information can be easily accessed by consumers via internet.

**Disadvantages:** It is difficult for consumers to associate the information with everyday items; it does not provide a systematic and practical labeling.

### **ECO-RATE<sup>135</sup>**

Eco-Rate deals with retail, manufacturers, hospitality, food, and automotive industries. It compares automobiles; electronics; appliances; household items. Eco-Rate is a consumer-based product comparison

133 GREENGUARD. Web Access in Feb, 2011. <[www.greenguard.org](http://www.greenguard.org)>.

134 GoodGuide. Web Access in Feb, 2011. <[www.goodguide.com](http://www.goodguide.com)>.

135 Eco-Rate. Web Access Feb, 2011. <<http://www.ecorate.com/>>.

website with national recognition, which complies with existing manufacturer's environmental stewardship (when applicable); LEED; Energy Star; EPEAT; and WaterSense. It does not have an implementation time-frame as it does not rate products, but it provides instant accessibility for consumers. The comparison path includes the assessment of the product environmental impact; its consumption, toxicity and lifecycle cost; and the product price. There is no cost for manufacturers/retailers to be rated, as well as for consumers to obtain the information.

**Advantages:** It provides consumers with detailed and unique information on everyday products; the information can be easily accessed by consumers via internet.

**Disadvantages:** It is difficult for consumers to associate the information with everyday items; it does not provide a systematic and practical labeling.

### **SUSTAINABLE FORESTRY INITIATIVE (SFI)<sup>136</sup>**

SFI deals with forestry, paper, packaging and publishing industries. It rates sustainable forestry certification; sustainable wood and paper products. It is a labeling system with international recognition. It complies with ANSI, ANAB, SCC. Its implementation time Original certification varies with industry, but an audit is needed every 12 months to maintain the certification. There are no direct costs with SFI to obtain SFI chain-of-custody label, but the cost of audit is around \$2,000 to \$3,000 per site.

**Advantages:** SFI is the world's largest single forest certification standard, it is endorsed by the American Forest and Paper Association, LEED, American Bird Conservancy, and the Conservation Fund.

**Disadvantages:** ForestEthics filed complaints against SFI on 2009, and the Sierra Club also lodged a complaint.

### **ENERGY STAR<sup>137</sup>**

Energy Star deals with businesses and homes. It rates energy products. It is a certification and labeling system with international recognition. It complies with ANSI, and many various standards depending on product. Its implementation time varies and the certification path follows EPA Energy Efficiency standards and includes a documents control, a product qualification and labeling, a product listing, and an ongoing verification. It has no cost.

**Advantages:** It is linked to energy efficiency standards: the program changes if savings are not realized, and the product must maintain the same performance demanded by customer. It is a Government-backed symbol for energy efficiency.

**Disadvantages:** There is a lack of empirical and independent verifiable data as well as independent results, and testing rules are out-dated.

### **ECO OPTIONS<sup>138</sup>**

Eco Options deals with homes products. It rates products in these categories: clean air, clean water, energy

<sup>136</sup> Sustainable Forestry Initiative. Web Access in Feb, 2011. <[www.sfiprogram.org](http://www.sfiprogram.org)>.

<sup>137</sup> EnergyStar. Web Access Feb, 2011. <[www.energystar.gov](http://www.energystar.gov)>.

<sup>138</sup> Home Depot U.S.A., Inc. The Home Depot Eco Options. Web Access in Feb, 2011. <<http://www.homedepot.com>>.

efficiency, healthy homes, and responsible forest management practices. Examples are: CFL bulb, consumer rechargeable battery recycling, cardboard, shrink wrap, mixed plastics, bins that collect paper, plastic, aluminum, and glass. It is a certification and labeling system with national recognition, which complies with Energy Star, FSC, DfE, and WaterSense. It does not have an implementation timeframe nor a certification path as products are already rated by other rating systems. It has an overall cost of \$1,500.

**Advantages:** It is a great example of what a store, namely Home Depot, is doing both in the retail of green products and in the recycling of products through in store recycling programs. It is a classification that allows customers to easily identify products that have less of an impact on the environment.

**Disadvantages:** These are related to the rating systems it complies with.

### **CSI GREENFORMAT<sup>139</sup>**

CSI Greenformat deals with the manufacturers and construction industries. It rates construction products. CSI Greenformat is a product listing system with national recognition. It does not comply with any rating systems. It does not have an implementation timeframe as it does not rate products itself, but it provides instant accessibility for consumers, and for manufacturers upon completion of a questionnaire. The listing path includes a questionnaire with five categories: Background Information, Product Details, Product Lifecycle, Additional Information, and Authorization. It has an overall cost of \$995 subscription cost plus \$100 for each additional product listing for manufacturers, and it is free for consumers.

**Advantages:** It reports on the properties of a product, referencing specific industry standards; and the questionnaire can be modified to reflect your needs.

**Disadvantages:** It does not determine whether a product is green; it is a self-verification system; and it is not consumer friendly.

### **CRADLE TO CRADLE (C2C)<sup>140</sup>**

C2C deals with businesses, homes and the construction industry. It rates building products, furnishing, textile, apparel, products sold to consumers. It is a product rating system with international recognition. It complies with FSC, Green-e Certification, Global Environmental Management Initiative, B Corporation, Social Accountability International SA8000. It has an implementation time that ranges from 6 weeks to 6 months, and the certification path includes an application process, a certification process, a report summarizing the findings, a certification and an annual re-certification. It has an overall cost that ranges from \$4,000 to \$ 150,000.

**Advantages:** It is a life cycle assessment; it evaluates product sustainability and manufacturing practices, technical and biological cycle.

**Disadvantages:** It has a time intensive certification process, and it could potentially be very expensive.

### **MARINE STEWARDSHIP COUNCIL (MSC)<sup>141</sup>**

<sup>139</sup> CSI Green Format. Web Access in Feb 2011. <[www.greenformat.com](http://www.greenformat.com)>.

<sup>140</sup> MBDC. Web Access in Feb, 2011. <<http://www.mbdc.com/>>.

<sup>141</sup> MSC Marine Stewardship Council. Web Access in Feb, 2011. <<http://www.msc.org/>>.



MSC deals with retail and wholesale industries. It rates seafood. It is an eco-labeling system with international recognition. It complies with EFF, SFF, and Sea Change Investment Fund. Its implementation time could be up to 18 months and the certification path includes a seven step full assessment and an annual audit to assess on-going compliance. It has an overall cost that ranges from 15,000 to \$120,000.

**Advantages:** It assesses sustainable fishing practices, and it looks at the entire supply chain.

**Disadvantages:** It is developed by an independent non-profit organization.

#### **EPEAT<sup>142</sup>**

EPEAT deals with appliances industries. It rates electronics and computers. It is a global registry with international recognition. It complies with ISDE, Energy Star, and IEEE 1680. It does not have an implementation timeframe as it does not rate products itself, but it provides instant accessibility for manufacturers, purchaser, resellers, and consumers. The certification path includes a non-pre-certified declaration of the product compliance to IEEE 1680 criteria, and a periodical random verification of the products and criteria in the registry. It has an overall cost that ranges from \$5,000 to \$115,000.

**Advantages:** It reduces the use of primary materials and toxic materials; it eliminates the use of mercury; it avoids the disposal of hazardous waste; and it reduces solid waste.

**Disadvantages:** The non-requirement of a precertification could potentially affect its credibility; and it could be costly.

### **APPENDIX III: WASTEWISE ANALYSIS: OVERALL ANALYSIS OF EPA WASTEWISE AND INTERVIEW WITH SHANE NELSON, U.S. EPA REGION 2<sup>143</sup>**

EPA WasteWise is a flexible voluntary program that encourages participants to design their own waste reduction and recycling programs. The voluntary agreement between the administrator and the participant is informal and there are no additional regulatory requirements enforced beyond existing state waste management legislation. For this type of voluntary agreement, monitoring procedures are a critical component. Its political acceptance depends on public confidence in its effectiveness. In order to determine its success and effectiveness, a detailed monitoring system is needed. Often monitoring and reporting requirements are considered to be one of the primary costs faced by the participants in voluntary agreements. Therefore, the criteria commonly used for evaluating the success of a voluntary program are its environmental and economic effectiveness.

**According to University of California Santa Barbara's research group and an interview with Shane Nelson, U.S. EPA Region 2, the benefits of EPA WasteWise include:<sup>144</sup>**

- **Cost savings:** Cost-savings are the main incentive for the firms to join the program. By reducing municipal solid waste, disposal costs are reduced and by reducing the amount of materials purchased, money can also be saved. Markets for high quality recyclables (i.e., white paper) exist. Therefore, one possible benefit is

<sup>142</sup> EPEAT. Web Access in Feb, 2011. <<http://www.epeat.net/>>.

<sup>143</sup> Interview with Shane Nelson, U.S. EPA Region 2. Conducted on March 21, 2011.

<sup>144</sup> University of California, Santa Barbara, (2000). An Assessment of the U.S. EPA Voluntary Partnership Program: WasteWise. Retrieved from <[http://www2.bren.ucsb.edu/~keller/courses/GP\\_reports/WasteWise\\_final.pdf](http://www2.bren.ucsb.edu/~keller/courses/GP_reports/WasteWise_final.pdf)>

that collecting and selling these marketable products could generate revenue. Figure 1 shows the approximate cost savings attributable to participation in WasteWise.<sup>145</sup>

- **Public Recognition:** Partners gain public recognition of their waste reduction efforts through EPA publications, case studies, award ceremonies, and national and regional events. The EPA also provides its partners with a variety of waste reduction publications, WasteWise Updates and Bulletins, describing tips for waste reduction, as well as waste reduction guides and directories. EPA also highlights any outstanding achievements of its partners in award ceremonies each year. Awards are given to partners based on their accomplishments in the tonnage of waste reduced, associated cost savings, and technological advances and innovation. Partners also can meet with EPA officials to share their accomplishments by attending the national forum, which is a biennial gathering, held in Washington D.C, and includes prominent speakers. For example, Vickie Bushnell, Coordinator of Kitsap County's Waste Reduction Program, discussed the benefits of recognition at WasteWise Partner Forum in 2005: "Being able to say 'award-winning program' helps to get your foot in the door and have credibility [with both management and other organizations to which you are presenting your program]."<sup>146</sup> In addition, there are regional forums and partner network meetings held in cities across the country, including New York City. Successful partners are all recognized at these events, which also provide partners with opportunities to network and share their waste reduction methods.

