

REACHING FOR ZERO:

The Citizens Plan for Zero Waste in New York City

A “Working Document”
1st Version

By

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The **New York City Zero Waste Campaign** was first conceived at the 2nd National People of Color Environmental Leadership Summit in October of 2002, where City activists were confronted with the ongoing concerns of other Environmental Justice communities that would continue to be burdened with the high volume of waste being exported from NYC. As a result of discussion with various activists in the City and elsewhere, a diverse group of environmental, social justice and neighborhood organizations came together to begin the process of planning for Zero Waste in NYC. A series of principles were initially drafted to serve as a basis for the entire plan. It is the Campaign's intent to expand discussions about the Zero Waste goal and to gain broad support for the detailed plan.

The **Consumer Policy Institute** is a division of Consumers Union, publisher of *Consumer Reports* magazine. The Institute was established to do research and education on environmental quality, public health and economic justice and other issues of concern to consumers. The Consumer Policy Institute is funded by foundation grants, government contracts, individual donations, and by Consumers Union.

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Reaching for Zero:

The Citizens Plan for Zero Waste in New York City

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REACHING FOR ZERO:

THE CITIZENS PLAN FOR ZERO WASTE IN NEW YORK CITY

Executive Summary

With close to 8 million residents and over 12 million people during a workday when commuters are in the City, New York City produces enormous amounts of waste. New York has thousands of businesses, hundreds of institutions like museums, colleges and universities, and a large number of City, state and federal agencies. So when NYC generates waste it is not just at home, it is on the way to work or school, in public transportation, while visiting government agencies, while shopping at stores and supermarkets, or while at work or play at many of New York City's recreational facilities, such as parks, zoos, and sports venues.

The City generates 13,000 tons per day of trash and recyclables from the residential and institutional sectors and 9,900 tons per day of putrescible trash—food scraps, dirty paper, and recyclable containers-- from the commercial sector. Commercial construction and demolition debris and fill material are generated in even larger quantities.

Since the announcement in 1997 that the Fresh Kills landfill on Staten Island, which had previously taken all the City's waste, would be closed, the City has maintained almost an exclusive focus on exporting waste out of the City to distant landfills and incinerators as the solution to its waste management problems. The costs of waste export to the City are enormous and have risen 91% since 2000 so that they are now over \$100 a ton. Following the announcement of the Fresh Kills closure, the City Council and planning committees in the offices of each Borough President made extensive recommendations about how the City should handle its waste. The recommendations, while differing on details, spoke to the need for the City to reduce or prevent waste, to recycle more, to create a larger reuse network, and to compost organic waste. To a large extent, these recommendations have been ignored.

Reaching for Zero: The Citizens Plan for Zero Waste seeks to alter New York City's current course. *Reaching for Zero* proposes a plan for reducing New York City's waste exports to very close to zero in 20 years, through a combination of waste prevention, reuse, recycling and composting. This plan will not only reduce and ultimately eliminate the crushing expense of waste exports from the City, but it will also keep dollars spent on waste management circulating within the City's economy, creating industry and jobs here rather than shipping our dollars along with our waste to out of state locations.

The Central Elements of The Citizens Plan for Zero Waste in New York City

- Establish a zero waste goal for NYC in 2024.

- Strengthen the existing recycling program.
- Build or contract for the needed infrastructure for reuse, recycling and composting.
- Establish viable ongoing waste prevention, reuse, and composting programs to address parts of the waste stream that paper and metal, glass and plastic recycling cannot.
- Change our focus from export and disposal to encompass economic development: building industry and creating jobs with materials that are recovered from our waste stream.
- Minimize environmental impacts and ensure that the burdens and benefits of the zero waste system are equitably distributed.
- Achieve the following milestones of increased waste diversion for each of three time periods: Near Term--30% diversion, Intermediate Term--50% diversion, and Long Term--100% diversion for all waste sectors- residential, institutional and commercial.

Recommendations to the City

This report recommends that the City Council and Mayor Bloomberg act immediately on the following priorities:

1. Pass the City Council Resolution #174 establishing a Zero Waste Goal for New York City.
2. Ensure that top level management in the City is committed to Zero Waste and to providing adequate funding for the necessary programs needed to reach our goals.
3. Ensure that key staff have adequate authority to be able to work across agencies and establish the necessary programs.
4. Require detailed Zero Waste Program Plans to be the major part of the 20 year Comprehensive Solid Waste Management Plan.
5. Think economic development, while investing in and developing zero waste programs.
6. Utilize all of the Pieces of Zero-- waste prevention, reuse, recycling and composting-- to achieve zero waste (or close to it) in 2024.
7. Ensure that all the necessary support programs are in place- Economic Development, Education, Enforcement, Transportation, Legislation and Regulation, Research and Data-gathering and Financing.

VISIONS OF ZERO WASTE AROUND THE WORLD

New York City

“Great achievements have never happened without auspicious goals; isn’t it time New York City raised its bar on solid waste?”

Marcia Bystryn, Executive Director, NY
League of Conservation Voters and former
New York Department of Sanitation
Assistant Commissioner for Bureau of
Waste Prevention, Reuse and Recycling

San Francisco

"San Francisco is the first jurisdiction in the country to adopt the ambitious goals of 75% landfill diversion by 2010 and zero waste by 2020. To accomplish these goals we must promote producer and consumer responsibility to prevent waste and take full advantage of our nation-leading recycling and composting programs."

Gavin Newsom, Mayor of San Francisco

Australia

"Canberra became the first community in the world with a Zero Waste focus when it launched its ‘No Waste by 2010’ strategy in December 1996. The community investment in recycling programs returns many millions of dollars to the city as well as jobs and a better environment. Humanity must begin to redefine its attitude to waste if we are to see human generations, beyond our children go on to live fulfilling and sustainable lives. Sustainability and waste cannot co-exist. The world needs models for Zero Waste. Just as Canberra has become the model, which has led to many other Zero Waste communities in our part of the world, so New York can become the great international model. Zero Waste is a goal at the end of a highway, it is the path to the future, it is a statement of belief in the lives of our grandchildren. Once you have set the goal, all policies change, all eyes turn toward the target - it will take you time to get there, but you are on the road.

All the very best from all of us for a Zero Waste New York.”

Gerry Gillespie
President, Canberra and Region
Environment Center, Canberra, Australia

Egypt

“New York City needs to recognize that waste is a tremendous resource. It would spare the municipality from having to transport their waste hundreds of miles to landfills in unwelcoming communities and protect these communities from getting submerged in someone else's discards. I encourage New York City to revise its waste management policy and practice.”

Laila Iskandar Kamel, 1994 Goldman Prize
winner for Sustainable Development related
to solid waste reclamation & community-
based waste management practitioner
working with

the zabbaliin (garbage collectors of Cairo)
for 22 years

New Zealand

“Zero Waste envisions a world where all materials are reintegrated back into the economy or harmlessly into nature. It starts by designing waste out of the system and integrating actions all the way down the supply chain for maximum materials efficiency. It challenges unsustainable patterns of production and consumption. It’s a whole system approach to a whole system crisis.”

Warren Snow, Envision New Zealand Ltd.

Argentina

"The whole-systems approach that Zero Waste requires offers countless opportunities to improve the health of our environment, economy and democracy."

Verónica Odriozola, Argentina Citizen's
Anti-Incinerator Coalition. Coalition
members are piloting zero waste programs
around Argentina.

India

“Zero Waste begins when we realize that there is no ‘away’ into which we can throw what we call our waste. This center is a visible demonstration of the economic and aesthetic potential of what we discard.”

G. Ananthpadmanabhan, Executive
Director Greenpeace India

PART I:

Overview

Reaching for Zero:

The Citizens Plan for Zero Waste in New York City

Overview

Reaching for Zero presents an alternative approach to handling solid waste in New York City. It envisions a system in which waste prevention, reuse, recycling and composting are the central elements of the management strategy, and waste transfer and disposal are phased out over time. As such, *Reaching for Zero* does not address the future of waste transfer and disposal, but rather focuses on strategies to eliminate waste altogether.

The Current Waste Problem and the Zero Waste Approach

With close to 8 million residents and over 12 million people during a workday when commuters are in the City, New York City produces enormous amounts of waste. New York has thousands of businesses, hundreds of institutions like museums, colleges and universities, and a large number of City, state and federal agencies. So when NYC generates waste it is not just at home, it is on the way to work or school, in public transportation, while visiting government agencies, while shopping at stores and supermarkets, or while at work, or at play at many of New York City's recreational facilities, such as parks, zoos and sports venues.

The City generates 13,000 tons per day of trash and recyclables from the residential and institutional sectors and 9,900 tons per day of putrescible trash—food scraps, dirty paper, and recyclable containers -- from the commercial sector. Commercial construction and demolition debris and fill material are generated in even larger quantities.

Until 1997, New York City dumped all its garbage at Fresh Kills on Staten Island, an enormous, unpermitted landfill. Fresh Kills throughout its history has been in violation of numerous environmental standards. As public pressure mounted, along with proposed state legislation to close it, Mayor Rudolph Giuliani, Borough President Guy Molinari and Governor George Pataki announced plans to close Fresh Kills. The City began exporting a portion of its garbage elsewhere with an initial contract to export garbage from the Bronx in 1997. The City subsequently contracted with major multinational companies—Waste Management Inc. and BFI/Allied--to take the rest of its garbage to disposal sites in other states. Fresh Kills was officially closed slightly ahead of schedule in 2001. However, it was reopened on an emergency basis a short time later following the September 11th tragedy involving the World Trade Center.

The City's Recycling Law of 1989 attempted to reform the way the City was managing its garbage by mandating recycling. However, despite more than ten years of experience with the program, recycling is pummeled during each budget cycle. The City has been unable to grow

recycling into a mature program that operates efficiently because it is continually in a new start-up mode, either adjusting to, or recovering from budget cuts. The failure to develop recycling and other waste diversion programs to their fullest potential carries a considerable cost.

The cost of exporting the City's residential and institutional trash has now resulted in a Sanitation budget of over \$1 billion annually. Disposal costs have been on the rise, particularly over the last few years. In February 2000, the Sanitation Department had to request additional funding from the City Council because the cost of export had risen from \$55 per ton to \$62 per ton (Warren, 2000). In February 2004, New York City's Independent Budget Office reported that the cost of export was now \$105 per ton (New York City Independent Budget Office, 2004). This is a 91% increase or almost a 23% increase per year in the costs of export from 2000-2004. These increases are primarily the result of increasing costs of landfills over the last decade and are believed to be at least partly due to the increased consolidation in the waste industry, leaving only a few major multinational companies controlling most disposal facilities.

Looking at it another way, as of 2004, the City is spending over \$1 million per day to dispose of City-collected garbage outside our borders, and the cost is rising. This does not include collection costs within the City. New York City thus finds itself in a position, which is clearly untenable for the long term.

Reaching for Zero therefore proposes a new model, a "zero waste" plan, for managing New York City's solid waste. This plan has as a goal-- the total elimination, or very close to it-- of garbage disposal in twenty years. Although this may seem like a radical concept, it is not. In fact zero waste goals have been adopted in several major cities, such as San Francisco and Toronto. While the plan will involve major restructuring of policy and programs to maximize waste prevention, reuse, recycling and composting, the plan contains very practical programs for implementation. This report describes in detail how to make this transition.

The restructuring of New York's solid waste management system will require enormous effort, especially in the first five years. It will require building new facilities, such as centralized composting plants for converting kitchen scraps into usable compost, and legislative changes, such as a law that will extend deposits on bottles to more types of beverage containers. It will take a consistent commitment, so that programs do not have to continually recreate themselves as funding jumps up and down. And it will require creativity, ingenuity and flexibility, characteristics that have up to the present not been hallmarks of the City of New York's Department of Sanitation (DSNY).

The benefits to the City of embarking on such a path are enormous. The first will be freeing the City from the ever increasing costs of hauling waste to distant landfills. Given that other localities are increasingly loathe to continue to accept NYC's waste, and that transportation costs are expected to rise, the cost alone would make it wise to pursue a zero waste plan.

But there will be other extremely significant benefits as well. When we export our trash, we export dollars to other communities. When we process, remanufacture and resell recyclables, reusables and compostables in NYC we add value to the materials and dollars to our economy, creating jobs and generating taxes in the process. Waste prevention, while not directly spurring

economic development, can result in immediate savings; dollars saved in City agencies can go to essential City services. See Chapter 5, Economic Development in this report.

For example, \$100 spent to export a ton of waste to a distant landfill benefits the multinational waste management company that earns the money and the distant town that accepts the waste at its landfill. It does little for New York City. However, \$100 spent to support a local reuse operation that takes reusable goods such as furniture and equipment and repairs and cleans them, so that these goods can be used for schools and the non-profit sector creates tremendous value added and employs New Yorkers. Indeed, we have a homegrown example of what investment in recycling in NYC can achieve. Visy Paper, which currently processes and recycles about 150,000 tons of paper collected by the City, now employs 160 people at its plant on Staten Island, and was in fact the largest new investment in manufacturing in the City in 50 years when it opened in 1997.

Reaching for Zero proposes that the City focus on using its discarded materials and waste management policy as a tool for economic development, thereby accomplishing several objectives:

- Diversifying the entities that process materials in the City's waste stream, making the City less dependent on a few large multinational corporations.
- Reducing trash disposal costs.
- Building industries within the City, like Visy Paper that will utilize recycled materials to make new products.
- Creating jobs.

None of these objectives is achieved by pursuing disposal for the majority of our trash. Dr. Barry Commoner of Queens College has studied and advocated for intensive recycling systems for NYC. In 1999 he and other authors at the Center for Biology of Natural Systems issued a detailed study, which demonstrated the potential for new industry to utilize the materials in our waste stream. The study concluded that between 3,416 and 12,025 new jobs would be created and between \$616 million and \$2.41 billion in revenue would be produced by maximizing recycling and stimulating local industrial growth in the recycling industry (Eisl et al., 1999).

This Zero Waste Plan proposes that we substantially improve our existing recycling program and add major programs in three areas—waste prevention, reuse and composting—which have received inadequate attention and funding to date. Fifty-six percent of the City's managed waste stream could be addressed by expanded programs in three areas—waste prevention, reuse and composting. All four waste diversion methods are what we call "Pieces of Zero", whereby we can achieve zero waste over 20 years. The Final Chapter of this report lays out the accomplishments that should be achieved in each of three periods—Near Term, Intermediate Term and Long Term-- if we are to reach our zero waste goal.

Achieving this ambitious goal requires a long term commitment from top elected officials and City Agency Commissioners and a management structure that prioritizes waste diversion strategies over disposal in terms of personnel and resources.

Seven chapters of this plan are devoted to supporting the four primary waste diversion methods: Education, Economic Development, Financing, Enforcement, Transportation, Legislation and Regulation and Research and Data-gathering.

We recommend expanding the recycling program and adding other zero waste programs. While DSNY has continually reported that recycling costs more than trash collection, DSNY's obscure accounting practices make it extremely difficult to verify whether this is true. However, it is clear that the City has been making some fundamental mistakes when it comes to recycling. The most prominent mistake is the continual failure to adequately invest in and sustain the recycling program over time so that it can mature. Repeated recycling cutbacks and reinstatements keep the programs operating always in the startup phase and prevent the necessary progress toward greater efficiencies and cost-effectiveness. In addition, the City has failed to develop the necessary modern recycling processing plants, such as that planned in the 1992 Solid Waste Management Plan, which would make processing less costly. Despite these missteps, a recent analysis by the Independent Budget Office found that the costs of recycling in New York City have been dropping, and the costs of waste disposal increasing (New York City Independent Budget Office, 2004).

When it comes to costs, more focus should be placed on studies that have compared the cost and benefits of recycling to disposal. The economic merits of investing in recycling were examined in a study by David Folz of 158 cities in the US, published in *Public Administration Review*. In the study he found after comparing recycling costs to disposal costs that "the cost per ton declined as city size and the number of tons recycled increased." The conclusions state, "Data indicate that a persuasive economic case can be made that the investments communities made in their recycling programs were prudent ones compared to the costs they incurred for collecting and disposing of solid wastes either by landfilling or incineration." Greater participation and greater quantities of recyclables collected led to lower overall recycling costs, with the mean net cost per ton for recycling \$85, compared to \$131 for waste collection and disposal (Folz, 1999). This study tells us that growing our recycling and other zero waste programs are likely to decrease costs as the tonnage diverted increases. Finally, if the City of New York, one of the great cities of the world, cannot make its recycling program as economically beneficial as 158 cities in the US, something is seriously wrong with existing management and we must make the needed corrections to turn it around.

Reaching for Zero recommends that we turn the City away from its focus on waste disposal to adopt a zero waste model, with its significant economic and social benefits. The City is proud of what it accomplished with Visy Paper. As a result of those efforts, the City does not pay for garbage export of its paper, but rather earns a minimum of \$10 per ton for paper it provides to Visy. Now the City needs to build on this economic development model to address other components of the waste stream. As the City completes its 20 year solid Waste Management Plan, we recommend adoption or incorporation of as much of this "Citizens Plan for Zero Waste" as possible.

Background on Solid Waste Planning in NYC

What is the SWMP? When will it come out? What will it do?

New York State's Solid Waste Management Act of 1988 required various jurisdictions within the state to conduct comprehensive solid waste management planning at least every 10 years with updates on a regular basis and modifications when there are significant changes in the system. The Act set goals of 10% waste reduction and 40% recycling by 1997. As a result, NYC prepared its first Solid Waste Management Plan (SWMP) in 1992, a huge effort encompassing many volumes of material. A new comprehensive Solid Waste Management Plan is currently overdue, because of the large changes in the City's management of waste related to the closure of Fresh Kills. The City is expected to issue a new SWMP in September of 2004. One important missing element in the 1992 plan was the failure to study the commercial waste system in the City. As a result, the City Council passed a law, Local Law 74 of 2000, requiring a commercial waste study for NYC. The City just released its first comprehensive Commercial Waste Study in April 2004. Its findings should be addressed in the upcoming 20 year SWMP, which must include plans for handling New York City's commercial waste.

The City recently released a Draft Scoping Document for the preparation of the 20 year Solid Waste Management Plan. Based on the scoping or outline for the City SWMP, export for disposal and the retrofit of the City's marine transfer stations to compact and containerize waste are the primary focus of the Department of Sanitation. The City needs to do more. It must do comprehensive solid waste management planning that maximizes alternatives to disposal – waste prevention, reuse, recycling, and composting—to meet the requirements of state law and for the good of the City.

The City has not really engaged in comprehensive planning since the announcement to close Fresh Kills, the City's last remaining landfill. Under the New York State Solid Waste Management Act of 1988, a comprehensive plan addressing the closure of Fresh Kills and examining all reasonable alternatives for handling the waste stream should have been produced. Instead the State agency, the Department of Environmental Conservation, which enforces the Act's requirements, allowed the City to complete only an Export Plan in 2000, thus negating the entire purpose of a Law, which required comprehensive solid waste planning to increase diversion from disposal to 50% by 1997. Part of the City's rationale for completing only an Export SWMP was the need to act quickly so that the principal facility in Linden, NJ could proceed through permitting.

The Linden proposal never came to fruition, and because of the exclusive focus on export, the City has essentially wasted a total of 8 years (from 1996 – 2004), which could have been used to develop waste prevention, reuse, recycling and composting alternatives to disposal. In fact, in 1997 each of the Boroughs, working with the Borough Presidents, produced Borough Solid Waste Plans, which all recommended pursuing alternatives to disposal and export. The City Council also prepared its own recommendations for expanding programs in waste prevention, reuse, recycling and composting in 1997. Instead, under the Giuliani administration, the Borough plans and the City Council plan were ignored in favor of pursuing an Export Plan.

The City administration will likely produce a new multi-volume 20 year Solid Waste Management Plan in August or September of 2004. The public and City Council may have only 30-60 days to review and comment on the Plan. The City Council should not wait until the City

Draft SWMP is produced to begin to consider what the plan should contain. This Zero Waste plan, as well as the recently released *Recycling Returns* report, by Natural Resources Defense Council and supported by 10 other environmental organizations, provide core recommendations for setting us on a zero waste future. The recommendations in the OWN/CPI report, *Taking Out the Trash*, which also dealt with the problems of commercial waste in NYC, should also be considered. Collectively, these plans and reports represent considerable public input. Therefore, the City Council, starting with the Sanitation Committee, should develop its position and start negotiating with the Administration as soon as possible, in order to achieve a Solid Waste Management Plan with a zero waste approach.

What is Zero Waste?

Our current waste systems are based on a premise that waste is an inevitable burden that must be managed. “Zero Waste” is a new approach, a creative and comprehensive one that says waste is a byproduct of poor planning, bad design and inefficient markets. The zero waste approach can sound radical and idealistic; however, it rests primarily on real, practical programs that have been around a very long time.

A Zero Waste Plan for New York City should be:

- An ambitious goal that can spark the kind of creativity and innovation that is needed to solve our mounting waste problem.
- A planning framework that seeks to create an economy where products are reused, repaired and recycled; an economy that minimizes and ultimately eliminates waste.
- A whole system approach to redesigning the way that materials and resources flow through our economy to eliminate waste and inefficiency at all phases of a product’s life cycle.
- The next industrial revolution – a system that goes beyond the three R’s (reduce, reuse, recycle) to address the three E’s (efficiency, economics and ethics).
- An investment in the local economy, and creation of local jobs, to reclaim materials that would otherwise become waste.

Zero Waste is not a literal target. It may not be possible to eliminate every item from the waste stream – but we will not know how far we can get unless we try. If we do not strive for zero, we will continue to make only incremental progress to stem the tide of waste.

A zero waste approach in NYC would mean that NYC should reduce its waste exports for disposal to very close to nothing. This can be done by intensive attention to the four Pieces of Zero—waste prevention, reuse, recycling and composting.

The California Integrated Waste Management Board, which sets policy for the entire State, has adopted a zero waste goal for 2020. As of 2002, 143 jurisdictions in California have exceeded a 50% interim waste diversion goal. Given New York City’s budget woes, it is perhaps worth noting that probably no state in the nation has a worse budget situation than California-- yet their accomplishments in the waste arena are leading the nation (Moulton-Paterson, 2002).

San Francisco has adopted a zero waste goal for 2020, with an interim goal of 75 percent diversion by 2010. To get there, the City is rolling out large scale organics composting. The City collects food and other organics and delivers them to a farm west of the City where they are composted and the compost is sold as a soil amendment. San Francisco's recyclables are delivered to a state-of-the-art processing facility. The facility was developed by NorCal Waste Systems on land owned by the City's Department of Ports and Trade with favorable financing from the City's economic development office. The programs are financed primarily through a Pay as You Throw system (Haley, 2002).

The City of San Francisco supplements these programs with educational efforts like its "Shop Smart" consumer campaign that combines shelf labeling and advertising to encourage consumers to purchase less wasteful products and packaging. The campaign has resulted in measurable reductions in the sales of targeted products and packaging and increases in sales of products sold in bulk (Liss et al, 1999).

Facing escalating waste disposal and export costs, the City of Toronto, Ontario, adopted a goal of zero waste by 2010, with interim diversion goals of 30 percent by 2003 and 60 percent by 2006. Toronto is on track, with a 32 percent diversion rate last year. This is challenging because, like New York, Toronto is a city of high-rise buildings – almost half its population lives in high-rise or multi-family buildings and speaks many languages.

Building on its current curbside recycling program, the plan Toronto created includes:

- Source separated organics recovery: Collection programs have been launched in low-density districts and two collection strategies are being tested for multi-family buildings; one uses an automated chute system and the other involves drop off sites with underground storage containers that reduce odor. Additional organics programs include subsidized backyard composting bins, a leave-it-on -the lawn grass clippings program and separate yard debris collections.
- Public space recycling: There are more than 3,000 "silver box" recycling bins in the city's public spaces that collect paper, beverage containers and waste. A firm supplies the bins free to the city. Advertising revenues are shared by the city and the company and cover the cost of servicing the bins.
- Innovative collection strategies: The city uses dual compartment trucks and collects organics and recyclables one week and organics and residue another week. It has improved collection efficiencies by 25 percent by transitioning its collection force to a workweek of four ten-hour days to enable collection on longer routes, or two routes per day (Center for Economic and Environmental Partnership, 2002).
- Household hazardous waste reduction: A program enables residents to drop off left over but usable toxic materials, like paint, for use by others who need them.
- Reuse: Recommendations include city-wide yard sales and "amnesty days" when residents would be encouraged to put unwanted materials on the curb for others to take.
- Education: This includes written materials in many languages, special programs and materials targeted at building superintendents, and community based education through the "Waste Watchers" program.
- Financing: Initial expenses in the zero waste program, including organics collection containers, were financed through a special assessment and the city is considering

implementing Pay as You Throw in both multi-family and single-family areas for long-term (Toronto Task Force, 2001).

Xerox adopted Waste-Free Factory environmental performance goals in the early 90s, which include significant reductions in waste, emissions, and energy consumption. Worldwide solid waste recycling rates reached 88% and savings amounted to \$45 million by 1998. Xerox has embraced extended producer responsibility and implemented design for recycling, disassembly and reuse. It also set environmental requirements for its suppliers worldwide, to design products that are durable and reusable, in factories that make dramatic reductions in air, water, and solid waste. Xerox is asking all of their facilities and suppliers to achieve a 90% reduction in all emissions from a 1990 baseline (Liss and Associates, 2000, and Xerox, 2003).

Achieving zero waste, or close to it, is possible using a mix of currently available methods. The Zero Waste goal may be ambitious, but the methods to reduce the waste stream and divert large amounts of material to reuse, recycling and composting have been proven to be quite practical over the long term in communities around the nation and the world.

Reaching for Zero: A Citizens Plan for Zero Waste in NYC

In Part II of this report, *Pieces of Zero*, we discuss the principal methods that can be used to achieve zero waste: Waste Prevention, Reuse, Recycling and Composting.

To date NYC has devoted most of its resources to disposal, rather than any of these alternatives. Of all available waste diversion methods, recycling has received the lion's share of attention. Recycling is of course essential, since recyclables account for 44% of the waste stream. However, ignoring waste prevention, reuse and composting will lock us into failure; it will be impossible to achieve zero waste or even 50-60% diversion by focusing exclusively on recycling. We must use all of the Pieces of Zero if we are to achieve success.

In this plan we discuss composting as separate from recycling. However, composting is actually nothing more than the recycling of food scraps and yard debris into soil amendments or fertilizers. Public officials often forget about the organic portion of the waste stream when recycling is discussed. We therefore discuss it separately.

In Part III of *Reaching for Zero*, there are seven chapters devoted to programs that support zero waste programming: Economic Development, Education, Enforcement, Transportation, Financing, Legislation and Regulation, Research and Data-gathering. We are recommending an entire comprehensive program for adoption by the City. Proper management is the glue that can integrate all the component parts into a comprehensive system with success as the outcome. The remainder of this section summarizes the programs necessary for "Reaching Zero."

Management

A Zero Waste future will require strong and authoritative management structures. The City's progress on recycling, waste prevention and composting to date has been hampered by the management of these programs being housed within an agency whose primary mission is to keep

the city's streets clean and clear. While the Department of Sanitation does a superb job of its operational tasks, such as garbage collection, snow removal, and lot clearing, its vision and creativity in planning for waste prevention, reuse, recycling and composting has been lacking. The upper management of this agency is made up almost exclusively of people whose tenure in the Department is marked in decades and whose work experience has focused on waste collection and disposal, rather than embracing opportunities to reduce and recycle.

There are at least four essential elements in a desirable zero waste management structure:

- An administrative structure that fosters cross-agency collaboration to develop ideas, activities, and programs.
- A long term, future oriented commitment to Zero Waste
- The authority to recommend and implement changes in multiple City agencies at the same time.
- Dedicated and consistent funding that attracts and retains qualified personnel to develop and ensure the success of the Zero Waste Programs.

In order to achieve zero waste (or darn close to it) New York City needs to place planning for waste prevention, reuse, composting and recycling within a structure that approaches these program elements as tools for environmental improvement and economic development, not solely as waste management strategies. This can be accomplished through a variety of specific means, including but not limited to:

- Elevating the Bureau of Waste Prevention, Reuse and Recycling to the Deputy Commissioner level, on par with other DSNY divisions;
- Expanding the role of the Mayor's Office of Environmental Coordination to include zero waste planning;
- Creating a new entity, either directly under the Mayor or in the Economic Development Corporation to plan for and manage a zero waste system;
- Developing a new agency that combines the environmental activities in both the Department of Sanitation and the Department of Environmental Protection. (Several cities, such as Portland, OR, and San Francisco, CA, have joined recycling and waste prevention with energy efficiency and other environmental planning functions under the direction of the Mayor in a city Office of Sustainability or Department of the Environment.)

Regardless of the structure ultimately chosen, it is critical that the staff planning for zero waste have the authority to work closely with and influence the activities of other city agencies. Many waste prevention, reuse, recycling and composting initiatives, most notably recycling market development and procurement, will require cross-agency collaboration. As a result, any management structure adopted must enable zero waste planners to work closely with other agencies and must give them sufficient authority to ensure implementation of zero waste initiatives. In addition, consistent planning and implementation activities would be greatly enhanced by developing a dedicated funding source outside the conventional tax base (See Chapter 9, Financing).

Finally, reaching zero waste (or very close to it) will require that the City commit staff and resources for the long haul. In this context, annual or semi-annual budget changes that scuttle

plans and reduce staffing are intolerable. Zero waste and economic development plans can be implemented and goals realized only if sufficient and experienced personnel are attracted and retained. Inconsistent funding and commitment will lead to zero waste programs with the least qualified staff. The importance of a long-term commitment also applies to the commercial sector, where investments in facilities are more likely to occur when it is clear that the City is committed for the long haul.

Implementation of the Zero Waste Plan

We have created a plan for achieving zero waste that is divided into three time periods: the first five years, the second five years and the final ten years. This summary provides a picture of the goals and objectives to be accomplished in each of three time periods through 2024 -- the Near-Term Period through 2009, the Intermediate Period through 2014 and the Long Term Period through 2024-- including the diversion achieved in each period. Below we provide tonnage estimates that each “zero waste” method diverts from the residential/ institutional waste stream. These are necessarily rough estimates given that only poor data are available on the composition of the waste stream. The last NYC waste composition study was completed in 1990 for the 1992 Comprehensive Solid Waste Management Plan. We don’t attempt to present commercial figures for two reasons—one, we don’t have an accurate estimate of commercial waste composition because there has been no study of this, and two, the tonnage that the City is responsible for directly affects the City budget and is of more immediate concern. This plan makes recommendations to increase commercial waste diversion, but recognizes that we need to have a better monitoring system in place to accurately document the handling of commercial waste in New York City and to identify areas, where zero waste efforts should be targeted.

We have prepared an “Implementation” chart that summarizes all the milestones or accomplishments that should be achieved in each program and in each time period. The Implementation chart follows this Overview. However, all the programs are described in much more detail in the individual chapters. For the Pieces of Zero-- waste prevention, reuse, recycling and composting – tonnage and percentage estimates are included showing what will be achieved in each period for the residential/institutional waste stream.

While it will certainly be useful to establish other objectives along the way, such as those related to market development or educational awareness, the overall waste goal will be measured by what we accomplish with the core Pieces of Zero. The City currently produces nearly 23,000 tons per day of trash or 6.9 million tons per year from all sectors. We estimate that for the 13,000 ton per day of the residential and institutional portion of the waste stream- waste prevention and reuse each represent 15% of the waste stream, compostable food and yard waste represent 26% of the waste stream and recyclables represent 44%. A commercial waste composition study would assist us in targeting future programs for this sector.

Near Term Goals 2004- 2009

Overall Diversion 30% or 1.175 million tons annually with a combination of Waste Prevention, Reuse, Recycling and Composting

(This tonnage applies only to the DSNY-managed residential/ institutional waste stream. Additional tonnage would come from the commercial waste stream)

In this period, we recommend laying the groundwork for all the zero waste programs, getting them established for the substantial diversion in the next two time periods. This is the period in which massive changes in the way we handle waste will have to be devised, planned, and set in motion. However, there will not be a dramatic improvement in diversion in this period, nor considerable savings to the City. Building these zero waste programs requires investment. We project that achieving a 30% diversion goal is achievable in the near term through a combination of waste prevention, reuse, composting and recycling. During this period we will heavily rely on recycling because it is an existing program, while the other programs will be starting almost from scratch.

At the end of 2009, if this Zero Waste Plan is adopted by the City, most of the necessary infrastructure will be planned or built. All the support programs described in these Chapters — Economic Development, Education, Enforcement, Financing, Research and Data-gathering, Legislation and Regulation, and Transportation—will largely be in place. This means that we should have expanded market development activities; more comprehensive and transparent information in order to make decisions; sounder, goal-directed education programs; and most important of all, the long term commitment of the City to a Zero Waste Future. The Implementation Chart provides a summary of all programs to be accomplished by the end of 2009. However, a weak commitment or failure to find dollars for important programs will delay the achievement of the overall zero waste goal. As experience has shown, landfilling costs only go up. Only a zero waste course will provide us with the needed diverse outlets to insulate the City from rising disposal costs.

Waste prevention programs in this first, Near Term period should prevent 89,212 tons per year of waste, or 15% of total preventable materials in the DSNY managed waste stream. Given that banning grass clipping collection could alone prevent 78,000 tons of waste for disposal, this goal should not be difficult to achieve.

The City must put the following programs in place to reach our goals:

- Zero Waste Coordinators in each of the City's 59 Community Districts
- Technical assistance offices and staffing that will provide waste audits and waste prevention assistance to agencies and institutions, hospitals and businesses
- School-based waste prevention coordinators and cafeteria conversions to reusable trays and serveware
- Revolving Loan programs to enable capital expenses aimed at waste prevention

Note: Each chapter contains much more detail about programs.

Reuse should divert 59,475 tons per year or 10% of available reusables. Given the limited existing reuse infrastructure, this plan is calling for the construction of reuse complexes and reuse recovery facilities in order to achieve this objective—diverting almost 200 tons per day of reusables such as furniture, appliances, carpeting, textiles.

Programs that must be put in place in this period include:

- Four Reuse Complexes and four Reuse MRFs operating in four boroughs with supplementary truck fleet
- Municipal curbside collection of durables and reusables—in non-compactor trucks
- On-line trading of reusables
- Technical assistance and financial support for reuse businesses
- Forty Neighborhood swap shops

Recycling should divert 872,300 tons per year or 50% of available recyclable material. This goal is not unrealistic—the City was recycling over 762,000 tons of recyclables before the recent cuts to the program in 2002.

Programs that must be put in place in this period include:

- Adequate recycling processing capacity under long term contract or planned
- Market development office created and development plan produced
- Curbside recycling collection efficiency improved. Various pilots should inform the efficiency improvements
- Recycling that reaches problem areas and participants—public spaces, multifamily dwellings, agencies and institutions

Composting of organics should divert 155,000 tons or 15% of available food and yard debris (this additional tonnage does not include the grass clippings, banned and listed under waste prevention above). An expansion of the City’s existing yard waste programs should be able to triple the compostable organics recovered from the waste stream, which were recently at 47,000 tons per year.

Programs that must be put in place in this period include:

- Grass clippings banned from collection
- Technical assistance for on-site composting for agencies, institutions and businesses
- One or more commercial scale food scrap composting facilities providing 900 tons per day of capacity
- 50,000 backyard bins distributed to households
- Spring/summer yard debris collection citywide
- Public task force created to advise City on compost facility siting and operational issues

Transportation

Programs to be put in place in this period include:

- Vehicle miles traveled (VMT) have been reduced as municipal route efficiency improvements were made subsequent to pilot tests
- Commercial collection franchise system makes significant reductions in VMT
- Clean fuel vehicle implementation strategy including for marine vessels developed and implemented
- Existing rail lines evaluated for their potential to move recyclables

Research and Data-Gathering

Programs to be put in place in this period include:

- Full waste composition analyses including toxic components of the waste stream
- Detailed and transparent data including costs available to the public on all zero waste programs and disposal.
- EPA-recommended standardized full cost accounting methodology used.

Education

Programs to be put in place in this period include:

- Zero Waste advertising campaign
- Consumer shopping campaign focused on waste prevention
- Reuse public awareness campaign
- Mandatory zero waste curriculum in schools
- Block and Building Leader volunteer programs to promote zero waste programs
- Targeted education campaigns for key constituencies- i.e., building superintendents
- Ongoing research to evaluate all programs

Economic Development

Programs to be put in place in this period include:

- Technical and financial assistance for zero waste businesses
- A capital fund for zero waste infrastructure investments
- Focused market development efforts on materials in our waste stream
- Planning for Reuse/Recycling Industrial Parks and one established

Enforcement

Programs to be put in place in this period include:

- Educational enforcement strategy with collection and enforcement crews trained
- More attention to multifamily dwellings and agencies and institutions
- New commercial recycling laws enforced
- Greater enforcement of operating facility violations

Legislation & Regulation

Legislation to be put in place in this period include:

- Grass clipping disposal ban
- NY State Bigger Better Bottle Bill
- Comprehensive City procurement legislation aimed at waste prevention, recycling, reuse and composting
- Zero Waste Resolution
- Updated and improved City Recycling Law
- Lower commercial carting rates for recyclable/reusable materials
- Market development stimulated with minimum content laws
- Some extended producer responsibility legislation developed and passed, with other bills being considered

Financing

Programs to be put in place in this period include funding mechanisms for zero waste programs:

- Waste Disposal Surcharges for Commercial and DSNY managed waste
- Commercial franchise fees established
- Grants Unit established
- Charging “Fees for Service” has been evaluated and implemented
- Partnership with Industry to fund certain programs
- The Bigger Better Bottle Bill
 - PAYT, Pay as You Throw, systems in place for institutional waste, a similar system for City agencies, and pilot tests being conducted in the residential sector in conjunction with deliberation of a PAYT Task Force
 - Extended Producer legislation enacted to shift waste handling and disposal costs back onto the producer.

The Intermediate Term Accomplishments (2010-- end of 2014)

Overall Diversion 50% with a combination of Waste Prevention, Reuse, Recycling and Composting (Tonnage figures are only for the residential/institutional waste stream.)

By the end of 2014, all needed new infrastructure should be built. Most of the pilot programs should be completed and evaluated so the rollout of the final programs can be accomplished. Ongoing evaluations and improvements to all programs are taking place in order to achieve the more ambitious goals of this period. However, unlike in the previous period, where the City needed to invest heavily in zero waste programs without seeing savings benefits right away, in this period these programs are claiming a bigger share of the waste stream and saving the dollars that would have been spent on disposal. This is largely because of more efficient recycling collections and reductions in unnecessary waste collections.

Waste prevention programs should prevent 208,000 tons or 35% of total available preventables. Technical assistance programs for NYC agencies and institutions will begin to have a real impact, as will the special consumer shopping days and the on-the-ground community zero waste coordinators. Evaluation of existing programs as well as the 2009 waste composition analysis are used to hone this phase of waste prevention programming.