- **Community Relations:** Local recognition is equally important to members as national recognition. According to a survey done by UCSB, community relations are most often cited as the most important reason for joining WasteWise (83.5% of respondents indicated that it was a major cause of joining the program). In order to direct partners' attention to improving community relations via WasteWise, the program could provide some resources to assist partners in promoting news of their participation and waste reduction efforts to the public. At present, the WasteWise logo does not help to market their participation in the WasteWise program and is limited in its use.

- **Technical assistance:** The WasteWise program offers technical assistance for its participants through the EPA's contractor Environmental Research Group (ERG). ERG provides staff for a toll-free HelpLine and assigns representatives to work directly with partners. Partners are encouraged to call their assigned consultants if they need help in developing and implementing their waste reduction activities, or if they need answers to general questions on solid waste reduction. The WasteWise website is also a place where partners can network and find out what other organizations similar to their own are doing with respect to solid waste management.

- **Data Collection:** An additional benefit of the WasteWise program is that it can make partners more diligent about collecting waste reduction data. It is difficult to convince organizations that tracking internal solid waste streams as a priority but the potential for reward serves this function. WasteWise delivers a

145 Figure 1: Approximate Cost Savings Attributable to Participation in WasteWise (As of 2000), University of California, Santa Barbara, (2000). An Assessment of the U.S. EPA Voluntary Partnership Program: WasteWise. Retrieved from <[http://www2.bren.ucsb.edu/~keller/courses/GP\\_reports/WasteWise\\_final.pdf](http://www2.bren.ucsb.edu/~keller/courses/GP_reports/WasteWise_final.pdf)>

146 U.S. Environmental Protection Agency, (2006). WasteWise Partner Forum – Awards and Reporting. Retrieved from <<http://www.epa.gov/osw/partnerships/wastewise/events/pubs/pfaward.pdf>>

valuable tool for tracking and collecting waste reduction data which is useful for evaluating an organization's progress. Tracking data allows organizations to identify wasteful practices and to target specific areas for improvement. In addition, quantified waste reduction values can be easily calculated to determine cost savings. These cost savings can be used to justify the financial costs of a waste reduction program to upper management and administration.

- **WasteWise Resources:** Organizations can benefit from WasteWise resources in developing their waste reduction/recycling programs. The WasteWise Toolkit, website, and links to other waste reduction websites are useful resources for partners in the early stages of developing a waste reduction program.

- **On-Site Visits:** According to the UCSB study, EPA WasteWise has made site visits to a number of partner facilities with relative success.<sup>147</sup> This provided a valuable opportunity for both EPA WasteWise and their partners to discuss any potential issues with the program as well as offer specific technical assistance. EPA learns the perspective of its partners and their assessment of the program, as noted in the interviews.

- **Waste Prevention and Greenhouse Gas Emissions:** WasteWise uses a Waste Reduction Model (WARM) that converts materials diverted from landfills to an estimate of greenhouse gas (GHG) emissions reductions. The WARM Model is a Microsoft Excel spreadsheet application created by the EPA to help solid waste planners and organizations track and voluntarily report on GHG emission reductions from several of their waste management practices. Although WARM was developed for state and local solid waste, managers and other organizations interested in calculating GHG emissions associated with different waste management options, WasteWise partners can download the WARM model from the EPA's website.<sup>148</sup>

**While EPA WasteWise provides many benefits for its partners, but there are shortfalls and obstacles in the program:**

- **Waste Reduction/Cost Reporting:** Many of the participating organizations do not actually calculate cost saving or costs associated with their waste reduction programs. As a result, many of their cost reports are rough estimates and may not represent the actual costs or cost savings attributable to the WasteWise program. This lack of cost reporting data also reflects a common difficulty that partners face in reporting their progress due to the variety of waste materials and dispersed waste stream locations. The WasteWise program allows partners to set their own goals based on their own needs. Consequently, goals can vary widely even within the same sector. This illustrates that a flexible voluntary approach can be beneficial. The program could be more effective if there was an increase in partner reporting. However, the major difficulty faced by WasteWise is that the reporting requirement is not enforced.

- **Difficulty in motivating partners:** According to Shane Nelson from EPA Region 2, despite the incentives listed above there are a few issues that dissuade potential partners. First, the EPA faces budget constraints issues. For instance, the EPA could not hold its award ceremony last year, which discouraged a lot

<sup>147</sup> University of California, Santa Barbara, (2000). An Assessment of the U.S. EPA Voluntary Partnership Program: WasteWise. Retrieved from <[http://www2.bren.ucsb.edu/~keller/courses/GP\\_reports/WasteWise\\_final.pdf](http://www2.bren.ucsb.edu/~keller/courses/GP_reports/WasteWise_final.pdf)>

<sup>148</sup> U.S. Environmental Protection Agency, (2010). Waste Reduction Model. Retrieved from <[http://www.epa.gov/climatechange/wywd/waste/calculators/Warm\\_home.html](http://www.epa.gov/climatechange/wywd/waste/calculators/Warm_home.html)>

of participants. Second, there is a failure on the part of EPA to communicate and promote its program to potential partners; many organizations are not aware that the EPA offers a voluntary program. The perception of EPA as a regulatory agency means that organizations do not look to it for voluntary programs and typically do not want to get involved because they think it will cost them too much money to implement a waste reduction program and may result in closer scrutiny.<sup>149</sup>

### **WASTEWISE SUCCESSES<sup>1</sup>**

Over 10 different private industries, in addition to many public institutions and government agencies, have achieved significant gains by implementing the WasteWise challenge. Within the private sector there have been four major sectors that have achieved substantial success by reducing solid waste, increasing diversion and increasing recycling.

- **Automotive** - Subaru of Indiana: The Lafayette Indiana plant currently recycles 99.9% of waste produced during the manufacturing process. Subaru's success has been utilized in 140 similar companies implementing similar manufacturing processes.
- **Banking** – Bank of America Charlotte NC: Bank of America regularly sponsors WasteWise educational events for their 148,000 employees to provide waste reduction, recycling and waste prevention in everyday business activities. Bank of America also sources furnishings (especially all carpeting) from manufacturers that utilize 100% recycled material produce offices furniture for all new buildings and existing renovations.
- **Manufacturing** – NEC Electronics America: With over 700 employees NEC has achieved remarkable success by substantially increasing total waste diversion. In 2008 the Roseville facility diverted 1.03 million pounds or 82% of total solid waste from landfills, which equated to savings of approximately \$97,000 in disposal fees. At the same time NEC was able to generate \$430,000 from sales of recyclable materials. Over the past 16 years NEC has successfully diverted 4,700 tons has been from landfills.
- **Retail** – Limited Brands, Inc.: Limited is the largest specialty retailer selling woman's intimate apparel, beauty, personal products and accessories within the United States. In 2007, Limited's brands diverted 83% of waste of which 65% was recycled and 19% was reused.

<sup>1</sup> EPA WasteWise <http://www.epa.gov/osw/partnerships/wastewise/success.htm> Retrieved from <http://www.epa.gov/epawaste/partnerships/wastewise/index.htm>

• **WasteWise Resources/Procedures:** Determining a baseline and setting goals continues to be a problem for new partners. Although the Toolkit and other WasteWise resources provide assistance on these tasks, they may not be sufficient or are too broad. They also do not provide any local resource contacts. According to the UCSB study, the WasteWise Helpline was the least useful resource available to partners for establishing their goals and setting their baseline. A number of partners responding to the WasteWise participant satisfaction survey complained that they did not receive return phone calls from the customer service

<sup>149</sup> University of California, Santa Barbara, (2000). An Assessment of the U.S. EPA Voluntary Partnership Program: WasteWise. Retrieved from <[http://www2.bren.ucsb.edu/~keller/courses/GP\\_reports/WasteWise\\_final.pdf](http://www2.bren.ucsb.edu/~keller/courses/GP_reports/WasteWise_final.pdf)>

representatives and felt that there was too much turnover of Helpline staff. The hours of the Helpline may not serve partners in different time zones well. Other partners felt that the program's communications with them was impersonal and did not offer enough local knowledge.<sup>150</sup>

- **The City's Involvement:** According to Mr. Nelson, the EPA has been trying to involve the City with WasteWise for several years but has not yet been successful in obtaining a commitment. There are a few pockets of activity throughout the city, but a large scale program is hard to implement. Composting food waste, for example, is a large scale issue in New York. Mr. Nelson does not think composting is problematic issue in terms of usage/marketing so far. According to him, there are ample opportunities to use the compost around the city in gardens, parks, and homes. However, permitting sites, compost facility locations, and spaces for composting are all issues.<sup>151</sup>

The City could assist the EPA to roll out its WasteWise program in NYC, but not act as administrator. WasteWise is a voluntary program which cannot be legally enforced. The lack of enforcement is another concern because it takes much effort to encourage the participants to commit to proper waste reduction. The City's intervention might discourage WasteWise partners who wish to avoid outside involvement but might encourage new participants.<sup>152</sup>

The effectiveness of voluntary waste reduction programs depends on setting clear goals as part of the agreement, specifying the baseline against which improvements will be measured, and specifying reliable and clear monitoring and reporting mechanisms. EPA's WasteWise proves to be a useful waste management program and provides plentiful resources to its partners to promote their waste reduction activities. The program offers sufficient incentives, including cost-savings and public recognition, to motivate its participants. However, WasteWise still has a difficulty in obtaining correct and accurate waste reduction reports from its partners. This is mainly because the reporting requirement is not enforced since WasteWise is a voluntary agreement program.

## APPENDIX IV: ADDITIONAL CORPORATE CHALLENGE CASE STUDIES & INTERVIEWS

### RECYCLE MANIA CHALLENGE CATEGORIES

- **Stephen K Gaski Per Capita Classic:** Institutions compete to collect the largest combined amount of paper, cardboard and bottles and cans per person. The Per Capita Classic is the original RecycleMania challenge.
- **Grand Champion:** The Grand Champion category evaluates data on institutions' waste and recyclable weights to calculate the recycling diversion rate, or recycling as a percentage of overall waste generation. Colleges and universities that are successful in this category demonstrate their achievement in both source

<sup>150</sup> University of California, Santa Barbara, (2000). An Assessment of the U.S. EPA Voluntary Partnership Program: WasteWise. Retrieved from <[http://www2.bren.ucsb.edu/~keller/courses/GP\\_reports/WasteWise\\_final.pdf](http://www2.bren.ucsb.edu/~keller/courses/GP_reports/WasteWise_final.pdf)>

<sup>151</sup> University of California, Santa Barbara, (2000). An Assessment of the U.S. EPA Voluntary Partnership Program: WasteWise. Retrieved from <[http://www2.bren.ucsb.edu/~keller/courses/GP\\_reports/WasteWise\\_final.pdf](http://www2.bren.ucsb.edu/~keller/courses/GP_reports/WasteWise_final.pdf)>

<sup>152</sup> University of California, Santa Barbara, (2000). An Assessment of the U.S. EPA Voluntary Partnership Program: WasteWise. Retrieved from <[http://www2.bren.ucsb.edu/~keller/courses/GP\\_reports/WasteWise\\_final.pdf](http://www2.bren.ucsb.edu/~keller/courses/GP_reports/WasteWise_final.pdf)>

reduction and recycling.

- **Waste Minimization:** Institutions compete to produce the least solid waste (both recyclable and non-recyclable waste) per person. This competition is intended to reward those institutions that generate the least amount of overall waste, emphasizing reuse and source reduction over recycling.
- **Gorilla Prize:** This category recognizes larger institutions that recycle the highest gross tonnage of combined paper, cardboard and bottle and cans during the ten-week competition, regardless of campus population.
- **Targeted Materials:** In addition to the four primary competitions, institutions may also compete in four targeted material-specific categories including Paper, Corrugated Cardboard, Bottles and Cans, and Food Service Organics.”<sup>153</sup>

#### **LESSONS FROM WHOLE FOODS MARKET<sup>1</sup>**

Whole Foods is one of the leading WasteWise retail partners in food composting. This supermarket chain has a goal of zero waste and is composting its unusable food, floral and food-soiled paper residuals in an effort to reach this goal, including in its NYC stores. Whole Foods can save an average of \$7,000 annually in a small-to-medium volume store and more in its higher-volume stores by composting because the company pays lower tipping fees for organics than trash. Although it is challenging to report on waste disposal for multiple types of waste across many stores, Whole Foods has been successfully reducing its waste as part of the WasteWise program.

However, pursuing the goal of zero waste is not without its difficulties. The lack of industrial-scale composters makes it difficult for haulers to find a market for their organic waste products. The NYC market has one or two large-scale composters at most. NYC itself has a great dearth of composters. As recently as 2004, none of Whole Foods' stores in New York had their organics composted due to the difficulty of finding a hauler who could accommodate them.

Another obstacle to segregating organic food waste is identifying space within the stores to dedicate recycling and composting. Major supermarkets in more suburban or rural areas like Ralphs and Von's are able to implement composting practices easily because they have sufficient large back end operations (nonretail areas); Whole Foods, however typically has more retail space and less back end operations space. Lack of space is a common challenge in NYC stores making it difficult to establish culling and sorting stations.

<sup>1</sup> Composting at the world's largest natural foods supermarket chain, BioCycle. Web. Accessed Feb, 2011. <[http://www.jgpress.com/archives/\\_free/000309.html](http://www.jgpress.com/archives/_free/000309.html)>

<sup>153</sup> RecycleMania, (n.d.). General overview. Retrieved from: <[http://www.nyc.gov/html/nycwasteless/html/recycling/schools\\_goldenapple.shtml](http://www.nyc.gov/html/nycwasteless/html/recycling/schools_goldenapple.shtml)>



### MASSDEP SUPERMARKET RECYCLING PROGRAM CERTIFICATION

The EPA's Shopping for Change program was implemented in Massachusetts and provides an example of a supermarket challenge that might be feasible for NYC. The Massachusetts Department of Environmental Protection (MassDEP) identified food waste diversion as a priority focus for waste reduction in Massachusetts. MassDEP partnered with the Massachusetts Food Association (MFA) and established a voluntary Supermarket Recycling Program Certification (SRPC) program to increase organics recycling at supermarkets in the state. MassDEP targeted grocery stores and supermarkets selling at retail a full line of dry grocery, canned goods, perishable and non-perishable items, with service deli, bakery, and seafood sections, annual sales of \$2 million or more.<sup>154</sup> This may be particularly instructive since targeting larger businesses with greater resources to begin implementation first allows smaller businesses time to catch up before a broader challenge is initiated.

As in NYC, Massachusetts supermarkets are a major organics generator producing an estimated 90,600 tons of organic material per year.<sup>155</sup> Since 75-85% of a supermarket's waste stream is biodegradable, composting of biodegradable materials saves supermarkets money because composting is less expensive to them than trash disposal.<sup>24</sup> By participating in the program, individual supermarkets were able to obtain a MassDEP SRPC and qualify for certain regulatory relief. The waste streams from supermarkets with SRPC were exempt from MassDEP's routine comprehensive inspections at disposal and transfer facilities for paper and cardboard, glass, metal and plastic containers, leaves and yard waste. According to MassDEP, the program achieved a 60-75% of organics recycling rate in 2005.

**Pros:** Supermarkets accrue benefits from participating in the Shopping for Change challenge/SRPC program by saving money and receiving positive recognition as well as welcome regulatory relief. According to MassDEP, participating supermarkets could save \$3,000-\$20,000 per store annually by recovering and recycling their food residuals.<sup>24</sup> On average, participating supermarkets saved more than \$4,400 per year per store and recycled 65.9% of their total waste stream resulting in \$700,000 in reduced disposal costs overall. Participating supermarkets also reaped the benefits of public recognition, which can be a positive motivation for their employees, as well as raising the supermarket's profile with the local rising community, thereby increasing its competitive advantage. Participants also increased their compliance with existing State regulations on waste disposal and received regulatory relief from comprehensive inspections of their waste haul trucks for prohibited recyclable materials by State agencies.

The program also benefits the State as a whole. Increases in composting helps conserve natural resources and frees up scarce landfill space. Also, compostable materials, such as vegetables, fruits, and bread, are used to make compost, enriching local soil. Recycling these materials back into the earth as soil is better for the environment as well as being a lower cost alternative to landfill disposal. This kind of program would also decrease greenhouse gases; food waste and other organic materials, when buried in landfills, are the primary contributors to the emission of methane, one of the most detrimental greenhouse gases for the atmosphere.

<sup>154</sup> Massachusetts Department of Environmental Protection, (2007). fact sheet: Supermarket Recycling Program Certification. Retrieved from <<http://www.mass.gov/dep/recycle/reduce/smfacts.pdf>>

<sup>155</sup> Shopping for Change: MassDEP Supermarket Recycling. Retrieved from <<http://www.epa.gov/osw/conservation/materials/organics/food/success/ma-shop.htm>>



**Cons:** As with many of the challenges described above, the infrastructure requirements of a challenge like this prove to be the primary obstacle to its implementation in NYC.

### GREEN RESTAURANT ASSOCIATION CERTIFICATION PROGRAM

The Green Restaurant Association (GRA) has a system in which participants collect “points” in order to qualify for certification. Under this system, companies can aim for 2 stars (100 points), 3 stars (175 points), or 4 stars (300 points). Participants are also required to have a recycling program in place, provide educational programs about waste reduction, and have a business free of Styrofoam usage. Ways to collect points include water efficiency, sustainable food and packaging purchasing, energy reduction, chemical and pollution reduction, and overall waste reduction.<sup>156</sup> The benefits the GRA cites of becoming certified include: cutting costs; positive publicity; improved staff productivity and morale; attracting new customers; staying ahead of legislative requirements; and helping to create a healthier environment.<sup>157</sup>

The certification is awarded directly by GRA and is endorsed by the Environmental Defense Fund, NRDC, NYS Restaurant Association, the Restaurant Association, and Surfrider Foundation and is also supported by several companies.<sup>30</sup> As a service to customers wishing to dine in GRA certified restaurants, GRA’s website has a search function allowing patrons to search for certified restaurants in different neighborhoods across the City. GRA assists businesses with the certification process by helping them with environmental assessments, consulting, public relations, and marketing associated with green practices. The GRA “endorses” green products that can be used on a day-to-day basis and can help in obtaining certification, for example bathroom tissue paper, cleaning supplies, and environmentally friendly take-out containers. Product manufacturers can become GRA endorsed by applying provided they meet the GRA’s comprehensive standards.

“The GRA’s mission is to create an ecologically sustainable restaurant industry.”<sup>158</sup> For about 20 years, they have offered solutions, tools, guidance, and education to businesses who want to make their business more sustainable. On the GRA’s website, they provide background information on various environmental issues, as well as recommendations on how to reduce carbon footprints, purchase environmentally responsible products, and methods on how to save money through energy reduction, waste reduction, and inventory control.

The GRA estimates that for restaurants, costs could be as low as \$300 per year to become GRA certified, depending on size of the business and the term of the contract. This process normally takes 3 months, but varies depending on methods adopted. In addition to restaurants, the GRA can certify any food service operation, including university dining halls, bakeries, bars, catering kitchens, events and corporate cafeterias.

**Pros:** The GRA is a good option for restaurants wishing to take proactive steps as individual business owners to make their restaurant more environmentally friendly. The certification process and assistance provided by the GRA are beneficial to the restaurant owners, the GRA itself, the customers, and the environment.