Reuse should divert 237,900 tons or 40% of available reusables, with all of the needed reuse infrastructure completed and functioning. Reuse should divert four times as much waste, 800 tons per day, as compared to the Near Term period. More importantly, reuse provides tremendous value for non-profits, schools, government and small businesses. All five boroughs now have Reuse MRFs and Reuse Complexes, and possibly more depending on capacity needs.

Recycling should divert 1.22 million tons or 70% of available recyclable material by the end of 2014. This achievement includes the expansion of the targeted materials for recycling. As determined by analyzing needs, additional recycling processing capacity is added.

Composting of organics should divert 464,000 tons or 45% of available food and yard debris. Additional composting or anaerobic digestion facilities will be constructed as identified by

capacity needs analysis. Expanded food and yard waste collections will accomplish this diversion goal.

Transportation

Achievements in this period include:

- Garbage collection frequency improvements, as well as route changes continue to be made; pilot tests inform efficiency improvements
- Significant progress made with clean fuel vehicle implementation strategy; vehicle miles traveled have been reduced, as municipal route efficiency improvements were made.
- New truck designs are being utilized

Research and Data-Gathering

Achievements in this period include:

- Ongoing waste composition analyses continue to inform progress
- Toxics purchases by the City have shifted significantly
- Detailed and transparent data including costs is now available to the public on all zero waste programs and disposal, enabling the public to make efficiency recommendations.

Education

Achievements in this period include:

- All members of the public understand Zero Waste programs as confirmed by ongoing opinion research
- The public has been changing shopping habits
- Large numbers of people are utilizing reuse centers
- Education is now largely in maintenance mode except for special campaigns or that for targeted groups

Economic Development

Achievements in this period include:

- Four Reuse/Recycling Industrial Parks established

Enforcement

Achievements in this period include:

- Complete evaluation of all enforcement efforts

Legislation & Regulation

Achievements in this period include:

- Additional EPR legislation
- Disposal bans on more materials
- Minimum content laws are targeting more materials and stimulating markets

Financing

Achievements in this period include:

- Continued funding for zero waste programs

- Evaluation of all existing programs and consideration for expansion

The Long Term Accomplishments Period (2015-2024)
Achieving Zero Waste with 100% Overall Diversion (or pretty close to it) with a combination of Waste Prevention, Reuse, Recycling and Composting
(Tonnage figures are for residential/institutional waste stream only.)

This final decade will undoubtedly be the toughest for the City. Success in 2024 is dependent on decisive action now. In 1992, the City committed to building Material Recovery Facilities (MRFs) for processing recyclables and composting facilities for organic material. These facilities were never built. Ten years later, in 2002, the City learned that processing recyclables costs more in old facilities with antiquated equipment. A lot of time has been wasted. If we are to avoid a situation where, in 2015, we realize that once again we have not invested in zero waste programs and waste costs are rising, we must act now to establish the necessary zero waste infrastructure and programs.

This plan calls for a full waste composition analysis every five years. The 2014 waste composition analysis should be used to shape the final programs necessary to reach the “summit” in 2024—the Zero Waste Goal, or close to it. What remains in the waste stream in 2014 could be there because we have not adequately focused on requiring producers to take responsibility for certain kinds of products at the end of their lives, or it could mean that education and enforcement needs improvement. The beginning of this period will be a time for serious evaluation of all programs, current problems and accomplishments. There should also be plenty of time for public input on how we reach for our Zero Waste goal.

Waste prevention programs should prevent 595,000 tons or close to 100% of total available preventables. All existing programs will be in operation, but additional ones such as new EPR legislation, will be added subsequent to the 2014 waste composition analysis.

Reuse should manage to divert 595,000 tons or close to 100% of available reusables. Modifications to the existing reuse programs will be made to capture goods not adequately captured as identified in the waste composition analysis. Efforts will also be made to improve the quality of reusables collected and the value of goods recovered.

Recycling should divert 1.74 million tons or close to 100% of available recyclable material by the end of 2014. Evaluation of all recycling efforts in 2015 for final concerted effort to reach zero waste goal.

Composting of organics should divert over 1 million tons of organic material or close to 100% of available food and yard debris. Early evaluation in 2015 of all diversion efforts enabled adjustments to program to increase diversion and achieve goals. Efforts should also be made to increase compost tonnage handled on-site at residences, institutions and businesses, thus avoiding collection and composting costs.

In this period all Support programs will need to be tuned up--evaluated, expanded, modified-- for the final push toward zero waste.

Conclusion

What is different about Reaching for Zero?

- It establishes a long term ambitious goal—Zero waste or close to it by 2024.
- It starts with a broad base of support—the individuals and organizations participating in the development of the Plan--and increases participation from there.
- It contains a timeline with milestones or needed steps to reach the goal.
- It identifies and discusses the necessity for fundamental reform that changes a system for collecting and disposal of trash to one that limits wasting—wasting our dollars, wasting our economy and wasting the only material resources NYC has.
- It is optimistic about a zero waste future and the promise it holds, while identifying the structural and policy reform needed to get us there.

What do we hope to achieve with Reaching for Zero?

The simple answer is that we hope to achieve Zero Waste in 2024. However, much more important now, as well as for the ultimate outcome, is the journey—the transformation or fundamental reform of the existing systems in place for garbage management. In the current system, the Department of Sanitation primarily collects and disposes of waste, keeping NYC's streets clean, and it also runs a recycling program, occasionally even doing excellent work when additional dollars are forthcoming in the City budget. If we hope to stop the wasting, recycling cannot be simply an add-on program that is allowed to function inefficiently and dispensed with at regular intervals. Instead, zero waste programs must be built on the existing recycling program by making the ten major improvements discussed in NRDC's recent report, *Recycling Returns*, and here in Chapter 3, the Recycling chapter. Getting to our destination requires, however, that we go beyond recycling to actively utilize all methods for waste diversion – waste prevention/reduction, reuse and composting.

The journey begins with establishing our destination—a zero waste goal-- and developing plans to get there. Progress will require new leadership, greater commitment, increased authority and funding for innovative zero waste policy and programs. These are the essential requirements for our zero waste approach. Success will be measured by less waste being put out for disposal collections, not by increased tonnage in such trucks. The reformed system will reduce wasting through waste prevention, then preserve our material resources-- reusables, recyclables and compostables. Dollars will shift from sending waste away to being spent in New York City on projects that will keep those dollars circulating in NYC's economy, expanding business opportunities and creating jobs.

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Summary of Milestones to Achieve Zero Waste in 2024

Program	Immediate Term Milestones Completed at End of 2009 Diversion Goal: 30 % diverted from Disposal by all Methods— Waste Prevention & Reuse & Recycling & Composting	Intermediate Term Milestones Completed at End of 2014 Diversion Goal – 50 % diverted from Disposal by all Methods – Waste Prevention & Reuse & Recycling & Composting	Long Term Milestones Completed at End of 2024 Diversion Goal – 100 % diverted from Disposal by all Methods – Waste Prevention & Reuse & Recycling & Composting
Waste Prevention	<p><i>Goal: 15% of Total Preventables are diverted by the end of 2009 with the following accomplished:</i></p> <ul style="list-style-type: none"> • 59 Zero Waste Coordinators are established promoting zero waste programs and \$1.18 million fund is available for projects • Waste prevention purchasing and management staff (5 members at minimum) are in place, waste prevention product guide completed, website in use, report on toxics purchasing in city government completed, and a plan for substituting and eliminating priority toxic chemicals being implemented. • Technical assistance office for agency waste prevention in place (12 staff) performing 50-60 waste audits annually and aiding in implementation with \$5 million revolving capital pool available for projects. 2008 report on findings, measures actually implemented, monetary savings and waste avoided will inform efforts during Intermediate Term. • School waste prevention coordinators in place (10 staff) instituting school-based waste prevention programs • Reusable service ware in use in 201 schools with dishwashers; feasibility study on dishwashing systems in other schools complete • Agency and institutional cafeterias; implementation plan developed based on pilots, 	<p><i>Goal: 35% of preventables are diverted by the end of 2014 with all waste prevention programs operating and all milestones completed.</i></p> <ul style="list-style-type: none"> • All previously established waste prevention programs and infrastructure sustained. • All school, agency and institutional cafeterias converted to reusable or compostable service ware • Evaluations and improvements to all waste prevention programs based on documentation of outcomes. Planning for achieving waste prevention long term goal completed. 	<p><i>Goal: 100% of preventables are diverted by end of 2024</i></p> <ul style="list-style-type: none"> • All previously established waste prevention programs and infrastructure sustained • Programs adapted and revised and updated

Program	Immediate Term Milestones Completed at End of 2009 Diversion Goal: 30 % diverted from Disposal by all Methods— Waste Prevention & Reuse & Recycling & Composting	Intermediate Term Milestones Completed at End of 2014 Diversion Goal – 50 % diverted from Disposal by all Methods – Waste Prevention & Reuse & Recycling & Composting	Long Term Milestones Completed at End of 2024 Diversion Goal – 100 % diverted from Disposal by all Methods – Waste Prevention & Reuse & Recycling & Composting
Waste Prevention (cont'd)	<p>conversions to reusables begun in 2008 impact 20% of agency cafeterias; technical assistance provided to institutional cafeterias to convert.</p> <ul style="list-style-type: none"> • Health and Hospitals Corporation waste prevention office created (6 staff) with revolving capital pool (\$300,000) to implement projects • Business waste prevention technical assistance office created (12 staff) performing business waste audits, managing a revolving loan program to implement projects and identifying priority commercial waste streams for attention 		
Reuse	<p><i>Goal: 10% of Total Reusables are diverted by the end of 2009 with the following accomplished:</i></p> <ul style="list-style-type: none"> • Four Reuse Complexes and four Reuse Material Recovery Facilities are operating in 4 boroughs with a supplementary vehicle fleet of 5 trucks per Complex. • Curbside collection of durables and reusables in place in four boroughs • State Approved Apprenticeship and Job Training programs in place developing the workforce for reuse enterprises • On-line trading of reusables established for agencies and individuals; 5 trucks and drivers for city agencies • Toolkit for neighborhood swap events developed and used by waste prevention coordinators and other organizations • 40 neighborhood swap shops established and operating • Technical assistance (EDC) division created to support reuse and remanufacturing enterprises with 	<p><i>Goal: 40% of Reusables are diverted by the end of 2014</i></p> <ul style="list-style-type: none"> • All previously established reuse programs and infrastructure sustained • Five or more (if warranted) Reuse Complexes and Reuse MRFs established with fleet of 25 trucks or more on hand • Curbside collection of durables and reusables in place city-wide, including small businesses 59 neighborhood-based reusable swap shops operating 	<p><i>Goal: 100% of Potential Reusables are diverted by the end of 2024</i></p> <ul style="list-style-type: none"> • All previously established reuse programs and infrastructure sustained • Programs adapted and revised and updated as appropriate. Additional Reuse Complexes and Reuse MRFs established, if necessary

Program	Immediate Term Milestones Completed at End of 2009 Diversion Goal: 30 % diverted from Disposal by all Methods— Waste Prevention & Reuse & Recycling & Composting	Intermediate Term Milestones Completed at End of 2014 Diversion Goal – 50 % diverted from Disposal by all Methods – Waste Prevention & Reuse & Recycling & Composting	Long Term Milestones Completed at End of 2024 Diversion Goal – 100 % diverted from Disposal by all Methods – Waste Prevention & Reuse & Recycling & Composting
	a dedicated capital pool <ul style="list-style-type: none"> • Quality control standards, labeling and implementation system for reusables developed and in use 		

Program	Immediate Term Milestones Completed at End of 2009 Diversion Goal: 30 % diverted from Disposal by all Methods— Waste Prevention & Reuse & Recycling & Composting	Intermediate Term Milestones Completed at End of 2014 Diversion Goal – 50 % diverted from Disposal by all Methods – Waste Prevention & Reuse & Recycling & Composting	Long Term Milestones Completed at End of 2024 Diversion Goal – 100 % diverted from Disposal by all Methods – Waste Prevention & Reuse & Recycling & Composting
Recycling	<p><i>Goal: 50% of Available Recyclables are diverted</i></p> <ul style="list-style-type: none"> • NYC has made long term commitment to recycling and provided the needed funding. • Market development office created and market development plan produced identifying material targets-- glass, plastics, textiles and other materials as appropriate. • Long-term contract with recycling vendor in place with provisions for commercial generators to use the vendor. Completed capacity needs assessment for municipal and commercial recycling infrastructure. • Curbside collection efficiencies improved as a result of various pilot tests and reduced trash collections as recyclable % increases. (See Transportation chapter for more details. • Curbside recycling expanded to include more materials -plate glass, ceramics, additional plastic resins and textiles, if markets permit. • Extended Producer Responsibility programs in place for plastics lacking viable markets, electronics, carpets and mercury containing products. • Public space recycling strategy developed and implementation begun citywide. • Multi-family recycling program options evaluated, pilots tested and report completed. • Agency and institutional recycling significantly improved- fines and incentives utilized as appropriate • Buyback Center pilot tested and citywide strategy for implementing buybacks completed. 	<p><i>Goal: 70% of Available Recyclables are diverted</i></p> <ul style="list-style-type: none"> • All previously established recycling programs sustained • Additional recycling infrastructure identified as needed in 2009, is developed. • Additional materials added to curbside recycling program as markets are developed • Continual improvements to collection efficiencies and materials collected. Comprehensive public space recycling program established city-wide • Improved multi-family recycling program established 	<p><i>Goal: 100% of Available Recyclables are Diverted</i></p> <ul style="list-style-type: none"> • All previously established recycling programs and infrastructure sustained • Programs adapted and revised and updated as appropriate • Market development office actively identifying target materials and develop markets • Additional materials added to curbside recycling program as markets are developed

Program	<p align="center">Immediate Term Milestones Completed at End of 2009 Diversion Goal: 30 % diverted from Disposal by all Methods—</p> <p align="center">Waste Prevention & Reuse & Recycling & Composting</p>	<p align="center">Intermediate Term Milestones Completed at End of 2014 Diversion Goal – 50 % diverted from Disposal by all Methods –</p> <p align="center">Waste Prevention & Reuse & Recycling & Composting</p>	<p align="center">Long Term Milestones Completed at End of 2024 Diversion Goal – 100 % diverted from Disposal by all Methods –</p> <p align="center">Waste Prevention & Reuse & Recycling & Composting</p>
	<ul style="list-style-type: none"> • Special waste collections strategy implemented citywide. 		

Program	<p align="center">Immediate Term Milestones Completed at End of 2009 Diversion Goal: 30 % diverted from Disposal by all Methods—</p> <p align="center">Waste Prevention & Reuse & Recycling & Composting</p>	<p align="center">Intermediate Term Milestones Completed at End of 2014 Diversion Goal – 50 % diverted from Disposal by all Methods –</p> <p align="center">Waste Prevention & Reuse & Recycling & Composting</p>	<p align="center">Long Term Milestones Completed at End of 2024 Diversion Goal – 100 % diverted from Disposal by all Methods –</p> <p align="center">Waste Prevention & Reuse & Recycling & Composting</p>
Composting	<p><i>Goal: 15 % of available organics are diverted</i></p> <ul style="list-style-type: none"> • Citywide “leave it on the lawn” education program and ban on the collection and disposal of grass clippings • Backyard composting education program in place and distributing 10,000 backyard bins per year • Support for “On-site” organics recovery programs by providing technical and financial assistance for institutions to implement food waste composting and other on-site organics recovery; ban on grass clippings collection implemented • Provide technical and financial support for commercial composting at on-site facilities and collection and processing at central facilities • Fall leaf and composting program serving all boroughs; Christmas tree collections resumed • Spring/summer yard debris collection rolled out citywide • Public Task Force established to assist with siting 	<p><i>Goal: 45% of available organics are diverted</i></p> <ul style="list-style-type: none"> • All previously established organics recovery programs and infrastructure sustained • Evaluation and monitoring of existing facilities and programs • Additional compost facilities developed as indicated by capacity needs analysis • Ensure that adequate organic diversion to meet 45% of all organic material is achieved by 2014. 	<p><i>Goal: 100% of available Organics are diverted</i></p> <ul style="list-style-type: none"> • All previously established organics recovery programs and infrastructure sustained • Programs adapted and revised as appropriate to achieve 100% diversion of organic material.

	<p>and operational issues associated with yard material and food scrap composting</p> <ul style="list-style-type: none"> • DSNY composting facilities open to landscapers on a fee-for-service basis • One or more commercial-scale food scrap composting facilities operating- providing 900 tons per day of capacity • Pilots and final evaluations of collection programs, facilities and compost product completed. • Compost capacity needs analysis completed • Recommendations of Task Force used to develop city-wide food scrap composting implementation strategy 		
Program	<p>Immediate Term Milestones Completed at End of 2009 Diversion Goal: 30 % diverted from Disposal by all Methods—</p> <p>Waste Prevention & Reuse & Recycling & Composting</p>	<p>Intermediate Term Milestones Completed at End of 2014 Diversion Goal – 50 % diverted from Disposal by all Methods –</p> <p>Waste Prevention & Reuse & Recycling & Composting</p>	<p>Long Term Milestones Completed at End of 2024 Diversion Goal – 100 % diverted from Disposal by all Methods –</p> <p>Waste Prevention & Reuse & Recycling & Composting</p>
<i>Economic Development</i>	<ul style="list-style-type: none"> • Technical and financial assistance office for Zero Waste businesses created with all services in one place and a website. • A dedicated capital pool for financing. • Planning for Reuse/Recycling Industrial Parks; one established. 	<ul style="list-style-type: none"> • Office and capital pool sustained • Four Recycling Industrial Parks in operation; a fifth in planning, if necessary 	<ul style="list-style-type: none"> • Zero waste economic development programs and infrastructure sustained • Five or more Recycling Industrial Parks in operation

<p>Education</p>	<ul style="list-style-type: none"> • Large scale zero waste public education advertising campaign developed and running. • Consumer campaigns developed and implemented – with one every 6 months- targeting shopping with waste prevention in mind. • Reuse public awareness campaign underway, including public relations and targeted education of key constituencies. • Block Leader/Building Leader community based education program in place in at least one borough (in conjunction with Zero Waste Coordinators) • Curriculum for all schools is mandatory and curriculum has been revised to reflect a zero waste focus. • Education programs targeted at key constituencies (building managers, businesses, agencies, etc.) implemented annually. • Opinion research compiled annually to gauge perceptions of reuse, recycling, waste prevention and composting. • A university engaged to conduct more in-depth educational research on an ongoing basis to evaluate and improve education and outreach • University certificate and degree programs initiated for zero waste professionals 	<ul style="list-style-type: none"> • Large scale zero waste advertising campaigns continuing • Consumer education campaigns developed and implemented bi-annually • Reuse public relations and education campaigns continuing • Opinion research on zero waste programs compiled bi-annually • Block Leader/Building Leader community-based education programs in place and expanding in all 5 boroughs working with Zero Waste Coordinators • Zero waste school curriculum is updated every three years • Targeted education programs at key constituencies implemented each year, modified every 3 years. • University research ongoing • Certified and degreed zero waste professionals are now part of the workforce 	<ul style="list-style-type: none"> • All previously established education programs and infrastructure sustained • Consumer education campaigns developed and implemented bi-annually • Reuse public relations and education campaigns implemented bi-annually • Opinion research on zero waste programs compiled bi-annually • Two targeted education programs implemented each year • Large scale zero waste advertising campaigns implemented consistently
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<p>Program</p>	<p>Immediate Term Milestones Completed at End of 2009 Diversion Goal: 30 % diverted from Disposal by all Methods—</p> <p>Waste Prevention & Reuse & Recycling & Composting</p>	<p>Intermediate Term Milestones Completed at End of 2014 Diversion Goal – 50 % diverted from Disposal by all Methods –</p> <p>Waste Prevention & Reuse & Recycling & Composting</p>	<p>Long Term Milestones Completed at End of 2024 Diversion Goal – 100 % diverted from Disposal by all Methods –</p> <p>Waste Prevention & Reuse & Recycling & Composting</p>
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<p><i>Enforcement</i></p>	<ul style="list-style-type: none"> • Educational enforcement strategy developed • Collection and enforcement forces trained in educational enforcement • Greater attention to large buildings and more enforcement with larger fines issued. • Strategy for institutional and agency enforcement developed and implemented. • New commercial recycling laws enforced • Enforcement of transportation violations increased • Commercial facility operations violation enforcement increased. 	<ul style="list-style-type: none"> • All previously established enforcement programs sustained • Evaluate status and progress of agencies and institutions (WP, Reuse, Recycling and Composting) annually in a report • Evaluate status and progress of residential efforts (Reuse, Recycling and Composting) and enforcement annually in a report • Evaluate status and progress of commercial efforts (Reuse, Recycling and Composting) and enforcement annually in a report • Additional enforcement strategies added as new rules are implemented 	<ul style="list-style-type: none"> • All previously established enforcement programs sustained • Additional enforcement strategies added as new rules are implemented
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Program	Immediate Term Milestones Completed at End of 2009 Diversion Goal: 30 % diverted from Disposal by all Methods— Waste Prevention & Reuse & Recycling & Composting	Intermediate Term Milestones Completed at End of 2014 Diversion Goal – 50 % diverted from Disposal by all Methods – Waste Prevention & Reuse & Recycling & Composting	Long Term Milestones Completed at End of 2024 Diversion Goal – 100 % diverted from Disposal by all Methods – Waste Prevention & Reuse & Recycling & Composting
<i>Transportation</i>	<ul style="list-style-type: none"> • Vehicles Miles traveled by Collection Trucks Begins to be reduced as route changes and other efficiency improvements are made. VMT reductions monitored and recorded. • Municipal trash and recyclable collections integrated and efficiency and cost effectiveness improved as more recyclables collected. Frequency of mixed trash collection reduced. Savings realized. • Various alternative truck designs have been pilot tested in addition to “single stream” collection of recyclables. • Commercial collection franchise system implemented city-wide. Franchise fees collected. • MTS system in use for transportation of recoverables (compostable and recyclable materials). • Clean fuel vehicles implementation strategy developed and implemented for DSNY and private carter fleets, as well as waterborne vessels. Permit conditions on private carters require cleaner fuel vehicles • Feasibility of using existing rail lines for transport of recoverables evaluated; expansion of rail use implemented if feasible. • Feasibility of local biodiesel production facility evaluated; facility in place, if feasible. 	<ul style="list-style-type: none"> • All previously established transportation programs and infrastructure sustained • Garbage collection frequencies steadily reduced to account for increased waste prevention, reuse, recycling and composting. • Clean fuels implementation strategy for DSNY and private carter fleets, as well as waterborne vessels, updated bi-annually. • Use of rail infrastructure increased, if feasible. • Diversification of truck fleet continues 	<ul style="list-style-type: none"> • Garbage collection frequencies steadily reduced to account for increased waste prevention, reuse, recycling and composting. • Clean fuels implementation strategy for DSNY and private carter fleets, as well as waterborne vessels, updated bi-annually. • Use of rail and water borne transportation maximized • Truck fleet transitioned to serve zero waste programs

Program	Immediate Term Milestones Completed at End of 2009 Diversion Goal: 30 % diverted from Disposal by all Methods— Waste Prevention & Reuse & Recycling & Composting	Intermediate Term Milestones Completed at End of 2014 Diversion Goal – 50 % diverted from Disposal by all Methods – Waste Prevention & Reuse & Recycling & Composting	Long Term Milestones Completed at End of 2024 Diversion Goal – 100 % diverted from Disposal by all Methods – Waste Prevention & Reuse & Recycling & Composting
<i>Financing</i>	<ul style="list-style-type: none"> • Waste disposal surcharge • Franchise fees established as commercial waste collection franchises implemented • Grants office established and Federal and state grants to finance zero waste projects actively solicited • Fees-for-services implemented for selected DSNY services • Industry partnerships developed to finance education and research activities • Pay As You Throw implemented in city agencies and institutions and in low-density residential districts (1-4 family homes); PAYT pilots for medium and high-density housing underway. • Bottle Bill passed and redemption centers being established • Extended Producer legislation for certain products 	<ul style="list-style-type: none"> • All previously established financing measures maintained • Fee for service programs implemented, as appropriate • Partnerships with industry for education and research developed and/or maintained • PAYT implemented city-wide in all housing types if feasible • Additional EPR target identified and legislation passed 	<ul style="list-style-type: none"> • All previously established financing measures maintained • Fee for service programs implemented, as appropriate • Partnerships with industry for education and research developed and/or maintained • Additional EPR target identified and legislation passed

<p>Program</p>	<p>Immediate Term Milestones Completed at End of 2009 Diversion Goal: 30 % diverted from Disposal by all Methods—</p> <p>Waste Prevention & Reuse & Recycling & Composting</p>	<p>Intermediate Term Milestones Completed at End of 2014 Diversion Goal – 50 % diverted from Disposal by all Methods –</p> <p>Waste Prevention & Reuse & Recycling & Composting</p>	<p>Long Term Milestones Completed at End of 2024 Diversion Goal – 100 % diverted from Disposal by all Methods –</p> <p>Waste Prevention & Reuse & Recycling & Composting</p>
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<p><i>Legislation & Regulation</i></p>	<ul style="list-style-type: none"> • Zero Waste local law or resolution passed. • Updated local recycling law passed. • Strengthened State Solid Waste Management Act passed. • Comprehensive City procurement legislation passed; programs in place • Legislation to establish commercial waste franchise districts established • Lower commercial carting rate for source-separated recyclables/ compostables/ reusables established • Additional regulations and incentives for commercial recycling identified and implemented • Bigger Better Bottle Bill passed- deposit raised to 10 cents in 2009 • City Council passes Extended Producer Responsibility legislative package for disposables, packaging, electronics, carpets and mercury containing products. • Grass clippings disposal ban implemented and effective. Other disposal bans considered where effective zero waste programs are in place. • Deposit Program implemented for Renovation and construction projects as well as for Special events – deposit returned upon showing of satisfactory waste diversion • Stimulate market development via mandatory minimum recycled content legislation passed for recycled glass products and other materials as identified • Policy reforms to eliminate barriers to reuse and provide support • Sales tax exemption established for reused items • City advocacy for the elimination of virgin material subsidies at the federal level. 	<ul style="list-style-type: none"> • Continued advocacy on legislative and regulatory priorities not achieved in immediate term • EPR legislation on products and/or packaging advanced bi-annually based on waste composition analysis • Disposal bans advanced for products and/or packaging as recovery programs grow • Minimum recycled content standard legislation advanced for materials needing market development 	<ul style="list-style-type: none"> • Continued advocacy on legislative and regulatory priorities not achieved in immediate or intermediate terms • EPR legislation on products and/or packaging advanced bi-annually based on waste composition analysis • Disposal bans advanced for products and/or packaging as recovery programs grow • Minimum recycled content standard legislation advanced for materials needing market development
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Program	Immediate Term Milestones Completed at End of 2009 Diversion Goal: 30 % diverted from Disposal by all Methods— Waste Prevention & Reuse & Recycling & Composting	Intermediate Term Milestones Completed at End of 2014 Diversion Goal – 50 % diverted from Disposal by all Methods – Waste Prevention & Reuse & Recycling & Composting	Long Term Milestones Completed at End of 2024 Diversion Goal – 100 % diverted from Disposal by all Methods – Waste Prevention & Reuse & Recycling & Composting
<i>Research and Data-Gathering</i>	<ul style="list-style-type: none"> • Detailed waste composition analysis complete (2004) • Waste composition analysis supplemented by frequent curbside and transfer station spot checks, including agency and institutional location • Detailed and decipherable data on zero waste and disposal program costs and results released annually. • Full cost accounting methodology in use to determine incremental costs of zero waste programs. Consistent methods to be used from 2005 through 2024. • Life-cycle costing in use for agency purchasing decisions. • 2009 Full waste composition analysis including toxic components of the waste stream completed 	<ul style="list-style-type: none"> • 2009, detailed waste composition analysis used to develop programs, regulation and legislation. • Ongoing waste composition by curbside and transfer station spot checks, as well as data from zero waste operations • Detailed and transparent data on zero waste and disposal program costs and results released annually. • Full cost accounting methodology still in use • Life-cycle costing still in use for agency purchasing decisions. • 2014 Full waste composition analysis including toxic components of the waste stream completed 	<ul style="list-style-type: none"> • 2014 detailed waste composition analyses used to develop programs, regulation and legislation. • Modifications to all programs in order to reach 2024 ZERO GOALS. • Ongoing waste composition by curbside and transfer station spot checks, as well as data from zero waste operations • Detailed and transparent data on zero waste and disposal program costs and performance released annually. • Full cost accounting methodology still in use • Life-cycle costing still in use for agency purchasing decisions. • 2019 Waste composition analysis informs plans for final 5 years in order to reach ZERO WASTE

PART II:

Pieces of Zero

1.

Waste Prevention

Waste prevention can take many forms. It usually involves changing purchasing or other habits to reduce waste at the source—preventing it from becoming waste in the first place. Rather than devoting energy, personnel and funding to disposal, waste prevention encourages a look at the front end. There are usually two categories associated with waste prevention activities:

- eliminating waste before it is generated, so that it does not need to be collected for disposal.
- changing the design or manufacture of products and packaging.

It is important to separate these two kinds of waste prevention activities, because under the first category there is a great deal New York City government and residents can do immediately to reduce waste that is put out for disposal. The second kind of activity usually involves legislation and could take longer to implement. However, changes at the design stage are voluntarily being implemented by some businesses—thus designing waste and toxic inputs out of the system. Because of the consideration for reducing and eliminating toxics, waste prevention can also be considered pollution prevention.

Waste prevention is considered the most preferred solid waste management option by the state and federal government because it completely eliminates the need to manage waste. It thereby provides the greatest environmental benefit, and the greatest savings in avoided disposal costs. In the 1992 City Solid Waste Management Plan, the City identified waste prevention as the least expensive waste management method—costing only \$20 per ton. The plan stated that as much as \$120 - \$130 additional dollars could be spent on waste prevention programs and the City would still be saving money (City of New York Department of Sanitation Comprehensive Solid Waste Management Plan, 1992).

More importantly, some waste prevention initiatives require only one-time investments that then yield disposal cost savings year after year. These often pay for the original investment in only a few years time.

The City has at times appeared to support waste prevention. In 1996, Mayor Giuliani issued a Mayoral Directive on Waste Prevention, which said, “Waste Prevention is the most fiscally prudent, socially responsible, and environmentally sound strategy for managing the City’s trash.” (Giuliani, 1996). Subsequently, however, no waste prevention coordinators (as required under the directive) were appointed to City agencies and no progress was ever reported.

Despite the clear benefits of waste prevention, the City has been reluctant to invest in it and to date has failed to make any substantial and continuing commitment to waste prevention. Partly this is due both to a mindset that focuses solely on waste prevention activities that involve changes in design and manufacturing of products and packaging, and to a reluctance to use legislative remedies. Another reason is the fact that while the costs of waste prevention programs are obvious, the benefits of waste prevention are often difficult to quantify. However, the U.S. Environmental Protection Agency (EPA) has quantified national waste reduction accomplishments of 23 million tons reduced or prevented in 1996, 11% of the waste stream that year (US Environmental Protection Agency, 1999). Many communities are realizing benefits by just implementing waste prevention programs.

Despite the lack of investment in waste prevention, NYC has some success stories. Under a grant from the City, the NY Botanical Gardens focused on grass clippings from City institutions. This resulted in getting 58 NYC Housing Authority developments to change their practices of bagging grass clippings for DSNY collection and instead use mulching mowers. As a result 8,000 to 15,000 tons of grass clippings were diverted from disposal (City of New York Department of Sanitation, Composting, 2001). At a cost of \$105 per ton for disposal, the disposal savings alone (not including collection) for 7 years of this program equal \$5.9-\$11 million. This program could have been expanded for other institutions in NYC, potentially saving millions more in collection and disposal costs. However, the funding for the entire NY Botanical Gardens program including composting initiatives was cut in June 2002.

The City estimates that there are a total of 78,000 tons of grass clippings in NYC in the residential and institutional waste streams (City of New York Department of Sanitation, Composting, 2001). If all this waste were prevented from entering the waste stream, the City could save \$20 million in collection and disposal costs using \$257 per ton for collection and disposal costs (City of New York Office of Operations, 2003). For more on this subject, please see Chapter 4, Composting.

In the residential sector, targeted shopping campaigns can help New Yorkers improve the way they shop in order to reduce waste, for example, by encouraging people to choose products with less packaging. Reducing junk mail and renting tools and equipment, instead of purchasing things one might use infrequently, can also reduce waste. Waste prevention in the institutional and industrial sectors is very similar. Purchasing printers and copiers that print on both sides of paper is a waste prevention measure.

When waste is prevented, not only is there no disposal cost, but the costs of collection and handling can also be eliminated. Collection cost savings are not achieved on a ton-for-ton basis – that is, not every ton reduced will lead to reduced collection costs. However, an effective and ambitious waste prevention program can bring in collection savings, as the volume reduced results in reduced truck shifts. In New York City, the cost of collection and disposal of solid waste in 2003 was \$257 per ton, so eliminating just 10 percent of the residential waste stream would save more than \$84 million annually (City of New York Office of Operations, 2003). Unfortunately, the promise of significantly reduced waste handling costs cannot be realized unless the City makes a real commitment to waste prevention.

Prevention opportunities can be identified by conducting waste audits for agencies, institutions and businesses in NYC. Waste audits not only reduce waste sent for disposal, producing some cost savings, but audits usually identify even larger savings that can be achieved by changing purchasing policies and habits. These savings have been documented for government agencies, institutions, like universities and large businesses. The savings are often so large that they pay for themselves in the same year the changes are made. Federal agencies have altered their purchasing practices and reduced waste sent for disposal; see the Waste Wise program (www.epa.gov/wastewise), which includes success stories for businesses and the Environmental Protection Agency's (EPA) database, which lists environmentally preferable products. (www.epa.gov/oppt/epp/database.htm). The federal EPA has recently established a Resource Conservation Challenge to achieve better materials management, which includes environmentally friendly design, product stewardship, priority chemical reduction, and greening the government—all elements of waste prevention (www.epa.gov/rcc).

At the local level, The NYC Council on the Environment, affiliated with the Mayor's Office, has completed waste audits at a number of institutions in NYC and identified the potential for savings. In addition a contractor to the New York City Department of Sanitation (DSNY), Science Applications International Corporation (SAIC), took a limited look at the activities of City agencies and identified a huge potential for savings (Science Applications International Corporation, NYC Sen\$e 2000). This makes waste prevention a "good government" program that can trim costs and put more in actual programs, where it belongs. The federal government has made a great deal of progress in this area with programs across many agencies.

A key element of waste prevention programs is updated information about the composition of the waste stream. Detailed waste composition studies of the residential, institutional and commercial waste sectors can identify targets for waste prevention programs, if they are designed to do so. New York City's last detailed waste composition study was in 1989; since then production, marketing and consumption patterns have changed significantly. The products used and wasted have changed; for example, cell phones are currently a significant electronic waste problem.

Much can be done to implement waste prevention programs in the short term. Longer term strategies require policy and even legislative changes. Strong waste prevention policy is critical to a zero waste system. If the City adopts the appropriate economic and policy incentives and provides education and technical assistance, waste prevention will be a natural outcome. For example, if Extended Producer Responsibility legislation is adopted, then businesses will find ways to make products and packaging that are less toxic and wasteful. Extended Producer Responsibility (EPR) legislation, in place for packaging and electronics in Europe and Asia, requires that the manufacturer of a product take responsibility – either fiscal or physical – for that product at the end of its life (Fishbein, 1996). These systems result in design and manufacturing changes that prevent waste. For example, when the German EPR program for packaging was put in place, brand owners immediately redesigned packaging to eliminate excess by selling toothpaste and deodorant without boxes (Fishbein, 1994). Similarly, a European electronics directive is driving manufacturers to eliminate the toxic materials in computer casings (INFORM, 2003).

However, we must make a more substantial investment than the City has in recent years. New York's investment in waste prevention in recent years has been minimal: \$1.6 million in 2001, \$2.8 million in 2002, \$1.6 million in 2003, and approximately \$600,000 in 2004. The primary reason appears to be that these programs are listed in the City budget as expenses, but the money they save, which totals in the millions, appears nowhere. Thus, in shortsighted and self-defeating decisionmaking, even very small waste prevention initiatives are repeatedly cut from the City budget.

Many players outside of the traditional waste management infrastructure, such as purchasing officials, designers, and planners, will need to be involved. Thus effective waste prevention requires a management structure that has the ability to work across many agencies. A comprehensive waste prevention program for New York City will include the following elements:

- **Community-based Zero Waste Coordinators:** a network of neighborhood coordinators to serve as an education and outreach force and to organize waste prevention (and other zero waste) projects, such as neighborhood yard/porch sales, zero waste block parties, and electronics collection events.
- **Waste Prevention in Agencies, Institutions and Schools:** staff and resources to bolster environmental purchasing and conduct waste audits, and financing to implement waste prevention projects, such as converting cafeterias to eliminate disposables and using duplex printers and copiers.
- **Business Waste Prevention:** increased technical assistance and financing to implement waste prevention projects, such as process changes to reduce excess materials use.
- **NYC Waste Prevention Legislation:** several bills have been floated over more than five years in City Council and extensive hearings have taken place. Comprehensive waste prevention legislation needs to be passed--whether in one or multiple bills. See Chapter 10, Legislation and Regulation.
- **Extended Producer Responsibility:** based on findings of waste composition studies identify items for which the producers could be required to assume greater responsibility. For more on EPR, see Legislation and Regulation chapter.
- **Consumer Education.** See Chapter 6, Education.
- **Waste composition studies.** See Chapter 11, Research and Data-gathering.

Residential Waste

Community Based Zero Waste Coordinators

As a first step, the City should hire coordinators to promote waste prevention, as well as reuse, recycling and composting in their districts. The City would contract with community-based organizations to fund coordinators in each of the City's 59 community districts to perform education and outreach about zero waste programs and participation. These coordinators would serve as an accessible source of information and because of their knowledge of the community they would be able to identify and remove barriers to participation. The coordinators would perform multiple tasks, including: developing block leader programs to help residents reduce waste and recycle properly; reaching out to businesses and government institutions to help them

comply with the City's recycling, reuse, composting, waste prevention, and "buy recycled" requirements; working with retailers and restaurants to implement waste prevention and reuse programs aimed at consumers (e.g. hanger take-back at dry cleaners, used battery, cell phone and carpet collection programs; environmental shopping campaigns); promoting backyard composting and "leave it on the lawn" programs; encouraging and facilitating the reuse of common household items (e.g., furniture, electronics and clothing); and working with schools to include waste prevention in the curriculum.

In 2001, the NYC Council allocated \$6.3 million for the development of the Waste Prevention Community Coordinator Program, which we are again recommending here. The budget crisis caused the City to cut back the program to only one year and reduce funding to \$1 million. This is particularly unfortunate because the whole point of the program was to build a network of resources and education in communities about waste prevention, recycling, reuse, and composting. These kinds of programs, where there are clearly start-up costs, must be planned and built for their long term benefits. INFORM, a NYC based environmental research organization, ran the residential portion of the program. Council on the Environment received the contract for the Board of Education and the NYC Housing Authority (NYCHA). The key success story of these programs was the incredible enthusiasm generated among neighborhood residents for the collection events for computers, building materials, food and yard waste. This resulted in a ripple effect which stimulated computer collection efforts at CUNY, new partnerships for additional organic waste collections, as well as 13 new drop-off sites for food waste at community gardens. Working with the community gardening program Green Thumb, NYCHA is planning increased diversion and use of organic waste. In addition, school library books no longer needed were donated to NYCHA community programs. Additional book donations freed up valuable space in city schools, while providing educational materials to other countries. (It is impossible for us to provide adequate detail here for the diverse array of programs, which were operated under this short term program). (Inform, 2004 and Council on the Environment, 2003).

The City needs to acknowledge that it cannot adequately educate the public about waste prevention from a central office in the Department of Sanitation. There must be on-the-ground community-based programs to generate the enthusiasm to support zero waste.

Implementation Schedule:

2005: Establish 5 coordinators.

2006: Establish 10 additional coordinators (total of 15).

2007: Establish 12 additional coordinators (total of 27).

2008: Establish 15 additional coordinators (total of 42).

2009: Establish 17 additional coordinators (total of 59).

2010 and beyond: Support 59 coordinators.

Community-Based Waste Prevention Project Fund

The City should complement the Coordinator Program by providing \$20,000 per coordinator per year to finance community-based waste prevention projects. The fund would enable community members to develop, plan and, with the coordinator's assistance, implement a variety of programs to improve waste prevention and recycling in the City's neighborhoods. As the recent

pilots through the NYC Community Coordinator program and experiences in other municipalities have demonstrated, waste prevention projects not only divert materials from the waste stream, they also provide educational and promotional value. Possible future grant projects might include: electronics collection events; neighborhood yard/porch sales; zero waste neighborhood events, such as block parties and community festivals; and environmental shopping days, modeled on Seattle's Waste Free Friday program, that teaches people how to generate less waste when shopping. (Genaux, 1999). We recommend doing an evaluation in 2008 of the lessons learned and ascertaining whether a larger fund might enable other projects, identified as desirable, to be implemented.

Implementation Schedule:

2005: Fund established at \$100,000

2006: Fund grows to \$300,000

2007: Fund grows to \$540,000

2008: Fund grows to \$840,000; evaluate lessons learned and need for a larger fund

2009 and beyond: Fund grows to \$1.18 million annually

Institutional Waste

Waste Prevention Purchasing and Management in City Agencies

The City would create seven staff positions to increase recycling, reuse and waste prevention activities within City agencies, and to increase the purchase of recycled and less wasteful and less toxic products:

- Four environmental purchasing staff—two environmental purchasing coordinators to review and develop specifications and identify products, and two environmental purchasing outreach coordinators to promote the program to City agency purchasers. One of the coordinators would have specific expertise in toxic chemicals.
- A Deputy Director for Waste Prevention within the Mayor's Office of Operations, because the implementation of waste prevention programs often requires inter-agency collaboration.
- Two Zero Waste Coordinators within the Department of Citywide Administrative Services (DCAS) to improve prevention and recycling in agencies and to review and restructure lease agreements to facilitate recycling.

The DCAS alone is responsible for \$500 –700 million in annual procurement of goods and services, testing and inspection, storage and distribution of goods. Significant downsizing in this agency means that there are no longer personnel to work on waste prevention, life cycle analysis, product performance or recycled content procurement (Science Applications International Corporation, New York City Sen\$e, 2000).

Tasks for the staff positions include the production of an environmentally preferable product guide, that is updated frequently and available on an interactive website, as well as a complete review of toxic chemical purchasing in City Government and a prioritization plan for substituting and eliminating the most hazardous chemicals.

As this core program for environmentally preferably purchasing develops, there will need to be the identification, assignment and training of staff in other agencies to coordinate and implement these policies for their agency purchases, contracts and City projects.

Implementation Schedule:

2006: New staff in place; identify and train staff for individual agencies.

2007: New staff in place; product guide and web site in use; report identifying toxics Agency purchasing and a prioritization plan for substituting and eliminating the most hazardous toxics on a rapid schedule.

2008: Core staff and system in place; evaluate progress of agencies.

2009 and beyond: Sustain programs.

Waste Prevention Technical Assistance to Institutions and City Agencies

There are more than 87 City agencies, 122 facilities under the Health and Hospital Corporation (HHC), and 346 NYC Housing Authority developments (2,702 residential buildings) in the City of New York (New York City Government Website). All could benefit from technical assistance on waste prevention. There are also thousands of non-profit institutions which receive free collection from the City and should be included in the waste prevention program. Examples include universities, museums, and cultural institutions. A Waste Prevention Technical Assistance Center would be established and staffed with waste audit/prevention specialists serving institutions and agencies. The Center would have twelve technical assistance providers who would perform waste audits and help implement waste prevention initiatives. Staff expertise must include waste audit experience and knowledge of toxic chemicals. The Waste Prevention Center would also serve as a clearinghouse of information on waste prevention and provide a catalogue of waste prevention strategies developed for agencies and institutions. The staff would develop waste prevention measures that could be used wherever functions are similar—offices, vehicle fleets, health clinics, etc. Such broad-based measures could be developed and implemented quickly while the waste audit program begins to have an impact. More detailed waste audits would be performed for City agencies and institutions on a schedule, which would enable lessons learned to be shared with other institutions having similar functions. Staff would also work with institutions to implement recommended changes.

A waste audit program will identify waste that can be avoided and like most such programs, identify enormous savings for the City on the purchasing side. A series of waste prevention reports completed by Science Applications International Corporation (SAIC) in 2000, a consultant for DSNY, (Science Applications International Corporation, NYC Sen\$e 2000) provided one of the best examples of money well spent by the City for waste prevention—despite the fact that this analysis was extremely limited with no complete waste audit for any entire agency. Unfortunately, despite identifying millions of dollars in potential savings for City agencies alone, implementation of the findings of the reports has been lacking. Just a few examples illustrate the potential for large savings: City agencies may be discarding 279,882 wooden pallets per year, or 7,697 tons. All pallets received from the Department of Citywide Administrative Services (DCAS) by City agencies have an \$8 deposit connected to them. Yet City agencies are often throwing perfectly good pallets away. In this case we are paying twice—DCAS buys them, the Agency pays an \$8 deposit, and then DSNY pays to collect and dispose of the waste. If all of the 279,882 discarded pallets, are not returned to DCAS, agencies are paying

a total of \$2.24 million in pallet deposits alone. A similar problem exists with 55-gallon drums, which carry a deposit of \$20 and were often found to be unreturned by agencies, forfeiting the deposit.

On a more positive note, DSNY was cited as implementing an extended preventive maintenance program for oil and oil filter changes. Based on extrapolating the over \$600,000 in annual savings for just 350 DSNY vehicles, the City might be able to achieve savings of \$47.9 million for the 25,000 vehicles it operates. The NYC Sen\$e Report contained numerous additional examples.

Many institutions that receive free waste collection would also benefit from this technical assistance and waste audit program. The potential for savings provides the “carrot” for participation. The program can be developed to be self-sustaining using the capital fund described below. The City may want to consider charging a modest fee for the waste audits of non-City institutions. After initial audits, there should be follow-up to see how recommendations are being implemented and to measure the success of the program.

Implementation Schedule:

2005: Establish Waste Prevention Technical Assistance Center with 6 staff.

2006: Add 3 staff (total of 9); perform 25 entire agency waste audits; prepare report generalizing recommendations from SAIC report for similar institutional functions- offices, automotive fleets, etc.

2007: Add 3 staff (total of 12); perform 40 waste audits; work to implement recommendations of prior audits.

2008: Perform 50 waste audits; work to implement recommendations of prior audits; prepare report on findings, measures actually implemented, monetary savings and waste avoided.

2009 and beyond: Maintain staff of 12 and perform 50-60 annual audits with recommendations.

Revolving Capital Fund for Waste Prevention

Waste prevention projects, such as eliminating disposable food service ware, reducing paper towel use, or duplex printing, are cost-effective in the long run, but often require an initial capital investment. A \$5 million fund would provide the necessary capital. The capital pool would be self-sustaining by recouping its outlays through savings to the agency or institution—as the savings are realized the agency or institution pays back the funds it used for the waste prevention project. The Office of Management and Budget needs to assist with establishing and maintaining this program as a functioning revolving fund.

Implementation Schedule:

2006: Fund created.

Waste Prevention in Schools

There are 2081 schools in New York City, 917 private and 1164 public (with 60 more public schools to be created next year)(New York City Department of Education, 2004).

According to the City’s 1990 Waste Characterization study, schools generate approximately 90,000 tons per year of waste. To deal with a variety of waste prevention programs in such a

large number of schools, we need 10 school-based waste prevention coordinators. These coordinators would also assist with reductions in school cafeteria waste.

Waste Prevention Programs

The Council on the Environment of NYC worked with schools to implement waste prevention. In just a few months of operations, the program diverted 200 tons of textbooks and computers from 49 schools (Council on the Environment, 2003). Much of this diversion could be maintained year after year, with little additional cost or effort. The results of that pilot indicate that waste prevention in City schools is a cost effective alternative, that helps schools. A comprehensive waste prevention program in schools should be anchored by ten waste prevention coordinator positions created within the NYC Department of Education (DOE). The coordinators should work with community-based zero waste coordinators to organize school programs, including:

- Textbook donation and recycling;
- Furniture and equipment exchange via both enhanced on-line trading and materials exchanges (e.g., Tools for Schools);
- Non-traditional art supplies through Materials for the Arts;
- On-site food waste composting;
- Leasing, instead of purchasing, computers, electronics and other products;
- Waste prevention curriculum (See Chapter 6, Education); and
- Guiding food service decisions by both nutrition and student food preferences.

Implementation Schedule:

2006: Hire five waste prevention coordinators; begin instituting programs.

2007 and beyond: Hire five more waste prevention coordinators; continue implementing initial programs; research, pilot test and implement new programs; track and document progress.

School Cafeteria Conversion Program

Much of the waste in schools is generated in cafeterias, primarily from the use of disposable service ware. During the first stage of this program, DOE would eliminate the use of disposable food service trays in the cafeterias of the 201 NYC public schools that have unused dishwashers. The City would then study the feasibility of expanding the program by installing dishwashing systems in the remaining schools and evaluating the potential for reusable dishes and utensils.

Implementation Schedule:

2005: Convert 50 schools.

2006: Convert 50 schools.

2007: Convert 50 schools.

2008: Convert 51 schools.

2009: Study feasibility of installing dishwashing systems in other schools; pilot test reusable dishes and utensils.

2010: Implement recommendations of feasibility study; evaluate pilot tests and consider expanding program beyond reusable trays.

Waste Prevention in the Health and Hospitals Corporation

Establish six Waste Prevention Coordinators, one for every two hospitals within the Health and Hospitals Corporation, to oversee and implement waste preventing practices and procurement in New York City's public hospitals. A revolving capital fund would make available at least \$25,000 per hospital for improvements. Savings realized are used to repay the revolving fund. According to the SAIC, full implementation of waste preventing strategies would reduce hospital operating costs for a 1,000-bed hospital by \$2.3 million a year (Science Applications International Corporation, New York City Wastele\$\$, 2000).

Implementation Schedule:

2007: Six coordinators in place.

2008: Coordinators continue; create revolving capital fund (\$300K).

2010 and beyond: Continue program; report progress and savings.

Agency and Institution Cafeteria Conversion Program

A large number of cafeterias are present in NYC agencies and institutions beyond the school system. Cafeterias are a source of enormous amounts of waste, especially if they use disposable plates, cups and serviceware. The City should develop a plan to convert all City agency cafeterias to use reusable plates, glasses, trays and serviceware. Where this is not possible the City might want to consider using biodegradable paper and compostable utensils. A technical assistance program for cafeteria conversions should be provided to institutions that receive free collections from DSNY.

Implementation Schedule:

2005: Establish a plan for City agency cafeteria conversion.

2006: Where not possible pilot test paper disposables and compostable kitchenware in at least 5 agencies or institutions.

2007: Based on pilot test results, develop an implementation plan for all cafeterias; provide technical assistance to institutions that receive free DSNY collections.

2008: Begin to implement cafeteria conversions.

2012: Complete conversion of all City agency cafeterias; if non-City institutions make insufficient progress, consider requiring needed changes, or charging for collection service.

Commercial Waste

Technical Assistance to Help Businesses Prevent Waste

Develop a Waste Prevention Technical Assistance Center and a revolving loan program, supported by an initial \$5 million. The center would have twelve technical assistance staff that would perform waste audits and work with companies to implement waste prevention initiatives, provide a clearinghouse of information on waste prevention and catalogue waste prevention strategies developed for private sector clients. Technical assistance staff would complete 50 to 60 full waste audits annually and work to implement recommended changes. The loan program would finance equipment expenses related to waste prevention. Businesses could pay back the loans from savings realized and funds could then be used for new projects at other businesses.

Implementation Schedule

2005: Establish center with 3 staff; establish target waste streams and set priorities

2006: Add three staff (total of 6); target businesses with priority waste streams; create revolving loan program

2007: Add three staff (total of 9); target businesses with second priority waste streams; manage loan program

2008: Add 3 staff (total of 12); target remainder priority waste streams; manage loan programs
Evaluate progress and modify program as appropriate

2009 and beyond: Maintain staff of 12; sustain program.

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Program	Benefits/Rationale	Implementation Schedule
<i>Community-based Coordinators</i>	Promote all WP and Recycling programs; education force	2005: Establish 5 coordinators 2006: Establish 10 additional coordinators (total of 15) 2007: Establish 12 additional coordinators (total of 27) 2008: Establish 15 additional coordinators (total of 42) 2009: Establish 17 additional coordinators (total of 59) 2010 and beyond: Support 59 coordinators.
<i>Community-based Waste Prevention Project Fund</i>	Enable coordinators to implement neighborhood based WP projects	2005: Fund capitalized at \$100,000 2006: Fund grows to \$300,000 2007: Fund grows to \$540,000 2008: Fund grows to \$840,000; Evaluate lessons learned and need for a capital fund 2009 and beyond: Fund grows to \$1.18 million annually
<i>Waste Prevention Purchasing and Management in City Agencies</i>	Substantial cost savings (\$2 million or more)	2006: New staff in place; Identify and train staff for individual agencies 2007: New staff in place; product guide and web site in use; report identifying toxics Agency purchasing and a prioritization plan for substituting and eliminating the most hazardous toxics on a rapid schedule. 2008: Core staff and system in place; Evaluate progress of agencies 2009 and beyond: Sustain programs
<i>Waste Prevention Technical Assistance to Agencies and Institutions</i>	Substantial cost savings potential	2005: Establish center with 6 staff 2006: Add 3 staff (total of 9); perform 25 entire agency waste audits; prepare report generalizing recommendations from SAIC report for similar institutional functions- offices, automotive fleets, etc. 2007: Add 3 staff (total of 12); perform 40 waste audits, work to implement recommendations of prior audits 2008: Perform 50 waste audits, work to implement recommendations of prior audits;

		<p>Prepare report on findings, measures actually implemented, monetary savings and waste avoided.</p> <p>2009 and beyond: Maintain staff of 12 and perform 50-60 annual audits with recommendations.</p>
<i>Revolving Capital Fund for Waste Prevention</i>	Provides initial capital for investments that save money for the long term	2006: Create Fund (\$5 million)
<i>Waste Prevention in Schools</i>	Reduces waste and associated costs; educational value	<p>2006: Hire five waste prevention coordinators; begin instituting programs</p> <p>2007 and beyond: Hire five more waste prevention coordinators; continue implementing initial programs; research, pilot test and implement new programs; track and document progress.</p>
<i>School Cafeteria Conversions to Reusables</i>	Eliminated disposable food service wear; saves money.	<p>2005: Convert 50 schools</p> <p>2006: Convert 50 schools</p> <p>2007: Convert 50 schools</p> <p>2008: Convert remaining 51 schools</p> <p>2009: Study feasibility of installing dishwashing systems in other schools; pilot test reusable dishes and utensils.</p> <p>2010: Implement recommendations of feasibility study; evaluate pilot tests and consider expanding program beyond reusable trays.</p>
<i>Waste Prevention at Health and Hospitals Corporation Facilities</i>	Substantial cost savings (\$20 million)	<p>2007: Six coordinators in place</p> <p>2008: Coordinators continue; create revolving capital fund (\$300K)</p> <p>2010 and beyond: Continue program; report progress and savings.</p>
<i>Agency and Institution Cafeteria Conversion</i>	Cost savings of thousands of dollars per institution per year.	<p>2005: Establish a plan for City agency cafeteria conversion.</p> <p>2006: Where not possible pilot test paper disposables and compostable kitchenware in at least 5 agencies or institutions.</p> <p>2007: Based on pilot test results develop an</p>

		<p>implementation plan for all cafeterias; provide technical assistance to institutions that receive free DSNY collections.</p> <p>2008: Begin to implement cafeteria conversions.</p> <p>2012: Complete conversion of all City agency cafeterias; if non-City institutions make insufficient progress, consider requiring needed changes, or charging for collection service.</p>
<i>Business Waste Prevention Technical Assistance</i>	Substantial cost savings; business retention/economic growth	<p>2005: Establish center with 3 staff; establish target waste streams and set priorities</p> <p>2006: Add three staff (total of 6); target businesses with priority waste streams, create revolving loan program</p> <p>2007: Add three staff (total of 9); target businesses with second priority waste streams; manage loan program</p> <p>2008: Add 3 staff (total of 12); target remainder priority waste streams; manage loan programs; evaluate progress and modify program</p> <p>2009 and beyond: Maintain staff of 12; sustain program.</p>

2.

Reuse

Reuse is the recovery of materials and products for the same or a similar end use. It involves taking useful products, such as furniture, books and appliances, discarded by those who no longer want or need them and redistributing them to those who do. In contrast to recycling, which recovers materials for processing, reuse recovers the original product. Reuse, therefore, primarily involves collection and redistribution of goods. Repair is often another function of reuse operations, when durable goods need only minimal repair to be fully functioning again.

Every year hundreds of thousands of tons of perfectly useful items are thrown away in New York City at an enormous cost to taxpayers and businesses. A recent report prepared for the City of New York Department of Sanitation (DSNY) by Science Applications International Corporation (SAIC) estimated that more than 700,000 tons of reusables are disposed of in NYC's system every year at a cost that could exceed \$50 million annually (Science Application International Corporation, 2000). See Table 1.

Table 1: Estimated Tonnage of Reusable Items in NYC Residential/Institutional Waste

REUSABLES	Tons per year
Furniture & Furnishings	217,790
Major appliances	42,317
Small appliances	21,750
Carpets & rugs	67,011
Clothing & footwear	114,324
Towels, sheets & pillowcases	18,556
Pallets & wood containers	<u>254,388</u>
Total Tonnage	736,136

Source: Science Application International Corporation, 2000

The SAIC report did not include the commercial sector, only the residential and institutional sectors. Used building materials are also not included in the list above. Thus, the potential of reuse is likely more than 736,000 tons per year (or greater than 2000 tons per day), even if we assume a large portion is not reusable but recyclable instead (Science Applications International Corporation, 2000). In spite of this potential, to date, the City has offered only the most minimal support to reuse operations. As a result, NYC is currently capturing and diverting only a small

fraction of the reusables in the waste stream. In reusing, NYC is failing just as the nation is. It is estimated that for the nation, 85% of reusables were sent for disposal in 1994 (Platt, 1997). To get to zero waste, we will have to significantly expand support for reuse.

Reuse is a strategy that has benefits for the City of New York on many levels. It eliminates waste, reduces waste disposal costs, and conserves energy and materials. Reuse also offers great benefits to low-income people, non-profit organizations, and others operating on tight budgets, like NYC schools, which can gain access to quality products and materials. The value of goods obtained for these groups through reuse operations is in the millions of dollars. As an economic development strategy, supporting reuse operations, puts dollars into the local economy rather than putting money into trucking waste out of state. At the same time, the educational value of reuse operations is enormous. People see in a very concrete way the value of recovering goods, rather than just disposing of them.

In addition to social and environmental impacts, the economic potential of creating and retaining jobs through reuse is enormous. Using an analysis by the Institute for Local Self-Reliance (ILSR), if only half of the 736,136 tons of durable goods produced in the City were reused within the City, over 3,000 jobs could be created for people refurbishing and reselling used items. Our calculation is based on ratio of jobs to reusables in the ILSR report: 220,000 jobs created for 25.5 million tons (Platt, 1997). Additional jobs could be created by deconstructing buildings and reusing building materials, a process that is just beginning to catch on in NYC.

The most noted example of a successful reuse operation is Berkeley's Urban Ore, which receives a wide variety of reusables, including furniture, lamps, windows and other building materials and resells them to the public. Supported initially by the City of Berkeley, CA, it is now a thriving business, receiving no subsidies. About half of the four hundred tons of reusables per day it receives is delivered directly by the City of Berkeley. The other half is received from private sources. The operation utilizes a three-acre site and generates \$1.6 million per year in sales. There are 32 employees and a \$750,000 annual payroll. Berkeley currently pays \$70-75 to dispose of waste, but when it delivers reusables to Urban Ore, it only pays \$25 per ton (Knapp, 2004).

The success of reuse requires developing the reuse infrastructure and raising public awareness. New York City has a network of small but successful reuse programs already in place. Reuse enterprises range from non-profit programs to for-profit businesses and include thrift stores, used equipment stores, reuse centers, salvage yards, refurbishers, food recovery and distribution, and on-line material exchanges and web posting sites. While they are limited in resources, these programs have had a significant impact. The programs include:

- NY Wa\$teMatch, an online materials exchange and solid waste reduction program, matches valuable industrial discards and surplus goods from waste generators to the businesses and organizations that can reuse them, providing businesses with savings of more than \$700,000 in 2003 (Etienne, 2004).
- City Harvest, a food rescue program redistributed over 10,000 tons of consumable food to the hungry in 2002/03, through a network of over 800 emergency food programs located throughout NYC (City Harvest, 2003).
- Materials for the Arts, a materials exchange, has redistributed more than 500 tons in FY '04 of surplus materials from businesses worth \$3.7 million to more than 2,000 of

NYC's arts and cultural organizations, schools and social service programs (Etienne, 2004).

- Tools for Schools, accepts office furniture, equipment and supplies and sells them to schools, non-profits and individuals; it has transferred over \$5 million worth of goods in its 11 years of operation (Etienne, 2004).
- Per Scholas reconditions end of life computer equipment, then redistributes systems to low income families, NYC schools and non-profits, while also training community members to become certified computer technicians. (Etienne, 2004)
- ARROW Reuse Center for Building Materials in only six months of operations diverted more than 42 tons of reusable building materials, valued at \$77,000, from the waste stream and sold them to homeowners, landlords and artists (Etienne, 2004). This project was created by a Queens community-based organization under the Waste Prevention/Recycling Coordinator program. All programs officially ended in October of 2003 after City funding discontinued.
- Recycle A Bicycle, a bicycle repair training program, has not only kept bicycles out of the waste stream and in the hands of youth that will use them, but also has taught skills and a marketable trade to youth (www.recycleabicycle.com).

The Reuse Alliance, a regional reuse sector development organization, is providing training and resources to build the capabilities of existing reuse enterprises and is raising public awareness about reuse. These programs demonstrate interest in and support for reuse within the City. (Etienne, 2004) However, a zero waste system requires a more significant investment in developing and promoting reuse operations. To date, the City has offered, for the most part, only minimal support. To get to zero, we must expand these programs substantially and promote reuse broadly as a good business and environmental strategy. A network of reuse outlets also provides an opportunity to distribute information about other zero waste programs. Chapter 6, Education, proposes expanded reuse education activities that would support the programs and infrastructure proposed here.

A comprehensive reuse program that would capture more of the reusable segment of the waste stream requires considerable infrastructure development and technical and financial support from the City. We envision both municipal sorting facilities and community managed reuse complexes supported by both municipal and supplementary truck fleets. Technical and financial assistance through the NYC Economic Development Corporation (EDC), a job-training program, swap shops and events, and on-line trading of reusables round out the overall program. Specifically the reuse program will include:

- Reuse Material Recovery Facilities (MRFs): will sort or "triage" durable and reusable goods and make them available to reuse complexes. Repair of some durables could be done at MRFs or at the reuse complexes discussed below.
- Community-Based Reuse Complexes: will provide warehouse and retail space for the City's existing reuse programs, enabling expansion of their operations, as well as for new reuse operations.
- Reuse Collections: Through both a municipal curbside bulky goods collection and a supplementary Reuse Fleet.
- Job Training/Apprenticeship Programs: will prepare job seekers for jobs in reuse.

- On-Line Trading of Reusables: will enhance City agency reuse and enable residents to trade reusables on-line.
- Neighborhood Reuse Swap Shops and Events: will include neighborhood yard sales or swap events, as well as year-round community swap shops.
- Technical Assistance Program: will support reuse development organizations, providing both a dedicated staff and a capital fund for research, development and demonstration projects.
- A “Seal of Approval” program: will assure quality control of reused goods.

Reuse Sorting Facilities or Reuse MRFs (Material Recovery Facilities)

Reuse Sorting Facilities, also known as Reuse MRFs, are envisioned as the first stop for durable and reusable goods, collected through DSNY’s regular bulky goods special collections and through drop-offs from businesses and residents. Reuse MRFs would act as triage centers to sort and evaluate incoming goods for their best use and need for repair. Then the goods would be distributed to reuse complexes. Materials in need of repair would be directed to those programs facilitating repair of different types of goods. Reuse MRFs could be located within or in close proximity to reuse complexes. A dedicated reuse truck fleet would be part of the operation of these facilities. Reuse MRFs could be municipally operated or this service could be contracted out to a private entity.

Implementation Schedule:

2005: Identify site for first Reuse MRF

2006: Open first Reuse MRF; establish sorting protocol; establish links to reuse complex and other market outlets; begin identifying site for next Reuse MRF

2007: Open second Reuse MRF; begin identifying site for next Reuse MRF

2008: Open third Reuse MRF; begin identifying site for next complex

2009: Open fourth Reuse MRF; begin identifying site for fifth Reuse MRF

2010: Open fifth Reuse MRF.

2011 and beyond: Support Reuse MRFs; evaluate capacity needs for additional MRFs.

Community-Based Reuse Complexes

The City should develop and support a network of community-based reuse complexes to provide warehouse and retail space that will both enable existing reuse programs to expand, and provide incubator space for additional reuse enterprises. Modeled on what it has done in the case of the Hunts Point Markets (fish, produce and meat), the City would provide land and buildings at a minimal cost, as well as enhanced technical and business services. The complexes would be developed in each borough and accept materials from residential and commercial generators. Consumers could bring computers here, for example, and materials from agencies and institutions could be incorporated once regulatory hurdles are cleared (see Chapter 10, Legislation and Regulation). The City would assist with financing central administrative costs, enabling reuse complexes to work with and support other reuse enterprises and swap shops and obtain cost savings by shared operations. The City would use avoided disposal costs to help finance central administrative costs of these complexes and thereby provide basic operating support for all the reuse operations discussed in this chapter. They would be fed by the dedicated truck fleet

described below. Each reuse complex would include an educational component, such as a zero waste resource library.

Implementation Schedule:

- 2005: Identify site for first reuse complex; establish partnerships with existing reuse programs/organizations.
- 2006: Open first reuse complex; establish standard operating procedures; establish links to local customer base, and create a toolkit for other centers; track value of goods transferred; begin identifying sites for next complex.
- 2007: Open second complex, begin identifying sites for next complex.
- 2008: Open third complex, begin identifying site for next complex.
- 2009: Open fourth complex, begin identifying site for fifth complex.
- 2010: Open fifth complex and evaluate capacity needs for additional complexes.

Municipal Curbside Collection for Reusables and Durables

Many municipalities have a separate collection day for bulky goods, including durable and reusable items. We are recommending a dedicated collection program that would provide goods to the Reuse MRFs and Reuse Complexes described above. Essential to the usefulness of this dedicated collection is attention to preserving the quality of reusable goods--as received at the curb--all the way until they arrive at the reuse enterprises.

Implementation Schedule:

- 2006: Pilot residential bulky goods collection in borough of first reuse complex and MRF; include evaluation of on-call pick-ups compared to separate collection days.
- 2007: Establish preferred collections in 2 boroughs with reuse MRFs/complexes; include small businesses.
- 2008: Add collections for third borough with reuse MRF/complex; include small businesses.
- 2009: Add collections for fourth borough with reuse MRF/complex; include small businesses.
- 2010: Add collections for fifth borough with reuse MRF/complex; include small businesses.
- 2012 and beyond: Sustain collections in all boroughs.

Supplementary Reuse Fleet

The City would purchase a fleet of alternative fuel, non-compacting box trucks (and hire drivers) that would be based at the Reuse MRFs /Complexes described above, and would pickup reusables and take them to a reuse outlet or move them from a reuse outlet to a new user. This fleet could supplement the DSNY curbside bulky goods collection described above to provide a separate collection and delivery fleet for the reuse operations. These services would be fee-for-service for businesses. The fleet should begin with 5 trucks per complex and increase as necessary to meet the demands of the reuse operations and the public.

Implementation Schedule:

- 2006: Purchase 5 or more trucks and hire drivers for first reuse MRF and complex.
- 2007: Purchase 5 trucks and hire drivers for second reuse MRF and complex; maintain existing trucks and drivers.

- 2008: Purchase 5 trucks and hire drivers for third reuse MRF and complex; maintain existing trucks and drivers; identify and address additional trucking needs for first 2 MRFs.
- 2009: Purchase 5 trucks and hire drivers for fourth reuse complex; maintain existing trucks and drivers.
- 2010: Purchase 5 trucks and hire drivers for fifth reuse complex; maintain existing trucks and drivers.
- 2011 and beyond: Maintain trucks and drivers; identify and address additional trucking needs as they arise.

State Approved Job Training and Apprenticeship Programs

Reuse operations need workers trained in commercial driving, forklift operations, equipment operations, logistics, inspection, grading, disassembly and repair. In addition, emerging reuse industries, such as building deconstruction, need a trained workforce.

Building deconstruction, in contrast to demolition, is the process of dismantling a building in order to salvage materials for resale or reuse. In recent years, a variety of economic and environmental factors have spurred renewed interest in deconstruction by entrepreneurs, contractors and policy makers. Entrepreneurs have sought to benefit from the growing market for high quality (and sometimes scarce) building materials, particularly old-growth wood and other materials that are no longer available, while demolition contractors have sought to manage rising costs for waste disposal. The deconstruction training program would enable vocational schools, community based organizations, unions and others to train people of all ages, so that they could be hired by reuse complexes and Reuse MRFs, as well as deconstruction and demolition contractors. Training programs would target the populations most in need and should be developed in consultation with existing reuse programs and support organizations to target the right skills and materials.

Implementation Schedule:

- 2005: Hire a Training Development Specialist to develop a training and certification package.
- 2006: Develop a training model, identify suitable training sites (e.g., vocational schools, reuse operators, community colleges) and develop curriculum for training programs.
- 2007: Implement the first training program at a site near a reuse complex.
- 2008: Adapt and revise program; implement in schools around the City as reuse complexes are developed (see timeline above).
- 2009 and beyond: Adapt, revise and sustain program.

On-line Systems for Trading Reusables

NY Wa\$teMatch has developed an on-line brokerage system that enables commercial entities to buy, sell or trade recyclables and reusables on-line. This automated system has dramatically increased diversion of materials and thereby helped businesses reduce their costs. It should be expanded, or a similar system developed, to cater specifically to residential and institutional generators and to enable businesses to donate to non-profit organizations. This on-line system would also be linked to the reuse complexes, allowing reuse operators to advertise their materials to key target audiences.

Enhance NYC City agency reuse through on-line system and trucking

We recommend that NYC develop an inventory database and on-line tracking system for reusables, such as furniture and furnishings, office supplies, etc., generated by City agencies, such as the Department of Health and the Board of Education. City agencies should be required to search that system before purchasing new furniture, supplies, etc. A fleet of alternative fuel trucks should be purchased to enable the agencies to get the reusables from one location to another.

Implementation Schedule:

2005: Develop inventory tracking and online GIS-driven trading system, preferably adapting existing software packages (NY Wa\$teMatch); provide sufficient technical support for the new system; track value of goods transferred.

2006: Purchase 5 trucks and hire drivers.

2007 and beyond: Support system, including trucks and drivers.

Create residential on-line reusables trading system

Robert Lange, Director of the Bureau of Waste Prevention Recycling and Composting at DSNY, has indicated that the City plans to develop an interactive on-line system as part of its existing telephone-based Stuff Exchange (Lange, 2004). Like NY Wa\$teMatch for businesses, this system would enable individuals to trade reusable household items on-line.

Implementation Schedule:

2005: Develop or preferably adapt (NY Wa\$teMatch), software to target residential waste streams and pilot test system.

2006 and beyond: Implement and maintain the system; track value of goods transferred.

Neighborhood Reuse Events and Swap Shops

Neighborhood swap events or yard sales can facilitate the exchange of reusable goods and information related to reuse. They can be organized by the Waste Prevention Coordinators described in Chapter 1, Waste Prevention. Coordinators should arrange for the reuse fleets described above to collect items remaining at the end of these events.

Implementation Schedule:

2005: Develop a toolkit and outreach program and engage waste prevention coordinators, reuse organizations and others to coordinate periodic, neighborhood and Citywide swaps.

2006 and beyond: Expand program as coordinators are placed city-wide.

Establish Community Thrift and Swap Shops

Community swap shops would enable neighbors to trade reusable items locally, year-round. They could be established in housing complexes, community centers, recreation centers, or other high-traffic common spaces. These shops could also stock items to be lent or rented, such as tools and equipment, and could sell repaired items from the reuse MRFs/Complexes. In addition, the centers could serve as drop-off sites for materials en route to the reuse MRFs/Complexes and thus would

be integrated into the larger reuse infrastructure being developed. Community swap shops would be networked with the Reuse complexes for administrative support.

Implementation Schedule:

2005: Identify five community districts to pilot test; locate appropriate and available space.

2006: Open Swap Shops in 5 districts.

2007: Open shops in 10 additional districts, support 5 existing; evaluate impacts and results of swap shops and adapt implementation plans and schedules accordingly.

2008: Open shops in 10 additional districts, support 15 existing.

2009: Open shops in 15 additional districts, support 25 existing; evaluate impacts and results of swap shops and adapt implementation plans and schedules accordingly.

2010: Open shops in 15 additional districts, support 40 existing.

2011: Open shops in 4 remaining districts, support 55 existing; evaluate impacts and results of swap shops and adapt implementation plans and schedules accordingly.

2012 and beyond: Support 59 existing swap shops.

Technical Assistance and Support for the Reuse Sector

New York City’s existing and emerging reuse enterprises need support services. We recommend financial support for reuse operations and businesses as well as for reuse development organizations that provide tools and resources to reuse enterprises. Reuse businesses, non-profits and their support organizations need technical assistance.

We also recommend that the NYC Economic Development Corporation (EDC) establish a technical assistance unit for reuse with a dedicated staff of five and a capital fund. The unit would assist in business planning, financing, market development, and particularly, helping businesses and reuse development organizations, advance their products and services to New York City agencies and institutions. The capital fund would be modeled on Empire State Development's Environmental Management Investment Group (EMIG) and would provide grants for research, development and demonstration, and capital projects with an emphasis on reuse.

Implementation Schedule:

2005: Establish EDC technical assistance for reuse division and capital pool.

2006 and beyond: Financially support EDC division and capital pool.

Quality Control Standards and Quality Assurance Labeling for Reusables

To build both consumer confidence in product integrity and markets for reusable items, NYC must develop a standardized system of processing with quality assurance and quality control. Working with the reuse sector in NYC and the public the City should develop a “Seal of Approval” that indicates that a reused item meets quality control standards. We recommend hiring an independent contractor to develop these standards and the mechanisms needed to put such a system in place.

Implementation Schedule:

2005: RFP for an independent contractor to develop standards and implementation mechanisms, in conjunction with the reuse sector and the public.

2007: Roll out “Seal of Approval” program with most important reusable products first.

2008: Engage marketing and PR support (see Chapter 6, Education) to establish recognition of Seal.

2009 and beyond: Monitor and evaluate program every two years and make needed corrections.