<sup>156</sup> Green Restaurant Association. Green restaurant certification 4.0 standards. Web. Access Feb, 2011. <<http://www.dinegreen.com/restaurants/standards.asp>>

<sup>157</sup> Green Restaurant Association. Six reasons to become a certified green restaurant. Web. Access Feb, 2011. <<http://www.dinegreen.com/restaurants/benefits.asp>>

<sup>158</sup> Green Restaurant Association. Education center. Web. Access Feb, 2011. <<http://www.dinegreen.com/customers/education.asp>>

Everyone involved benefits from the certification process on some level. Additionally, the GRA encourages the use of yellow grease, which was not seen in other food related challenges.

**Cons:** The initial cost to the restaurant or business of implementing the changes necessary to earn certification could be a deterrent. Since many people are not familiar with the GRA, there may be a learning curve involved in understanding how it works, how it can be effective it is, or why it's important. Additionally, many consumers are not aware of the program so it may not provide a significant competitive advantage yet.

### **RESTAURANT CASE STUDY: GUSTORGANICS AND TARANTA**

Currently there are only two NYC restaurants that have been certified by the GRA. One restaurant, GustOrganics, wanted to serve only organic food. With GRA's assistance, they were able to achieve the goal of serving 100% organic food.

The second restaurant, Taranta, aimed to reduce its waste removal and energy costs. The initial steps recommended by the GRA and implemented by Taranta were: eliminating Styrofoam; changing pre-rinse spray valves to more water efficient types; switching from wax candles to solar powered ones; installing motion sensors in bathrooms for electricity purposes; adopting a recycling method which separates organic from inorganic materials; and replacing paper towels in bathrooms with hand dryers.

The savings realized by the restaurant upon implementation were about \$1,300 per year from switching over to a hand dryer and 25 per year in energy costs were also saved installing CFL light bulbs, \$. The restaurant noted that "by composting and recycling, we cut our garbage collection bill to almost 50%."<sup>159</sup> The owner of Taranta has also converted his delivery truck to run on leftover grease.

### **STARBUCKS CASE STUDY**

Currently, the Starbucks Coffee Company produces 3 billion paper cups annually that are landfilled once discarded. At the end of 2010, Starbucks tested an 8-week pilot program which included 86 locations within New York City to determine the feasibility of the company to recycling its beverage cups. The program utilized in-store recycling bins with paper bags and special liners to prevent leaking; the recycling bins were separated from the solid waste bins and color-coded for ease of identification. The purpose of the pilot was to test the recyclability of the cups themselves and not the cardboard sheathes or lids. The use of the paper bag liners was to properly identify the cups during recycling pickup. The cups were hauled by Action Environmental Carting and collected with the other recycling, separate from other solid waste. Once collected, the cups would be comingled with old corrugated cardboard (OCC) so that they could be recycled for a variety of uses, from recycled paper to corrugated cardboard.

The Starbucks cups from the NYC pilot locations were transferred to the Pratt Industries recycling plant in Staten Island, NY where they were they would be added to linerboard components to create NYC pizza take-out boxes. Two of the greatest difficulties that the paper cup industry has faced in trying to increase diversion from landfills to recycling plants are sorting and contamination issues. Sorting at recycling transfer sites is technically difficult for electronic sorters due to a lack of identifiable markings and synthetic coatings

<sup>159</sup> Green Restaurant Association. Case studies. Web. Access Feb, 2011: <<http://www.dinegreen.com/restaurants/cases.asp>>

within the cup are not recyclable. Additionally, excess liquid contents contaminate other paper products leaving them worthless and unrecyclable.

Starbucks has been working with the Fiber Box Association's wax alternative protocol to develop a hot and cold cup liner that is easily recyclable. The Green Blue Institute is working in conjunction with the Sustainable Packaging Coalition (SPC) to establish criteria for costs, carbon footprint, compatibility and end of life properties to develop a comparative packaging assessment program called "Compass," which Starbucks intends to use. Starbucks' goal to provide reusable or recyclable cups by will be more easily achieved with the industrial ecology knowledge of Compass.

### **THE COMPOSTING PROJECT AT OHIO UNIVERSITY**

Ohio University commissioned an in-vessel composting machine at the end of January 2009 from Wright Environmental, Inc., a nationwide composting machinery supplier for one of their campuses consisting of over 21,000 students.<sup>160</sup> Employees from Wright Environmental taught three members of the grounds crew of Ohio University how to operate the in-vessel machine, which has been in use ever since its installation. The system was able to handle two tons of organic waste in total, spread over 14 separate "trays". The university filled one tray per day, which stayed in the unit for 14 days, then cured for 90 days before completion. During the school year the university was able to use this machine to compost about 50% of its total food waste, for a total of over 263 tons of food waste and service-ware since July 2010.<sup>161</sup>

Ohio University was recently awarded \$1,088,571 through the American Recovery and Reinvestment Act to expand its compost project, which will include the addition of an expansion system for the in-vessel machine, a solar array for power, a solar thermal water heating system, and an industrial shredder to process the organics more effectively. The expansion project is expected to be completed by the end of 2011. The university predicts that the upgraded system will divert up to 25% of the campus' current landfill waste, which includes 100% of its pre- and post-consumer food waste, and "result in an annual greenhouse gas emissions reduction of approximately 1,200 metric tons of carbon dioxide equivalents--about the same amount of CO2 emissions resulting from the energy use of 108 homes in one year."

A downside to this project was the extremely high start-up costs, which totaled about \$800,000 including external costs such as the repaving of roads, heating systems, and creating a leach field. However, the university secured many grants for this project, including the grant from the American Recovery and Reinvestment Act.

### **COMPOSTABLE PREPARED FOOD TAKE-OUT CONTAINERS AT EPA/RTP LAKESIDE CAFÉ**

In the fall of 2001, the EPA/ Research Triangle Park (RTP) facility, which has over 1,550 employees, launched a "green" cafeteria project, resulting in the establishment of the "Lakeside Café." At the heart of the cafeteria project lie the principles of Environmentally Preferable Purchasing (EPP), source reduction, and effective waste disposal. The inventory management and procurement staff at Lakeside Café are guided by the EPA's EPP Guiding Principles towards environmentally friendly procurement decisions. Multiple

<sup>160</sup> Ohio University, (2011). Focus on Ohio. Web. Access Feb, 2011: <<http://www.ohio.edu/focus/>>

<sup>161</sup> Ohio University, (2010). Waste. Web. Access Feb, 2011: <<http://www.ohio.edu/sustainability/Compost.htm>>

recycling and composting bins have been placed throughout the cafeteria to facilitate customers' disposal of all recyclable and compostable objects in the appropriate receptacles.

The service provider operating Lakeside Café is under contractual obligation to provide paper service products such as napkins, cups, plates, bowls, etc. made with either 100% recycled materials or with entirely compostable materials. Compostable waste is trucked to a facility approximately 60 miles away from EPA/RTP, every two days. In return for the waste, which the EPA facility collects and hauls itself, the composter offers EPA a discount on its finished product, compost for use on the RTP site. This practice fulfills the service provider's contractual obligation that no organic waste be landfilled. Furthermore, this system closes the loop on organic waste; Lakeside Café not only provides raw materials to make compost, but purchases the finished compost and uses it wherever it's needed.

Managers of the program believe that as a result of the exposure to "green" practices within an upscale atmosphere like Lakeside Café, more food service establishments will use these "green" products and services. Currently compostable products are still more expensive than more commonly used products. They hope this pilot will lead to a decrease in prices for compostable food containers as a result of increased volume and demand. There are a variety of companies that manufacture and/or distribute compostable food service containers for hot and cold food and beverages. However, the prices are still higher than for regular polystyrene or paper. For instance a large 8" x 8" clamshell EPS container is approximately 6 cents whereas the biodegradable alternative ranges between 24-31 cents.

Another goal of the program is to gain employee acceptance of the "green" program through continued exposure to environmentally-preferable options with the expectation that it will lead to increased likelihood of employees adopting these practices beyond the cafeteria in their everyday lives. According to the EPA, it is still too early to determine the success of the entire project. However, "if the initial successes and the enthusiasm of the EPA employees at RTP are any indication, the project could have a long standing impact on the food service industry"<sup>162</sup>

#### **INTERVIEW WITH ADAM PASQUALE, LEED AP ACTION CARTING ENVIRONMENTAL GROUP AND GREG GALIETTI, ACTION CARTING ENVIRONMENTAL GROUP**

Action Carting Environmental Group is New York City's most progressive and innovative non-hazardous waste management service hauler. Action caters to a diverse variety of clientele ranging from restaurants, medical facilities, building contractors, investment banks and other businesses. Collection, sorting, recycling and composting of organic materials are all services that Action provides to its customers. Action collects approximately 38 tons of organic waste per day from 400 customers in the Tri-State area. Fees generally range depending on the specific customer's volume and are on average as low as one-half to two-thirds of the maximum BIC rates of \$ 10.42/100 lbs. or \$15.89/ loose yd. Action is the largest organic food waste hauler and daily deploys 4 customized leak proof collection trucks to haul the waste. Furthermore, Action provides customers that produce organic waste with separate receptacles to store and dispose of the waste.

<sup>162</sup> United States Environmental Protection Agency. "Environmental Preferable Purchasing. Green Cafeterias". Web. Accessed March 4th 2011. <<http://www.epa.gov/epp/pubs/case/cafeteria.htm>>

As of June 2008, Action completed construction of its state-of-the-art Materials Recovery Facility (MRF), which is one of the largest and most active recycling facilities within the New York City metropolitan area. Originally the plant was expected to process 200 tons of material per day. Currently, the MRF processes between 350 and 450 tons per day. Everyday Action deploys 18-20 recycling-specific trucks to collect and haul recyclable materials from all over the city. Additionally, other private haulers and the Department of Sanitation utilize the MRF to sort recyclable material. The Materials Recovery Facility's recycling rules strictly follow regulations and sort and recycle all cardboard, plastics (LDPE, PTE, miscellaneous plastics), aluminum, white paper and mixed paper. Mr. Pasquale estimates that 80% of all recyclable material is shipped to Nine Dragons, China and only 20% is recycled domestically.