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<i>Program</i>	Benefits/Rationale	Implementation Schedule
<i>Establish Reuse Material Recovery Facilities</i>	Develops reuse infrastructure, enables sorting of goods and distribution, improves efficiency and productivity of reuse complexes	<p>2005: Identify site for first Reuse MRF</p> <p>2006: Open first Reuse MRF; establish sorting protocol; establish links to reuse complex and other market outlets; begin identifying site for next Reuse MRF</p> <p>2007: Open second Reuse MRF; begin identifying site for next Reuse MRF</p> <p>2008: Open third Reuse MRF; begin identifying site for next complex</p> <p>2009: Open fourth Reuse MRF; begin identifying site for fifth Reuse MRF</p> <p>2010: Open fifth Reuse MRF;</p> <p>2011 and beyond: Support Reuse MRFs; consider additional MRFs if warranted</p>
<i>Develop a Network of Community-Based Reuse Complexes</i>	Substantial cost savings; business retention/economic growth; redistribution of usable goods to those who need them	<p>2005: Identify site for first reuse complex; establish partnerships with existing reuse programs/organizations</p> <p>2006: Open first reuse complex; establish standard operating procedures; establish links to local customer base, and create a toolkit for other centers; track value of goods transferred Begin identifying sites for next complex</p> <p>2007: Open second complex, begin identifying sites for next complex</p> <p>2008: Open third complex, begin identifying site for next complex</p> <p>2009: Open fourth complex, begin identifying site for fifth complex</p> <p>2010: Open fifth complex and evaluate capacity needs for additional complexes</p>

<p><i>Establish Municipal Curbside Collection for Reusables and Durables</i></p>	<p>Provides materials for Reuse MRFs and complexes, improves efficiency of reuse infrastructure</p>	<p>2006: Pilot residential bulky goods collection in borough of first reuse complex and MRF; include evaluation of on-call pick-ups compared to separate collection days 2007: Establish preferred collections in 2 boroughs with reuse MRFs/complexes. Include small businesses 2008: Add collections for third borough with reuse MRF/complex. Include small businesses 2009: Add collections for fourth borough with reuse MRF/complex. Include small businesses 2010: Add collections for fifth borough with reuse MRF/complex. Include small businesses 2012 and beyond: Sustain collections in all boroughs.</p>
<p><i>Establish Supplementary Reuse Fleet</i></p>	<p>Improve efficiency and impacts of reuse complexes described above</p>	<p>2006: Purchase 5 trucks and hire drivers for reuse MRF/complex 2007: Purchase 5 trucks and hire drivers for reuse MRF/complex; maintain existing trucks and drivers 2008: Purchase 5 trucks and hire drivers for reuse MRF/complex; maintain existing trucks and drivers; identify and address additional trucking needs 2009: Purchase 5 trucks and hire drivers for fourth reuse complex; maintain existing trucks and drivers 2010: Purchase 5 trucks and hire drivers for fifth reuse complex; maintain existing trucks and drivers 2011 and beyond: Maintain trucks and drivers; identify and address additional trucking needs as they arise</p>
<p><i>Develop State Approved Job Training and Apprenticeship Programs</i></p>	<p>Job opportunity for youth; trained workforce for reuse complex</p>	<p>2005: Hire a Training Development Specialist to develop training and certification package 2006: Develop a training model, identify suitable training sites and develop curriculum for training</p>

		<p>programs</p> <p>2007: Implement training program at first site in proximity to first reuse complex/MRF</p> <p>2008: Adapt and revise program; implement in schools around the City as reuse complexes are developed (see timeline above).</p> <p>2009 and beyond: Adapt, revise and sustain program.</p>
<i>Develop on-line Trading of Reusables for City Agencies</i>	Substantial cost savings, both on disposal and new purchase; redistribution of usable goods	<p>2005: Develop inventory tracking and GIS-driven trading system, preferably adapting existing software packages (NY Wa\$teMatch), technical support; track value of goods transferred</p> <p>2006: Purchase 5 trucks and hire drivers</p> <p>2007 and beyond: Support system, including trucks and drivers</p>
<i>Develop Residential on-line Trading of Reusables</i>	Substantial cost savings on disposal; redistribution of goods	<p>2005: Develop or preferably adapt (NY Wa\$teMatch), software to target residential waste streams and pilot test system; track value of goods transferred</p> <p>2006 and beyond: Implement and maintain system</p>
<i>Support Coordinated Neighborhood Swap Events</i>	Enable neighbors to trade usable goods (furniture, tools, etc)	<p>2005: Develop a toolkit and outreach program and engage waste prevention coordinators, reuse organizations and others to coordinate periodic, neighborhood and Citywide swaps</p> <p>2006 and beyond: Expand program as coordinators are placed</p>
<i>Establish Community Thrift and Swap Shops</i>	Enable neighbors to trade usable goods (furniture, tools, etc)	<p>2005: Identify five community districts to pilot test, locate appropriate and available space</p> <p>2006: Open Swap Shops in 5 districts;</p> <p>2007: Open shops in 10 additional districts, support 5 existing; evaluate impacts and results of swap shops and adapt implementation plans and schedules accordingly.</p> <p>2008: Open shops in 10 additional districts, support 15 existing;</p>

		<p>2009: Open shops in 15 additional districts, support 25 existing; evaluate impacts and results of swap shops and adapt implementation plans and schedules accordingly.</p> <p>2010: Open shops in 15 additional districts, support 40 existing;</p> <p>2011: Open shops in 4 remaining districts, support 55 existing; evaluate impacts and results of swap shops and adapt implementation plans and schedules accordingly.</p> <p>2012 and beyond: Support 59 existing swap shops.</p>
<i>Provide Technical Assistance and Support for the Reuse Sector</i>	Economic development, job creation and market development	<p>2005: Establish EDC technical assistance for reuse division and a capital pool</p> <p>2006 and beyond: Financially support EDC division and capital pool</p>
<i>Develop Quality Control Standards and Quality Assurance Labeling for Reusables</i>	Encourages consumer confidence in product integrity; builds markets for reusable items.	<p>2005: Issue RFP for an independent contractor to develop standards and implementation mechanisms, in conjunction with the reuse sector and the public.</p> <p>2006: Develop standards for reusable products; establish sorting protocol; develop training and certification processes</p> <p>2007: Roll out “Seal of Approval” program with most important reusable products first</p> <p>2008: Engage marketing and PR support (see Education section) to establish recognition of Seal</p> <p>2009 and beyond: Monitor and evaluate program every 2 years and make needed corrections.</p>

3.

Recycling

Overall New York City's recycling program has been a success. This is in large part due to the tremendous support and enthusiasm for recycling on the part of the people of the City, as well as its elected officials, including most notably the Borough Presidents and City Council. Recycling has also been NYC's primary waste diversion strategy – waste prevention, reuse and composting have all received extremely limited attention.

New York residents could potentially set out 45% of the materials in their discards for curbside recycling pick-up: clean paper, cardboard, glass bottles, metal cans and plastic bottles. These materials, which are targeted by the current recycling program constitute 45% of NYC's residential waste. In the nearly decade and a half since its inception, those New Yorkers participating in the recycling program and getting the correct materials in the recycling bin had achieved a 20% diversion rate prior to the recent partial suspension of the program in the summer of 2002.

However, recycling has suffered from recent changes in the program. The City suspended glass and plastics collections, then restored plastics on July 1, 2003 and restored glass on April 1, 2004. However, New Yorkers, as a result, were recycling at only a 13.2% diversion rate in December of 2003 (the most recent figures for both curbside and containerized collections) (City of New York Department of Sanitation, Recycling Diversion Report, 2004). The diversion should improve with the recent addition of glass to the program. As of December 2003, 11,400 tons per day of waste are sent for disposal on average, while 1,609 tons of recyclables are collected every day and sent for processing (City of New York Department of Sanitation, Recycling Diversion Report, 2004).

Visy Paper is the largest contractor processing the City's paper, paying the City a minimum of \$10 per ton for paper (Izeman and Gokaldas, 2004). The processing of metal, glass and plastic is more expensive and has been costly for the City because of the lack of recycling infrastructure and the failure of the City to invest for the long term in modern technology. The 1992 Comprehensive Solid Waste Management Plan called for the development of 3000 tons per day of recycling processing capacity under every scenario except for the maximum incineration scenario. The City actually selected a vendor for a 600 ton per day Material Recovery Facility (MRF) on Staten Island, but despite the considerable planning involved, failed to finally activate the contract (City of New York Department of Sanitation, Comprehensive Solid Waste Management Plan, 1992, and Eisl, et al, 1999). No other MRFs have been proposed by the City.

In the summer of 2002 private recycling processors proposed an increase in what they charged the City to process metal glass and plastic. The City found the increase unacceptable and cancelled plastic and glass collections, maintaining only metal collections. The relatively high processing costs for recyclables were due to the outdated equipment at facilities in the City and the short term contracts the City issued for this service. With no long term contracts, businesses were reluctant to invest in newer equipment. The cancellation of plastic and glass pickup in the City led to a reduction in recycling rates. Not surprisingly the City never realized the savings it anticipated from cutting back the recycling program. The City should soon be awarding a long term contract for metal, glass and plastic which should be less costly per ton than waste disposal.

New York City's recycling success up to 2002 occurred despite major structural problems in NYC's management of recycling—little recycling processing infrastructure within NYC, lack of attention to market development and large sectors--agencies and institutions, multifamily dwellings and public spaces-not adequately participating. As NYC's primary waste diversion strategy, recycling has received the lion's share of attention. Yet major hurdles remain to achieving a cost-effective and comprehensive recycling program. To get to zero waste, we must strengthen and stabilize the existing program, and then expand it to target and capture more materials.

Over the years, the environmental community and the public sector have convened meetings and dialogues, performed significant analyses, and issued reports that detail strategies to improve recycling and overcome some of the structural problems that have hampered greater success. These include the *Recycle First* plan issued by recycling advocates in 1991, the series of recycling market development dialogues convened by the Department of Sanitation in the mid-1990's, Comptroller reports, the Borough-based solid waste management plans and the City Council's plan, all developed in 1997, and the Organization of Waterfront Neighborhoods/Consumer Policy Institute plan in 2000-- *Taking Out the Trash: A New Direction for New York City's Waste*.

The suspension of elements of the recycling program in 2002 spurred a number of efforts to identify ways to improve the recycling program and make it more cost-effective, including *Why Waste the Future?* issued by the NYC Waste Prevention Coalition in May 2002 (New York City Waste Prevention Coalition, 2002). A roundtable was also convened, "Making Recycling Work: A Roundtable on the Future of Recycling in NYC", by the Center for Environmental and Economic Partnership and the Citywide Recycling Advisory Board in November 2002 (Center for Economic and Environmental Partnership, 2002). In April of 2004, *Recycling Returns* was issued by the Natural Resources Defense Council with input from ten other environmental organizations (Izeman and Gokaldas, 2004).

The recycling hurdles identified in these plans and discussions include:

- Getting the commitment of the highest elected officials in the City and adequate authority for recycling within the Department of Sanitation
- Ensuring steady and adequate funding
- Making efficiency improvements to make the program more cost-effective
- Building adequate physical infrastructure
- Developing sufficient markets

- Increasing recycling opportunities or availability for under-served sectors—multifamily dwellings, agencies & institutions, public spaces
- Providing for sufficient education and enforcement
- Targeting enough materials, including household hazardous waste

The City administration has recently made some significant strides toward correcting the long-term problems that have plagued the recycling program. Most notably, the City of New York Department of Sanitation (DSNY) recently issued a request for proposals for a 20-year contract to process the City's recyclables. This is a significant step forward since the previous short-term contracts (one to three years) were significant barriers to investment in state-of-the-art recycling facilities, and contributed to poor material quality and high recyclable processing costs. Another positive sign is the recent shift of some planning functions to the City's Economic Development Corporation, (EDC) a signal that the City is beginning to recognize that recycling, reuse, composting, and waste prevention can be economic development strategies, not just waste management programs.

Recycling programs are a major component of any zero waste system. A critical element to stabilizing the current program is developing markets for the City's glass. Cities and states around the country, including New York State, have put significant resources into developing a variety of markets for glass, from low-value applications like replacement for pea gravel to high-value uses like fiberglass and sandblasting medium. (For more on glass market development, see below and Izeman and Gokaldas, 2004). Furthermore, the City can build on its existing program by supplementing curbside collection with other methods, such as drop off and buy back centers, as well as increasing recycling in public spaces, City agencies and workplaces.

Moreover, to reach zero waste, our recycling programs must be more aggressive by both targeting additional materials and collecting more of the materials targeted. For example, even though when it was in full operation (prior to its partial suspension in July of 2002) New York City's residential recycling program targeted more than 45% percent of the materials in the waste stream, its diversion rate was only around 20%. That means that the program captured a little less than half of the materials targeted.

Getting to zero will involve recycling more materials and recycling both at home and away from home. Many other communities have added the collection of all plastics, of textiles, and window glass and ceramics (see discussion below). In addition, recycling in workplaces and public spaces can be greatly improved. In many cities, recycling bins are provided side by side with garbage bins in public transit stations and on public streets. And, businesses could do a much better job of recycling if the commercial recycling infrastructure were improved.

In order to achieve zero waste, the City must place a much greater emphasis on educating the public, City employees, and businesses both about the importance of recycling and the mechanics of how to do it right. To date, too many of the City's educational efforts have been vague and general -- telling the public that recycling is good, but not telling us precisely what to recycle and how. In addition, its enforcement programs have been too punitive, simply fining those who recycle improperly without educating them as to what they did wrong and how to do better next time. To achieve zero waste, the City must both inspire and require New Yorkers to

recycle more and recycle better through a combination of enhanced education and enforcement programs. (For a full discussion of these issues, see Chapter 6, Education, and Chapter 7, Enforcement.)

Critical to any of these improvements is accurate information on what kinds of materials are generated and where. The City's planned waste characterization study is a strong step in the right direction. It should be fortified and followed up periodically to verify what types of materials are generated at home, at the office, on the go, in commercial settings, and when people are enjoying the recreational opportunities in NYC. Waste characterizations must look at categories of recyclables and compostables, as well as durables, reusables, preventables, and packaging. This information will inform the program's expansion over time, and can help to identify areas where the program is falling short, i.e., if a targeted material continues to show up in the waste stream the program to recover it may need attention. Disappointing is the fact that the study will not characterize commercial waste – only residential and institutional. The recently released commercial waste study looked only at broad categories of waste and thus cannot be considered a waste characterization study. This is unfortunate because the opportunities in the commercial waste sector need to be identified for the 20-year City Solid Waste Management Plan. (For a full discussion, see Chapter 11, Research and Data-gathering.)

Equally critical is the development of the physical infrastructure – the facilities and equipment – that can recover our valuable recyclable materials. Without ample capacity, recycling cannot succeed and zero waste will remain out of reach. The City's move toward a 20-year contract with a recycling vendor is a strong step towards ensuring the development of that infrastructure. Its long-term nature is an incentive to develop state-of-the-art processing systems. Long-term contract provisions that ensure the ability to add capacity to handle increasing amounts of recyclables will ensure that the ultimate vendor can be a partner in the move toward zero waste. Should this long-term contract not come to be, it is essential that the City move quickly to develop sufficient processing capacity, either publicly owned or through a public-private partnership. In addition, collection infrastructure, such as bins and collection areas in multi-family buildings and businesses, is important to make recycling convenient and feasible.

Several programmatic improvements can ensure the infrastructure is in place to achieve total recycling on the way to zero waste. Some of the recommendations below are very specific and implementable in the near term. Others are more long-term and speculative in nature. Since the latter are more difficult to anticipate precisely, the recommendations are more general and intended to guide the approach to planning for the future. In summary, the recommendations are to:

- Stabilize and support existing recycling programs by making a long term commitment to the programs and ensuring adequate funding;
- Expand market development efforts for recyclables, most notably glass;
- Build sufficient recycling infrastructure to ensure ample capacity to handle increasing amounts of materials;
- Make recycling collections more efficient and cost-effective and test new collection methods to improve the quality and marketability of recyclables;
- Implement recycling in public spaces;
- Improve multifamily residential recycling;

- Improve recycling in City agencies and institutions;
- Improve commercial recycling;
- Increase investment in education efforts and enhance enforcement. (See Chapters 6 on Education and Chapter 7 on Enforcement for these recommendations.);
- Target more materials and expand residential recycling options;
- Build Buy Back Centers to supplement curbside recycling;
- Expand the Bottle Bill;
- Develop producer responsibility programs for problem products;
- Increase the availability and awareness of collections for household hazardous waste.

These elements are expanded upon below.

Stabilize and Support Existing Recycling Programs

The City and its top elected officials must make a long term commitment to maintaining a recycling program without annual budget renegotiations. Despite the fact that recycling has been with us for more than ten years, frequent budget cuts and program changes mean that the investments in public education are barely able to keep pace with the changes. Recycling is also kept in the start-up mode rather than maturing and becoming more cost-effective. Most importantly, the message to the public is that the City does not take recycling seriously—a very damaging mass media message.

The first step to an improved recycling program is to stabilize what is already in place and move the recycling rate toward 25%. This rate is a break even point for costs in NYC (Eisl, et al, 1999). A recent analysis by the Independent Budget Office found that the costs of recycling in New York City have been dropping, and the costs of waste disposal increasing (New York City Independent Budget Office, 2004). The City's decision to bring glass recycling back in April 2004 is an important move in that direction, as is the pending long-term contract for processing the City's recyclables. An accompanying focus on market development (see below) will also serve to stabilize the program. The City might also want to explore using drop-off locations for collecting clear glass—thus keeping this high value material free of contamination.

Providing consistent funding long term requires attention to developing alternative funding mechanisms. These alternative funding mechanisms are discussed in Chapter 9, Financing; they are essential to enable the recycling program to access consistent funding and be exempt from annual budget battles. And finally, more and better public education and enforcement are critical to stabilizing and making the most of our current recycling programs. (See Chapter 6, Education and Chapter 7, Enforcement.)

Implementation Schedule:

2004: NYC's Solid Waste Management Plan should document a commitment by the City to long term support for current recycling programs and to the development of stable financing; complete long term contract for processing of City recyclables.

2005 and beyond: Consistently fund recycling and education programs.

Expand Market Development Efforts

Stable markets for recyclables are the key to a cost-effective and efficient recycling program. In the early 1990s, the City recognized this by establishing a market development unit within the Department of Sanitation's Recycling Office, that received direct leadership from the Commissioner. The dedicated staff and high-level leadership ultimately led to the VISY paper mill on Staten Island, the largest manufacturing investment in the City in the last half century and the cornerstone of the profitable paper recycling program. This type of effort must be revitalized. Because market development requires interagency collaboration, it is critical that this activity be part of a management structure that can bring agencies like the Department of Transportation (DOT) and the Department of Citywide Administrative Services (DCAS) to the table to help build recycling markets. A key factor for all zero waste programming is the commitment of the City's top management. The particular management structure for implementation of these efforts should be a decision made by the Mayor in conjunction with the City Council.

Most immediately, the City must focus on market development for glass containers. The marketing of mixed color broken glass, or cullet, has been problematic for the City's recycling contractors, because the markets available have been low quality and low margin, such as landfill cover. However, the technology exists today to process mixed color cullet into a product equivalent to sand that has many end-uses, including as an abrasive (e.g., sandblasting medium), as a filtration medium (e.g., pool filters), in cement, and as an aggregate to replace pea gravel (Center for Economic and Environmental Partnership, 2002). The City itself and the contractors it uses could create significant markets for each of these end products (Center for Economic and Environmental Partnership, 2002). In addition, these end-use technologies are not restricted to container glass, they can also absorb ceramics and plate glass.

In moving toward comprehensive recycling, the City should work aggressively to develop these markets for mixed color cullet. While the City should strive to keep as much glass as possible whole to access higher value container and fiberglass markets, there will always be some mixed broken glass requiring low value markets, and in a city the size of New York, the volumes would likely still be substantial. The City should begin by holding meetings with the glass industry, recyclers and public interest groups to discuss improving market opportunities. Once glass markets are developed, the City should add plate glass and ceramics to the curbside collection system.

Subsequent to efforts related to glass, the City should identify other materials that would benefit from market development. A market development plan should be produced and discussed with the City Council and public advisory boards. Market development efforts must include the City of New York as a major purchaser of good, since changing City purchases alone can substantially change the market. (This topic is discussed further in Chapter 10, Legislation and Regulation.) In order to ensure the City receives the benefits of its market development efforts, long-term contracts for recyclables processing must provide the City the right of first refusal for marketing the recyclables.

Implementation Schedule:

- 2005: Reestablish market development office; focus on market development for glass;
- 2006: Implement market development for glass; begin market development on next target material; produce market development plan;
- 2007 and beyond: Identify target recyclables and work to identify and develop markets.

Build Recycling Infrastructure

The City must ensure that there is ample recycling processing capacity within its borders. The partial suspension of the recycling program in 2002 was caused in part by the lack of modern processing plants in NYC for sorting recyclables (Izeman and Gokaldas, 2004). The City's recent move toward a 20-year contract for processing recyclables is a strong signal that it has recognized the importance of developing substantial processing capacity. This capacity must keep pace with a progression toward zero waste and enable commercial carters to use the City's recycling vendors. Should the 20-year contract currently being negotiated not be finalized, the City must move immediately to develop sufficient recycling infrastructure in some other way--with public ownership or a public-private partnership. The City should also keep in mind the desirability of maintaining a healthy amount of competition to keep costs down. Previous City efforts to build recycling infrastructure have faltered when it mysteriously decided not to activate a contract already awarded for the Staten Island MRF (Eisl, et al, 1999). This cannot be allowed to happen again because it jeopardizes our ability to develop recycling as a cost effective alternative to disposal and export.

Implementation Schedule:

- 2004: Complete long-term contract with recycling vendor; commit to building the needed recycling infrastructure--public or private--in the twenty year Solid Waste Management Plan.
- 2008: Assess capacity needs for municipal and commercial infrastructure.
- 2010: Complete additional recycling infrastructure.

Make Recycling and Waste Collections More Efficient and Cost-Effective While Preserving the Quality of Recyclables

Collections, whether waste or recycling, are the most expensive part of the Sanitation budget. Collections also contribute to traffic congestion and air pollution--both serious problems in NYC. Rather than cover this issue twice, we cover it more thoroughly in Chapter 8, Transportation—where we discuss reducing vehicle miles traveled.

In the context of recycling, however, we still have two systems—one for garbage collection and one for recyclables. The City has been reluctant to integrate the two systems in a way that has resulted in major savings for other municipalities-by substituting improved recycling collections for waste collections as recycling tonnage increases.

The issue of efficiency and cost- effectiveness of recycling collections in NYC has been discussed at great length over the past several years in reports and recommendations coming from advisory committees, environmental groups and the City Council. Cutting waste collections

will be a political hot potato, if not accompanied by sufficient public education and discussions of how to accomplish the task effectively. However, we must integrate the collection systems in order to obtain savings that other communities are already benefiting from. In fact, when we are targeting half the materials in the waste stream for recycling, maintaining waste collections at the same schedule as prior to recycling is actually a disincentive to greater recycling. The issue of reducing waste collections and creating one integrated system is dealt with more thoroughly in Chapter 8, Transportation.

In order to achieve high efficiencies, DSNY must reduce the frequency of garbage collection as recycling, reuse, composting, and waste prevention programs reduce the amount of waste generated. Obtaining savings from reducing waste collections is absolutely critical to improving the cost-effectiveness of recycling. In addition, it is important to increase recycling collections as diversion levels improve. Inadequate recycling collections for the amount of material available can lead to storage problems in congested buildings and cause valuable material to enter the waste stream, instead of being recycled.

Another means of improving recycling cost effectiveness is to try different types of truck collections and truck designs. Some of these methods can improve the quality of the recyclables collected and enable the City to obtain a higher revenue from the materials. Various kinds of pilot collections and truck designs are discussed in Chapter 8, Transportation.

Implement Recycling in Public Spaces

In order to maximize recycling, the City must provide the opportunity for people to recycle away from home. More and more of our most recyclable materials are being sent to landfills and incinerators because they are generated in public spaces where the user has little or no opportunity to recycle. For example, the recycling rate for aluminum cans and plastic soda bottles has been on a steady decline because soft drinks are often consumed on the go. Every day tons of valuable paper are thrown away in subway stations and on streets. Communities around the country have been working to develop new methods of recycling in public spaces.

Some innovative new systems raise revenue while they improve recycling by providing both advertising space and recycling instructions on public space collection bins. In Toronto, Ontario, more than 3,000 “silver box” recycling bins in the City’s public spaces collect paper, containers, and waste.

The public space recycling program should be implemented in two phases:

- First in Indoor Spaces - all City, State and Federal agencies and offices must provide the opportunity for the public to recycle paper and metal, glass and plastic containers.
- Second in Outdoor Spaces - stadiums, parks, business districts, widely traveled streets, street fairs, and at transportation sites-subway and bus stations and other places where recyclables are commonly discarded.

Implementation Schedule:

- 2005: Establish the requirement for public space recycling in indoor spaces; research the different methods of/strategies for public space recycling, including collection containers that generate advertising revenue.
- 2006: Enforce the requirement for public space recycling in indoor spaces. Pilot test the most promising methods of outdoor public space recycling identified in several different settings, e.g., subway station, busy street, park and stadium.
- 2007: Revise and adapt pilots if necessary; based on pilot tests, develop implementation strategy to roll out public space recycling City wide.
- 2008: Implement strategy developed.
- 2010: Achieve comprehensive public space recycling City-wide.

Improve Multifamily Residential Recycling

Recycling in multi-family buildings poses unique challenges and opportunities. Participants at the November 2002 Roundtable on the Future of Recycling in NYC noted that nearly every other City in the nation designs specific recycling programs for multi-family buildings that speak to their particular needs and circumstances (Center for Economic and Environmental Partnership, 2002). New York should follow this lead and develop a program that specifically targets multi-family generators. Research indicates that strong programs, supported by specific education initiatives, such as Building Leaders (see Chapter 6, Education), can improve diversion in multi-family buildings (US Environmental Protection Agency, 1999). A variety of incentives should also be considered for use in multi-family buildings.

An effective multi-family building recycling program must address the building infrastructure, particularly in buildings with garbage chutes. There are two models for adapting such infrastructure. One involves installing two chutes, one for recyclables and one for garbage. This type of system has been developed by Hi-Rise Recycling and is in use in New York City already; it can be required in the building code and/or financed through avoided disposal costs. Another option, chosen by the City of San Francisco, is to eliminate the use of garbage chutes and replace them with accessible collection containers (Miggins, 2003).

Improving multi-family recycling requires a detailed plan for targeting these residences and addressing all the existing barriers to effective recycling. Containers for use within apartments should be identified and utilized. For those moving in or out, special services should be made available. Multi-family recycling will also require targeted education and enforcement in multiple languages, not only to residents, but also to building managers, porters, and other “on-site champions” like volunteers. (For more detail see Chapter 6, Education). Enforcement in building must ensure that adequate recycling spaces are provided with appropriate signage. Implementing “Pay as You Throw” (PAYT), or volume-based pricing for non-recycled solid waste would be an important driver for increasing recycling in multi-family contexts and would strengthen the viability of the recommendations above. (For more information, see Chapter 9, Financing).

Implementation Schedule:

- 2005: Study options for improving multi-family recycling and develop a detailed multi-family dwelling recycling plan;
- 2007: Pilot test different options for improving multi-family recycling by issuing RFPs for 3 non-profit organizations to run 3 different programs;
- 2008: Prepare a report comparing the performance of pilot programs;
- 2009: Based on tests, determine which options are most effective for different housing stocks;
- 2010: Implement improved multi-family recycling programs.

Improve Recycling in City Agencies and Institutions

NYC agencies and institutions generate significant amounts of recyclable materials, but to date much of it goes unrecovered. According to the 1990 DSNY Waste Characterization Study, more than 50 percent of the institutional waste stream is paper, which is not only recyclable, but also generates revenue for the City (City of New York Department of Sanitation, Comprehensive Solid Waste Management Plan, 1992). Unfortunately, major institutions that receive free collection from the City have no incentive to recycle. This can be corrected by instituting a PAYT program for institutions, as discussed in the Chapter 9, Financing. More immediately, the City can adjust recycling bin size and collections at institutions, so that they meet the volume of recyclables generated. This was found to be a problem at City schools, where the barrier to recycling was related to bin size and collection frequency. DSNY changed over to dual-bin trucks for school collections, which allowed recycling collections to occur at the same frequency as for trash. The result was an increase in recycling diversion from 2.1% to 20.5% within 1 year. (City of New York Department of Sanitation, Chart: Dual Bin School Truck Summary, 2004)

Clearly identifiable recycling bins of different sizes would help this effort. More substantial fines can also be established for institutions not recycling. City agencies also currently have little incentive to recycle since the costs of disposal are not even represented in their budgets, and they get no direct benefit for increasing recycling. To improve recycling in City agencies, the City could implement a shared savings program modeled on the federal government's program (Clinton, 1998). The program would enable agencies to share the revenues from the materials they recycle, most notably paper, and share the savings from avoided disposal costs. Those savings and revenues could fund new programs, or supplement core activities. Waste audits could not only improve recycling, but also help an institution save money and prevent waste. (See Chapter 1, Waste Prevention).

The City should begin by gathering more data on the waste generation of various institutions and agencies, and their compliance with recycling requirements. At the same time, it should investigate, test and then implement incentives for increasing institutional recycling.

Implementation Schedule:

- 2005: Evaluate each major institution for its generation of recyclables and adjust recycling collections accordingly; conduct outreach and education on recycling requirements; implement larger recycling fines for institutions not in compliance; research models for creating incentives for agency recycling, such as shared revenue/shared savings.

2006: Continue to gather data and monitor recycling compliance by agencies and institutions; pilot test most promising models for agency recycling incentives; adapt and revise pilots as necessary.

2007: Draft implementation plan for agency recycling and incentives, begin implementation.

2008: Complete implementation of agency recycling incentives.

Improve Commercial Recycling

For at least a century, a stable industry has existed in the recycling of commercially generated scrap paper and scrap metals. In addition, there are strong existing incentives to recover and reuse common-size shipping pallets. As a result, much of the scrap metal and corrugated cardboard generated by businesses in the City are recycled, as are the common size pallets. However, little infrastructure is in place to recycle other materials generated by businesses, such as bottles and cans and scrap wood, and many small businesses do not have the wherewithal to access the existing markets for scrap metals and paper.

Commercial recycling rules allow carters to collect mixed materials for processing at recycling facilities. However, the lucrative export contracts offered by the City caused waste companies to use existing facilities primarily for processing waste for export. This indirectly led to the dismantling of recycling equipment at transfer stations in the City.

To achieve comprehensive recycling in the commercial sector, there must be infrastructure for processing recyclables. This will require economic development work to create reuse and remanufacturing businesses in the City (see Chapter 5, Economic Development). The City might also want to revisit the commercial rules to require other recyclables to be separated.

Carting rates should encourage recycling by commercial generators. The City merely sets a maximum carting or hauling rate, currently \$12.20 per cubic yard or for heavier food waste \$8.00 per 100 pounds. (Wilkinson, 2004). Paper and scrap metal usually cost less or even generate revenue. The reality is that many commercial businesses are not made aware of the different rates for recyclables. The City must increase its outreach program to businesses to make them aware of the benefits of recycling and ensure that carters are informing customers of their recycling services.

The Technical Assistance Program for businesses (discussed in Chapter 1, Waste Prevention) can develop business policies for recycling and make businesses aware of new rules and diversion programs as they develop. The program would also support commercial recycling by completing waste audits and identifying opportunities to divert materials for recycling. Businesses can be encouraged to adopt Zero Waste business principles and goals and to develop a plan to achieve them (Grass Roots Recycling Network, 2004). NYC might want to look at what other communities are doing to require greater business participation in preventing and recycling waste. In Pittsburg, CA for example, an ordinance requires businesses to submit a simple recycling plan with their annual business tax reports. This city has provided a commercial recycling handbook to assist businesses in developing their plan (Liss, 2004).

Implementation Schedule:

2005: Conduct outreach and education to businesses about recycling policies and rate structure. Require commercial carters to inform customers of recycling services.

2007: Evaluate capacity needs for recycling infrastructure and make recommendations to improve commercial recycling in NYC.

Target More Materials

In order to reach zero waste, New York City needs to collect more recyclable materials. The addition of materials to the recycling program must be carefully planned and coordinated with market development efforts, as outlined above.

Specifically, the City should develop a list of materials for expanded recycling. They include all glass (container glass, window glass, ceramics), all plastic containers, film plastic, wood, tires, building materials and textiles (carpets, spent clothing, sheets, towels, only those not suitable for reuse). For each material, the City should investigate what markets exist and how it can access those markets, or, if a market does not yet exist, what markets are possible and what the City can do to create those markets. As the markets are accessed or opened, the City should add those materials to the curbside collection system.

Many communities collect a wider range of materials than the mixed paper, metal, glass, and plastic collected in New York City. For example, St. Paul, MN, collects textiles at curbside (Eureka Recycling, 2004). Many communities have begun to collect all plastic bottles (numbers 1-7), including Portland (OR), Vancouver (WA) and Columbia (MD) (allplasticbottles.org, 2004). And Broome County, NY, was able to add plate glass and ceramics to its curbside collection due to the glass recycling technology it uses and the markets it opened through a partnership with the county public works department.

As the City investigates the viability of adding materials to the curbside recycling program, it may identify materials that are more marketable when they are collected by means other than curbside. For example, a 1996 study found that textile recycling was viable in New York City, but collecting those materials at curbside reduced their marketability. The City might want to explore collecting textiles in special bags with bulk pickups. Similarly, glass containers are much more marketable if they are kept whole and not crushed in the back of a collection truck. For these materials, drop off centers, buy back centers, or producer take back programs may be the most viable options and thus must be investigated and established if found viable. In the case of the 1.7 million tires generated annually in NYC (or 17,000 tons of tires) (Science Applications International Corporation, 2000), we look forward to the day when New York State tire deposits fund an adequate recycling network for tires. Essential to developing the recycling network will be adequate funds—all the deposit funds should go to cleaning up tire dumps and to the recycling network, not to the State's general fund.

Implementation Schedule:

2005: Develop markets for mixed color glass cullet. Develop list of materials to consider for expanded recycling and evaluate markets for most promising materials.

2006: Add collection of plate glass and ceramics; develop markets for most promising materials.

- 2007: Add collection of additional plastics and/or enact legislation to institute Extended Producer Responsibility for plastics where markets don't exist; develop markets for textiles.
- 2008: Add collection of textiles; develop markets for next target material.
- 2009 and beyond: Continue to develop markets for additional materials; add to collection program as markets develop.

Build Buy-Back Centers to Expand Residential Recycling Options

In addition to collecting more materials, the City could capture more recyclables by supplementing curbside recycling with other programs, such as buy-back centers. Despite the fact that the City's Recycling Law requires that each borough establish a buy-back center, the City's centers were closed in the early 1990s. Buy-back centers can build participation in low performing districts because they provide a direct economic incentive to recycle by paying cash for recyclable materials. The centers also improve program economics because they recover high-quality source separated recyclable materials with no collection costs. For example, when the Bronx buy-back center was operational more than a decade ago, it received a subsidy of only \$50 per ton. Even if that amount were doubled, the centers would provide a net savings over collection and disposal.

Implementation Schedule:

- 2006: Pilot test buy-back center in at least one borough.
- 2008: Based on results of buy-back pilot program, develop City-wide implementation strategy.
- 2009 and beyond: Implement buy-back center strategy.

Expand New York's Bottle Bill

New York State's existing Bottle Bill has been a success story for the environment, by reducing litter found in parks and along roadways. It is a good example of developing a system that assigns responsibility for bottle discards alleviating the burden of collection on municipalities. New York now needs an improved and enhanced Bottle Bill, known as the Bigger, Better Bottle Bill. See Legislation and Regulation Chapter for more on this topic.

Develop Extended Producer Responsibility Programs

Certain products are not suitable for curbside recycling because they are bulky, contain toxic materials, or they are generated infrequently and/or in small quantities. Nonetheless, they are recoverable through special programs. These products currently include computers and electronics; paint; pesticides; tires; and fluorescent light bulbs, batteries and other mercury containing products. The City should seek to pass legislation or enter into binding voluntary agreements with the producers of these products to create take-back programs whereby the manufacturer would collect the materials or finance their collection and ensure that they are recycled or properly disposed of. The City may want to work closely with the state in adopting EPR legislation.

As the City moves toward zero waste it should identify other products to target for producer take back programs. For example, if the market development activities outlined above do not yield viable markets for certain products, such as film plastic, the City should seek to establish producer take back programs for those materials. For more detail and an implementation schedule, see the section on Extended Producer Responsibility in Chapter 10, Legislation and Regulation.

Increase the Awareness and Public Availability of Special Waste Collections for Recycling

The City has established special collection drop-off sites at Sanitation Garages for household hazardous wastes, such as leftover chemicals and paint, batteries, and used tires, to ensure that these materials are safely disposed of. Unfortunately, these sites are neither easily accessible nor regularly promoted. Many citizens are unaware of their existence. As a result, much of the City's household hazardous waste is disposed of with regular trash. In order to keep these toxic and hazardous materials out of the waste stream and ensure that they are properly handled, the City must increase the availability of special waste collections. This could be done in several different and not mutually exclusive ways. For example, the City could have widely promoted special waste collection days, where household hazardous materials are collected at convenient locations. In addition, community-based coordinators (see Chapter 1, Waste Prevention) could organize and promote neighborhood-based special waste collections, and Reuse MRFs or Complexes (see Chapter 2, Reuse) could have special days during which household hazardous materials are collected. These events would need City support for proper handling and disposal. Furthermore, Sanitation Garages could hold special waste collection events if they are adequately publicized.

Implementation Schedule:

2006: Study the alternative means of increasing the availability of special waste collections.

2007: Pilot test several special waste collection events and methods.

2008: Determine which types of special waste collections are most effective in which neighborhoods and housing stocks; develop implementation plan for broader special waste collections.

2009: Implement special waste collections strategy Citywide.

2010 and beyond: Sustain special waste collection strategy.

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Program	Benefits/Rationale	Implementation Schedule
<i>Stabilize and Support Existing Recycling Programs</i>	Improves program economics by increasing tonnage; increases diversion and cost savings	2004: NYC's Solid Waste Management Plan should document a commitment by the City to long term support for current recycling programs with supporting rationale and to the development of stable financing. Complete long term contract for processing of City recyclables. 2005 and beyond: Consistently fund recycling and education programs
<i>Expand Market Development Efforts</i>	Improves program economics; creates jobs in the City	2005: Reestablish market development office; focus on market development for glass 2006: Implement market development for glass; begin market development on next target material; produce market development plan 2007 and beyond: Identify potential recyclables and work to identify and develop markets
<i>Build Recycling Infrastructure</i>	Provides the physical capacity to recycle increasing amounts and improves economics	2004: Complete long-term contract with recycling vendor. Commit to building the needed recycling infrastructure- public or private- in the 20 year Solid Waste Management Plan 2008: Assess capacity needs for municipal and commercial infrastructure 2010: Complete additional recycling infrastructure
<i>Make Recycling and Waste Collections More Efficient and Cost-Effective While Preserving the Quality of Recyclables</i>	Improves recycling's cost effectiveness	See Transportation Chapter for Implementation Plan

<p><i>Implement Recycling in Public Spaces</i></p>	<p>Enables residents to recycle away from home; assists education efforts; improves diversion and recovery</p>	<p>2005: Establish the requirement for public space recycling in Indoor spaces as above Research the different methods of/strategies for public space recycling, including collection containers that generate advertising revenue.</p> <p>2006: Enforce the requirement for public space recycling in Indoor spaces. Pilot test the most promising methods of outdoor public space recycling identified in several different settings, e.g., subway station, busy street, park and stadium.</p> <p>2007: Revise and adapt pilots if necessary; based on pilot tests, develop implementation strategy to roll out public space recycling City wide</p> <p>2008: Implement strategy developed</p> <p>2010: Achieve comprehensive public space recycling City-wide</p>
<p><i>Improve Multifamily Residential Recycling</i></p>	<p>Increases diversion and related cost-savings.</p>	<p>2005: Study options for improving multi-family recycling and develop a detailed multifamily dwelling recycling plan</p> <p>2007: Pilot test different options for improving multi-family recycling by issuing RFPs for 3 non-profit organizations to run 3 different programs</p> <p>2008: Prepare a report comparing the performance of pilot programs</p> <p>2009: Based on tests, determine which options are most effective for different housing stocks</p> <p>2010: Implement improved multi-family recycling programs</p>

<i>Improve Recycling in Agencies and Institutions</i>	Increases diversion; conveys public message that City is serious about recycling	<p>2005: Evaluate each major institution for its generation of recyclables and adjust recycling collections accordingly; conduct outreach and education on recycling requirements Implement larger recycling fines for institutions. Research models for creating incentives for agency recycling, such as shared revenue/shared savings models</p> <p>2006: Continue to gather data and monitor recycling compliance by agencies and institutions. Pilot test most promising models for agency recycling incentives; adapt and revise pilots as necessary</p> <p>2007: Draft implementation plan for agency recycling and incentives. Begin implementation</p> <p>2008: Complete implementation of agency recycling incentives</p>
<i>Improve Commercial Recycling</i>	Targets more than half the waste stream; business retention through cost savings	<p>2005: Conduct outreach and education to businesses about recycling policies and rate structure. Require commercial carters to inform customers of recycling services</p> <p>2007: Evaluate capacity needs for recycling infrastructure and make recommendations to improve commercial recycling in NYC</p>

<i>Target More Materials</i>	Improves program economics by increasing tonnage; increases diversion and cost savings	<p>2005: Develop markets for mixed color cullet Develop list of materials to consider for expanded recycling and evaluate markets for most promising materials</p> <p>2006: Add collection of plate glass and ceramics; Develop markets for most promising materials</p> <p>2007: Add collection of additional plastics and/or enact legislation to institute EPR for plastics where markets don't exist; develop markets for textiles</p> <p>2008: Add collection of textiles; develop markets for next target material.</p> <p>2009 and beyond: Continue to develop markets for additional materials; add to collection program as markets develop.</p>
<i>Build Buy-Back Centers to Expand Residential Recycling Options</i>	Increases participation particularly in low income communities; increases diversion and improves recycling economics	<p>2006: Pilot test buy-back center in at least one borough.</p> <p>2008: Based on results of buy-back pilot program, develop City-wide implementation strategy.</p> <p>2009 and beyond: Implement buy-back center strategy.</p>
<i>Develop Extended Producer Responsibility Programs</i>	Products are recycled at no cost to the City; encourages design for recycling, low toxicity	See implementation steps in Legislation & Regulation chapter.
<i>Increase the Awareness and Public Availability of Special Waste Collections for Recycling</i>	Ensures safe handling of household hazardous materials; provides educational opportunity for consumers to reduce use of hazardous materials	<p>2006: Study the alternative means of increasing the availability of special waste collections.</p> <p>2007: Pilot test several special waste collection events and methods</p> <p>2008: Determine which types of special waste collections are most effective in which conditions; develop implementation plan for broader special waste collections</p> <p>2009: Implement special waste collections strategy.</p>

		2010 and beyond: Sustain special waste collection strategy.
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Composting

According to the Department of Sanitation's 1990 Waste Composition Analysis, organic materials, such as leaves, grass clippings, wood and food waste, make up a substantial 26 percent of New York City's waste stream, second only to paper as a single category (City of New York Department of Sanitation, Solid Waste Management Plan, 1992). The City generates about 13,000 tons of residential and institutional recyclables and waste per day; 3,380 tons of this amount is organic material. Additional organic material is generated in the commercial sector, such as in restaurants.

All organic waste can be recycled by the composting process into valuable soil amendment material. As of 2001, the City diverted an average of 47,000 tons per year of organic waste from export and disposal. This represents about 4% of the estimated 1 million tons per year of organic material that DSNY collects. Over a decade ago, the City proposed to substantially increase composting. In 1992, it proposed building 500 to 2300 tons per day of composting facility capacity (City of New York Department of Sanitation, Solid Waste Management Plan, 1992). However, only three yard-waste facilities were actually created. Composting operations in NYC now handle 47,000 tons annually including (City of New York Department of Sanitation, Composting, 2001):

- 20,000 tons of leaves collected in 34 out of 59 community districts, and sent to one of three leaf composting sites;

- 7,500 tons of food waste composted at Rikers Island prison facilities;

- 2,500 tons of Christmas trees sent to parks for mulch;

- 10,000 tons of grass clippings and leaves handled on site by the NYC Housing Authority.

Budget cuts in 2002 cancelled funding for separate collection of leaves and composting, as well as for the Botanical Gardens efforts to promote leaving grass clippings on the lawn and to distribute compost bins.

Because of its substantial volumes, expanded composting of organic waste is critical to the success of any zero waste program. In fact, getting even close to zero waste will not be possible without greater recovery of organics. Organics composting is one of the key characteristics of recycling programs that exceed 40 percent recovery (Institute for Local Self-Reliance, 2002).

Many of the cities planning for zero waste, such as San Francisco and Toronto, are pursuing large scale composting, including curbside collection of food waste, as a central element of their strategy.

Composting is a natural process that converts organic matter into a fertilizer or soil enrichment. There are a multitude of management options for composting. Implementing larger scale composting Citywide should involve a variety of programs tailored to specific boroughs, specific housing stock and specific organic materials. Composting can be done either 'on-site' -- in a backyard or on the grounds of larger institutions -- or at centralized facilities. New York will have to utilize both. However, maximizing on-site composting has the dual benefit of reducing collection and disposal costs and eliminating the environmental impacts of having to collect and transport the material.

Organic materials are being targeted for recovery not only to reduce waste, but also because landfilling contributes to global warming. When organic material breaks down in an environment starved of air, such as a landfill, it releases methane, a harmful greenhouse gas. Because of these methane releases and the leachate produced by organics in a landfill, the European Union has set goals for reducing organic waste disposal at landfills by 65% in 15 years (Favoino, 2002).

Composting technologies are generally one of two types: Aerobic systems use air as a part of the decomposition process, while anaerobic systems break down organics in an environment deprived of air. Both of these methods can use "in-vessel", or enclosed, systems that control odor. Anaerobic digestion systems tend to be more space efficient; moreover, the methane gas they generate can be captured to create electricity and steam heat, making these systems net energy producers.

Certain organic materials, such as yard waste, leaves and Christmas trees, should be targeted for discrete, seasonal collection programs, while others, such as food waste, must be collected year round and more fully integrated into the City's collection system.

To date, New York City's organics recovery efforts have been limited to fall leaf collection and composting, some on-site food waste composting at the Rikers Island prison, and education and outreach programs to promote composting and distribute subsidized backyard composting bins. Despite the suspension of most of these programs in 2002, they form a strong base on which to build a more comprehensive organics recovery program.

A zero waste program requires comprehensive organics recovery strategies. There are three primary components to a NYC composting program. The first deals with yard and food waste that can be composted on-site. By addressing just 10% of the DSNY organic waste stream, on-site processing could save the City over \$25 million per year in collection and disposal costs, assuming \$257 for collection and disposal (City of New York Mayor's Office of Operations, 2003). Collection cost savings are not achieved on a ton-for-ton basis – that is, not every ton reduced will lead to reduced collection costs. However, an effective and ambitious program can

result in collection savings, as the volume reduced results in reduced truck shifts. The second component is to reinstate and expand separate yard waste collections and composting the material at central locations. The third component is to develop new centralized food waste collection and composting systems.

This plan includes:

- **Residential On-Site Backyard Composting and Grass Mulching:** More than 930,000 NYC households have backyards and, based on DSNY research, 70 percent of households support backyard composting as a waste management strategy for the city (City of New York Department of Sanitation, Backyard Composting, 1999). An investment in subsidized bins for these households will yield substantial disposal and collection cost savings. We also recommend that a grass collection ban be accompanied by education on the benefits of leaving grass clippings on the lawn.
- **Institutional On-Site Composting and Grass Mulching:** The City should reinvigorate its technical assistance program, previously run by the NY Botanical Gardens, to help institutions do on-site composting. The City must also ban grass collections for institutions. These institutional programs should be coupled with PAYT. See Chapter 9 Financing
- **Commercial On-Site Composting:** the City should bring its plans for on-site composting at the Hunts Point Food Distribution Center to fruition and identify other areas that generate substantial amounts of food scraps (i.e. food courts, airports, etc.) for additional on-site composting systems.
- **Centralized Composting of Residential Yard Waste and Fall Leaves:** The City should reinstate fall leaf and Christmas tree collection and pilot test spring collection of yard trimmings for composting at DSNY sites. In addition, the City should enable landscapers to bring yard debris to DSNY sites for composting.
- **Centralized Food Scrap Composting:** The City should develop composting facilities to process organic food waste. We recommend evaluating two possible composting systems: a) one that utilizes dedicated collections of source-separated or clean organic materials and b) one that collects organic materials mixed with other trash –the trash remaining after comprehensive waste prevention, reuse, and recycling programs have been implemented. The City should pilot test collection of organics in several areas, including those generating substantial amounts of commercial food waste (i.e., restaurant districts) as well as low-density and high-density residential districts. Tests should compare the advantages and disadvantages of source-separated collection with the collection and processing of mixed trash materials, including final product quality.

On-Site Composting Systems/Organic Waste Prevention

From 1992 through 2001, DSNY supported education programs run by the Botanical Gardens. The programs distributed subsidized backyard composting bins and educated residents and institutions to mulch grass clippings, or “leave it on the lawn.” These programs should be reestablished and expanded.

Grass Clippings Collection Ban and Mulching

The City should follow through on the grass clipping collection ban proposed in DSNY's 1992 Solid Waste Management Plan. To ensure residents have the information needed to comply, the City should also reinstate the citywide "leave it on the lawn" education program. Under a grass clippings collection ban, residents would be required to mulch grass, i.e., leave clippings on the lawn to decompose naturally, compost clippings in their backyard, or have their landscaper remove clippings. According to the City's waste composition studies, grass clippings comprise about 2% of the residential solid waste stream, or about 78,000 tons a year (City of New York Department of Sanitation, Composting, 2001). Therefore, a grass clipping ban could save the city as much as \$20 million annually, assuming \$257 for collection and disposal (City of New York Mayor's Office of Operations, 2003). In order to realize collection savings, truck shifts must be reduced, so collection savings are not immediately realized until there is significant diversion.

Implementation Schedule:

2005: Reestablish citywide 'Leave it on the lawn' education program and institute a one-year warning period prior to instituting the ban on collection of grass clippings.

2006 onward: Enforce grass collection ban and fund citywide education and outreach.

Residential Backyard Composting

DSNY's 1999 report, "Backyard Composting in New York City: A Comprehensive Program Evaluation," estimates that one-third of New Yorkers, or 930,000 households, have some form of backyard. The report cites market research that 70% of these households agree that backyard composting should be considered as a waste management tool.

The City's efforts to encourage backyard composting, including the distribution of subsidized backyard composting bins in appropriate neighborhoods, were very successful and should be reinstated. In FY '99, working through the Botanical Gardens, DSNY distributed 425 compost bins; in FY '00 they distributed 4,200 bins; in FY '01 5,000 bins. The reinstatement of backyard composting education should include funding for the subsidized distribution of 10,000 compost bins (made of recycled materials) per year. In Santa Cruz, CA, their program has provided a financial incentive to choose backyard composting over organics collections.

In a limited pilot program, DSNY estimated that households diverted 6.8 pounds of yard waste per week. This is likely a serious underestimate of the potential diversion. However, if we assume that just 10%, or 93,000 of households with backyards, participate and divert 6.8 pounds per week, the overall savings to the City per year could be as high as \$4.2 million, assuming \$257 per ton for collection and disposal (City of New York Department of Sanitation, Backyard Composting, 1999, and The City of New York Mayor's Office of Operations, 2003).

Implementation Schedule:

2005: Reinstate education program and distribute 10,000 compost bins.

2006 and beyond: Support education program and distribute 10,000 bins per year.

Institutional On-site Composting and Grass Recycling

The City should reinstate its outreach program to encourage institutions to do on-site composting of food scraps and yard trimmings and to do grass mulching. Due in large part to the outreach programs run by the Botanical Gardens under contract to DSNY, many institutions adopted on-site yard waste composting. The NYC Housing Authority (NYCHA) adopted “leave it on the lawn” practices for 8,000-15,000 tons of grass clippings at all its housing developments. Assuming only 8,000 tons diverted at \$257 for collection and disposal, these practices save the City \$2 million every year (City of New York Department of Sanitation, Composting, 2001 and City of New York Mayor’s Office of Operations, 2003). NYCHA also developed on-site leaf composting operations at many of its sites (City of New York Department of Sanitation, Composting, 2001).

By eliminating waste collection and disposal costs, these projects provide the City with substantial savings that continue year after year, long after the initial investment. However, it is a mistake to no longer count the monetary benefits that continue to accrue. This is waste prevention at its best with waste diverted before entering the DSNY collection system. The City needs to properly account for these savings in future years.

Once the outreach program is reinstated, the City should implement a grass collection ban for all institutions and agencies.

In the past, DSNY has also assisted in piloting on-site food waste composting at a number of institutions. If these pilots are successful, they should be expanded. On-site handling of food wastes would result in collection and disposal savings for the City.

A key barrier to getting large institutions to adopt composting is that they currently receive free waste collections from the City, while they must invest in and maintain composting systems. If instituted as a part of a zero waste system, in tandem with incentives such as Pay-As-You-Throw, volume-based pricing (see Chapter 9, Financing), composting becomes a more attractive option for institutions. Furthermore, composting technology continues to improve and become more cost-effective. Therefore, the City should continue to monitor and test new systems for technical and economic feasibility.

On-site food waste composting systems have been very successful where there are other motivating factors beyond cost saving. For example, the “Hot Box”, installed in approximately 25 community gardens, parks, school yards and other sites, is a low-tech composting system developed by Open Road of New York, with students from the East Side Community High School (IS 318), and support from DSNY. The boxes are made from recycled plastic and handle

small volumes of organics. Open Road assembles the boxes and provides instructions and training in their proper use. This program also has high educational value for the students.

In addition to on-site composting, on-site de-watering systems at larger institutions and where food is processed may provide a cost-effective way to reduce the weight and volume of food waste. De-watering can supplement on-site composting or contribute to more efficient waste collection where space does not permit on-site composting. De-watering has the advantage of being less labor and space intensive than the on-site composting systems currently available. The City should provide technical assistance and other incentives for institutions interested in on-site de-watering.

Implementation Schedule:

2005 and beyond: Reestablish composting outreach program to institutions and agencies citywide; require all institutions and agencies to “Leave it on the Lawn.”

2006: Institute PAYT for institutions (see Chapter 9, Financing); provide technical and financial assistance to institutions to establish composting and de-watering systems for food wastes.

Commercial On-site Composting

For the past three years, DSNY has been working with the Economic Development Corporation (EDC) and the Hunts Point Food Distribution Center to develop an on-site composting system to process fruit and vegetable waste. That project should be brought to fruition and adopted in other NYC areas that generate large volumes of organic waste. Other large commercial generators of food waste that would benefit from on-site composting include office complexes, food courts, airports, and wholesale food processors.

These on-site composting facilities would reduce disposal costs to businesses, while eliminating the need for and the environmental impacts of transporting organics to a disposal site. The recent restructuring of commercial carting fees that raised the rates for “wet wastes” like restaurant food waste to \$8 per 100 pounds or \$160 per ton makes composting a more attractive option for operations that produce large amounts of organic waste.

The City should provide technical assistance and other incentives to interested businesses. The City could also encourage waste haulers to offer on-site composting services, as they offer other equipment such as compactors.

Implementation Schedule:

2005 and beyond: Establish and support citywide commercial organics recovery outreach program. Provide technical and financial assistance to help businesses establish in-vessel food waste composting systems.

Centralized Composting of Residential Yard Material

Despite the potential benefits, not all yard waste can be composted on-site. There will still be a need for yard waste collections for composting off-site. At the time the leaf composting collection program was suspended in 2002, it was diverting approximately 20,000 tons annually and collection efficiency had increased from 4.8 tons to 7.2 tons per truck. The City has three existing leaf composting sites, Soundview Park in the Bronx, Spring Creek on the Brooklyn-Queens border, and Fresh Kills on Staten Island. These facilities have sufficient capacity to handle 20,000 tons of leaves per year. If the leaf capture rate expands dramatically or the City starts to receive large amounts of landscaper organic waste (see below), additional acreage may be required.

We recommend both increasing yard waste collections and allowing landscapers to utilize composting sites. This has the potential to increase dramatically the amount of organic waste processed in NYC.

In resuming separate fall leaf collection and composting, DSNY should:

- Convene a task force to identify possible additional composting sites, to further decentralize operations, or to replace the existing temporary facilities with permanent ones. The task force should explore siting of facilities outside of parkland and seek to minimize the loss of open space to environmental justice communities, which have less open space in NYC.
- Ensure the facilities are properly managed to avoid odor, noise, dust or litter problems.
 - Require that leaves be set out for collection in either loose in rigid containers or in compostable paper bags; this can reduce litter at compost sites and reduce composting costs by an estimated 50 percent.
 - Expand leaf collection to areas of the city not previously serviced, including the large private housing complexes, NYCHA developments and neighborhoods with brownstones (e.g., Harlem and Chelsea) in Manhattan.

In addition to separate fall leaf collections, the City should expand the yard debris program to:

Reinstate Christmas tree collection and mulching

In 2004, the City resumed its citywide Christmas tree collection and created a partnership with the Parks Department for chipping collected trees to create mulch for use in parks. DSNY should explore ways of reducing collection costs, possibly through private collection or partnerships with the Parks Department and other organizations. As part of their licensing process, tree vendors should be required to distribute literature describing the city's tree recycling program and the procedures residents are to follow in setting out their trees for collection.

Pilot a spring/summer yard trimmings program

Initially in low-density neighborhoods in Staten Island, Brooklyn, Queens and the Bronx and then expand city-wide if successful. Spring collection would run for approximately 6 weeks -- the same length of time as the leaf collection cycle. Due to the volume reduction that occurs during composting, spring and summer yard debris could probably be handled at existing leaf composting sites without expanding their footprint. Therefore there should be no capital costs associated with these added collections.

Open city compost sites to private landscapers

Enable landscapers to dispose of yard trimmings at all City composting facilities (currently only the Fresh Kills facility is open to landscapers) to generate revenue through tipping fees and generate more compost, which is valuable to the Parks Department. This also reduces the likelihood that landscapers will leave yard waste at the curb for DSNY collection (an illegal but common practice). While no quantitative data are available, anecdotal information suggests that many of these leave yard waste at the curb for DSNY collection. Either the City should implement an enforcement program aimed at landscapers to end this practice or the City could begin to charge for this service. (See Chapter 9, Financing.)

Implementation Schedule:

- 2005: Reinstate and enhance curbside collection and composting of fall leaves; form task force to address siting issues and needs; open composting facilities to private landscapers; reinstate Christmas tree collection education and pilot test options for reducing collection costs; pilot test spring/summer yard debris collection.
- 2006: Expand fall leaf composting to include Manhattan; implement recommendations of task force; develop and implement strategy to roll out spring/summer yard debris collection city-wide.
- 2007 and beyond: Sustain fall leaf composting, Christmas tree collection, and spring/summer yard debris collections.

Centralized Food Scrap Composting and Collection

Composting food waste and other organics at commercial-scale, centralized facilities is a demonstrated, proven practice, with many such facilities in operation in North America and Europe. Commercial scale composting facilities are generally one of two types: aerobic technologies, commonly known as composting, use air as a part of the decomposition process; and anaerobic technologies, break down organic material in an environment deprived of air, known as anaerobic digestion. For our purposes we refer to both types of natural processes as “composting.”

Large scale composting is not a new idea to New York City. Previous solid waste plans have included the development of large composting facilities. Furthermore, DSNY has worked to establish the Riker’s Island food waste composting program as well as to compost fall leaves and

Christmas trees. Composting process costs for NYC are estimated at \$62 per ton -- less than the cost of export. These costs could be cut in half by simply collecting the material with cans, bins or compostable bags (Izeman and Gokaldas, 2004). A DSNY pilot test sent New York City residential and commercial waste to a mixed waste composting facility and found that the facility was able to produce high quality compost, although this pilot may not be representative of the entire City since the pilot was conducted in a low density district of Staten Island. However, there remain two challenges to developing large-scale organics composting in New York City: an efficient collection system and the siting and operation of facilities.

Elsewhere in Kings County, Washington (the county includes Seattle) a facility processes approximately 195,000 tons per year of yard and food waste. Pilot projects to collect source-separated food and yard waste were met with a favorable response by residents, so the program was expanded to 45,000 households. Seattle City Council also approved funding to offer curbside collection of food scraps to city businesses (Musick, 2004). Los Angeles, California just completed negotiations for a contract to purchase 40 megawatts/day of electricity for 20 years for \$320 million. The 2,700 ton per day anaerobic digestion plant will provide enough electricity for 40,000 homes plant and process source-separated green waste (Corum, 2004).

In Europe, anaerobic digestion facilities have become increasingly common in the past decade, with more than 70 commercial plants now in operation. (US Environmental Protection Agency, 2001). Like aerobic composting, anaerobic digestion produces a soil amendment product, but it has the added benefit of producing methane fuel that can be captured to create electricity and steam heat through co-generation, making it a net energy producer.

In NYC, each facility should be designed to accept and process either source-separated or mixed trash materials. There are trade-offs that must be evaluated thoroughly. In general, it is always preferable to use the cleanest food and yard debris--free of glass, plastic and other contaminants, such as toxic products like pesticides and batteries -- to produce a high quality compost product. Source-separating organics for composting have clear advantages in terms of excellent compost quality and reduced processing costs. However, with a diversified zero waste system of waste prevention, reuse and recycling, composting could be tried with a mixed waste stream, with other materials, especially toxic or hazardous materials, pulled out prior to composting. This would provide a second chance to capture recyclables and to quickly see the success of other zero waste programs in diverting materials. It would also result in essentially 100 percent recovery of organics with no additional collection cost. As zero waste programs are implemented, the waste stream delivered to composting facilities would become more pure, providing higher quality compost and lower processing costs over time.

Some advocates prefer that the organic material be collected separately so the end product can be valuable enough to be bagged and sold. Some cities, San Francisco and Toronto, for example, have adopted "green waste" collection programs to capture food and yard waste that is relatively clean for composting. Other composting advocates believe that if we have maximized our waste prevention, reuse and recycling programs, including capturing special or hazardous waste, contamination would be at a minimum and we could do what is called "mixed waste

composting.” Mixed waste compost can also be sold, but usually for a lower price. At the composting facility, a separation line would remove unwanted material and compost the rest. Such a system would avoid a separate food and yard debris waste collection, but, in a City like New York, could have reduced product quality. Advocates of mixed waste composting believe that some processing will be needed no matter how we collect the material; therefore there would be no difference in facility design. They also feel that we could strive for improved compost quality over time.

As we expand composting we are recommending that these trade-offs and the products produced be tested thoroughly through pilot tests of the two systems—1) using source-separated organic waste and a composting facility and 2) using mixed waste and a composting facility. While DSNY has done a pilot test of mixed waste composting, the results may not be representative of what would occur when servicing higher density communities. All organic composting facilities should have the ability to do some processing to remove undesirable contaminants. We also recommend that a public stakeholder committee be formed to deal with principal challenges associated with siting and operation of the composting facilities and to provide valuable input on the design and conduct of collection pilot projects.

Organics Facility Development

To begin implementing organics composting, the city should release Requests for Proposals in FY '05 for one or more composting facilities. It should consider both aerobic and anaerobic technologies and facilities should be able to demonstrate economies of scale and good commercial performance (i.e., composting 250-500 tons per day). The facility should be designed to handle both commercial and residential food scraps and handle future growth.

Appropriate sites can be identified within the City’s borders, such as under-utilized DSNY facilities or City-owned properties under the NYC Economic Development Corporation’s jurisdiction. For example the Fresh Kills Landfill site offers substantial space and barge access that could be suitable to host composting operations. The City should provide land for facilities and work with a public stakeholder committee to identify sites and to select the technology and operational management that maximizes space efficiency and prevents odors. Because most composting technologies involve two stages – the initial and relatively short stabilization period and the longer curing period - the initial facilities should evaluate the feasibility of both on-site and off-site curing and storage.

Based on the results of the initial facilities, the City should conduct an analysis to determine space and facility requirements needed to serve the City’s commercial, residential and institutional sectors. The analysis should consider not only different technology options, but also the possibilities of separating the processing function from the curing/storing/distribution functions. The site assessment should take into account the amount of organics generated locally as well as the potential to move materials by barge or by rail. The analysis and operating experience should be used to develop and implement a strategy for City-wide organics recovery.

In developing commercial-scale composting, the City should plan for both the commercial and residential waste streams. The Business Integrity Commission's decision in Fall 2003 to charge a higher carting rate of \$8 per 100 pounds or \$160 per ton, for heavy waste, such as from restaurants and other food establishments, will likely cause more businesses to find less expensive alternatives (Cooper, 2003). Many restaurants, green grocers and food processors in the City would benefit from source-separated organics collections and composting services. Some private carters are actually starting to collect for source-separated organics and deliver them to distant compost facilities. A local facility would reduce the transportation costs substantially.

These facilities will likely compost some combination of food and yard waste for maximum efficiency. If we aim to compost 30% of organics on-site and another 30% in low tech yard waste facilities, the other 40% would need high technology composting facilities. For the DSNY managed waste alone, we would need 1,400 tons per day of composting capacity, without even considering capacity for commercial waste composting.

Composting significantly reduces the volume and weight of the original waste materials—as much as a 50% volume reduction in two weeks. Compost is a valuable product even just for City of New York landscaping applications. If not of sufficient quality to be sold, it can replace many City purchases of topsoils and compost. Thus avoided disposal costs as well as avoided City purchases of this material should be included in the cost evaluation of composting. Higher quality compost product could also generate revenue.

Implementation Schedule:

- 2005: Issue RFP for one or more commercial scale composting facilities; form public stakeholder committee; establish criteria for evaluating the technology in conjunction with the public stakeholder committee.
- 2006: Identify city-owned site(s) and vendor of composting technology and establish at least one facility.
- 2007: If only one facility is established in 2006, establish a second or more to achieve 900 tons per day total capacity.
- 2008: Begin operation of facility/ies; complete organics recovery capacity needs analysis; develop strategy for implementing city-wide organics recovery.
- 2009 and beyond: Using needs analysis, issue RFPs for additional composting facilities; implement strategy for city-wide organics recovery.

Pilot Organics Collections

As part of the overall program for organics recovery, the City must continually evaluate the best ways to handle various organic waste streams, whether on-site, through drop-off programs, and/or through curbside collection programs.

Drop-off Programs: Programs in Europe can serve as the inspiration for the development of organics drop off locations in well-traveled areas. Here in New York City, the Lower East Side

Ecology Center has offered a program to collect kitchen scraps at the farmers' market at Union Square. Collection points should be available in well traveled areas, for example, close to a subway entrance, busy bus stop, or at strategic points in a neighborhood park, so people can drop-off source-separated kitchen scraps as part of their daily routines,

Community gardens in NYC can also utilize food waste to grow plants. Under the Waste Free NYC Community Coordinator Program, which operated for ten months ending in October of 2003, community residents were encouraged to drop off kitchen scraps at their neighborhood garden where they were composted and used on-site. As a result of this program, twelve community gardens established drop-off programs for foodwaste; one at an apartment complex in Manhattan alone diverted 1500 pounds per month (INFORM, 2003).

Curbside Collection of Source-Separated Organics

Other cities, such as Toronto and San Francisco, are instituting curbside collection of source-separated organics for composting in both residential and commercial sectors. NYC should pilot test collection of organics in several areas, including areas generating substantial amounts of commercial and institutional food waste (i.e., restaurant districts), as well as low-density and high-density residential districts. A variety of tests should evaluate the feasibility of source-separated organics collection with locking bins of assorted sizes. This system should be compared to collecting and processing the mixed materials that remain after comprehensive waste prevention, reuse, and recycling are implemented. The evaluation should include the quality of the compost product and the impact of locking food waste bins on the rat population in the high-density districts receiving organics collections.

Implementation Schedule:

- 2007: Design, plan and gather public input on the collection pilots, as well as the drop-off programs.
- 2008: Begin piloting collection of institutional, commercial and residential organics in selected districts; evaluate pilots.
- 2009: Expand organics collections to other districts based on lessons learned in pilots; develop strategy for City-wide organics collection
- 2010: Implement strategy for City-wide organics collection

Organics Facility Development

To begin implementing organics composting, the city should release Requests for Proposals in FY05 for one or more composting facilities. It should consider both aerobic and anaerobic technologies and should request that facilities be able to demonstrate economies of scale and commercial performance (i.e., composting 250-500 tons per day). The facility should be designed to handle both commercial and residential food scraps and handle future growth.

Appropriate sites can be identified within the City's borders, such as under-utilized DSNY facilities or City-owned properties under the NYC EDC's jurisdiction. For example the Fresh

Kills Landfill site offers substantial space and barge access that could be suitable to host composting operations. The City should provide land for the initial facilities and work with a public stakeholder committee to identify other sites and to select the technology and operational management that maximizes space efficiency and prevents odors. Because most composting technologies involve two stages – the initial and relatively short stabilization period and the longer curing period - the initial facilities should evaluate the feasibility of both on-site and off-site curing and storage.

Based on the results of the initial facilities, the City should conduct an analysis to determine space and facility requirements needed to serve the City's commercial, residential and institutional sectors. The analysis should consider not only different technology options, but also the possibilities of separating the processing function from the curing/storing/distribution functions. The site assessment should take into account the amount of organics generated locally as well as the potential to move materials by barge or by rail. The analysis and operating experience should be used to develop and implement a strategy for City-wide organics recovery.

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Implementation Schedule:

- 2005: Issue RFP for one or more commercial scale composting facilities; form public stakeholder committee; establish criteria for evaluating the technology in conjunction with the public stakeholder committee.
- 2006: Identify city-owned site(s) and vendor of composting technology and establish at least one facility.

2007: If only one facility is established in 2006, establish a second or more to achieve 900 tons per day total capacity.

2008: Begin operation of facility/ies; complete organics recovery capacity needs analysis; develop strategy for implementing city-wide organics recovery.

2009 and beyond: Using needs analysis, issue RFPs for additional composting facilities; implement strategy for city-wide organics recovery.

Use of Food Scrap Disposers in NYC

NYC recently legalized residential food waste disposers, in-sink devices that send ground food waste down the drain, and is currently evaluating its policy on disposers in commercial establishments. Many in the environmental community prefer that kitchen scraps be recovered as valuable soil amendment and nutrient for gardens and plants. Significant concerns have been raised about transferring these materials into the sewage treatment system where they could exacerbate water quality problems.

Wider use of food waste disposers could cause more release of combined sewage and storm water into the city's waterways, closing beaches and affecting water quality. In addition, increasing the amount of food waste in the system would increase nitrogen levels, which are already exceeding standards in New York Harbor and Long Island Sound. Already an EPA enforcement order is forcing the City to invest millions of dollars to remove nitrogen from sewage treatment plant discharges. Adding more nitrogen could exacerbate the problem and lead to greater costs.

Given the significant issues at stake and the potential for multi-million dollar costs, we do not recommend permitting substantial expansion of food waste disposers. It is critically important that if an expansion is considered, it not proceed without thorough study and reporting on all the relevant issues and the costs for the city of handling food waste in the water treatment system, versus in the recycling system.

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Program	Benefits/Rationale	Implementation Schedule
<i>Residential Grass Clippings Collection Ban and Mulching</i>	Savings of up to \$19 million; improves health of lawns	2005: Reestablish citywide education program and institute a one-year warning period. 2006 onward: Enforce grass collection ban and fund citywide education and outreach.
<i>Residential Backyard Composting</i>	Substantial collection and disposal cost savings; generates valuable soil amendment	2005: Reinstate education program and distribute 10,000 compost bins. 2006 and beyond: Support education program and distribute 10,000 bins per year.
<i>Institutional On-Site Composting and Grass Recycling</i>	Substantial collection and disposal cost savings; generates valuable soil amendment	2005 and beyond: Reestablish outreach program to institutions citywide aimed at organics. Require all institutions and agencies to “Leave it on the Lawn”(grass collection ban) 2006: Institute PAYT for institutions. Provide technical and financial assistance to institutions to establish in-vessel food waste composting systems and dewatering systems.
<i>Commercial On-Site Composting</i>	Substantial collection and disposal cost savings; business retention through operating cost reduction	2005 and beyond: Establish and support citywide commercial organics recovery outreach program Provide technical and financial assistance to businesses to establish in-vessel food waste composting systems.

<i>Centralized Composting of Residential Yard Material</i>	Reduces disposal; compost creates valuable soil amendment for NYC Parks, for brownfield remediation and other projects	<p>2005: Reinstate and enhance curbside collection and composting of fall leaves (see above). Form task force to address siting issues and needs. Open composting facilities to private landscapers. Reinstate Christmas tree collection education and pilot test options for reducing collection costs. Pilot test spring/summer yard debris collection.</p> <p>2006: Expand fall leaf composting to include Manhattan. Implement recommendations of task force. Develop and implement strategy to roll out spring/summer yard debris collection city-wide</p> <p>2007 and beyond: Sustain fall leaf composting, Christmas tree collection, and spring/summer yard debris collections.</p>
<i>Centralized Food Scrap Composting and Collection</i>	Substantial waste diversion; cost savings and energy generation potential	<p>2005: Issue RFP for one or more commercial scale composting facilities. Form public stakeholder committee. Establish evaluation criteria for the technology in conjunction with the public stakeholder committee.</p> <p>2006: Identify city-owned site(s) and vendor of composting technology and establish facility(s)</p> <p>2007: If only one facility is established in 2006, establish a second or more to achieve 900 tons per day total capacity.</p> <p>2008: Begin operation of facility/ies. Complete organics recovery capacity needs analysis. Develop strategy for implementing city-wide organics recovery.</p> <p>2009 and beyond: Using needs analysis, issue RFPs for additional composting facilities. Implement strategy for city-wide organics recovery.</p>
<i>Centralized Food Scrap</i>	Tests various methods to determine most	2007: Design, plan and gather public input on the

<p><i>Composting – Pilot Organics Collection</i></p>	<p>viable and cost-effective systems for organics collections.</p>	<p>collection pilots.</p> <p>2008: Begin piloting collection of institutional, commercial and residential organics in selected districts; evaluate pilots.</p> <p>2009: Expand organics collections to other districts based on lessons learned in pilots; develop strategy for city-wide organics collection</p> <p>2010: Implement strategy for city-wide organics collection</p>
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PART II:

Pieces of Zero

5.

Economic Development

A zero waste program can be a powerful driver for economic development. A key benefit of targeting and achieving zero waste (or very close to it) is that it tends to keep material resources and dollars circulating within and benefiting New York's economy and creating jobs. In order to achieve the economic development potential of a zero waste future, the City must begin to view a zero waste program as a driver for job creation and economic development, not simply as a waste management plan. These goals should be reflected in the upcoming 20-year City Solid Waste Management Plan. The reuse centers, recycling industrial parks and composting facilities proposed in this report all generate jobs.

According to the Grass Roots Recycling Network, conventional material recovery facilities (MRFs), also called recycling processing facilities, create ten times as many jobs as transfer stations, landfills and incinerators (Grass Roots Recycling Network, 2000). Actually, manufacturing new products from recyclable materials has the potential to create anywhere from 18 to 93 jobs for every one in disposal (Grass Roots Recycling Network, 2000). And, reuse companies can create even more – in some cases hundreds of jobs for every one in disposal (Grass Roots Recycling Network, 2000). The redistribution of valuable usable goods to those who need them at low cost is also a major benefit.

Many studies have quantified the job creation potential of recycling. In 1994 the Northeast Recycling Councils (NERC) found that recycling firms employed more than 103,400 people, accounting for nearly 3 percent of the manufacturing jobs in the region (Weston, 1994). The study found more than 20,000 people employed in recycling processing and manufacturing in New York State, or just over 2 percent of the manufacturing job base. A study by the State of North Carolina in 1995 found that the job gains in recycling far outpaced the losses in waste carting and disposal – for every 100 jobs created by recycling, only ten were lost in disposal (Grass Roots Recycling Network, 2000).

In addition to creating jobs, a zero waste approach will ensure that the money spent on zero waste programs remains circulating within the City's economy, instead of being paid to a landfill operator in a faraway state. Waste prevention audits can save millions of public dollars – directing the dollars instead to educating our kids and providing fire protection. Similar waste prevention monetary benefits can accrue for the City's tax exempt institutions. The income tax, sales tax and business tax generated by the zero waste programs and infrastructure will all

remain within the City to help fuel its growth. And, the value added through recycling remains local.

A real life example illustrates this point. In the 1980's and early 1990's, R2B2, a Bronx-based organization, operated a buy back center in the Bronx, paying cash for recyclable materials. One of its transactions involved about 80,000 tons per year of PVC scrap. R2B2 purchased the materials from a self-employed supplier who had purchased it from a local manufacturer. R2B2 processed the material and sold it to another local manufacturer. The manufacturer used the material to make aquarium tubing and then sold that tubing to a local wholesaler of pet supply products. The wholesaler then sold the tubing to retail pet stores. At each of these steps value was added, taxes were paid and jobs were supported, all within the City, and all activities except for the retail sales were in the Bronx. The total value of this series of transactions was \$250,000. Had that scrap simply been disposed of the value would be gone. If it were sold to a processor out of the City, the value to the City would be minimal (Schedler, 2004).

The City recognized the value of recycling-based economic development when it worked to attract the Visy Paper mill to Staten Island. Visy Paper, which opened in 1997, was the largest manufacturing investment in New York City in 50 years. The mill takes in the City's mixed paper and manufactures paper used to make corrugated cardboard boxes. The plant not only uses more than 150,000 tons of the City's paper, it supports more than 160 jobs. In summer 2003, Visy Paper announced plans to create a box factory adjacent to their recycling plant on Staten Island. It was immediately called the second biggest manufacturing investment in New York City in 50 years, right behind the original recycling plant, and is expected to support 125 additional jobs when it is up and running (Office of the Mayor, 2003).

In the commercial arena, developing recycling, reuse and composting outlets for businesses will reduce their operating costs by providing cheaper alternatives to disposal. For businesses, every dollar saved is worth two dollars earned. As a result, reducing disposal costs will help to retain businesses in NYC and make them more competitive with lower cost regions of the country. So, disposal cost savings can actually lead to increases in tax revenue and job generation, as they can make it possible for businesses to expand and grow. The promise of large volumes of recyclables will encourage businesses to stay in the City. Incentives for businesses that depend upon resources that are only available here (i.e. the massive volumes of recyclables we generate) are sound investments.

The following economic development program elements will support a zero waste infrastructure:

- Targeted Technical and Financial Business Assistance: will provide technical assistance and a capital pool to attract zero waste design, reuse, recycling, remanufacturing and composting businesses and to stimulate their growth; help develop the infrastructure described below; and help organize "virtual industrial parks" by providing economic development incentives and technical expertise to smaller zero waste businesses.
- Recycling Industrial Parks: will house clusters of recycling-based manufacturing businesses that can provide the market for residential, institutional and commercial recycling processors.
- Reuse Complexes/Reuse MRFs: will provide space for the City's nascent reuse operations to achieve their potential to divert waste and redistribute usable goods and will

develop remanufacturing and repair businesses that used to be common prior to the rise of our throw-away society. See Chapter 2, Reuse, for specific recommendations.

Technical and Financial Assistance for a Zero Waste Infrastructure

The City should create either a zero waste program office within its Economic Development Corporation (EDC) or a new entity to plan for zero waste. In either case, the office would provide technical and financial assistance to support zero waste businesses and seed the infrastructure necessary to reclaim materials and retain their economic value within City limits. Zero waste businesses include those engaged in recycling, reuse, repair, lease/rental, remanufacturing, composting, and architectural and product design.

Most recycling, reuse and remanufacturing businesses tend to be small to medium-sized. All services for these businesses would be offered through one zero waste office in the City (one-stop shopping), as well as through the internet, in a “virtual industrial park.” The notion of a “virtual industrial park” recognizes that many existing businesses are already in NYC and may not wish to move to an actual industrial park (described below). The internet “virtual industrial park” could also enable new businesses to learn about NYC’s incentive programs.