Mr. Pasquale thinks the best course of action in order to increase organic waste diversions from solid waste would be to target grocery stores and large-sized restaurants. After a phase-in period has passed, small restaurants should be incorporated into the scheme. Action regularly conducts surveys of all its customers to gain an understanding and breakdown of the waste stream within NYC. Findings have shown that recycling material and wet solid waste consistently contaminate one another and are often intermingled. The main cause of the contamination is a lack of bag standardization. Mr. Pasquale suggests that clear bags be used for all waste so that haulers can easily identify bag contents and frequent contaminators can be notified and provided guidance on proper waste segregation.

To divert organic waste from the wet solid waste stream, the City could establish relationships with farmers outside the City. These farmers could compost a portion of the organic waste the City produces. Furthermore, the city could issue a request for proposals (RFP) for organic digester facilities such as multiple small-scale Anaerobic Thermal Conversion (ATC) plants around the tri state area. Small-scale ATC plants would be able to consume organic waste as a feedstock and produce clean energy.

**Pros:** Mr. Pasquale's suggestions have the potential to increase recycling and organic waste diversion from the wet solid waste stream. Establishing relationships with nearby farming communities could result in a market that would absorb a portion of the organic waste collected. The construction of ATC or other organic digesters throughout the tri state area could aid in further reducing the organic waste being landfilled. Increasing recycling and diverting organic waste would reduce the percentage of greenhouse gases (GHG) released from trucks transporting waste from NYC were facilities cited locally. Furthermore, expansion of organic composting and digestion will create new short-term construction and long-term maintenance, facilities and management jobs. Finally, studying the breakdown of the waste stream through the city would provide an in-depth understanding of who generates what garbage and where; it would be possible to identify the largest and smallest waste generators are and ultimately where that waste ends up.

**Cons:** Legislation would be required to mandate that all recyclables be placed in clear plastic bags in order to successfully reduce contamination. The mandate would also need to be enforced. The identification of sites for and the construction of organic digesters would be time consuming and potentially expensive. Appropriate land would need to be surveyed and developed to erect appropriate organic waste facilities. Finally, large numbers of farmers would need to be contacted, regulatory compliance assured and contract negotiations would need to occur before organic waste deliveries could commence. Farms would need to

be located not farther than 100 from the city for the plan to succeed. Farms located further than 100 miles are too distant and not cost-effective due to the high cost of transportation.

## APPENDIX V: NYC INDUSTRIAL ECOLOGY CASE STUDIES

### WASTEMATCH

WasteMatch is used by NYC businesses, nonprofit organizations, government agencies and artists.<sup>163</sup> The materials exchanged are typically: computers, electronics, office equipment, supplies and furniture, metal, glass and plastic products, surplus food, textiles, fabric and leather, and containers and packaging. WasteMatch does not buy, sell, store or transport the materials, rather it provides a virtual venue for others to post requests for materials or advertise their materials. The database provides information about materials, the borough/county in which they are located, the quantity and frequency of the materials' availability or need, and the price and delivery method.<sup>164</sup> One can search for products by using key words, or narrowing down the search based on category and location. WasteMatch provides additional services, such as performing an initial assessment of a client's materials and conducting research to identify reuse and recycling opportunities for materials that are hard to place.<sup>165</sup>

### BUILD IT GREEN! NYC

Build it Green! NYC (BIG!NYC) is a nonprofit organization that acts as a discount retail outlet for salvaged and surplus building materials.<sup>166</sup> The organization partners with Community Environmental Center (CEC) and relies on donations, supporters, and the revenue from its sales to cover its operating costs; the remaining profits are donated to CEC's SolarOne, the first solar powered building in NYC.<sup>167</sup> Founded in 2005, BIG!NYC initially sold materials straight from the source at deconstruction sites and storage spaces, until it acquired a more accessible 18,000 square foot warehouse in Astoria, New York. The program prides itself on creating more green jobs than recycling, maintaining a high value for the materials it collects and keeping the products local. This exchange program has great potential to save New Yorkers money; in 2011, BIG!NYC expects to save New Yorkers between \$1.5-2 million in purchasing costs, and \$1 million in other economic activity (e.g. avoided tipping fees, hauler fees and storage).<sup>168</sup>

BIG!NYC accepts donated building materials that are in working and good condition.<sup>169</sup> These materials are typically from buildings that are about to be demolished or remodeled. The materials are put on display at its warehouse where they can be viewed by the general public. Their website also displays photographs and descriptions of featured items. The donors do not receive profits from the sales and are responsible for transporting the materials to the warehouse. BIG!NYC will pick up materials if they have a total original cost of more than \$3,000.<sup>170</sup> The donations are tax deductible, and donors typically save money because they do not have to pay any of the costs that are associated with discarding the materials. BIG!NYC also

163 NYC WasteMatch. About. Web. Access March 21, 2011, from <<http://www.wastematch.org/about>>

164 NYC WasteMatch. Exchange Home. Web. Access March 21, 2011, from <<http://www.wastematch.org/exchange>>

165 NYC WasteMatch. Our Services Web. Access March 21, 2011, from <<http://www.wastematch.org/services>>

166 Build It Green! NYC. What We Do. Web. Access March 22, 2011, from <<http://www.bignyc.org/whatwedo>>

167 Build It Green! NYC. Build It Green! History. Web. Access March 22, 2011, from <<http://www.bignyc.org/history>>

168 Interview with Justin Green, March 24, 2011

169 Build It Green! NYC. What We Do. Web access March 22, 2011, <<http://www.bignyc.org/whatwedo>>

170 Build It Green! NYC. How To Donate. Web access March 22, 2011, <<http://www.bignyc.org/how-to-donate>>



offers deconstruction services for kitchen cabinets, and total building or partial building deconstruction.<sup>171</sup> This service is typically done free of charge, depending on the value of the salvaged materials.

### **BIG!NYC Best Practices:<sup>172</sup>**

1. **Specialization** – BIG!NYC focuses on building and deconstruction materials, which have both a high number of suppliers and a large demand in NYC.
2. **Warehouse Space** – BIG!NYC has a warehouse where they accept donated goods. This allows contractors and donors to drop off donated items immediately, without having to wait for a buyer or recipient. The warehouse also allows buyers to browse for materials and to physically see the products.
3. **Economic Incentives** – It can be cheaper for the contractor to donate materials, which are accepted free of charge and result in a tax deduction, rather than pay to dispose of the materials in a landfill. The extra costs associated with donating are: the need to more carefully deconstruct buildings and take care of the materials (which BIG!NYC has taken the initiative to provide assistance), and coordinating drop-off or pick-up.
4. **Full-Time Experienced Staff** – BIG!NYC has 14 staff members, who are dedicated to coordinating donations and outreach, educating contractors about their program and soliciting donations.
5. **Funding** – BIG!NYC receives support from the Empire State Development Corporation, and was able to find affordable space in NYC, allowing them to have a low startup cost.

### **FILM BIZ RECYCLING**

Film Biz Recycling (Film Biz) is a nonprofit organization founded in 2008 with a mission to reduce the amount of waste generated by the film, TV, commercial and print advertising business in NYC.<sup>173</sup> Initially, Film Biz collaborated with BIG!NYC to use their warehouse to accept donations. In 2009, it opened its own 11,000 square foot showroom in Brooklyn, NY where it sells donated items. In addition, it opened a prop (Theatrical Property) house in Long Island City where it rents and sells props to the industry. These sales are the primary source of funding for the organization, along with a small grant and some financial donations.<sup>174</sup> Film Biz accepts donated goods that can be used by the film industry and also items which can be donated to other organizations.<sup>175</sup> Sixty percent of the items donated to Film Biz are then donated to charities such as Materials for the Arts and homeless shelters.<sup>176</sup> Film Biz also advises donors on where they should donate or recycle items that Film Biz cannot accept.

Film Biz does not provide pick-up services for donated items unless they are highly valuable, but it does

<sup>171</sup> Build It Green! NYC. How Does It Work?. Web access March 22, 2011, <<http://www.bignyc.org/how%20does%20it%20work.>>

<sup>172</sup> Interview with Justin Green, March 24, 2011.

<sup>173</sup> Film Biz Recycling. History. Web access March 22, 2011, <<http://www.filmbizrecycling.org/who-we-are/history/>>

<sup>174</sup> Film Biz Recycling. FAQs. Web access March 25, 2011, <<http://www.filmbizrecycling.org/faqs/>>

<sup>175</sup> Film Biz Recycling. FAQs. Web access March 25, 2011, <<http://www.filmbizrecycling.org/faqs/>>

<sup>176</sup> Interview with Eva Radke on March 24, 2011.



provide a number of other services. After shoots, Film Biz conducts site visits to storage units that store the sets, props and set dressing, that are typically discarded of once the editing is complete.<sup>177</sup> Film Biz creates a plan for how to distribute the materials it collects by working with charities and vendors. Donors receive a tax deduction and benefit from other cost savings. Clean-outs have been shown to be on average 45% less expensive than throwing out the materials. In addition to these services, Film Biz also provides consultation services for greening productions.

### **Film Biz Best Practices:**<sup>178</sup>

1. **Specialization** – Film Biz focused on just one industry—the entertainment/film industry—that produces a great deal of reusable waste and is also home to many progressively minded individuals. It does not accept donations from the general public; the general public is directed to other donation centers and recycling facilities.
2. **Warehouse Space** – Film Biz has a physical location where donations can be made and props/materials can be purchased or rented, allowing for an income stream that allows them to be self-sustaining. In addition, the showroom provides additional time for the materials to be matched with a recipient when oftentimes the donor does not have the luxury of holding onto the materials for a prolonged period of time.
3. **Economic Incentives** – Film Biz was able to show the entertainment industry that reuse and recycling cost-effective. The industry gets a tax deduction and does not need to pay disposal fees, and donating materials creates green jobs, for those who work to “upcycle” the materials and the organization’s staff. All of this addresses the industry’s bottom line profits.
4. **Full-Time Experienced Staff** – The founder of Film Biz was previously a middle manager in the film industry and do understands the industry and is able to respond to industry concerns. This in-depth knowledge of the target industry is critical because it is often difficult to engage organizations, especially when it comes to changing the way they run their operations. Film Biz also has a staff of 12, including a director of sales and a director of operations.
5. **Facilitation** – Film Biz provides the entertainment industry tools addition to advice. Film Biz encouraged and provided assistance for the industry to recycle and donate their products, while also providing a means for the industry to do it. The physical showroom and prop house facilitate the donation process and eliminate the need for the donor to wait for a buyer/recipient to respond to an ad.

### **MATERIALS FOR THE ARTS**

Founded in 1978, Materials for the Arts (MFTA) is a private/public organization run by the NYC Department of Cultural Affairs that seeks to remove materials from the solid waste stream to allow for their reuse as materials in arts programs. It is supported by the DSNY as well as the Education Department. Recipients of

<sup>177</sup> Film Biz Recycling. Services. Web access March 25, 2011, <<http://www.filmbizrecycling.org/what-we-do/services/>>

<sup>178</sup> Interview with Eva Radke on March 24, 2011.

the reusable materials include arts and cultural organizations, public schools as well as community arts programs.<sup>179</sup> In 2009, approximately 660 tons of material valued at over \$7 million were donated to MFTA and were reused by arts and cultural programs throughout NYC.<sup>180</sup> Materials are donated to MFTA by individuals and organizations and are then distributed to qualifying organizations—nonprofit arts and cultural groups, select NYC public schools, social services, health and environmental organizations with ongoing art programs, and government agencies.<sup>181</sup> Recipients then make appointments for shopping times to come to the warehouse to pick up needed materials.<sup>182</sup>

Currently, MFTA has thirteen staff members, two trucks and a 35,000 square foot warehouse in Long Island City, Queens. A significant component of MFTA is its warehouse, which has been referred to as the “heart of [the] program,” and where MFTA stores its materials.<sup>183</sup> MFTA expanded its warehousing space in 2009 by 10,000 square feet to its current footprint of 35,000 square feet.

MFTA receives full financial support, \$1.2 million a year, from the City; its main funder is the Department of Cultural Affairs, followed by the Department of Education and DSNY.<sup>184</sup> Of that \$1.2 million, approximately 75% is spent on rent. In addition, Friends of Materials for the Arts (FOMA), a nonprofit organization, supports programs and initiatives that would otherwise not be funded by the City. FOMA raises \$300,000 a year by soliciting financial donations from individuals, corporations and foundations.<sup>185</sup> These donations are used to support education programs and MFTA’s materials database, among other things.<sup>186</sup> Currently, there are approximately 4,210 active recipients for MFTA materials. Donors benefit from a tax deduction and may donate their materials three ways: drop donations off at MFTA’s warehouse; post the items online using MFTA’s service for direct donations from seller to buyer; or arrange for MFTA to pick up materials if they are over 250 lbs. and/or valued over \$1,000.<sup>187</sup> The availability of a direct donation database allows MFTA to provide forum to exchange those items that are either too small or too large for MFTA to pick up, and it means that donors do not have to drop the materials off at the warehouse themselves. The donor can list the item online, where eligible recipients can search the database and contact the donor directly to arrange for a pickup.<sup>188</sup>

**1. Specialization** – MFTA’s targeted industry is limited, but also large. MFTA provides supplies to the arts community within NYC, which is large and robust. In order to receive donated items, a recipient must apply to become a member.

**2. Warehouse Space** – MFTA has a warehouse where donated items can be dropped off, and recipients can come at designated time slots to “shop.”

179 Materials for the Arts. About Us. Web access March 28, 2011. <<http://www.mfta.org/aboutus.html>>

180 Materials for the Arts. About Us. Web access March 28, 2011. <<http://www.mfta.org/aboutus.html>>

181 Materials for the Arts. Recipients-Do I Qualify. Web access March 28, 2011. <[http://www.mfta.org/recipients\\_doiqualify.html](http://www.mfta.org/recipients_doiqualify.html)>

182 Materials for the Arts. Recipients. Web access March 28, 2011. <[http://members.mfta.org/recipient\\_list/](http://members.mfta.org/recipient_list/)>

183 Santos, F. (2011). For Schools, Free Art Supplies, and Much More. New York Times. New York. February 28, 2011.

184 Interview with Harriet Taub on March 29, 2011.

185 Materials for the Arts. Friends of Materials of the Arts. Web access March 28, 2011. <<http://www.mfta.org/foma.html>>

186 Interview with Harriet Taub on March 29, 2011.

187 Materials for the Arts. Material Donors. Web access March 28, 2011. <<http://www.mfta.org/donors.html>>

188 Materials for the Arts. Direct Donation. Web access March 28, 2011. <[http://www.mfta.org/donors\\_direct\\_donations.html](http://www.mfta.org/donors_direct_donations.html)>

3. **Economic Incentives** – Donors receive a tax deduction for their donations, and they also avoid storage, hauling and tipping fees.

4. **Funding** – MFTA is fully funded by the City through various departments. MFTA is able to maintain its level of funding, in part, by providing a five-fold return on investment to the City using \$1.2 million of funding to distribute over \$7 million of materials. The donated items have a wide impact on both NYC's arts and education programs, and save them millions of dollars by eliminating the need for them to purchase these supplies.

5. **Public Awareness** – MFTA is a well-known organization in NYC because it has coupled its reuse mission with education. MFTA trains teachers, parents and students to look at these materials as a resource rather than a waste. MFTA staff teaches children how to reuse while making it fun and interesting. This education leads to a new generation that is conscious of the amount of waste they produce.

### **PENINSULA COMPOST GROUP**

Peninsula Compost Group has a maximum capacity of 600 tons of organic waste per day or 160,000 tons per year. The plant's composting formula ratio by volume is 3:1 wood/yard waste to food waste. The equivalent is a 1:1 wood/yard waste: food waste by weight.<sup>189</sup> Most of the yard waste is not from NYC. Action Carting Environmental Services transports approximately 40 tons of commercial organic food waste from NYC per day to the facility with the rest of the food waste brought in from other cities in New Jersey, Maryland and Delaware. Peninsula Compost Group charges a low tipping fee of \$45/ton to Action Environmental Service and IESI in exchange for a well sorted waste stream in which glass and plastics are sorted out.

Peninsula Compost Group uses aerated static pile aerobic digestion technology with water proof fabric material from W.L. Gore & Associates. Peninsula Compost Group claims that the facility has not had any complaints about odor, pests or other problems from its neighbors through its 18 months of operation. The composting process described above can take up to 8 weeks and converts the input material into compost at a conversion rate of 60%, resulting in an annual compost output of around 100,000 tons of compost.

Peninsula does not have difficulty selling its organic fertilizer. In fact it was able to sell all 100,000 tons of fertilizer they produced last year. The company sells the fertilizer by the truckload at a price \$25/ton. The company claims that its organic fertilizer does not have any contamination issues because the company only accepts well sorted food waste unlike other composting sites that accept sewage material, which may contain heavy metals.<sup>190</sup>

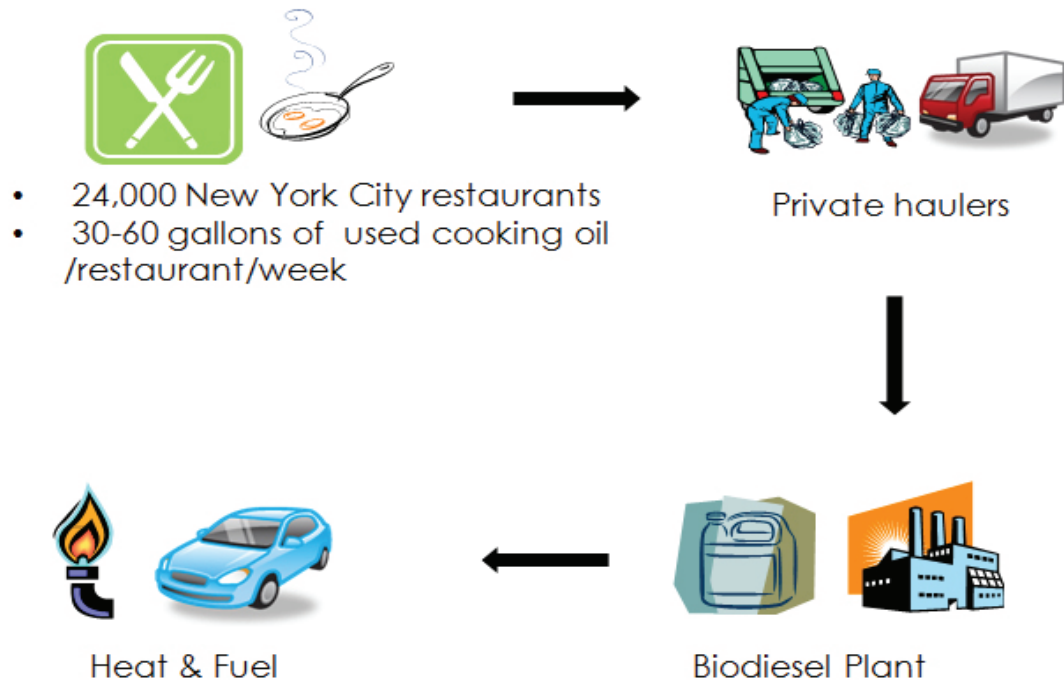
### **ANAEROBIC DIGESTION**

Anaerobic digestion and aerobic digestion are technologies that convert organic food waste into energy and fertilizer. More information can be found on these technologies in the Appendix VII. All of the three cities discussed as examples in the appendix below are committed to using anaerobic digestion technology. San Francisco is currently using both aerobic and anaerobic digestion systems. Seattle is waiting for permitting

<sup>189</sup> Food waste is heavier than yard waste

<sup>190</sup> Interview with Nelson Widell, Marketing and Sales Director and Co-Founder of Peninsula Composting Group on 30 March 2011

issues to be resolved to begin work on a planned anaerobic digestion system. The Environment Services Department (ESD) in San Jose has suggested to San Jose that an anaerobic digestion system should be utilized. According to San Jose's ESD, this technology would allow the city to generate renewable energy, reduce odor and greenhouse gases (GHGs), and promote green technology innovation.