Recognizing that the zero waste infrastructure will most likely be made up of hundreds of smaller businesses, instead of large companies like Visy Paper, the zero waste office should plan for staff sufficient to attract remanufacturers, to target particular materials and to develop innovative incentives for existing and potential new businesses. For example, the office could study the viability of attracting a bio-diesel manufacturing company to provide both a market for used cooking oil and a local source of cleaner fuels for transportation.

The staff of this office would provide in-depth technical assistance to zero waste businesses located in New York City. For example, the staff would aid in business planning, advertising, financing, market development, and in particular, could help businesses present their products and services to NYC agencies and institutions. In addition, this office would work with other city agencies, such as the Department of Business Services, the Department of Citywide Administrative Services, and the EDC Real Estate Division, to provide low cost space on City-owned properties for zero waste businesses with high overhead.

Staff could also leverage significant funding for NYC companies from state and federal sources including Empire State Development’s (ESD) Environmental Services Unit, the New York State Energy Research and Development Authority, federal agency Small Business Innovation Research programs, and the US Economic Development Administration. Staff would develop full proposals for additional financing mechanisms -- a revolving loan fund, a capital pool, a tax credit program, etc. -- to address the needs of this sector.

To support the efforts of this new office, the City should create a dedicated \$5 million fund for reuse, remanufacturing, composting and recycling projects in New York City. The fund could be modeled on ESD’s Environmental Services Unit, or its predecessor the Office of Recycling Market Development, and could provide grants for research, development and demonstration, and capital projects with an emphasis on design, reuse, remanufacturing and waste prevention.

ESD's nationally recognized grant program has been extremely effective in developing new markets and new technologies that use reusable and recyclable materials in New York State. During its 15 year tenure, the program has invested \$25.9 million in reuse, remanufacturing and recycling businesses, and leveraged more than \$70 million in other funds. Those investments have created nearly 700 new jobs, retained more than 800 jobs in the state, and led to the recovery of more than 13 million tons for reuse, recycling and remanufacturing (New York State Department of Environmental Conservation, 2001-2004). If we are to attract the kind of businesses we need for a zero waste infrastructure, we need a New York City based program modeled on ESD's.

Implementation Schedule:

2005: Create strategic plan for new technical and financial assistance office to identify optimal staffing size and configuration and performance objectives.

2006: Create new technical and financial assistance office, a Zero Waste office with all services located in one place and a complementary website.

2007: Create capital pool for new technical and financial assistance office.

2008 and beyond: Sustain office and replenish capital pool as necessary.

Developing Recycling Industrial Parks

The development of recycling industrial parks located in discrete geographic areas offers numerous advantages for a zero waste future and for the City. A recycling industrial park, as we define it, would cluster recycling, reuse and remanufacturing-related businesses. Like the City's other districts, such as the Flower District, the Garment District, and the Hunts Point Markets, clustering these businesses can aid in their growth and competitiveness. In addition, co-locating like businesses can reduce operating costs by enabling shared administration, marketing, transportation, logistics, etc.

In capturing the value of materials we currently send out of the City as waste, a recycling industrial park can fuel jobs and turn what has been a burden into an opportunity for economic development. The technical assistance office described above could identify companies to include in a recycling industrial park.

Regardless of its structure, the park would include both recycled material processing operations and manufacturers that can use the recycled materials to create new products. It can include one or more large firms that process several materials, like a traditional material recovery facility (MRF), as well as several smaller operations that add value to materials through repair, remodeling, refurbishing or remanufacturing. For example, in addition to a MRF, a park could have one or more companies that process the MRFs' glass output for markets like aggregate and sandblasting medium; take the MRFs' plastic and manufactures plastic lumber; and/or take in used tires and manufacture crumb rubber for use in playing fields or as an asphalt binder.

In 2000, Bronx Borough President Fernando Ferrer issued "Report on the Feasibility of Developing A Bronx Recycling Industrial Park." The study found that Bronx businesses alone generate sufficient supplies of scrap materials to support a host of new manufacturing businesses. It also found that existing Bronx recycling companies were interested in expanding into a

recycling industrial park, and several recycling-based manufacturers from outside the City were interested in launching operations here. The study projected that a Bronx recycling industrial park would generate 200-300 jobs and reclaim more than 200,000 tons of materials annually. The main barrier to the implementation of the Bronx Park has been the lack of affordable space – the complex would require 10 to 15 acres either on one site or a combination of sites (Ferrer, 2000).

By serving both the residential/institutional and commercial streams of recyclables, recycling industrial parks can provide significant cost savings to the business sector. The Bronx report found that even at half its designed capacity, or 100,000 tons per year, a recycling industrial park could save Bronx businesses approximately \$25 million annually in waste disposal costs (Ferrer, 2000).

Based on the findings of the Bronx report, it is likely that each NYC borough would generate sufficient quantities of materials to support a recycling industrial park. To the extent possible, to be consistent with the principle of borough-based self-sufficiency, each borough should have its own park. However, because some areas of the City generate more materials than others, it is possible that the City would be well served by three or four parks fed by borough-based depots in those areas lacking a full park. The parks should be located in proximity to both barge and rail access, so that they can receive materials through the City's marine transfer system so that recycled products could be shipped by rail or barge.

The parks should be located in heavy manufacturing zones and favor recycling technologies that minimize air pollution and other environmental impacts. The City could support the parks in one or both of two ways: by providing low-cost space, enhanced technical assistance and administrative support, or by paying park tenants a certain amount per ton reclaimed to help defray cost. The first option is preferable, as it would offer greater assistance during start up, when companies may not achieve substantial diversion, and could scale down support as the businesses grow to be more self-sufficient.

Implementation Schedule:

2006: Plan for first park, including land and implementation strategy.

2008: Open first park; plan for second.

2010: Open second park; plan for third.

2012: Open third park; evaluate need for additional industrial parks.

2015 and beyond: Support parks; plan and open additional parks if necessary.

References

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New York State Department of Environmental Conservation. New York State Solid Waste Management Plan. 2001-2004 Update.

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Weston, R.F. 1994. Value Added to Recyclable Materials in the Northeast. Brattleboro, Vermont: Northeast Recycling Council.

Program	Benefits/Rationale	Implementation Schedule
<i>Technical and Financial Assistance for a Zero Waste Infrastructure</i>	Spurs the development of the recycling, reuse and composting businesses that create zero waste infrastructure; increases diversion and reduces costs; captures economic benefit of zero waste locally.	<p>2005: Create strategic plan for new technical and financial assistance office to identify optimal staffing size and configuration and performance objectives.</p> <p>2006: Create new technical and financial assistance office, a Zero Waste office with all services located in one place and a complementary website.</p> <p>2007: Create capital pool for new technical and financial assistance office.</p> <p>2008 and beyond: Sustain office and replenish capital pool as necessary.</p>
<i>Developing Recycling Industrial Parks</i>	Creates infrastructure for recycling and remanufacturing; captures the economic value of zero waste system, including job creation; reduces the operating cost of commercial enterprises to improve competitiveness of NYC as a location.	<p>2006: Plan for first park, including land and implementation strategy.</p> <p>2008: Open first park; plan for second.</p> <p>2010: Open second park; plan for third.</p> <p>2012: Open third park; evaluate need for additional industrial parks.</p> <p>2015 and beyond: Support parks; plan and open additional parks if necessary</p>

6.

Education

Once the necessary infrastructure and management are in place, the key challenge to achieving zero waste is motivating individual behavioral change. Effective education is the key to that inspiration. The first step in enforcement should also be educational. That is, before receiving a fine, a resident or business should be told what they did wrong and how they can avoid a fine in the future. Enforcement activities are very direct and occur at the community level, thus should be understood to influence all community based education efforts. (For more on this, see Chapter 7, Enforcement). New Yorkers must be educated not only on what to do (the mechanics of reduction and recycling) but also on why to do it (the environmental, social and economic benefits of zero waste). Comprehensive educational programs should achieve the following objectives:

- Increase participation among individuals who live, work and play in the City;
- Increase awareness and understanding of all zero waste programs;
- Increase the success rate in all zero waste programs--measured by the increased capture of more and better quality materials for recycling, reuse and organics recovery;
- Evaluate educational outcomes and use feedback for future programming.

New York City's recycling and waste prevention education programs to date have been inconsistent and underfunded. Participants in the November 2002 Roundtable on the Future of Recycling in NYC noted that most cities spend \$1 to \$1.50 per capita on recycling and waste prevention education (Center for Economic and Environmental Partnership, 2000). NYC's efforts are minimal by comparison, with an average of \$2 million allocated or \$0.25 per capita (in good budget years) for a City of more than 8 million residents, and more than 12 million persons on any given workday. Consistent and sufficient funding will be critical in maximizing people's participation in waste prevention, reuse, composting and recycling programs and moving toward zero waste. In general, the City of New York Department of Sanitation (DSNY) has produced some very high quality educational materials, most notably the "RRR You Ready" curriculum for schools. However, as long as we have limited budgets for education, we need to shift the emphasis away from expensive, multicolor print materials to making sure that basic educational materials are getting to those who need them.

A comprehensive program will include, at a minimum, the following elements implemented and funded consistently:

- **Mass Media and Schools:** Print advertising, bus shelter ads, and subway ads are effective at reaching the masses with simple messages. Many other cities have partnered with the private industries that depend on recycled materials, such as the paper and plastics industries, to finance ads that promote recycling. It should be noted that this approach alone will not be effective at teaching New Yorkers to reduce, reuse, compost and recycle correctly and should be combined with community-based education. In addition, the City should make recycling, composting, reuse and waste prevention education in schools mandatory.
- **Shopper Campaigns:** The “Save Money and the Environment Too” campaign (previously known as ShopSmart), initiated by cities in the San Francisco Bay area, combines print, billboard and radio advertising with shelf labeling to promote waste prevention and use of recyclable products and packaging. Analysis of sales data showed a nearly 20 percent increase in purchases of well-packaged products and a 36 percent decrease in the sale of overpackaged products (Liss et al, 2000).
- **Neighborhood-based Education:** The most effective education, particularly about how to recycle, reuse or compost, or what to do with a particular item, is often a person in the neighborhood who knows. The most successful recycling programs in the nation use a network of Block Leaders or Building Leaders (in multi-family buildings) that help their neighbors recycle well. The Zero Waste Coordinators proposed in Chapter 1, Waste Prevention, could identify and support these leaders.
- **Targeted Campaigns:** Specific education campaigns for key audiences, such as building managers and porters, City agency operations staff, businesses and commercial generators, ethnic communities, etc., can boost reduction, reuse, recycling and composting dramatically. Specific campaigns should focus on reuse and waste prevention, as well as recycling and composting.
- **Evaluation and Research:** Sound opinion and educational research must be used to evaluate and inform continued educational programs, and to remove all barriers to participation.
- **University-based Education:** City and state universities should be encouraged to develop certificate and degree programs for zero waste resource managers.

The following section provides more detail on the areas outlined above.

Large-Scale Public Education

Advertising and/or Mass Media Messages

Simple messages on the importance of a zero waste future and the path to get there can be effectively delivered through conventional advertising venues, such as print, radio, television, bus shelter and subway ads. While these types of ads, on their own, do not provide enough information to ensure that people reduce, reuse, recycle and compost properly, they are a valuable part of a larger campaign, particularly when reinforced by community-based education

efforts--that is, if the messages seen in advertisements are followed up by personal contact and assistance.

One barrier to implementing large-scale public education campaigns, especially in a city like New York, is the substantial cost. Some of this cost can be reduced by using Public Service Announcements (PSA's) on radio and TV, or by partnering with others to sponsor ads. Several recycling industries, most notably paper and plastics, are lacking sufficient supply to feed their recycling facilities. In other communities, they have partnered with the municipality to provide artwork and technical support, and to sponsor advertisements that help generate more recyclables. Residents will benefit from knowing where their recyclables go—dispelling rumors that it all goes to a landfill. New York City should pursue such partnerships to finance public education campaigns. Proactive speeches by the Mayor and other elected officials can also utilize public forums to take advantage of free media opportunities.

Implementation Schedule:

- 2005: Engage in discussions with recycling companies and trade associations regarding collaborative, industry funded advertising campaign to promote recycling.
- 2006: Develop an advertising program with industry partners.
- 2007 and beyond: Implement advertising program.

Reuse Public Awareness Campaign

In conjunction with plans to develop a network of reuse complexes and neighborhood reuse centers, it is important that the City promote the benefits of buying used goods and confront some of the negative perceptions of buying second hand. A multi-pronged approach should include support for existing and new community-based education activities (see below), targeted education campaigns on reuse (see below), and professional public relations assistance. The City would be well served by investing in a public relations firm to research public perceptions and develop a campaign to promote reuse and the purchasing of reused products.

Implementation Schedule:

- 2007: Engage a public relations (PR) firm for a multi-year annual reuse campaign; develop PR campaign and access to free media.
- 2008: Develop targeted education campaigns for facility managers, businesses, residences, etc.
- 2010: Revise reuse campaign.
- 2016: Evaluate whether reuse is adequately established and PR campaign could be scaled back from every year to every two years.

School-Based Programs

DSNY has developed an excellent waste prevention and recycling curriculum package. “RRR You Ready” is aptly named because it is ready for use by teachers in all schools Citywide. The use of this curriculum should be made mandatory. In addition, the curriculum should be updated as the City’s programs change to reflect a focus on zero waste. Opportunities to integrate the educational materials into science and math classes should not be lost.

Implementation Schedule:

- 2005: Make the use of the DSNY recycling curriculum mandatory in all public and private schools.
- 2008: Revise curriculum to reflect zero waste focus and new programs developed.
- 2009: Introduce updated curriculum.
- 2011 and beyond: Revise and introduce updated curriculum every three years.

Shopper Campaigns

In order to prevent waste, consumers must be aware of both the products and packaging that are wasteful and the alternatives to their use. Environmental labeling, shelf labeling and advertising programs can help to raise that awareness.

One successful model is the “Save Money and the Environment Too” campaign (previously known as ShopSmart) initially implemented by the City of San Francisco in 1995. The campaign is a multi-pronged approach to educate consumers about wasteful products and encourage the purchase of waste preventing, reusable, recycled and recyclable alternatives. It includes billboard, print and radio ads, as well as messages printed on shopping bags and milk cartons, and shelf labeling of waste preventing products. The campaign was so successful that the governments in the Bay area worked collaboratively to expand it to include more than 110 municipalities and 400 supermarkets. Success was measured by tracking sales figures that demonstrated an increase of nearly 20 percent in sales of well-packaged products in 1996. In 1999, 61 percent of the campaign’s target audience received its message 3.3 times (Liss et al, 2000).

Other successful consumer campaigns have focused on junk mail reduction. Generally, these campaigns educate consumers on strategies to reduce or eliminate junk mail, like contacting the Direct Marketing Association and requesting to be removed from lists. With thousands of catalogs available via www.catalogs.google.com, people have other means of accessing the information.

New York City should implement a comprehensive consumer education program, like Save Money and the Environment Too. It should follow campaigns with others, such as a junk mail reduction campaign, to achieve even greater waste prevention and cost savings.

Implementation Schedule:

- 2006: Research consumer campaigns, including Save Money and the Environment Too and junk mail reduction campaigns.
- 2007: Design two consumer campaigns for New York City.
- 2008: Implement consumer campaigns every six months.
- 2010 and beyond: Revise campaigns every two years; continue to implement consumer campaigns every six months.

Neighborhood-Based Education

Community-based education offers something that public advertising cannot address—an on-the-ground personal and practical touch. This approach provides residents with immediate feedback on things they do not understand, identifies important barriers to participation, and enables community educators to make immediate corrections.

Many communities with successful recycling and waste prevention programs, such as Boulder, CO; St. Paul, MN; Seattle, WA; and San Jose, CA, have programs that engage residents to help their neighbors reduce, reuse, recycle and compost properly. Sometimes called “Block Leader” or “Building Leader” (in the case of multi-family) programs, or referred to as Master Recycler, Reuser or Composter programs, they all include a focus on neighbor-to-neighbor education. Leaders or Masters are trained in the mechanics of waste prevention, reuse, recycling and/or composting, as well as in the benefits of these programs. They are prepared to reach out to their neighbors, to answer common questions and to direct people to the proper outlets for their materials. These programs have proven effective because of the personal connection involved--if a person is unsure about how to handle a material, they are more likely to ask someone they know than to wait for a response from an automated telephone hotline. Some websites discussing block leader programs are: <http://www.raleigh-nc.org/sw/recyclinghome.htm>; <http://www.townofcary.org/news/blokled.htm>; www.ecocycle.org/volunteer/blockleader.cfm; www.ci.austin.tx.us/sws/block.htm

The Zero Waste Coordinators, proposed in Chapter 1, Waste Prevention, should recruit and train the volunteer Block and Building Leaders or Masters in their districts of focus. Essential to the success of any volunteer program is adequate support with materials, programming and training. The City should provide printed materials, including suitable articles for newspaper publications. To further their education and outreach objectives, Block and Building Leaders could also submit educational pieces on their various zero waste programs to neighborhood newspapers. It should be noted that DSNY has spent considerable effort preparing booklets and brochures that are very helpful but have not been adequately distributed. The Block and Building Leaders would provide an effective distribution system for these materials.

Implementation Schedule:

- 2006: Pilot test Block Leader/Building Leader program in districts where Waste Prevention Coordinators are in place.
- 2008: Roll out Leader program to an entire borough; provide materials for local newspaper columns.
- 2010: Roll out Leader program in second borough; provide materials for local newspaper columns.
- 2011: Roll out Leader program in third borough; provide materials for local newspaper columns.
- 2012: Roll out Leader program in fourth borough; provide materials for local newspaper columns.
- 2013: Roll out Leader program in fifth borough; provide materials for local newspaper columns.

Targeted Campaigns

In a city the size of New York, broad scale public education on the details of what and how to reduce, reuse, recycle and compost can be difficult and expensive. The City and its zero waste programs would be better served by targeting intensive outreach to key actors listed below. Materials targeted to different groups should be prepared, distributed and made available through community boards, libraries, and zero waste coordinators.

- **Multi-Family Building Operators:** Recycling in multi-family buildings offers unique challenges and opportunities that require targeted education to building managers, maintenance staff, and porters. Adequate signage must be prepared and made available in these buildings. Working through unions, the Real Estate Board of NY, and other entities can help to reach these constituencies.
- **Businesses and Commercial Entities:** As the infrastructure and policy to support commercial recycling are improved, it is crucial that businesses and commercial generators are brought into the zero waste framework.
- **Agencies and Institutions:** As incentives for agency and institutional waste prevention and recycling are implemented, managers and operations staff must become aware of the benefits of participation and be provided with the assistance they need to establish effective programs. This will be aided by developing an education program specifically for agency and institutional facility management staff.
- **Low Performing Districts:** Education should be targeted to the areas that are clearly in need of assistance – those that are not reducing, reusing, recycling or composting enough. Popular education campaigns should be developed specifically to address the major ethnic or other culturally diverse sectors of the low-performing neighborhoods.
- **Enforcement Agents:** Training for DSNY enforcement agents is essential in order to obtain the desired educational objectives. Agents should be trained in the approach used by DSNY when recycling of plastic and glass were suspended, whereby sanitation workers left stickers on bags and cans to inform residents that the City was recycling metals only. (See Chapter 7, Enforcement, for more on this topic.)

Implementation Schedule:

2005: Identify and prepare materials to reach targeted groups.

2006: Begin annual implementation of targeted educational programs for these groups.

2008: Assess programs, report on progress, make revisions as appropriate.

2009 and beyond: Continue to implement targeted programs annually; Evaluate programs every 3 years.

Evaluation and Research

Public education efforts should be informed by sound opinion research. Only if the City understands public perception of its messages on recycling, reuse, waste prevention, and composting can it design messages that will inspire broad participation in achieving zero waste. Opinion and waste composition research should be coordinated, so that opinion research is focused on materials and products that the composition analyses identify as comparatively difficult to divert. Sound educational research should supplement opinion research evaluating the

success of campaigns aimed at specific populations and identifying the impact and best method of delivering multiple educational messages and programs. Identifying all barriers to participation in zero waste programs is a very important component of this research, so that these barriers can be removed.

Implementation Schedule:

2005: Engage a firm to do research on public perceptions of reuse, recycling, waste prevention and composting; engage a university to conduct sound ongoing research on all zero waste education programs.

2007 and beyond: Repeat opinion research every year, informed by both the detailed waste composition analyses prepared every five years and the ongoing community-based waste composition evaluations. Use educational and opinion research findings to inform other campaigns and modify educational programs.

University-Based Education Programs

City and state universities should be encouraged to develop certificate and degree programs for zero waste professionals, waste auditors, environmental purchasing staff, natural resource managers, etc. Developing qualified individuals is important to ensure that we have the professional educators and program leaders we will need in the future.

Implementation Schedule:

2007: Identify universities interested in developing these programs and begin discussions about types of programs needed.

References

Center for Economic and Environmental Partnership. 2002. Making Recycling Work: A Roundtable on the Future of Recycling in NYC. Roundtable Proceedings Report.

Liss, G. and Associates. 2000. "Innovations" Case Study: Save Money and the Environment Too. California Integrated Waste Management Board.

Program	Benefits/Rationale	Implementation Schedule
<i>Large Scale Public Education</i>	Reaches large numbers of people with simple messages.	2005: Engage in discussions with recycling companies and trade associations regarding a collaborative, industry funded advertising campaign to promote recycling. 2006: Develop an advertising program with partners identified. 2007 and beyond: Implement advertising program.
<i>Reuse Public Awareness Campaign</i>	Supports investments in reuse complexes and neighborhood Swap Shops.	2007: Engage a public relations firm for a long-term, annual reuse campaign; develop public PR campaign and access to free media. 2008: Develop targeted education campaigns for facility managers, businesses, residences, etc. 2010: Revise reuse campaign. 2016: Evaluate whether reuse is adequately established and PR could be scaled back to every two years.
<i>School-Based Programs</i>	Educates students who can then educate their parents.	2005: Make the use of the DSNY recycling curriculum mandatory in all schools- public and private. 2008: Revise curriculum to reflect zero waste focus and new programs developed. 2009: Introduce updated curriculum. 2010 and beyond: Revise and introduce updated curriculum every three years.
<i>Shopper Campaigns</i>	Reaches consumers while they are making product choices that affect waste. Documentable prevention benefits.	2006: Research consumer campaigns, including Save Money and the Environment Too and junk mail reduction campaigns. 2007: Design two consumer campaigns for New York City. 2008: Implement consumer campaigns every six months. 2010 and beyond: Revise campaigns every two years; continue to implement consumer campaigns every six months.

<i>Neighborhood-Based Education</i>	Supplemental educational force providing personal connection.	<p>2006: Pilot test Block Leader/Building Leader program in districts where Zero Waste Coordinators are in place.</p> <p>2008: Roll out Leader program to an entire borough; provide materials for local newspaper columns.</p> <p>2010: Roll out Leader program in second borough; provide materials for local newspaper columns.</p> <p>2011: Roll out Leader program in third borough; provide materials for local newspaper columns.</p> <p>2012: Roll out Leader program in fourth borough; provide materials for local newspaper columns.</p> <p>2013: Roll out Leader program in fifth borough; provide materials for local newspaper columns.</p>
<i>Targeted Campaigns</i>	Reaches key constituencies that can have a significant effect on program success	<p>2005: Identify and prepare materials to reach targeted groups</p> <p>2006: Begin annual implementation of targeted educational programs for these groups.</p> <p>2008: Assess programs, report on progress, make revisions as appropriate.</p> <p>2009 and beyond: Continue to implement targeted programs annually; evaluate programs every 3 years.</p>
<i>Evaluation and Research</i>	Informs all public education work; ensures investments achieve goal.	<p>2005: Engage a firm to perform opinion research on perceptions of reuse, recycling, waste prevention and composting; engage a university to conduct sound educational research on all zero waste education programs on an ongoing basis.</p> <p>2007 and beyond: Repeat opinion research every year, informed by both the detailed waste composition analyses prepared every five years and the ongoing community-based waste composition evaluations. Use educational and opinion research to inform other campaigns and modify</p>

		educational programs as indicated by findings of research.
<i>University-Based Education Programs</i>	Provides supply of trained professionals for zero waste programs	2007: Identify universities interested in developing these programs and begin discussions about types of programs needed.

7.

Enforcement

To achieve zero waste (or darn close to it) New Yorkers will need to be both inspired and required to reduce, reuse, recycle and compost like they never have before. While education and financial incentives can provide the inspiration, enforcement is a critically important element to ensuring a zero waste future.

Enforcement as a motivating factor should not be overlooked. Behavior studies have shown that monetary incentives, both positive (rewards) and negative (fines) are effective motivators, especially if combined with other motivating factors, such as education (De Young, 1985-6). Furthermore, enforcement of requirements for adequate recycling collection and storage areas in multi-family buildings can actually eliminate barriers to participation.

Indeed it is in the City's interest to use all of the tools available to encourage and enable residents to recycle, reuse and compost properly. Only by doing so can we ensure the success of a zero waste program. However, we should not overlook the fact that enforcement fines can be a valuable revenue enhancement tool that can help to finance a zero waste program.

New York City's enforcement efforts to date have been inconsistent, punitive and almost entirely focused on low density housing. Enforcement officials tend to simply fine residents without informing them of precisely what they did wrong or how they can do better next time. This punitive approach can result in residents putting recyclables in the trash to avoid getting tickets for putting the wrong material in the recycling bin.

When properly executed, enforcement can spur greater participation in recycling programs. The City of Philadelphia recently held focus groups to determine what would motivate residents to recycle more and found that the most important driver was the fear of fines. With this information the City, launched an advertising campaign in March of 2002 that depicted a recycling enforcement officer talking with a resident about the mistakes made in sorting recyclables and warning her that if she makes the mistake again she will get fined. Philadelphia followed that same strategy on the street—warning first and then fines. The campaign resulted in 18% overall increase in recyclable tonnage over 18 months (Robinson, 2004). This “warning first” approach should be used as NYC launches enforcement for each new program.

Other cities have used more creative incentives to motivate better recycling. The City of Berkeley had a contest during which city crews inspected numerous recycling bins and provided

a cash prize to the resident who recycled the best (i.e., did not sort out any non-recyclable materials and did not throw away any recyclables). For more information, see: <http://www.ci.berkeley.ca.us/news/2003/07jul/071503cashfortrashwinnersrecognized.html>.

Enforcement to support a zero waste system should include the following components:

- **Education First:** In most cities, the first message to a household that has improperly sorted its recyclables is a “sorry tag” or “love note” provided by the collection crew that informs the resident of what was done wrong and serves as a warning that if the mistake is repeated, they will receive a fine. Only after that note is left and ignored does the resident receive a fine from an enforcement agent for recycling improperly. DSNY used this approach briefly when glass and plastic recycling were suspended in 2002, affixing stickers on improperly sorted bags notifying residents of the new rules.
- **Greater fines for multi-family dwellings:** Larger fines, increasing with the size of the building and number of repeat offenses, would get the attention of multi-family building owners and reflect the greater impact of problems in those buildings, as opposed to single family homes.
- **Clear bags to enhance enforcement:** Officials will more easily identify zero waste violations if they can see the materials being thrown away. To clearly differentiate garbage from recycling, paper recycling bags could be clear with a green stripe and container recycling bags could be clear with a blue stripe.
- **Enforcement of recycling area regulations:** DSNY has regulations regarding the availability, signage and maintenance of recycling areas in multi-family buildings. Preliminary City University of New York (CUNY) research shows an association between poor recycling conditions in apartment buildings with poor diversion rates, and good recycling conditions with better diversion rates (Clarke, 2004).
- **Agency and Institutional Participation:** Recycling in NYC agencies and institutions has not been enforced; the City should develop strategies to enforce recycling requirements in this sector. These could include sanctions to employees (including facility managers) who knowingly disregard recycling rules and requirements.
- **Commercial Recycling Enforcement:** The infrastructure developed for commercial recycling after the passage of Local Law 87 was dismantled in the late 1990’s to enable transfer station operators to handle City garbage export contracts. This has resulted in a recycling void in the commercial sector, where even the most well-meaning businesses have little or no opportunity to recycle materials other than paper and scrap metal. Thus enforcement must follow infrastructure, legislative and programmatic improvements. Then an education first enforcement model can begin for the commercial sector (see Chapter 3, Recycling, and Chapter 10, Legislation and Regulation).
- **Transportation Enforcement:** The City should do more to enforce transportation-related violations by commercial carters and DSNY fleets, including on-street queing, excessive idling and noise pollution.
- **Facility Operations Enforcement:** All processing facilities should be required to meet a high standard for environmental performance and worker health and safety.

Residential Enforcement

The City should adopt an enforcement policy of warning and informing first, and then following up with fines. It would be most efficient to train the collection crews to leave “sorry tags” when they identify improperly sorted materials. These tags would inform residents of what they did wrong and how to separate their materials properly next time.

Once this is achieved, the City should invest in a greater number of enforcement agents to more aggressively enforce recycling, reuse and composting requirements. Enforcement must emphasize helping residents improve their performance, not on penalizing them for participating in the program, but getting a minor point wrong. In addition, a sliding scale of fines should be developed with larger fines levied on larger buildings and smaller fines on single family homes. Increasing fines for repeated offenses should also be considered. Multifamily building enforcement must be a higher priority, including making sure recycling areas in buildings are properly maintained with appropriate signage. The revenues generated through the increase in fines would more than cover the cost of additional agents. Revenue should be dedicated to education efforts (see Chapter 9, Financing).

Implementation Schedule:

2005: Begin to train collection crews to use “sorry tags.”

2005: Begin inspections to make sure recycling areas in apartment buildings are located and maintained optimally for maximum participation.

2006: Increase the number of enforcement agents and fines issued; institute larger fines for larger buildings; inspect and enforce conditions in recycling areas of buildings.

2007 and beyond: Increase fines for repeated offenses. Evaluate other regulations or problem areas for enforcement needs.

Agency and Institutional Enforcement

Enforcement of recycling requirements in the institutional sector is critical to the success of a zero waste program. City agencies set an example not only to their employees, many of whom are City residents, but also to the public they serve. Thousands of New Yorkers visit City agencies daily. Devising a means for enforcing participation in the City’s recycling, reuse and composting programs will therefore be critical in broadcasting the message that the City is serious about zero waste.

Because NYC agencies and institutions do not see the cost of recycling or disposal, there has been no incentive nor has there been a mechanism to ensure their participation in recycling programs. The Pay as You Throw program proposed in Chapter 9, Financing, will provide agencies with an incentive to divert materials through waste prevention, reuse, recycling and composting; however, an enforcement system is also necessary. A carrot and stick approach is preferred: If administrators are unwilling to embrace the benefits of Pay as You Throw, then they must be penalized through enforcement actions, just as residential communities are. Enforcement could include sanctions to management or employees who knowingly disregard requirements to recycle, reuse or compost, or to follow the waste prevention rules or directives.

The City currently provides free collection to a large number of institutions. These institutions must be required to participate in all waste reduction, reuse, recycling and composting programs to the greatest extent possible. Technical assistance to increase waste prevention and purchasing has demonstrated the potential for major savings. If a non-City institution is found to be evading zero waste requirements, DSNY should discontinue collection services, so that the institution will have to hire a commercial waste carter.

Implementation Schedule:

2005: Develop strategy to enforce agency and institutional waste prevention, reuse, composting and recycling requirements.

2006: Implement strategy to enforce agency and institutional waste prevention, reuse composting and recycling requirements.

2007: Evaluate progress annually in a City Agency and Institution report.

Commercial Enforcement

Current commercial recycling rules are relatively unenforceable due to a combination of factors and events. Local Law 87 requires commercial waste generators to recycle certain materials, including paper, metal, glass and plastic. After the law was passed several commercial carters developed “post-collection separation” facilities that extracted recyclable components from mixed commercial waste, and the DSNY approved those facilities as adequate for meeting recycling requirements. Several years later, as the commercial carters were bought out by multi-national waste corporations, which prepared to handle the City’s residential waste through the Interim Waste Export Plan, these post-collection separation facilities were effectively dismantled, leaving little commercial recycling infrastructure in New York City.

While the century old scrap metal and paper recycling operations still survive, very little opportunity exists to recycle other commercially generated recyclables. As a result, enforcing the current law, which places the responsibility for recycling on the generator, would effectively punish the victim, as even the most conscientious generator may not have the opportunity to recycle.

As the infrastructure for residential recycling is developed with excess capacity to handle the commercial waste stream and as more enforceable policies are put in place through legislation and regulation (see Chapter 10, Legislation and Regulation), the City should improve commercial recycling requirements, first by ensuring more favorable carting rates for source-separated recyclables and then by stepping up enforcement. Like residential enforcement, commercial recycling enforcement should be educational first and punitive second. It should be targeted not only at the generator, but also at the carting companies and transfer station operators. Carting companies must be required to educate customers about different rates for separated materials. Citizens should be encouraged to report where commercial recycling opportunities do not exist and DSNY should follow up. Rewards could be given to encourage citizens to participate in enforcement, similar to the rewards now given for information on illegal dumping.

Those who separate materials improperly should be fined. Both dumpsters of generators and loads tipped at waste transfer stations should be inspected for recyclable or reusable/durable materials. Any load containing a majority of recoverable materials must be sorted for reuse and recycling. Once instituted, fines must be sufficiently high to stimulate a change in behavior on the part of the commercial establishment, rather than have the fine absorbed as just a cost of doing business. Repeated offenses also need to have increased fines.

Implementation Schedule:

2006: Pass legislation and regulations requiring commercial carters to offer recycling collections at more favorable rates than for trash hauling.

2007: Begin enforcement of new regulations; launch citizen enforcement program.

2008 and beyond: Evaluate status and progress of commercial sector efforts. Modify enforcement as needed.

Transportation Enforcement

The City can use several existing laws to better enforce transportation related violations by DSNY and commercial carters. These include laws restricting excessive noise, requiring use of truck routes, on-street queuing, and excessive idling. Enforcing them would be aided by encouraging police officers to issue violations.

Implementation Schedule:

2005: Engage assistance of NYPD to issue transportation-related violations.

2006: Launch broad effort to increase enforcement of transportation-related regulations.

2007 and beyond: Continue strong enforcement of transportation related regulations.

Facility Operations Enforcement

A zero waste system requires that wastehandling, recycling and remanufacturing facilities be operated to the highest environmental and worker health and safety standards. This ensures that these facilities are both good neighbors and good employers. City enforcement should ensure that recycling, reuse, composting and waste handling facilities comply with rules and adopt best management practices for clean air, clean water, noise, odor control and worker health and safety.

Implementation Schedule:

2005 and beyond: Increase enforcement of facility operations regulations.

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Program	Benefit/Rationale	Implementation Schedule
<i>Residential Enforcement</i>	Improves participation and diversion; reduces disposal costs.	<p>2005: Begin to train collection crews to use “sorry tags.” Begin inspections to make sure recycling areas in apartment buildings are located and maintained optimally for maximum participation.</p> <p>2006: Increase the number of enforcement agents and fines issued. Institute larger fines for larger buildings. Inspect and enforce regarding conditions in recycling areas of buildings.</p> <p>2007 and beyond: Increase fines for repeated offenses. Evaluate other regulations or problem areas for enforcement needs.</p>
<i>Agency and Institutional Enforcement</i>	Improves participation and diversion; reduces costs to City.	<p>2005: Develop strategy to enforce agency and institutional waste prevention, reuse, composting and recycling requirements.</p> <p>2006: Implement strategy to enforce agency and institutional waste prevention, reuse, composting and recycling requirements.</p> <p>2007: Evaluate status and progress annually in a City Agency and Institution report.</p>
<i>Commercial Enforcement</i>	Improves participation/diversion and reduces cost to business; helps to retain business.	<p>2006: Pass legislation & regulations requiring commercial carters to offer recycling services.</p> <p>2007: Begin enforcement of new regulations; launch citizen enforcement program.</p> <p>2008 and beyond: Evaluate status and progress of commercial sector efforts.</p>
<i>Transportation Enforcement</i>	Improves air quality and quality of life in NYC neighborhoods.	<p>2005: Enable NYPD to issue transportation violations.</p> <p>2006: Increase enforcement of transportation violations.</p> <p>2007: Continue enforcement of transportation violations.</p>
<i>Facility Operations Enforcement</i>	Improves quality of life for neighbors of facilities	2005 and beyond: Increase enforcement of facility operations regulations.

8.

Transportation

Vehicle traffic and its associated congestion and air emissions represent an enormous environmental health challenge in a city like New York with such long standing poor air quality. Under any solid waste system, transportation should be well understood and impacts minimized to the greatest extent possible. Fortunately, a plan to achieve zero waste can offer substantial advantages for reducing truck vehicle miles traveled and air emissions at the same time as it reduces the generation of waste. However, under any configuration of waste prevention, reuse and recycling programs, some transportation will be necessary.

The zero waste system we propose seeks to reduce or minimize transportation impacts in the following ways:

- **Minimize waste generation through waste prevention/ reduction:** Other chapters of the report outline the programs and actions that can reduce the amount of materials requiring transportation and reduce the distance materials travel by developing localized recovery systems. Chapter 2, Reuse, proposes a network of reuse complexes that would minimize the transportation distance of reusables, and neighborhood “Swap Shops” that would handle some reusables even closer to home. Chapter 4, Composting, outlines a strategy for increasing backyard and neighborhood based composting to reduce the organics requiring transportation. Chapter 5, Economic Development, defines a strategy for borough-based Recycling Industrial Parks, which would process and add value to recyclable materials closer to the point of generation.
- **Reduce Vehicle Miles Traveled (VMT) and Improve Efficiency of the Waste Collection System:** Reducing overall waste generation, processing and handling materials closer to the point of generation, and efficient truck routing are all viable strategies for reducing the miles traveled, and thereby reducing emissions and other impacts of transportation. Franchising commercial waste collection routes, so that only one commercial carter, provides service for each neighborhood would dramatically reduce VMT (instead of the current system where multiple trucks are traveling the same routes). As we move to a zero waste system with more recyclables collected, we must make collections more efficient and cost-effective.
- **Try Innovative Truck Design:** To move efficiently to a zero waste system, the City should consider a variety of truck designs that may be better suited to the purpose or the neighborhood. For example, DSNY may improve efficiency by using larger collection

trucks in more densely populated areas and using trucks specifically designed to handle recyclables for those streams. DSNY must also recognize the progressive nature of a zero waste system that may require a progression from one truck design to another as collection requirements change due to alterations in collection streams and participation.

- **Maximize Waterborne and Rail Transportation:** As the Mayor, opinion leaders, advocates, and communities have recognized, NYC's waterways are an underutilized transportation resource. To the extent possible, materials should be moved via barge to processing and recovery facilities and clean fuel technologies utilized on tugboats and other marine vessels. Furthermore, existing but dormant rail lines should be evaluated and rehabilitated to move materials to inland locations where financially viable.
- **Use Cleaner Vehicles:** Conventional diesel-fueled garbage trucks generate noxious as well as toxic emissions that have been linked to lung cancer, asthma attacks, reduced birthweight and size, and cardiopulmonary mortality. They are also very noisy, posing a quality-of-life challenge for all New Yorkers, but especially those who live near garbage truck depots or waste/ recycling transfer stations. There are a number of fuel choices (compressed natural gas, biodiesel, ultra-low sulfur diesel, hybrid and electric) and add-on emissions control devices that offer superior health, environmental and quality of life benefits over conventional diesel. Over the 20-year planning period, the DSNY should seek to continually reduce vehicle emissions by using state-of-the-art technologies while laying the groundwork for hydrogen fuel cells or other zero emissions vehicles.