In a December 2005 report titled “Hunts Point Food Distribution Center: Organics Recovery Feasibility Study” available on the DSNY website, anaerobic digestion is preferred over in vessel composting as well as by fertilizer producers. Based on technological and economic factors, anaerobic digestion was recommended as the best approach for an organic food waste recovery facility in NYC. The report cites its advantages over the other two technologies as being a smaller footprint, less odor generation, energy and compost production and eligibility for special financing as an alternative energy producer.

## APPENDIX VI: YELLOW GREASE CASE STUDY

An example of industrial ecology at work in the food industry is in the area of used cooking oil and its conversion into biofuel. In this case study restaurants in NYC and the potential for bio-diesel recycling were examined. Yellow grease typically comes from used oils from deep fryers in the kitchen of restaurants, while the grease from grease interceptors is called brown grease. Our main focus is on yellow grease. This study was conducted primarily through interviews with one of the key stakeholders in the industry in NYC, Tri-State Biodiesel (TSB).

Biodiesel is suitable for use with all unmodified diesel vehicles and motors. It is also used as in place of #2 Fuel Oil in unmodified boilers. According to TSB, the company sold a biodiesel blend to more than 100 buildings across Manhattan, Brooklyn, Queens, and the Bronx. More than 300 trucks run on the com-

pany's output. Recently, a Sunoco station in the South Bronx installed four nozzles to fill up vehicles on TSB product.<sup>191</sup>

### **AVAILABILITY OF YELLOW GREASE SOURCE**

According to Tri-State Biodiesel, the company can collect, on average, 30-60 gallons of used cooking oil from a single NYC restaurant. As a rough approximation, with approximately 24,000 restaurants, NYC's used cooking oil volume could be somewhere in the range of 37.44 million-74.880 million gallons per year.

### **USED COOKING OIL WASTE TRANSPORTATION**

Currently, there is no used oil disposal or recycling plant in NYC. The used cooking oil haulers have to transport oil out of the city in order to process it. Used oil collectors do not get paid from the food establishments for such services. There are several companies that collect used cooking oil in NYC such as Tri-State biodiesel and Brooklyn Bio-Diesel. Tri-State Biodiesel is the biggest used cooking oil collector in NYC. The company claims that it collects about 10% of the used cooking oil that NYC generates or about 4,000 food establishments in the tri state area. In addition, METRO Fuel Oil Corp., a fuel distributor located in the NYC area, is scheduled to open one of the country's largest biodiesel plants next year in Brooklyn.<sup>192</sup>

### **YELLOW GREASE RECYCLING**

According to an interview with Tri-State Biodiesel, the collected used cooking oil is about 90% soy based. Also, there is a 7% loss in converting used-cooking oil into biodiesel or in other words there is a 93% conversion rate. Thus, NYC has potential to generate biodiesel from used oil from at least 34.82 million gallons to 69.64 million gallons per year. This could translate to the potential value of biodiesel from 116.3<sup>193</sup> million USD to 232.59 million USD. Currently, Tri-State Biodiesel's plant has the annual capacity of generating 3 million gallons of biodiesel.

### **RELATED REGULATIONS**

In August, 2010, NYC has required all heating oils used in NYC contain at least two percent biodiesel. This would help promote more use of Biodiesel and used cooking oil opportunity.<sup>194</sup>

### **LESSONS LEARNED**

The biodiesel industry in NYC has been growing and has recently attracted another company to come into the market. This successful industrial ecology case occurred because of two main reasons.

- The supply of used cooking oil is constantly available from restaurants and food establishments in NYC. Thus, the biodiesel plant operators can be assured of their production supply stream.

191 Damiano Beltrami. "Turning French Fries Green and Growing Profitable, Too" The Huffington Post Web access 5 March 2011. 24 March 2011<[http://www.huffingtonpost.com/2011/02/03/turning-french-fries-gree\\_n\\_818452.html?s235137](http://www.huffingtonpost.com/2011/02/03/turning-french-fries-gree_n_818452.html?s235137)>

192 "Big Apple" takes a bite out of air pollution. National biodiesel Board. Web access 24 March 2011< [http://www.biodiesel.org/news/pressreleases/20100817\\_BigApple.htm](http://www.biodiesel.org/news/pressreleases/20100817_BigApple.htm)>

193 At a Bronx gas station "Schildwachter & Sons Oil", the price of biodiesel was 3.34/gallon in 01/11/2011

194 Loeser/Evelyn Erskine. "Mayor Bloomberg Signs Legislation to Promote the Use of Clean Heating Oil". News From the Blue Room. Web access 24 March 2011<[http://www.nyc.gov/portal/site/nycgov/menuitem.c0935b9a57bb4ef3daf2f1c701c789a0/index.jsp?pageID=mayor\\_press\\_release&catID=1194&doc\\_name=http%3A%2F%2Fwww.nyc.gov%2Fhtml%2Fom%2Fhtml%2F2010b%2Fpr358-10.html&cc=unused1978&rc=1194&ndi=1](http://www.nyc.gov/portal/site/nycgov/menuitem.c0935b9a57bb4ef3daf2f1c701c789a0/index.jsp?pageID=mayor_press_release&catID=1194&doc_name=http%3A%2F%2Fwww.nyc.gov%2Fhtml%2Fom%2Fhtml%2F2010b%2Fpr358-10.html&cc=unused1978&rc=1194&ndi=1)>

- The value of the end product as the biodiesel is high enough to cover the production cost, collection and transportation cost. The industry is lucrative enough to attract another company to the market.

## APPENDIX VII: US CITIES ORGANIC FOOD WASTE CASE STUDIES

### SEATTLE

The city provides a beneficial regulatory scheme and has an exclusive partnership with Cedar Grove Composting. Resource Venture acts as a coordinator between city, public and composter. Four main waste haulers transport the organic food waste from each sector to composting site.



### POLICY REQUIREMENT

Seattle's Food Packaging Law now requires all food service business, including restaurants, grocery stores, delis, coffee shops and institutional cafeterias to use compostable or recyclable single use food packaging in place of disposables by July 2010.<sup>195</sup> The City's impetus in passing the law is to prevent Seattle's approximately 6000 tons per year of plastic and plastic-coated paper single use food service ware from landfills. In addition, by ensuring that food service ware is compostable, Seattle is facilitating composting by reducing possible sources of organic food waste contamination. Any person or business violating the ban on Styrofoam containers is subject to a civil penalty of up to \$250 for each violation. Garbage service in Seattle is expensive. Commercial recycling and compost services are 30-50 percent cheaper.<sup>196</sup> Recycling organic food wastes is a voluntary program in Seattle. Cedar Grove along with Resource Venture, a city-funded outreach program, works with restaurants, hospitals and businesses with cafeterias to develop food recycling program. The amount of commercial organic waste composted in Seattle monthly has jumped from about 500 tons to nearly 1,800 tons over the past few years.<sup>197</sup>

<sup>195</sup> Resource Venture, Food + Compostables Resource Venture, Web access April 2011 <http://www.resourceventure.org/foodpluscompostables>

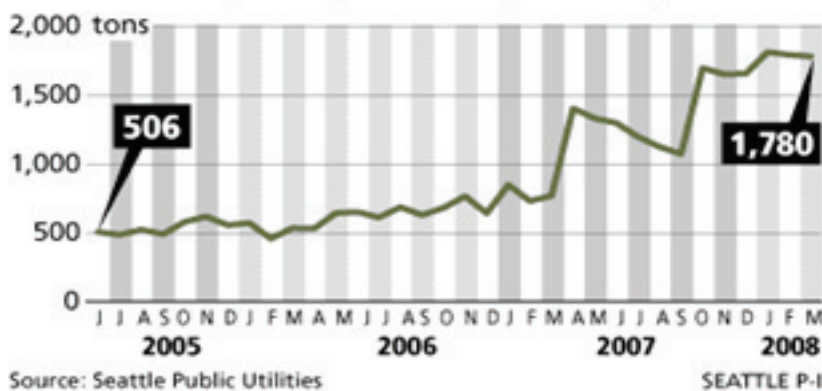
<sup>196</sup> Resource Venture, Food + Compostables Resource Venture, Web access April 2011 <http://www.resourceventure.org/foodpluscompostables>

<sup>197</sup> Jennifer Langston, Seattle Pi Local. Web access 29 March 2011 [http://www.seattlepi.com/local/379713\\_organics19.html](http://www.seattlepi.com/local/379713_organics19.html)



## COMMERCIAL COMPOST

The city of Seattle has seen a dramatic increase in the amount of organic and food waste that commercial businesses are separating and sending to be composted.



## TRANSPORTATION AND TECHNOLOGY

Cedar Grove Composting operates regional composting facilities contracted with the City of Seattle for Seattle's yard waste. Though there are other composting facilities in the region of Seattle, Cedar Grove is the only one that is currently contracted with the City government.<sup>198</sup> Cedar Grove Composting does not haul the waste, but rather there are several other private haulers, such as CleanScapes, Rabanco/Allied Waste and Waste Management, who pick up food discards in totes or roll-carts and composters.<sup>199</sup> Cedar Grove still has the largest share of the market in the region of Seattle.

The organics are composted in Cedar Grove facilities located in Maple Valley and Everett, Washington. Cedar uses W.L. Gore & Associate's GORE Cover System. Yard trimmings and food discards are processed in an aerated, in-vessel batch method. Cedar Grove has one of the largest GORE systems in the US.<sup>200</sup> GORE Cover system technology is the most widely distributed in vessel composting system in the world with over 150 facilities located in more than 20 countries. This system provides a low risk, low cost solution which can sustainably process a wide range of organic waste in the most varied climate conditions while controlling odor and emissions.<sup>201</sup> Cedar Grove is currently waiting for a permit to operate an anaerobic digestion plant. The anaerobic digestion plant will allow Cedar Grove to utilize the biogas, such as methane, for power generation use.<sup>202</sup>

## RECYCLING REQUIREMENT

The facility takes all kinds of organic food wastes except for yellow grease. Yellow grease will be collected separately in order to produce biodiesel. All the food waste including compostable food packaging will be degraded into compost/fertilizer on the site.