Improve Garbage Collection Efficiency and Cost-effectiveness

Reduce Vehicle Miles Traveled by Employing Better Routing, and Adjusting Collection Frequencies.

One of the most significant transportation concerns with regard to materials handling is the sheer number of garbage trucks that traverse our streets. In high density districts each residential block has been served by three trucks in most areas of the City: one for garbage, one for metal/glass/plastic recycling, and one for paper recycling. Two trucks serve 22 lower density districts where dual bin recycling trucks are in use (New York City Waste Prevention Coalition, 2002). The routing of trucks is determined by a number of factors, including City Charter provisions restricting trucks from crossing community district lines. Such restrictions must be evaluated and adapted to ensure maximum efficiency. In addition, the City should continually evaluate its routes, their diversion rates and their efficiency to determine where gains may be possible by lengthening routes, reducing collections, etc.

Many areas of the City still receive garbage collection three times per week, and even low-density districts have waste collection twice weekly. These collection frequencies have not been adjusted since recycling has taken hold. Even in areas where recycling rates had topped 30 percent, garbage collection frequency did not change (New York City Waste Prevention Coalition, 2002). As we move toward a zero waste system, DSNY must reduce the frequency of garbage collection in order to maintain high efficiencies, since recycling, reuse, composting and waste prevention programs reduce the amount of waste generated. Obtaining savings from

reducing waste collections is absolutely critical to improving the cost-effectiveness of recycling. In addition, it is important to increase recycling collections as diversion levels improve. Inadequate recycling collections for the amount of material available can lead to storage problems in congested buildings and the subsequent entry of valuable material into the waste stream rather than into recycling collection. The City should develop a model for transitioning a route from one where the main collection is for garbage to one where the main collections are for recycling, reuse and composting. The model would determine when and how transitions would take place in areas of the City with different demographic and density characteristics.

Implementation Schedule:

- 2006: Identify districts with high recycling diversion rates (over 30 percent) and garbage collections three times per week, reduce garbage collections by one per week in these neighborhoods. Develop model for transitioning collection from predominantly garbage to predominantly recyclables and reusables in all City neighborhoods.
- 2007: Evaluate routes to determine if efficiencies could be gained by lengthening routes or crossing district lines; if so, pursue changes to City Charter; evaluate and record VMT improvements; make route maps available to the public and elected officials, so that they can make recommendations.
- 2008 and beyond: Annually evaluate all City routes against model and implement route and frequency changes; continue to implement garbage collection reductions as diversion rates increase.

Explore Various Recycling Collection and Truck Design Options

DSNY has always used the same trucks to collect garbage and recyclables in all neighborhoods around the City. The City's frequent turn-over of trucks offers an opportunity to test and evaluate different options and to stage implementation of a diversified fleet.

The use of standard packer trucks has affected the quality of the City's recyclables, as well as the efficiency of its collections. For example, one of the primary drivers to suspending glass recycling was the enormous volume of low-value, mixed color broken glass being collected. Those high volumes are the direct result of the method of collection -- since glass is collected with other containers in a packer truck with sometimes high compaction ratios, it is often broken during collection. (For a complete discussion on glass see Chapter 3, Recycling).

To move efficiently to a zero waste system, the City should consider a variety of truck designs that may be better suited to the purpose or the neighborhood at hand. Cities like Philadelphia have a diverse fleet and dispatch trucks to certain neighborhoods based on demographics, width of streets, volumes, and other data analysis (Robinson, 2002). For example, DSNY may improve efficiency by using larger collection trucks in more densely populated areas and smaller trucks in lower density districts. In addition, using trucks specifically designed to handle recyclables, with little or no compaction and multiple bin design can improve the quality of recyclables, as well as the costs of collection and processing.

The City should investigate and test collection methods that both improve recycled material quality and reduce costs, including reducing compaction, "single stream" recyclables, and

containerized and semi-automated collections. For example, reducing compaction in collection trucks can reduce glass breakage. Collecting all recyclables, including paper and containers, in a “single stream” in one truck can improve efficiencies by collecting more materials in fewer vehicles; in some cases, its convenience has led to improved participation in recycling programs. However, single stream collection can cause greater contamination and affect recycled material quality, creating significant concerns for some materials markets, particularly the recycled paper industry (Center for Economic and Environmental Partnership, 2002). Using semi-automated collection vehicles in low-density districts has enabled other cities to reduce collection crew size from three to one per truck and thereby reduce collection costs significantly. In semi-automated collection systems, common receptacles can be loaded into a truck using a mechanical arm. Other cities have achieved these transitions without job losses by switching to semi-automated collection in concert with other changes, such as additional collections for source-separated organics. The City should investigate these and other options. All such tests and evaluations should be planned and conducted in a transparent process with public input. The findings should be conveyed in a report to the public.

Furthermore, the City should seek to expand the collection methods that have proven to be the most cost-effective, including both containerized collection (dumpsters) and dual bin collection vehicles for recycling in low-density districts. Containerized recycling collections, currently in place for large complexes, are very cost effective because of the automation of collection—the frequency of recycling collections can be increased as well as the number of containerized service locations. Dual bin trucks are in use in 22 districts and provide significant cost savings by collecting two material streams (paper and metal) in one truck with one crew. The recent report “Why Waste the Future” indicates that it may be feasible to extend the use of dual bin trucks to an additional 7 to 13 districts (New York City Waste Prevention Coalition, 2002).

Implementation Schedule:

- 2005: Test collection in trucks with adjusted compaction ratios to determine if reducing compaction improves the marketability and quality of the recyclables collected; determine the optimal compaction ratio for maximum material quality and collection efficiency.
- 2006: Based on test, implement optimal compaction ratios City-wide; evaluate the expansion of the use of containerized collection and dual bin collection.
- 2007: Perform a pilot test of “single stream” collection in at least five districts; evaluate for impacts on participation, material quality and residue rate.
- 2008: If warranted, develop strategy for expanding “single stream” collection to the optimal districts, as determined by the pilot test.
- 2009 and beyond: Continue to monitor the state-of-art in recycling collection and test new strategies and truck technologies as they become available; continually measure recycling rates, quality of recyclables and other performance indicators.

Implement a Franchise System for Commercial Waste

Because the commercial waste handling system is a completely open market, one business district can be serviced by a dozen private carting operations, each operating its own vehicles. This excessive truck traffic is a burden to communities, because of its air quality, noise and

traffic impacts. It also increases wear and tear on our roads. For commercial customers and carters it increases the overall cost of doing collections. To address this critical issue, the City should expand the provision in Local Law 42 §16-523 to enable franchise waste districts to be implemented Citywide, similar to those operating in many California communities. Local Law 42 §16-523 currently gives the City the right to “designate no more than two areas of the City as special trade waste removal districts.” A change in this law would be needed to implement franchises Citywide (Hammer Environmental Consulting, 2001). Commercial carters and DSNY crews could bid on the right to serve these districts and the lowest qualified bidder could then serve an entire neighborhood, substantially reducing the vehicle miles traveled by commercial carting trucks. Intermediate tipping sites to reduce VMT should also be considered. To encourage further reductions of VMT, higher priority should be given to carters with local garages in a given district.

Changes to the law and implementation of franchising should consider means to enable independent recycling operations to offer competitive recycling services in the districts.

Implementation Schedule:

2006: Conduct groundwork to implement commercial franchise system; pilot test commercial franchises system in two districts.

2007: Continue to pilot test and develop the franchise system.

2008 and beyond: Pass implementing legislation; establish districts for franchise system; implement commercial franchise system Citywide.

Maximize Waterborne and Rail Transportation

Waterborne Transportation

As we develop an enhanced recovery infrastructure, we must ensure that it can maximize use of the City’s waterways for transportation. Increasing waterborne transportation will reduce traffic congestion, air pollution, noise, and wear and tear on NYC’s streets, arteries and highways. It will also improve efficiency, since one 600-ton barge can move as much material as approximately 58 ten-ton trucks.

Indeed, mixed paper recycling is one of the most cost effective elements of the City’s recycling program, in part because much of that paper is moved by barge from the marine transfer station at West 59th Street to the Visy plant on Staten Island. It appears that DSNY is already thinking in terms of expanding such opportunities, since the recent request for proposals for a long-term recycling contract gave preference to proposers with waterfront facilities.

In its efforts to redesign the marine transfer station (MTS) system, the City should be planning for inclusion of both commercial and residential recyclables to the greatest extent feasible and transitioning to handling only compostables, recyclables and reusables (if feasible), as we approach zero waste. That is, over the long term, the operating marine transfer stations should transition from handling primarily waste and some recyclables, to handling materials en route to reuse, composting and recycling operations.

As the City increases its use of marine vessels, it must recognize that these vessels are also powered by largely unregulated and polluting diesel engines. Public policy should focus on reducing emissions of several contaminants from marine engines, including nitrous oxides (NO_x), particulate matter (PM) and sulfur oxides (SO_x). Thus far, federal regulation has been inadequate to bring emissions from marine vessels anywhere close to new standards for on-highway vehicles.

Marine vessels like tug boats could transition to ultra-low sulfur diesel or biodiesel coupled with pollution control technologies. To ensure adequate fueling infrastructure, the City and the Port Authority should work together to install clean fueling stations as part of the capital upgrade of marine and container terminals in the Comprehensive Port Improvement Plan (CPIP). (A full discussion of the various alternative fuel options is provided below.) The City should be a major driver for emissions improvements to marine vessels within its purview and it should produce a clean fuels strategy for marine vessels.

Implementation Schedule:

- 2005: Ensure that planning for the retrofit of the marine transfer station system supports a long-term vision of eliminating waste and moving reusables, compostables and recyclables through that system.
- 2006: Research alternative fuel possibilities for marine vessels.
- 2007: Identify fuels of choice for long-term marine clean fuels strategy; begin to pilot test the transport of reusables, compostables and recyclables by barge.
- 2008: Develop a clean fuels implementation strategy for marine vessels; expand use of the MTS system for reusables, compostables and recyclables.
- 2009 and beyond: Implement clean fuels strategy; fully utilize the operating MTSs for reuse, composting and recycling.

Rail Transport

The existing network of freight rail lines should be evaluated to determine its usefulness for internal movement of recoverable materials. Using this network, compostables, reusables and recyclables could be transported by a combination of barge and rail from one borough to another, reducing the amount of trucks used for intra-borough waste transport. The freight rails that currently exist in the City previously serviced manufacturers and distributors receiving raw materials and products by barge. Many of these systems are no longer operational because the bulkheads have deteriorated, leaving the barges with nowhere to land. As a result, companies that used these rail lines for incoming materials now rely on more costly and environmentally destructive truck delivery. Rail lines should be reactivated to move recoverable materials more efficiently to processors within the City. This would reduce the costs of transport, as well as the negative environmental impacts of truck traffic.

The City should evaluate the existing rail lines to determine their value in moving recoverable materials to processors or end-users. This evaluation should consider proximity to operating MTS and freight barge unloading sites, as well as to current or planned recycling, reuse or composting facilities. It should also consider the equipment needs to utilize rail, such as the inventory of current engines available. Next, the City should undertake a full feasibility study on

the use of rail for transporting recoverable materials. The study should consider routes materials would travel from the point of generation or transfer to the point of processing or end-use and should identify specific equipment needs and clean fuel alternatives.

Implementation Schedule:

2006: Evaluate the existing rail lines to determine their value in moving recoverable materials.

2007: If evaluation warrants, conduct feasibility study of using rail to transport recoverable materials.

2008: Develop schedule for repair and reinstatement of rail lines and a plan for operation of the rail lines (if feasible).

2009: Reactivate rail lines as MTS and other barge facilities come on-line (if feasible).

Use Cleaner Vehicles

Many other cities are converting their waste collection and other large fleets to alternative fuels and cleaner vehicles. In Los Angeles, fleets of more than 15 vehicles are required to convert to alternative fuels (Liss, 2004). San Francisco is transitioning its fleet to compressed natural gas and experimenting with compressed natural gas hybrid vehicles, while its neighbor Berkeley and half a dozen other communities are utilizing biodiesel in recycling fleets (Haley, 2002 and Farrell, 2002). In NYC, DSNY was among the first to pilot compressed natural gas (CNG) trucks. DSNY has also committed to retrofit its existing fleet of diesel sanitation trucks with additional pollution controls by mid- 2006, when the use of ultra low sulfur diesel fuel is mandated. However, there is also an opportunity for NYC to do more.

Cleaner Fuel Options

There are several types of “clean fuel” technologies including (CNG), biodiesel, hybrid electric (hybrids also use gasoline/diesel), and full electric. Ultra low sulfur diesel fuel is a new federal requirement that will soon (2006) be required to be used by on-highway diesel vehicles. The use of these fuels and technologies can reduce the air pollution burden as we make the long-term transition to clean technologies like hydrogen fuel cells. Each type of fuel has its benefits and drawbacks and is best used under certain circumstances.

Ultra low sulfur diesel (ULSD) works with conventional diesel engines, and can achieve the best emission reductions when coupled with pollution controls, such as diesel particulate filters or oxidation catalysts. DSNY has already committed to the retrofit of existing vehicles with pollution controls and for the use of ULSD in its fleet by mid-2006. The conversion is spurred by the recent EPA rule requiring that a) all diesel fuel used in on-road vehicles have no more than 15 ppm sulfur by 2006 and b) NEW highway diesel engines start to meet new stringent emissions standards for PM and NOx beginning in model year 2007. City of New York Local Law 77, enacted in 2003, requires all City- contracted construction contractors to use ULSD and pollution controls in their non-road diesel engines. The law is effective immediately in Lower Manhattan and applies Citywide in 2005. DSNY should follow suit for the non-road vehicles that they operate. In May 2004, the federal EPA announced the phase-in of requirements for ultra low sulfur diesel for all non-road engines in 2010 and for locomotives and marine engines in 2012 (US Environmental Protection Agency, 2004).

Compressed natural gas (CNG) is a clean burning fuel that requires less frequent engine maintenance and therefore has reduced operating costs. CNG vehicles are also quieter than diesel engines. However, CNG requires specially designed engines, which are relatively expensive, and NYC presently lacks the necessary fueling infrastructure. Because garbage trucks in NYC travel relatively short distances and refuel at central stations, they are well suited for (CNG). The DSNY fleet was the first in the nation to pilot CNG trucks in 1989, and today operates 26 CNG trucks (Bloomberg and US Environmental Protection Agency and Department of Transportation Commissioners, 2003).

Electric vehicles consist of a variety of types that are in production and use today. While fully electric vehicles themselves have no emissions, the generation of electricity to charge them commonly creates pollution. Electrical generation facilities in NYC are commonly found in low-income communities of color that may also host waste transfer stations. Hybrid electric vehicles that use an onboard fuel to generate electricity do not connect to the electric grid and are not responsible for increased pollution at power plants. In the past, electric vehicles were often not powerful enough to drive heavy loads; however, recent improvements have enabled more powerful heavy-duty vehicles, such as the hybrid electric garbage trucks made by ISE Corporation that are available on the market today (ISE Corporation, 2004).

Biodiesel is produced from domestic, renewable resources (vegetable oil or animal fat) and can be used in compression-ignition (diesel) engines with little or no modification. This fuel can originate from a virgin source or; preferably from our perspective, from used vegetable oil and animal fat. While local distributors exist, there is no local producer in NYC making biodiesel from used oil. Biodiesel contains no petroleum, but it can be blended at any level with petroleum diesel to create a biodiesel blend. It currently comes in two standard formulations B20 (20% biodiesel, 80% diesel) and B100 (100% biodiesel) (US Department of Energy, 2001).

The major benefits of biodiesel are that it is simple to use, biodegradable, nontoxic, essentially free of sulfur and aromatic hydrocarbons, and can be derived from recycled feedstock. Furthermore, biodiesel emissions are much lower than conventional diesel.

Pilot programs around the country have begun expanding their fleets using biodiesel and hybrid-biodiesel systems. Yosemite National Park is in the process of purchasing hybrid/biodiesel buses to conduct shuttle service within the park. These buses will run on fuel processed within the park from concessionaires' waste oil. Growing from its 1995 pilot program, the National Parks System now has 675 vehicles and equipment in 21 parks that run on biodiesel (Hodel, 2004 and National Parks Service, 2004). The recycling fleet for the City of Berkeley, California, operated by the Ecology Center, runs on fuel derived from used vegetable oil generated by local restaurants. In Austria, McDonalds completes the recycling loop by processing its waste vegetable oil into biodiesel to fuel its own delivery trucks (PR Newswire, 2003).

New York City should evaluate the potential for a biodiesel production facility to make use of the large amount of used oil and grease from commercial and institutional food establishments. Currently, such grease poses a significant problem for the Department of Environmental Protection (DEP), which maintains NYC sewers. The DEP currently requires businesses that

discharge grease and oil into the sewer system to have a grease interceptor (Department of Environmental Protection, 2002). Capturing this grease and turning it into a product could simultaneously solve a problem and provide an economic development opportunity for the City. The business feasibility analysis and facility development should be done by the Technical Assistance Unit described in Chapter 5, Economic Development.

Cleaner Vehicle Implementation Strategy

The City should develop a “Clean Vehicle Implementation Strategy” for DSNY, as well as for private sector carters and transfer stations. The strategy should evaluate all of the DSNY fleet, including administrative and other smaller vehicles, in addition to trucks. It should also evaluate fuel and technology choices and the environmental impacts and economic costs of each. Since DSNY trucks are replaced approximately every 7 years, every year about 14 percent of DSNY trucks must be newly purchased. (Lange, 2004) This means that every year there is an opportunity to move the fleet toward zero emission vehicles. When purchasing new diesel trucks in 2007-2010, DSNY should require manufacturers to provide only vehicles that meet the new more stringent standards. The strategy should set up a research program to regularly evaluate new developments in the field and to conduct pilot tests of cleaner fuels and of engine and vehicle technology, such as hybrid electric trucks. There should also be timetables for the purchase of zero emission vehicles.

The “Clean Vehicle Implementation Strategy” must also address private sector carters and transfer stations. Private or commercial waste haulers must be required to make a similar level of investment in environmental improvements for their vehicles as the City is. While implementing a franchise system for commercial carters has the greatest potential to reduce the number of trucks traveling on the same streets, and thus to reduce overall mileage and pollution, using cleaner fuels and technology must also be required in the commercial waste sector. The City could follow the lead of the South Coast Air Quality Management District (SCAQMD) and the City of Hayward, California and require private carters to use alternative fuels or diesel retrofit emissions control equipment as a permit condition. The recently passed NYC Local Law 77, which requires using ULSD for nonroad construction equipment, needs to be expanded to include nonroad equipment used at all transfer stations, junk yards, and recycling processing facilities.

Implementation Schedule:

- 2006: Produce a “Clean Vehicles Implementation Strategy” for all of DSNY fleet and the private sector. Set permit conditions for private sector phase-in of cleaner vehicles and nonroad engines or Pass Local Law with the same effect.
- 2007: Begin implementation of clean vehicles strategy. Design and conduct pilots of fuels and technology. Evaluate potential for a Biodiesel Production facility in NYC.
- 2008 & beyond: Report on Progress every two years. Update the Clean Vehicles Implementation Strategy every two years to incorporate evolving technology.

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Program	Benefits/Rationale	Implementation Schedule
<p><i>Reduce Vehicle Miles Traveled by Employing Better Routing, and Adjusting Collection Frequencies</i></p>	<p>Reduces congestion, noise and air pollution</p>	<p>2006: Identify districts with high recycling diversion rates (over 30 percent) and garbage collection three times per week, reduce garbage collections by one per week in these neighborhoods. Develop model for transitioning collection from predominantly garbage to predominantly collection of recyclables and reusables in all City neighborhoods.</p> <p>2007: Evaluate routes to determine if efficiencies could be gained by lengthening routes or crossing district lines; if so, pursue changes to City Charter; evaluate and record VMT improvements; make route maps available to the public and elected officials, so that they can make recommendations.</p> <p>2008 and beyond: Annually evaluate all City routes against model and implement route and frequency changes; continue to implement garbage collection reductions as diversion rates increase. Implement commercial franchise system Citywide.</p>
<p><i>Explore Various Recycling Collection and Truck Design Options</i></p>	<p>Improve program efficiency</p>	<p>2005: Test collection in trucks with adjusted compaction ratios to determine if reducing compaction improves the marketability and quality of the recyclables collected; determine the optimal compaction ratio for maximum material quality and collection efficiency</p> <p>2006: Based on test, implement optimal compaction ratios City-wide; evaluate the expansion of the use of containerized collection and dual bin collection</p> <p>2007: Perform a pilot test of “single stream” collection</p>

		<p>in at least five districts; evaluate for impacts on participation, material quality and residue rate.</p> <p>2008: If warranted, develop strategy for expanding “single stream” collection to the optimal districts, as determined by the pilot test.</p> <p>2009 and beyond: Continue to monitor the state-of-art in recycling collection and test new strategies and truck technologies as they become available; continually measure recycling rates, quality of recyclables and other performance indicators.</p>
<i>Implement a Franchise System for Commercial Waste</i>	Reduces traffic and air pollution	<p>2006: Conduct groundwork to implement commercial franchise system; pilot test commercial franchises system in two districts.</p> <p>2007: Continue to pilot test and develop the franchise system.</p> <p>2008 and beyond: Pass implementing legislation. Establish districts for franchise system; implement commercial franchise system Citywide.</p>
<i>Maximize Waterborne Transportation</i>	Reduces congestion, noise and air pollution	<p>2005: Ensure retrofit of the marine transfer system supports vision of eliminating waste and moving recyclables, compostables and reusables through that system.</p> <p>2006: Research alternative fuels for marine vessels.</p> <p>2007: Identify fuels of choice; begin to pilot test the transport of recoverables by barge</p> <p>2008: Develop clean fuels implementation strategy; expand use of MTS system for recoverables.</p> <p>2009 and beyond: Implement clean fuels strategy; fully utilize the MTSs for composting, reuse and recycling.</p>
<i>Maximize Rail Transport</i>	Reduces congestion, noise and air pollution	<p>2006: Evaluate the existing rail lines to determine their value in moving recoverable materials.</p>

		<p>2007: If evaluation warrants, conduct feasibility study using rail to transport recoverable materials,</p> <p>2008: Develop schedule for repair and reinstatement of rail lines, a plan for operation of the rail lines (if feasible).</p> <p>2009: Reactivate rail lines as MTS and other barge facilities come on-line (if feasible).</p>
<p><i>Cleaner Fuel Vehicles – Implementation Strategy</i></p>	<p>Reduces air pollution and associated health impacts</p>	<p>2006: Produce a “Clean Vehicles Implementation Strategy” for all of DSNY fleet and the private sector. Set permit conditions for private sector phase-in of cleaner vehicles and nonroad engines or Pass Local Law with the same effect.</p> <p>2007: Begin implementation of clean vehicles strategy. Design and conduct pilots of fuels and technology. Evaluate potential for a Biodiesel Production facility in NYC.</p> <p>2008 & beyond: Report on Progress every two years. Update the Clean Vehicles Implementation Strategy every two years to incorporate evolving technology.</p>

9.

Financing

The City of New York Department of Sanitation (DSNY) budget has now topped \$1 billion a year. The NYC Independent Budget Office reported in Feb. 2004 that the budget for disposal and recycling had reached \$1.04 billion. Since the City began to export waste from the Bronx in FY 1997, this budget has increased by \$359 million or 53%. (This was calculated using disposal and recycling costs in 1998, minus the \$390,000 for the initial Bronx export, as compared to current total disposal including export and recycling costs as reported by IBO in 2004). (City of New York Department of Sanitation, Comprehensive SWMP Draft Modification, 1998 and IBO, 2004).

The DSNY budget alone consumes approximately 22% of all City residential property taxes. However most taxpayers do not appreciate the costs of the current system, or the savings possible in a zero waste system, since those costs and savings are not clearly visible to them (Hammer, 2002).

In planning for a zero waste future, the City must provide sufficient and consistent funding for waste prevention, reuse, recycling and composting. To date, DSNY has viewed these programs as nonessential to its core mission – keeping the streets of the city clean and getting rid of garbage. Budget cuts and later partial reinstatements have been a hallmark of the City's recycling program.

Unfortunately, inconsistent funding can actually waste money and increase cost—witness the recent interruption of certain elements of the recycling program. This change has caused considerable confusion about what is and is not collected for recycling. The overall recycling rate has dropped from 20% before the cuts to around 13% at present (DSNY). It will cost millions to dispel this confusion and re-educate New Yorkers about what they can recycle and when.

Efficient and effective zero waste management requires a certainty of funding availability that cannot be guaranteed if budgets are subject to annual review and adjustment depending on the state of the economy, tax revenue and current political sentiment. While the long-term savings of zero waste programs may be significant, many programs require several years of investment before savings are seen. As a result, a review of costs and benefits of these programs needs to be longer term than one budget year. A key example is the failure of the City to really make

investments in waste prevention, even though they are likely to result in millions in recurring annual savings for the City. One way to provide stable funding for zero waste programs is to look at sources other than the general tax base. Ensuring a steady stream of adequate funding for zero waste programs is essential to developing a system for the future that will save money and create jobs. Alternate sources range from the simple – applying for grants and stepping up enforcement – to the more complex – Pay as You Throw volume- based pricing. It is important to note that financing and policy are very closely linked and that many of these options require legislation or regulation. Those changes are discussed further in the Chapter 10, Legislation and Regulation.

Some combination of the following strategies could raise sufficient revenue to finance many of the programs identified in other sections of the report.

- **Waste Disposal Surcharge:** Communities like Alameda County, CA, have financed waste prevention, reuse, recycling and composting by placing a surcharge on the transfer of waste for disposal. This surcharge could be applied in NYC at commercial waste transfer stations for waste sent for disposal, not for recyclables. The surcharge is intended to provide a steady stream of funding for zero waste programs. This provides the dual economic driver of increasing the cost of wasting while simultaneously ensuring the necessary funds to build the infrastructure and programs for a more cost-effective zero waste future. In NYC this plan is a bit more complicated since the City is paying for export and naturally would not want to increase its own costs. In the City's case the surcharge would require a budget set aside. However, the intent of a disposal surcharge is to provide a certainty of funding for diversion programs while adding a disincentive to disposal. (A surcharge is added on top of tipping fees that usually cover the costs of waste transfer and disposal. Some portion of tipping fees may also be allocated to provide community benefits to communities that host these facilities.)
- **Enforcement:** The fines generated from enforcement of recycling violations should be dedicated to fund recycling education. Similarly, fines on waste carting trucks for on-street idling and queing should be increased and dedicated to finance cleaner vehicle/fuel conversions.
- **Franchise Fees:** Under a new system of commercial waste collection franchises, described fully in Chapter 8, Transportation, Transportation, carters would pay a fee for the opportunity to obtain a franchise for a commercial waste district. Revenues from franchise fees should be dedicated to finance education and technical assistance services to support commercial zero waste programs.
- **Grants:** State and Federal agencies often provide grants for innovative programs. For example, the New York State Energy Research and Development Authority funds the development of energy-saving recycling technologies and Empire State Development funds research and development and capital costs for new or expanding recycling enterprises and projects.
- **Fee for Service:** Many cities charge residents for certain waste services. A fee for service could be charged for collection of spring and summer yard debris, for example, and it could be a trial project for the roll out of a larger PAYT program (see below).
- **Partnership with Industries:** Recycling industries have aided other communities in financing research, market development and education programs. They have a stake in the success of the city's recycling program since they depend on our materials.

- **The Bigger Better Bottle Bill:** The improved bottle bill (A3922-A and S1696-A) would expand the current bottle deposit/return system, which keeps 69% of covered containers out of the waste stream, to include non-carbonated beverages like iced teas, bottled water and juice drinks. It would also enable the state to use the unclaimed bottle deposits that remain with beverage distributors in the current system. The deposits would be used to finance waste prevention, reuse, recycling and composting programs, including redemption centers that would take back all deposit bottles, not just those sold at a particular store. The bill is expected to generate approximately \$179 million in unclaimed deposits statewide, of which more than \$75 million is estimated as New York City's share (Gitlitz, 2004).
Pay As You Throw: Instead of treating garbage collection as a “free” service, that is paid out of the general tax base, PAYT programs create a utility like system, similar to electricity, water and gas, where a resident is charged based on their use of the system—usually by the volume of garbage they generate. A user fee system can be fairer to City residents than a property tax system. Institutions that currently pay no property taxes currently pay nothing for waste disposal and would have to share the costs of waste handling under PAYT. Also, rather than paying the costs of garbage collection indirectly through property taxes, residents and institutions would be charged based on how much garbage they put at the curb. However, waste prevention, reuse, recycling and composting services must be provided at no charge in order to create an incentive to reduce and recycle as much as possible. There are considerable challenges to successfully implementing such a program in NYC such as devising a simple payment and record keeping system, and ensuring that PAYT does not put a burden on low income residents or create public health problems. Overcoming hurdles associated with apartment residents in multi-family buildings and preventing illegal dumping would also need to be addressed.
- **Extended Producer Responsibility (EPR):** Usually pursued through legislation, EPR systems ensure that the manufacturer of a product bears the financial responsibility for its ultimate disposal/recycling. Such programs can actually require the take back of a product such as a computer, thus relieving the City of the responsibility and cost of managing these wastes. Set up in a different way, manufacturers can fund the programs necessary to reuse and recycle their products – thus providing actual dollars to the City for handling these materials. (See Chapter 10, Legislation & Regulation, for this discussion.)

More detail on these alternative revenue-raising strategies is provided below.

Waste Disposal Surcharge

Applying a surcharge to the transfer of waste for disposal enables a municipality to squirrel away monies to build its zero waste infrastructure and programs for the future. No surcharges apply to reuse, recycling or composting tonnages. This mechanism has been successful in other jurisdictions, most notably Alameda County, CA, that has used the revenues to finance recycling-based economic development projects, waste prevention, education and other activities. (A surcharge is added on top of tipping fees that usually cover the costs of waste

transfer and disposal. Some portion of tipping fees may also be allocated to provide community benefits to communities that host these facilities.)

In the case of the NYC commercial stream, the surcharge would be levied at the transfer station on commercial garbage being sent for disposal on a per-ton basis. The commercial transfer surcharge revenue should be used to finance zero waste business technical assistance programs and recycling-based business development.

In the City’s residential and institutional system, the surcharge would effectively be a budget “set aside” by the City, based on the amount of waste sent for disposal, for the necessary zero waste programs. That is, for every ton of residential and institutional waste sent for disposal, the City would commit a specified amount to fund waste prevention, reuse, recycling and composting. The dollar amount should be sufficient to cover the bulk of the costs of these programs, at least until other mechanisms are put in place. While this proposal may look like an unnecessary accounting device, we have noted the City’s willingness to almost spend any amount on garbage disposal while depriving alternative programs of the necessary resources. This proposal ensures that zero waste funding is generated from disposal.

It is important to note that a surcharge on its own, without accompanying infrastructure development and improved access to waste prevention and recycling opportunities will not have the effect of reducing overall waste generation. Therefore, the surcharge should be pursued in concert with other zero waste policy and infrastructure improvements described elsewhere in this plan.

Implementation Schedule:

2005: Identify the means to implement a commercial waste surcharge (i.e., regulation, legislation, etc.); establish a similar surcharge or “set-aside” funding commitment for municipal residential/institutional stream.

2006: Pursue the implementation of a commercial waste transfer surcharge.

Enforcement

The enforcement of recycling violations should be increased and their revenues dedicated to the programs that generated the violations. That is, recycling violation revenues should be dedicated to recycling education; revenue from commercial carter idling or on-street queing violations should be dedicated to cleaner vehicle/ fuel programs. Enforcement and the minimal fines need to be increased for multifamily buildings and for institutions that are not adequately participating, which are currently too low to encourage a change in behavior—essentially the same fine as for a single family household. To date, for example, not a single \$500 fine has been issued. However, enforcement should encourage correct recycling behavior, not frustrate it. For more detail see Chapter 7, Enforcement.

Franchise Fees

In Chapter 8, the Transportation Chapter we proposed a commercial waste collection franchise system. In such a system bids would be issued for waste and recycling services in commercial

districts so that these districts are each served by one carter, instead of the multiple carters and associated truck traffic, as is the case today. As this system is implemented, carters should be charged a franchise fee – a fee for the right to provide commercial collection services in a district. The revenue from this fee should be dedicated to business education and technical assistance to support zero waste programs, in addition to oversight by the City of the quality of franchise services.

Implementation Schedule:

2006: Conduct groundwork to implement commercial franchise system.

2007: Propose regulatory changes.

Establish districts and fees for franchise system.

2008 and beyond: Implement commercial franchise system citywide.

Grants

Several State and Federal agencies provide grants to municipalities to offset the cost of programs and environmental technologies. For example, the New York State Energy Research and Development Authority funds the development of energy-saving recycling technologies and Empire State Development funds research and development and capital costs for new or expanding recycling enterprises and projects. The State Environmental Protection Fund was recently expanded to enable it to fund waste prevention and recycling education programs. Similarly, the federal Transportation Equity Acts have focused on opportunities to reduce emissions, traffic and congestion and may offer a variety of funding opportunities to NYC. New York City should take greater advantage of these opportunities to finance a zero waste future.

The City can also assist community-based organizations conducting zero waste programs to be viable by supporting their grant efforts and providing in-kind contributions. Zero waste programs conducted by these organizations at low costs and involving communities offer the City substantial benefits in reducing costs for waste disposal.

Implementation Schedule:

2005 and beyond: Establish a zero waste grants unit with appropriate staffing; monitor state, federal and private grant programs; apply for grants.

Fee for Service

Fee for service programs could be instituted for other problematic streams, such as the landscaper-generated yard debris that is often left for curbside collection, despite rules against doing so. Residents could be charged for collection of yard debris, and it could be a trial project for the roll out of a larger PAYT program, which is discussed below. Payment of these charges could be managed by a software program, like ProFee, the billing system used by DSNY to charge medical professionals with offices in residential buildings for collection services.

Implementation Schedule:

2006: Examine other options for fee-for-service revenues, including yard debris removal.

2007: Implement other fee-for-service programs as appropriate.

Partnership with Industry

Many municipalities have partnered with the recycling industry, remanufacturing industries or brand owners to finance specific programs including education, technology evaluation, market development and advertising. Industries have an incentive to participate because, in the case of the recycling industry they depend on our programs to generate the material they recycle and, in the case of other industries and brand owners, they receive bad public relations if their materials and products are habitually wasted.

Literally hundreds of communities have partnered with trade associations and industries to finance recycling education and to provide in-kind services, such as the development of public service announcements, graphics and other valuable tools. In addition, dozens of cities and towns have worked with the recycling industry to test and evaluate new processing technologies and to develop new markets for recyclable materials.

New York City should take advantage of opportunities to engage industry members to finance certain program elements, specifically where the programmatic content will not be affected. As noted in Chapter 6, the Education Chapter, partnerships with industry can be a valuable strategy to implement large-scale, simple message advertising campaigns, assuming the City carefully reviews and approves the content. However, this recommendation does not suggest in anyway that the City allow industry- sponsored educational materials in the public schools, which can contain biased and inaccurate messages.

Implementation Schedule:

2005: Research models of industry/municipality partnership toward zero waste goals.

2006: Determine which types of partnership are the most viable and valuable to the city and work with industry to pursue those.

2007: Begin implementing partnerships with industry toward zero waste goals.

The Bigger Better Bottle Bill

New York City should become a strong advocate for passage of the Bigger Better Bottle Bill (A3922-A and S1696-A) currently pending before the state legislature. The bill would expand on the most successful recycling program in New York's history – the deposit/return system in place for beer and soda. This simple system effectively captures 69 percent of the City's cans and bottles covered by the program. The new bill would expand the system to include non-carbonated beverages, such as juice drinks, sport drinks, bottled water, teas, and other so-called "new age beverages." In so doing it will remove an additional 2.5 million containers from the waste stream statewide, more than half of those being in NYC (Gitlitz, 2004).

The bill will also enable the state to assume control of the unclaimed deposits that are held by beverage distributors in the current deposit/return system and use them to fund reduction, reuse, recycling and composting programs. These unclaimed deposits likely account for approximately \$179 million statewide annually. The bill would make \$75 million in deposits available to fund New York City recycling programs (Gitlitz, 2004). Public support is strong; a recent survey of

New York State voters found that approximately 70 percent of New Yorkers support the Bigger Better Bottle Bill and an even larger 86% support using the unclaimed deposits for environmental programs (Public Policy Associates, 2004). New York City was a critical force behind the passage of the first bottle bill, and given the substantial potential benefits and revenues to the City, should be a major force to pass the Bigger Better Bottle Bill.

Implementation Schedule:

2004: Advocate for the passage of the Bigger Better Bottle Bill.

2005: Plan for redemption centers in NYC.

Changing the Way We Pay for Garbage Services: Pay As You Throw (PAYT)

In New York City we currently pay for garbage services through property taxes. This means that there is no cost savings for those who reduce their generation of garbage and recycle more than others. In addition, tax exempt organizations, such as universities and cultural institutions pay nothing for waste disposal. Overall garbage costs have risen dramatically to over \$1 billion annually. It may be time for NYC to consider a new way to charge for garbage services, which rewards those who reduce their waste for disposal and recycle more. One possible system is called “Pay As You Throw”. In this section we discuss some of the issues associated with PAYT programs and recommend study and pilot testing in conjunction with a task force that includes strong public participation. Any actual plan for establishing a PAYT system in NYC must include:

- 1) dedicated revenue devoted to zero waste programs;
- 2) provide strong incentives for recycling (by not charging for this collection service);
- 3) provide some minimal level of free collection service so that the cost is not a burden to those who have low or fixed incomes;
- 4) developing similar PAYT systems in the City agency, institutional, and commercial sectors; and
- 5) must overcome significant challenges to implementation in NYC.

Background On PAYT Programs

More than 5000 communities in the United States have “Pay as You Throw” programs where residents are charged for the amount of waste that they generate, usually by volume (US Environmental Protection Agency, Could PAYT Offer Hope for New York City’s Recycling Program, 2003). Coupled with this is usually no charge or reduced charges for recyclables or organics collections (dedicated to yard and food waste). In addition some companies are developing technology that could assist with PAYT in multifamily dwellings (US Environmental Protection Agency, PAYT: Apartments/Multifamily Dwellings, 2004).

PAYT takes different forms depending on the goals and needs of a particular community. The key feature is that instead of treating garbage collection as a “free” service, paid for by the general revenue tax base as is done in NYC, these programs create a utility like system, similar to electricity, water and gas, where a resident is charged based on their use of the system. So, rather than paying the costs of garbage collection through a tax, residents would be charged based on how much garbage for disposal they put at the curb.