198 Interview with Susan Thoman, Director of Business Development, Cedar Grove, 31 March 2011, Hsiaolan Mu

199 Denise Foland, Washington: Seattle's Cedar Grove Composting Facility Web access 31 March 2011 <http://www.sustainableplastics.org/early-adopters/seattles-cedar-grove-composting-facility>>

200 Denise Foland, Washington: Seattle's Cedar Grove Composting Facility Web access 31 March 2011 <http://www.sustainableplastics.org/early-adopters/seattles-cedar-grove-composting-facility>>

201 Cedar Grove, [http://www.gogreenscene.com/cg\\_systems.asp](http://www.gogreenscene.com/cg_systems.asp)

202 Interview with Susan Thoman, Director of Business Development, Cedar Grove, 31 March 2011, Hsiaolan Mu



## DISPOSAL AND REUSE

Cedar Grove Composting is one of the largest commercial composters in the country. Cedar Grove itself is recycler, manufacturer, wholesaler and retailer of compost. Cedar Grove Composting is driven to produce the finest compost which meets the definition of the U.S. Composting Council: “Product resulting from the controlled biological decomposition of organic material that has been sanitized through the generation of heat and ‘processed to further reduce pathogens’, as defined by the U.S. EPA (Code of Federal Regulations Title 40, Part 503, Appendix B, Section B), and stabilized to the point that it is beneficial to plant growth.” Compost contamination is not a serious issue in Cedar Grove now. Effective management, a well-developed education program, and the City’s compostable food packing law, all minimize the issue of contamination.<sup>203</sup> A high quality end product is the best market incentive that drives this composting program in Seattle.

## SAN FRANCISCO

The San Francisco Board of supervisors has mandated a goal of 75% waste diversion for all of San Francisco by the year 2010 and zero waste by 2020.<sup>204</sup> In order to achieve this goal, San Francisco is the first city to mandate that all residents, plus businesses and restaurants compost food waste. Today, San Francisco residents, over 3,000 restaurants and other businesses send over 400 tons of food scraps and other compostable material each day to Recology’s Jepson-Prairie composting facility.

## POLICY REQUIREMENT

San Francisco is the first city to mandate that all residents, plus businesses and restaurants to compost food waste. Any business that fails to maintain and pay for adequate trash, recycling, and composting service is subject to liens, fines, and other fees. The city can request waste haulers to provide a list of addresses that have been warned for repeated misuse. City enforcement may then follow, starting with a call or visit to the address. Starting in 2011 the City will be able to impose fines on those who do not effectively separate these materials. After a process of education and warnings, the fine will be \$100 for small businesses and single occupancy homes and up to \$1,000 for large businesses and multi-unit buildings.



**Blue- recycling; Green- Composting; Gray- Landfill**

<sup>203</sup> Interview with Susan Thoman, Director of Business Development, Cedar Grove, 31 March 2011, Hsiaolan Mu

<sup>204</sup> Recology, commercial compost collection program, Web access 28 March 2011 <http://sunsetsavenger.com/commercialCompost.htm>

### TRANSPORTATION AND TECHNOLOGY

Recology which is the parent to Sunset Scavenger and Golden Gate has an exclusive refuse collection license in San Francisco. Sunset Scavenger serves the large residential neighborhoods and Golden Gate serves the downtown area.<sup>205</sup>

Jepson Prairie Organics (JPO), which is also operated by Recology. JPO operates both Engineered Compost Systems (ECS) and anaerobic digestion system. ESC utilizes two primary types of feedstock in the composting process: food scraps generated at restaurants, hotels, markets and coffee shops throughout Northern California and yard trimmings generated in Dixon, Vacaville and Vallejo. JPO presently processes approximately 11,000 tons per month of mixed organics. JPO also processes approximately 150 tons of food wastes per week for anaerobic digestion. The clean renewable energy produces by the anaerobic digestion are being used to power homes and industries throughout Central California.

RECYCLING REQUIREMENT	
Acceptable	Unacceptable
Food scraps Soiled paper Plants Cutlery and plastic that clearly labeled "compostable"	Aluminum foil or trays "Biodegradable" plastic Juice or soy milk type boxes with foil liner Ceramic dishware or glassware Clothing and linens Cooking oil Dirt, rocks or stone Flower pots or trays Foil-backed or plastic-backed paper Kitty litter or animal feces Recyclable/clean cardboard or paper Styrofoam Plywood, pressboard, painted or stained wood Plastic bags, wrappers or film Corks Diapers

### DISPOSAL AND REUSE

Jepson Prairie Organic's unique recycling program diverts yard trimmings, food scraps and other compostable material from different entities. These source materials create especially rich, black compost that is perfect for reconditioning soil due to its diverse feedstock.<sup>206</sup>

<sup>205</sup> Laura Tam, "Toward Zero Waste", Web access 31 March 2011 Retrieved from [http://www.recology.com/press\\_room/articles/pdf/2010/2.1.10.Model.Recycle.Policies.in.SF.SPUR.pdf](http://www.recology.com/press_room/articles/pdf/2010/2.1.10.Model.Recycle.Policies.in.SF.SPUR.pdf)

<sup>206</sup> Jepson Prairie, Organics, Web access 28 March 2011 <http://www.jepsonprairieorganics.com/index.htm>

The compost is also approved for use in organic farming. Organic farmers sell the fresh organic produce they grow alongside this compost at farmers' markets throughout the Bay Area. The markets provide produce to the individual consumers and restaurants that initially generated the food scraps. In this way, San Francisco has closed the food waste recycling loop locally.

In addition to marketing its compost to the organic farming industry, Jepson Prairie Organics sells its material to vineyards, retail soil bagging operations, landscape material yards, as well as highway erosion and control projects.

## SAN JOSE

The organic food waste recycling program is currently undergoing consideration in the City Council of San Jose. The City was recommended by the San Jose Environmental Services Department (ESD) to negotiate with one specific hauler, Zero Waste Energy Development Company, on an agreement to perform Commercial Organic Waste Processing services citywide from July 1, 2012 through June 30, 2027.<sup>207</sup>

### POLICY REQUIREMENT

If this policy passes, San Jose will start an exclusive partnership with the selected waste hauler<sup>208</sup> and will soon be instituting organic waste collection. San Jose's current non-exclusive commercial solid waste franchise system serves more than 8,000 commercial, industrial, and institutional waste generators. This system has presented challenges such as wide variations in services and in service quality to customer, low rates of waste recycling and diversion from landfills, declining City fee revenues, limited infrastructure investment by the haulers from recycling, and limited control available to the City to ensure hauler performance.<sup>209</sup>

### TRANSPORTATION AND TECHNOLOGY (IF PASSED)

San Jose evaluated both anaerobic digestion and composting systems. The exclusive company under this case is Zero Waste Energy Development (ZWED). In San Jose's evaluation, composting and anaerobic digestion proposals scored similarly. Proposals were scored under the following criteria with some criteria weighted a specific percentage

1. Cost per ton
2. Qualifications and experience (25% of 100%)
3. Technical proposal (30% of 100%)
4. Environmental stewardship (5% of 100%)
5. Local business (10% of 100%)
6. Small business
7. Cost proposal (30% of 100%)

207 Nader, Nadine. "Memorandum." 17 March 2011. City of San Jose Capital of Silicon Valley. 28 March 2011 Retrieved from <[http://www.sanjoseca.gov/clerk/Agenda/20110405/20110405ed\\_x.pdf](http://www.sanjoseca.gov/clerk/Agenda/20110405/20110405ed_x.pdf)>

208 Nader, Nadine. "Memorandum." 17 March 2011. City of San Jose Capital of Silicon Valley. 28 March 2011 Retrieved from <[http://www.sanjoseca.gov/clerk/Agenda/20110405/20110405ed\\_x.pdf](http://www.sanjoseca.gov/clerk/Agenda/20110405/20110405ed_x.pdf)>

209 Nader, Nadine. "Memorandum." 17 March 2011. City of San Jose Capital of Silicon Valley. 28 March 2011 Retrieved from <[http://www.sanjoseca.gov/clerk/Agenda/20110405/20110405ed\\_x.pdf](http://www.sanjoseca.gov/clerk/Agenda/20110405/20110405ed_x.pdf)>

Both anaerobic digestion and composting can divert much of the food waste and other organics that are currently going to landfill. The key considerations leading staff to recommend the anaerobic digestion system are the generation of renewable energy, the use of green technology innovation, and odor and greenhouse gas reductions.

- **Renewable energy:** Unlike composting, anaerobic digestion can capture methane gas generated from organic waste and convert it into combustible gas, which can be then be converted into electric power or vehicle fuel. The ZWED proposal that San Jose picked can potentially provide a source of local energy for operations at the nearby San Jose/Santa Clara Water Pollution Control Plant or could be converted to CNG fuel for collection trucks. This support San Jose's Green Vision goals for waste-to-energy and renewable energy production
- **Green technology innovation:** As compared to composting, anaerobic digestion is a more innovative technology that will serve as a model for green technology development. The "dry fermentation" plan is proposed in ZWED's plan. Dry fermentation technology has been used to process similar waste streams in Europe and will be the first unit of its kind in the US.
- **Odor and GHGs reductions:** Anaerobic digestion can also be a valuable pre-processing step before composting that reduces odors and GHGs from the initial food processing stages. The anaerobic digestion option proposes to processes the organic material within the City of San Jose, reducing vehicle emissions caused by trucking this material outside the City limits.

#### DISPOSAL AND REUSE

The digester is planning to sit at an existing water treatment facility that already emits odor. End products will not be used for farming, but will possibly be supplied for landscaping usage.<sup>210</sup>

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210 Interview with Jeff Anderson, City of San Jose Garbage and Recycling Services Program Manager on 18th March 2011