System Options

There are three types of PAYT systems. The first requires households to subscribe to a service whereby they choose a particular size locking can or toter and are billed monthly based on the size of that toter. Recycling households can usually request much smaller cans and are thus billed less. In the event that they need additional waste disposal, such as a party or special event, they can purchase stickers or tags for their additional waste. While this system is costly to start (cans or toters must be purchased by the City) and administer (billing system), it has the benefit of reducing rats and vermin because garbage is in a sealed container. To ease administration the garbage costs could be integrated into the water billing system. Landlords would generally pay the bills for renters in multi-family buildings in this system.

The second type of system requires that households can only put their waste out in city-approved bags. The bags are sold at local stores at a cost that covers the expense of handling that amount of waste. The stores return the revenue to the city. The third system is similar to the bag system, but instead of providing an approved bag, residents must purchase tags or stickers for whatever bag or bin they use. These programs are administratively simple, since they do not involve billing, and minimize start up costs. They could also potentially cover all residents including renters in multi-family buildings. But they do not provide any benefit in vermin control.

In most PAYT programs, residents are charged for solid waste, but reuse, recycling and composting services are provided at no cost. As a result, these programs support a zero waste system because they provide a direct financial incentive for the waste generator to reduce and recycle as much as possible. A PAYT program must be implemented along with expanded programs for recycling, reuse, composting and waste prevention. If not, the opportunity for savings will be hampered by a lack of infrastructure for prevention and recycling.

PAYT programs can be structured to be revenue neutral, which means property taxes are reduced when PAYT service charges are imposed. The big change often is that those institutions that are currently tax exempt would now be paying for garbage services. Thus, to some degree, PAYT as a way of paying for garbage would be fairer to households in NYC.

PAYT could provide significant benefits to New York City. If people generate less waste, the benefits include reduced waste disposal costs – at a cost of more than \$105 per ton for garbage disposal, a reduction of even 10 percent would save \$31.5 million on disposal alone, in addition to any collection cost savings that might be achieved (City of New York Office of Operations, 2003). The funds generated from PAYT would enable the City to finance education, waste prevention, reuse, composting and recycling in a much more significant way than has been possible in the past—but only if the funds are set up as a dedicated revenue stream. A PAYT program in NYC could also reduce the rat population in NYC, if the City follows Buffalo's system and institutes a fee system and rigid locking containers. The Buffalo Department of Health estimated an 80% reduction in pest control expenses as a result (Cornell Waste Management Institute, 2001).

Low and Fixed Income Households

There are several models for combating the regressive aspects of PAYT and insulating low and fixed income residents from negative impacts. In the first, used by San Francisco, San Jose and Los Angeles, low and fixed income households qualify for a discounted rate, anywhere from 15 to 50 percent of costs. Residents would have to show proof of low income, as when applying for the school lunch program, for example. In the second model, usually used in cities with bag or tag systems, free or low cost bags or tags are distributed to residents with other public assistance, such as food stamps, social security. Finally, a minimal amount of free garbage disposal could be provided to all City residents with the amount set to encourage recycling behavior.

Low income residents tend to generate less waste than those with higher incomes, therefore there is a fairness rationale for keeping garbage costs low for those residents with low and fixed incomes beyond ensuring affordability and protecting public health. PAYT systems can be designed to address this issue.

Another option would be to cap waste disposal costs at a fixed rate, as is done with water charges in New York City. This would ensure that costs do not increase for those who cannot afford to pay. Most waste prevention advocates prefer the first option, a discounted rate, because it still provides an incentive for residents to reduce waste and recycle more. When coupled with strong education and assistance, this can be an effective means of both containing costs and reducing waste.

Advantages of a PAYT system

The potential advantages of PAYT include the following:

- A recent Duke University study found that on average 14-27% of the waste a community generates is reduced or eliminated in the first year after PAYT is implemented, often saving million of dollars (Miranda, 1996).
- User fees can ensure support for needed alternatives to disposal- like composting and recycling—so that they are not pummeled with each budget cycle.
- The system is more fair to people because they pay for their own use. Institutions that are tax exempt must pay for waste services also.

The 1996 Duke University study, supported by EPA, also found that the amount recycled in these communities increased by between 32 and 59 percent, on average (Miranda, 1996). This is largely due to the strong incentive participants have to recycle under PAYT programs. The largest number of PAYT programs exist in the following states: Washington, Minnesota, Iowa, Wisconsin, and Pennsylvania.

The US Environmental Protection Agency strongly recommends PAYT programs to American communities as a simple and fair way to encourage good behavior and reduce waste. The EPA web site and newsletter report on experience with PAYT programs in other cities through case studies, research, and other information on how these systems work (see <http://www.epa.gov/epaoswer/non-hw/payt/>). In 2000, a Roundtable on PAYT for major cities was convened in New York City with support from EPA (Cornell Waste Management Institute, 2001).

Significant Challenges to Implementing PAYT in New York City

Potential difficulties in instituting PAYT in the City include:

- The most serious concern about such a program is that City officials will see PAYT only as a new revenue opportunity to close budget gaps and as a way to pay disposal costs. However, the primary purpose of a PAYT program should be to encourage people to reduce waste generation and increase recycling. It is absolutely critical that the City follow EPA guidance when establishing a PAYT system so that it creates incentives for the right behavior and is not used merely as a way to pay for waste export.
- Protecting low income residents from excessive charges will be extremely important in New York City with large low income populations.
- Garbage will be created whether people can pay or not and an appropriate fee structure that encourages recycling and prevents improper dumping will be essential. One solution might be to allow each family a certain allowable amount of garbage—say one bag of non-recyclables a week, for free, along with free disposal of all recyclables.
- Preventing cheating – or dumping in other people’s cans.
- Making the program work in multifamily rental buildings, where the disposal cost will be imposed on the landlord.
- Insuring that billing is structured and handled in an efficient manner that does not use up all the revenue generated in the administration of the program.
- Providing adequate enforcement

Interestingly, although all municipalities worry that implementing PAYT will increase illegal dumping, according to the US EPA most cities where PAYT has been implemented, have found that illegal dumping is less of a concern than anticipated. Case studies on how PAYT has been implemented in other cities are available at the EPA website <http://www.epa.gov/epaoswer/non-hw/payt/>.

Implementing PAYT in New York City will be challenging, particularly in devising systems that work in multi-family contexts and in insulating low and fixed income residents from the regressive tax potential of this type of system. Nonetheless, the system offers such significant potential benefits that it should be explored, tested and debated for implementation in New York City.

A recent study by Hammer Environmental Consulting, Inc. estimates that annual PAYT costs for a household in NYC would be \$322 per year or \$26 per month and that it could generate \$977 million for the City (Hammer, 2002).

With a minimum of 5,000 PAYT models to learn from, NYC has an opportunity to benefit from the experience of others when designing a program that meets our goals and needs. At the same time we know that NYC has unique challenges. Therefore we recommend that the City approach this concept with caution, openness and a strong democratic process. A substantial planning effort including a Task Force with broad public participation should be a first step and then several well-designed pilot projects should test the adequacy of any potential PAYT systems. A Task Force is consistent with recommendations from EPA that PAYT programs require a considerable planning effort with broad participation from citizens. The Task Force would have to tackle all of the important challenges--low income rates, multifamily dwellings, city agency

participation, efficient administration, illegal dumping and possible public health impacts –while soliciting extensive public input and recommending the best designs for pilot PAYT projects.

Implementation Schedule:

2005: Establish PAYT task force with broad participation especially representation from low income groups.

Agencies and Institutions

City agencies and other tax-exempt institutions generate 1 million tons of waste per year. In the current system they are provided with free disposal – the costs of disposal do not even appear in their budgets. In order to provide some incentive to reduce their waste, the City must develop a plan for, and then implement, a transition to some form of a PAYT system. This is relatively easy for the tax-exempt institutional sector; the City has to merely establish waste disposal rates for institutions and encourage them to participate in waste audits and in waste prevention, recycling, reuse and composting programs. For City agencies, it is a bit more complicated, and the City has resisted even attempting to quantify waste costs for each agency. The City might consider the Federal Government model in which agencies that meet or exceed waste diversion goals get to keep some of the revenues from recycling. That model could be expanded to provide both revenues from recycling and credit for savings due to reduced disposal costs. If agencies do not cooperate with waste audits and fail to make progress toward recycling and reduction goals, increased fines and the cost of waste disposal should be charged directly to that agency as a part of their annual budget. Thus City agencies may need both a carrot and stick approach. Without question, every year city agencies should be required to report their zero waste progress with measurable milestones in the Mayor’s Management Report.

Implementation Schedule:

2005: Begin planning effort for institutions and city agencies.

2006: Complete plans for program roll-out to institutional sector; outreach & education; start waste audits/technical assistance; implement larger fines for institutions. Target several city agencies for piloting shared savings program.

2007: Begin institutional PAYT program.

2008: Using lessons learned from pilots, rollout city agency modified “PAYT” program.

1-3 Family Homes

Approximately 2.5 million people live in housing with under 4 units and generate close to 33% of the waste stream (Hammer, 2002). This sector presents the least challenges, and should therefore be the first to implement PAYT after institutions. The program would begin by raising awareness of costs. Homeowners would be provided with a line item on their property tax bill that delineates the costs for waste disposal or an informational mailing could be prepared detailing the costs for each homeowner.

After one year of education, PAYT would be pilot tested in at least five predominantly single family districts. Initially, property taxes would be reduced to reflect the amount allocated for waste disposal. As a result, homeowners would not face increased costs, but would have an

opportunity to reduce costs overall by wasting less. Once kinks are worked out, the system would be implemented in all low-density districts.

Implementation Schedule:

2005: Inform homeowners of costs of waste disposal system

2006: Perform pilot test in five districts (one per borough)

2007: Expand pilot to all low density districts in one borough; plan for roll out in other boroughs

2008: Implement PAYT in all low density districts

Multi-Family & High Rise Buildings

In multi-family buildings it is difficult to track the individuals waste disposal habits and therefore difficult to implement and enforce PAYT systems. The city should identify a number of incentive and operating systems that could be implemented in multi family buildings and pilot test them to determine which is the most viable for different housing stocks. Pilot tests should also evaluate the benefits of locking containers on rat control for the tested district. Once the tests are complete, a public dialogue should begin about how and whether to implement a full-scale program.

For example, in some cities where the trash bill is paid by the landlord the city works with landlords to create programs whereby they share the savings that result from waste prevention with their tenants, either in the form of cash, rent reduction or building improvements. This assumes that the landlord has received an equivalent property tax reduction as PAYT is begun. This can create an incentive for the landlord to educate the tenants, for the porter or superintendent to recycle as much as possible, and for the tenants to reduce their waste. In a high-rise context, the city should test garbage meter systems that could be integrated into current buildings and develop new building code requirements that require buildings to integrate design elements that enable implementation of PAYT, waste prevention and recycling in new buildings.

Implementation Schedule:

2005-2007: Task Force deliberations and implementation recommendations for pilots.

2008: Begin pilot scale implementation in select districts (one per borough), including use of locking containers where rats are a priority problem.

2009: Using lessons learned, expand pilot to additional medium and high-density districts, while continually working to solve problems that arise.

2010: Report on the Task Force deliberations and the results of pilot projects; decide appropriate next steps.

Commercial

A PAYT system exists in the commercial sector in New York City where companies are charged by the cubic yard for the amount of waste they generate. However, carting fees set by the City provide no reduced rates for recyclable materials, which would provide an incentive for recycling.

There is a limited infrastructure for commercial waste prevention and recycling. There are strong markets for commercially generated paper and scrap metals, but little else. In terms of waste prevention and reuse, few companies have the internal capacity to make real gains, and the technical assistance available has been limited to a few small companies and programs, such as Wa\$teMatch in New York City. (See discussion of this program in Chapter 2, Reuse. Second, commercial carters have not promoted or encouraged the use of the limited infrastructure that is in place. As a result, most commercial businesses either do not have the opportunity to recycle and reuse more, or they are not aware of that opportunity if it exists.

This experience underscores the importance of implementing PAYT in conjunction with investments in reuse and recycling infrastructure, as well as education and technical assistance, including waste audits. (See report sections on these topics.) Only with this combination of programs and strategies will PAYT help to move New York City to a true zero waste future.

Implementation Schedule:

2005: Develop a commercial PAYT implementation strategy with appropriate incentives to encourage waste prevention, reuse, recycling and composting

2006: Establish differential rate for source-separated recyclables; ensure that there is adequate recycling infrastructure in the City for commercial recyclables

2007: Implement the new PAYT strategy and monitor results.

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Program	Benefits/Rationale	Implementation Schedule
<i>Waste Disposal Surcharge</i>	Generates revenue for commercial waste prevention programs; increases incentive to reduce and recycle.	2005: Identify the means to implement a commercial waste transfer tax (i.e., regulation, legislation, etc.); establish “set-aside” funding commitment for municipal residential/institutional stream. 2006: Pursue the implementation of a waste disposal surcharge
<i>Franchise Fees</i>	Generates revenue for commercial zero waste programs; enables improved oversight of commercial carting services; reduces truck miles on city streets.	2006: Conduct groundwork to implement commercial franchise system 2007: Propose regulatory changes. Establish districts and fees for franchise system 2008 and beyond: Implement commercial franchise system citywide.
<i>Grants</i>	Generates revenue from state and federal government sources.	2005 and beyond: Establish a zero waste grants unit with appropriate staffing; monitor state, federal and private grant programs; apply for grants.
<i>Fee-for-Service</i>	Generates revenue for services already provided by the city.	2005: Examine options for fee-for-service revenues, including yard debris removal. 2007: Implement other fee-for-service programs as appropriate.
<i>Partnership with Industry</i>	Generates revenue or offsets expenses; engages those who have a stake in our recycling program in helping to finance it.	2005: Research models of industry/municipality partnership toward zero waste goals. 2006: Determine which types of partnership are the most viable and valuable to the city and work with industry to pursue those. 2007: Begin implementing partnerships with industry toward zero waste goals.
<i>The Bigger Better Bottle Bill</i>	Generate \$75 million in revenues.	2004: Advocate for the passage of the Bigger Better Bottle Bill. 2005: Plan for redemption centers in NYC
<i>Changing the Way We Pay for Garbage Services: Pay As You Throw (PAYT)</i>	Reduces waste stream; generates revenue for zero waste programs; incentive to reduce and recycle.	2005: Begin planning effort for institutions and city agencies 2006: Complete plans for program roll-out to institutional

		<p>sector; outreach & education; start waste audits/technical assistance; implement larger fines for institutions; target several city agencies for piloting shared savings program</p> <p>2007: Begin institutional PAYT program</p> <p>2008: Using lessons learned from pilots, rollout City agency modified “PAYT” program.</p>
<i>PAYT – 1-3 Family Residential</i>	Reduces waste stream; generates revenue for zero waste programs; incentive to reduce and recycle.	<p>2005: Inform homeowners of costs of waste disposal system</p> <p>2006: Perform pilot test in five districts (one per borough)</p> <p>2007: Expand pilot to all low density districts in one borough; plan for roll out in other boros</p> <p>2008: Implement PAYT in all low density districts</p>
<i>PAYT – Multi-Family and High Rise Residential</i>	Reduces waste stream; generates revenue for zero waste programs; incentive to reduce and recycle.	<p>2005-2007: Task Force deliberations and implementation recommendations for pilots.</p> <p>2008: Begin pilot scale implementation in select districts (one per borough), including use of locking containers where rats are a priority problem.</p> <p>2009: Using lessons learned, expand pilot to additional medium and high-density districts, while continually working to solve problems that arise.</p> <p>2010: Report on the Task Force deliberations and the results of pilot projects; decide appropriate next steps.</p>

10.

Legislation and Regulation

A comprehensive legislative and regulatory framework is needed to support a zero waste future for New York City. Not all public policy requires legislation and an enormous amount of change can occur under the leadership of the Mayor and Commissioners, if they are committed to zeroing out waste. However, in some cases achieving strong zero waste programs will require new regulations and new laws. The City has jurisdiction to propose and pass new laws at the municipal level. The City also maintains a presence at the state and federal level to advocate for legislation it deems in its interest.

This plan does not dictate the details of the actions proposed, but rather identifies the areas that should be addressed to support a zero waste future and suggests timeframes for their implementation. The details should be developed and fully aired through stakeholder meetings, public hearings, and other means of public input and involvement.

Some of the most important legal and regulatory changes needed include:

- Zero Waste Legislation/Resolution: to establish a zero waste goal and direct the city to begin planning for it. A zero waste resolution has been introduced in the City Council.
- Strengthen the City's Recycling Law, LL 19, the State Solid Waste Management Act and the City's Commercial Recycling Law, LL 87: to establish aggressive, mandatory performance targets and to be consistent with a zero waste goal.
- Comprehensive Government Procurement Legislation: to use the city's purchasing power to create markets for recycled, reused and waste preventing products. The federal government has made real strides in this area and has produced purchasing guides for use by state and local governments.
- A bigger better bottle bill for New York State: to reduce the amount of waste the city must handle, and generate more than \$75 million annually to finance New York City zero waste programs (Gitlitz, 2004).
- Extended Producer Responsibility legislation: to ensure that the producers of products bear the financial burden for their entire life cycle, including disposal and/or recycling, rather than local governments; immediately target toxic or problem products like electronics, carpets, fluorescent bulbs and other mercury containing products, batteries, and tires. This kind of legislation can be passed at all levels of government-city, state and federal.

- **Legislate Market Development:** to establish mandatory minimum recycled content for products like fiberglass insulation, plastic bags, and plastic and glass bottles. The City can create demand for our recycled materials in this way.
- **Make legislative or regulatory changes to remove barriers to reuse:** Address procurement regulations, building code barriers and low-income housing financing guidelines that restrict the use of reused goods, and enable agencies to donate reusables to not-for-profit organizations.
- **Draft building code requirements to enhance opportunities for recycling in multi-family buildings:** provide ample recycling space and/or innovative equipment to facilitate storage and sorting of recyclables.
- **Establish export and disposal bans as the recovery infrastructure develops for various products;** prohibiting disposal of specific materials at transfer stations destined for landfills and incinerators.
- **Establish an incentive and deposit system to reduce, reuse, recycle and compost waste in two categories—**1) special events like street fairs and 2) new construction, demolition and renovation projects. Special event organizers and building contractors would make a substantial deposit when a project begins. The deposit would be returned only when the party demonstrates that it has met targets for prevention, recycling, reuse and composting.
- **Eliminate federal virgin materials subsidies:** The US Government provides \$2.6 billion in virgin materials subsidies, such as oil and gas depletion allowances and below cost timber sales, every year (GrassRoots Recycling Network, 2000) that make virgin materials artificially cheap, at the taxpayer's expense, and thereby make recycled materials and the companies that use them less competitive on the open market.

This section provides more detail on the policy actions outlined above.

Setting the Context for Zero Waste Planning

Local -- Set a Zero Waste Goal

The City Council could set the context for the City's next Solid Waste Management Plan by passing a resolution or law establishing a zero waste goal, (that is a goal of reducing NYC's waste exports to zero through prevention, reuse, recycling, and composting,) and by directing the City to have that goal guide its planning. The states of California and Wisconsin, as well as the Cities of Toronto (ON), San Francisco and San Luis Obispo (CA), Del Norte County (CA), and the Town of Carboro (NC), have all adopted zero waste goals.

Implementation Schedule:

2004: Pass a zero waste local law or resolution.

Local– Update the City's Recycling Law, Local Law 19

Many stakeholders agree that the City's recycling law, originally passed in 1989, needs to be updated to better reflect current circumstances. The landmark law mandated that the city meet certain tonnage diversion targets. The tonnages were intended to reflect the percentages of

diversion that the city was striving for. The March 2003 report of the New York City Joint Recycling Task Force recommends that the City revise its tonnage requirements after examining recycling laws and practices in other cities. While the dates to achieve the 1989 Recycling Law's goals have certainly slipped and need to be revised, the tonnage requirements should not be changed. Operating under a zero waste goal, the City will need to expand the materials targeted for recycling – particularly organic waste, which has been shown in communities around the country to increase recycling rates dramatically.

The mandatory nature of Local Law 19, the City's Recycling Law, must be preserved while it is revised to codify many of the critical program elements described in this report that support the zero waste goal. The revised law should incorporate a zero waste goal, as well as implementation plans to reach that goal in the near term, intermediate term and long term periods. It should require progress reports from City agencies on economic development, procurement and zero waste programs. The revisions to Local Law 19 should be carefully coordinated with the solid waste management planning process and should ensure that waste prevention, reuse, recycling and composting form the basis of the City's long-term waste management strategy. Consideration should also be given to putting some teeth into the Solid Waste Management plans the City develops. As we discuss below, the State Solid Waste Management Act is not readily enforceable and since the City's first plan many important milestones were missed. The City could make solid waste management plans subject to local law and thus local enforceability. This change could be made as part of modifications to LL 19 or in another bill.

Implementation Schedule:

2005: Begin hearings and dialogue on updating Local Law 19, and making solid waste management plans subject to local law.

2006: Pass legislation.

State -- Strengthen the Solid Waste Management Act

The New York State Solid Waste Management Act (NYSSWMA) is more than a decade old and in need of revision. While it set diversion targets for recycling and waste prevention programs, they were not readily enforceable. If a city does not meet the diversion target the State can withhold permits for disposal facilities, but there are no other consequences. Since many communities do not own their own disposal facilities, this enforcement mechanism is ineffective.

Statewide enforceable legislation to establish a New York State zero waste goal and aggressive 20-year milestones for communities to meet that goal (or close to it) would be very helpful. While this report proposes ways to move the City toward a zero waste goal, the assistance and support of state government would be welcomed in achieving the goal.

The new State act should also be more readily enforceable. California's state law, AB 939, offers a strong model for New York. That law required communities to plan for and meet diversion goals of 25 percent by 1995 (meaning diversion away from disposal) and 50 percent by 2000. Communities that did not achieve those goals were subject to a fine of \$10,000 per day for their lack of compliance. (In the case of New York, a sliding scale of fines may be preferable,

with smaller fines for smaller towns and larger fines for major cities.) California's law, AB 939, also created the California Integrated Waste Management Board to guide the state's programs in this area. Having achieved the 50 percent diversion target in AB 939, the Board recently adopted a zero waste goal. New York could adopt/pass a law like California's law, which is mandatory with specific milestones and provides extensive support for various innovative zero waste programs.

In addition to aggressive and enforceable targets, a new state Solid Waste Management Act should address:

- Specific targets for waste prevention, reuse, recycling and composting;
- Strong government procurement programs (see below), particularly waste preventing procurement;
- Disposal surcharges at landfills and incinerators to finance recycling and waste prevention;
- Product and shelf labeling of waste preventing, recycled and recyclable products;
- Waste prevention, reuse, recycling and composting education;
- Banning disposal of recyclables and compostable organic materials, as has been planned in the European Union, because the methane gas released as organics break down in the landfills contributes to global warming and because organics can be composted to create a valuable soil amendment (See Chapter 4, Composting).

Additionally, in order to be certified as complete by the State, all plans issued by municipalities should contain sufficient number and quality of planning milestones in every year of the plan to make reasonable progress towards the established waste prevention, reuse, recycling and composting goals.

Implementation Schedule:

- 2005: Begin hearings and dialogue regarding modifications to NYS's Solid Waste Management Act.
- 2007: Pass legislation to improve the NYS SWMA.

Local -- Establish Strong Government Procurement Programs

While the City could make substantial inroads to support a move to zero waste through voluntary affirmative procurement practices, strong government procurement legislation would ensure that the government's purchasing power is fully harnessed to support zero waste. The current proposed procurement legislation, Intro 89 of 2004, is a good start, but it does not include all the provisions necessary to support a zero waste future. Therefore, a more comprehensive bill or set of bills should be drafted. The legislation should require compliance by City agencies and large contractors, and include the following provisions:

- Ensure the removal of specifications that create barriers to the procurement of environmentally preferable products (including waste preventing, reused, recycled and composted, as well as less toxic products).
- Specify requirements for the use of recycled glass in public projects -- for example as road aggregate, as a sandblasting medium, and as a filter medium. The NYS Thruway Authority has adopted specifications using crushed glass as aggregate that NYC could immediately adopt on many public works projects (Grober, 2002).

- Specify requirements for the use of other recycled products, such as plastic lumber, paper, and the more than 50 other products included in the US EPA's Comprehensive Environmentally Preferable Procurement Guidelines.
- Increase recycled content levels for recycled products purchased by the City over time.
- Establish preferences for products that are designed to be reused, refilled, recharged, repaired and/or recycled; for products that use returnable packaging or are not excessively packaged; and for waste preventing products (e.g. more durable and long lasting products).
- Develop, plan and establish procurement requirements for prohibiting purchase of the most toxic chemicals by the City and for substituting non-toxic or least toxic chemicals. This will reduce workers' and the public's exposure to toxics during use, and during handling of waste.
- Write requirements for City contracts specifying that the producers of certain products, such as carpets, electronics, batteries and mercury containing products, must take their products back at the end of their useful life.
- Establish a preference for leasing products where possible.
- Develop analyses of life cycle costing for major City purchases, so that products with the lowest cost over their useful life are favored over those with lower up-front costs.
- Codify and expand NYC agency waste prevention practices outlined in the 1996 Mayoral Directive.
- Establish requirements for new buildings and construction projects to meet US Green Building Council's Leadership in Energy and Environmental Design (LEED) standards and for rehabilitation and retrofit projects to utilize the Department of Design and Construction's High Performance Building Guidelines.
- Require that plans for new buildings and construction projects be assessed to determine whether demolition and new construction are needed, or whether rehabilitation is possible; also provide preferences for building deconstruction contractors.
- Establish contract requirements for vendors of construction and renovation services to document the reuse, recycling or composting of the materials generated during a project.
- Provide for adequate reporting and enforcement provisions to ensure compliance.

Implementation Schedule:

2004: Draft needed bills to create strong environmentally preferable procurement policy for the City; hold hearings to develop comprehensive procurement legislation.

2005: Pass comprehensive procurement legislation.

Local -- Strengthen Commercial Recycling & Create Waste Franchise Districts Citywide

The City should amend Local Law 87, the commercial recycling law, to make it more enforceable. Specifically, it should require that commercial carters make recycling services available to their customers for materials including, but not limited to, scrap metal, paper, glass, and plastic containers. Both the list of materials targeted and the required services should be expanded to include reuse and composting, as the infrastructure for these programs and materials is developed, as outlined in other sections of this plan. In addition, as the infrastructure develops, carting rate caps for recyclables and compostables should be reduced to provide incentives for participating in recycling.

The City should expand Local Law 42 §16-523 to enable Citywide waste franchise districts and thus reduce truck traffic on City streets. (See Chapter 8, Transportation).

Implementation Schedule:

2005: Advance legislation requiring commercial carters to offer expanded recycling services.

2006: Research policy options to create additional incentives/regulations for commercial recycling, including lower carting rate caps for recyclables. Pass legislation to set-up waste franchise districts citywide.

2007: Implement new policy options to promote commercial recycling.

Improving Materials Diversion and/or Raising Revenues

State -- The Bigger Better Bottle Bill

New York City should become a strong advocate for passage of the Bigger Better Bottle Bill (A3922-A and S1696-A) currently pending before the state legislature. The bill would expand the most successful recycling program in New York's history – the deposit/return system in place for beer and soda. The current system effectively captures 75 percent of the state's cans and bottles covered by the program. The new bill would expand the system to include non-carbonated beverages, such as juice drinks, sport drinks, bottled water, teas, and other so-called "new age beverages." In so doing it will remove an additional 3.4 million containers from the waste stream statewide, about half of them in NYC. The bill will also enable the state to assume control of the unclaimed deposits that are currently held by bottlers and beverage distributors and use them to fund reduction, reuse, recycling and composting programs. Under an expanded bill, these unclaimed deposits could top \$179 million annually. If the deposits collected in NYC were made available to City government, more than \$75 million would come to New York City (Gitlitz, 2004). One important use for this money would be the building of redemption centers for all types of bottles, so that consumers can redeem all their nickels in one place, instead of needing to return to several different stores. New York City was a critical force behind the passage of the first bottle bill, and given the substantial potential benefits and revenues, the City should be again with the Bigger Better Bottle Bill.

Over time, increasing the deposit to keep pace with inflation will ensure that the program continues to provide sufficient incentives for returns. As such, the city should periodically advocate for legislation to increase the deposit.

Implementation Schedule:

2004: Advocate for the passage of the Bigger Better Bottle Bill.

2009: Advocate for legislation to increase the deposit to 10 cents.

2019: Advocate for legislation to increase the deposit to 15 cents.

Local, State or Federal -- Extended Producer Responsibility

Extended Producer Responsibility (EPR) is a policy approach taking hold around the globe. EPR creates a framework that ensures that the manufacturer or brand owner is financially

responsible for its product and/or packaging throughout its entire life cycle, including eventual recycling or disposal. EPR includes the cost of ultimate disposal in the cost of the product, so that the consumer pays less for products that are more easily recycled and less wasteful. Furthermore, policies promoting EPR have been a driver in getting manufacturers to design products for recyclability and to reduce or remove toxic chemicals, since recyclable and less toxic products are generally cheaper to manage at the end of their lives. Most importantly, EPR ensures that products and packaging are responsibly recycled or disposed of at no cost to the taxpayer.

There are many EPR models around the world. The Bottle Bill's deposit/return system is one form of EPR. In Europe, EPR systems are in place for packaging, electronics and automobiles (Fishbein, 1996). In Ontario, Canada, a quasi-EPR system finances the curbside recycling program (Miller, 2004).

In most cases, EPR requires manufacturers and/or brand owners to pay into a system, usually managed by an independent third party, to recover a class of products (e.g., electronics) or packaging. EPR can also generate revenue for the municipality by requiring the third party to pay the costs of municipal recycling collections, transportation and processing.

One of the most well documented EPR programs, and arguably the first non-bottle bill EPR system, is the German packaging recycling system, the *Duales System Deutschland* (DSD). The DSD was created in the early 1990s after the Germans passed legislation requiring manufacturers to pay the cost of recycling the packaging material they used. To implement this legislation, German industry established a third party system, the DSD, to manage the packaging recycling program. Manufacturers and brand owners pay into the system based on the materials they used and the costs of recycling those materials. In addition to ensuring that materials were recycled without using government funds, the law immediately resulted in the elimination of millions of tons of unnecessary packaging, like boxes for toothpaste and deodorant and plastic "blister pack" packaging (Fishbein, 1994).

More recently, in 2003, the European Union adopted the Directive on Waste from Electrical and Electronic Equipment (WEEE)(INFORM, 2003). The directive promotes design for repair, upgrade, reuse, dismantling and safer recycling. It requires distributors to take back electronics from consumers at the end of their useful life and producers to finance collection systems. It prohibits the use of toxic chemicals like mercury, cadmium, hexavalent chromium, and brominated flame retardants by 2004 and sets compulsory collection, recycling and reuse targets for manufacturers.

In the US, the Consumer Federation of America (CFA) in 2004 adopted a policy position in support of EPR. New York City should pursue the implementation of EPR policies on the local and state level. While EPR has not been implemented extensively on the local level in Europe or elsewhere, there are no apparent legal restrictions to doing so and the City offers a reasonably large economy of scale – on par with many states. The City should immediately identify viable targets for EPR. Targets could include disposable products (plates, cups, razors, diapers), packaging, electronics, carpets, fluorescent bulbs, and batteries. Using the results of the waste characterization research proposed in Chapter 11, Research and Data-gathering, the City should

identify additional targets for EPR based on materials that remain in the waste stream as comprehensive waste prevention, reuse, recycling and composting programs are implemented.

Local Action Implementation Schedule:

2005: Evaluate findings of waste composition studies; conduct Council hearings on EPR targets.

2006: Advance an EPR legislative package targeting disposable products, consumer packaging and electronics.

2007: Advance an EPR legislative package targeting carpets and mercury containing products (batteries, fluorescent light bulbs, etc.).

2008 and bi-annually thereafter: Based on waste characterization data, identify one additional product/packaging category and advance EPR legislation.

Local or State -- Disposal Bans

When implemented in conjunction with recovery programs, bans on the disposal of recoverable materials are a valuable driver for increased diversion. They have the effect of “plugging the pipe” to ensure that the materials targeted for reuse, recycling and composting do not find their way to landfills and incinerators.

Forty-seven states ban selected materials from landfills and incinerators. Twenty-two states ban the disposal of some or all yard trimmings. These bans were usually put in place as states and localities developed yard waste composting infrastructure and promoted leave-it-on-the-lawn programs. The bans are widely viewed as critical to the success of yard waste composting nationally. In a 1996 survey of state recycling programs, the majority of state managers responding found landfill bans to be an effective tool for increasing recycling (GrassRoots Recycling Network, 2000).

As the city develops the infrastructure and programs to reuse, recycle and compost, it should institute disposal bans on the materials targeted within a year of full operations. The bans should be enforced at the curb, as well as at the transfer station (particularly for commercial generators). This approach will ensure that the materials targeted are not inadvertently wasted. An initial ban should target grass clippings, as proposed in the Chapter 4, Composting, since clippings can be left on the lawn. A grass ban could save the city in excess of \$20 million annually. (For a complete discussion of this topic, see Chapter 4, Composting).

As an enhanced recycling program is implemented, disposal bans can be advanced for the materials targeted for curbside recycling. Similarly, as EPR programs are put in place, the materials they target can be banned from disposal.

Local Implementation Schedule:

2004: Ban the disposal of grass clippings with waste (couple with education on the benefits).

2005 and years thereafter: Advance disposal bans for other materials as effective recovery infrastructure is developed.

Local -- Construction and Renovation Diversion Initiatives

The City of San Jose, CA, has implemented an innovative program to provide incentives for the reuse, recycling and composting of construction and demolition debris. Under that program, the City requires any construction or remodeling contractor to make a deposit as a condition of the building permit. The amount of the deposit is based on the size of the proposed job. The deposit is returned to the contractor at the end of the job only if he/she demonstrates that diversion targets have been met. If not, the deposit is surrendered to the City. Contractor can demonstrate compliance and retrieve their deposits by using a facility that the city has certified to maximize recovery. New York City should adopt this type of system and adapt it to support the zero waste infrastructure proposed in this report. For example, NYC could provide special credit or incentives for those engaged in remodeling and reconstruction to maximize the materials directed to Reuse and Recycling facilities. To ease the transition into this type of system, the Buildings Department would provide technical assistance and information to help contractors identify outlets for their reusable and recyclable materials.

Implementation Schedule:

2005: Initiate contractor education.

2007: Implement deposit program for construction and renovation projects.

Local – Special Event Diversion Initiatives

New York City should also adapt the San Jose construction and demolition deposit model (discussed above) to provide incentives for zero waste, in special events like the Olympics, major sporting events (the US Open), street fairs, parades, festivals, etc. As with the model described above, the size of the deposit could be scaled to the size of the event. To ease the transition into this type of system, the Department of Parks and Recreation (for events in parks) and the Department of Transportation (for concessions and street events) should provide technical assistance and information to help event organizers plan zero waste events and identify outlets for their reusable, recyclable and compostable materials.

Deposits should be devoted to technical and physical support for these programs.

Implementation Schedule:

2005: Initiate special event organizer education.

2007: Implement deposit program for special events.

Supporting Zero Waste Infrastructure

Local or State -- Legislate Market Development

In the 1990's, nine states advanced legislation requiring manufacturers of certain products to use minimum levels of recycled content. These laws spurred investment in manufacturing systems that could handle recycled feedstock. California passed laws requiring a minimum of 35 percent recycled content in glass bottles, 30 percent recycled glass content in fiberglass, and 30 percent recycled content in plastic trash bags. Nine states, including Connecticut, Illinois and Arizona, enacted legislation requiring newspapers to print on recycled paper. However, instead of

enacting minimum content legislation for newspapers, New York State entered into a voluntary agreement with publishers to ensure they would achieve certain targets for recycled content.

Mandatory minimum content laws support recycling programs by creating a market for the materials generated. For example, the laws for newsprint launched billions of dollars of investment into the equipment and facilities needed to recover old newspapers. New York City should pursue such laws immediately for its most problematic materials, most notably glass, and then consider expanding the law to include additional materials.

Local Implementation Schedule:

- 2005: Advance legislation to set mandatory minimum content requirements for glass bottles, fiberglass insulation and other products that can use recovered glass.
- 2007 and thereafter: Identify materials in need of market development and appropriate to minimum content standards and advance legislation to establish standards.

Local -- Remove Barriers to Reuse

There are several regulatory barriers to increasing the reuse of goods and the use of reused goods in New York City. They include:

- Government procurement policies that prohibit the purchase of reused goods;
- Building code requirements that bar the use of reused goods in new or renovated buildings;
- Low-income housing financing guidelines that exclude the purchase of reused items from eligibility; and
- Government regulations that do not permit city agencies to donate reusables to not-for-profit organizations.

The city should perform, or contract with a reuse organization to perform, a thorough review of regulations and policies that keep reuse from reaching its potential and advance a package of reforms that encourage the use of reused items.

Implementation Schedule:

- 2005: Conduct review of policies and regulations related to disposition of materials or purchase of products.
- 2006: Advance a package of regulatory reforms that support reuse. Conduct hearings; pass legislation.

Local -- Establish Reused Item Sales Tax Exemption

Reused product sales outlets sometimes have difficulty competing against new products, particularly those that are manufactured abroad at low cost. A sales tax exemption would give reused items a competitive advantage at a very low cost to the City and State.

Implementation Schedule:

- 2005: Advance legislation to establish an exemption from sales tax for reused items.

Federal -- Eliminate Virgin Materials Subsidies

Each year, the US Government provides \$2.6 billion in direct subsidies for the extraction of virgin materials, such as oil and gas depletion allowances and below cost timber sales (GrassRoots Recycling Network, 2000). These subsidies make virgin materials artificially cheap, at the taxpayer's expense, and thereby make recycled materials and the companies that use them less competitive on the open market. Eliminating these subsidies would support the success of the zero waste businesses proposed in this plan.

Implementation Schedule:

2005: Work with other states, attorneys general, and public interest organizations to develop a network of support for the elimination of virgin materials subsidies.
Advocate in Congress for the elimination of federal subsidies for virgin materials extraction, including the 1872 Mining Law.

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Program	Benefits/Rationale	Implementation Schedule
<i>Set a Zero Waste Goal</i>	Creates context for SWMP	2004: Pass a zero waste local law or resolution
<i>Update the City's Recycling Law</i>	Codifies zero waste plan elements	2005: Begin hearings and dialogue regarding updating Local Law 19, and making solid waste management plans subject to local law. 2006: Pass legislation
<i>Strengthen the State Solid Waste Mgmt Act</i>	Supports zero waste goal and enforces diversion standards	2005: Begin hearings and dialogue regarding modifications to NYS's Solid Waste Management Act 2007: Pass legislation to improve the NYSSWMA
<i>Establish Strong Government Procurement Programs</i>	Reduces waste and associated costs; supports recycling market development	2004: Draft needed bills to create strong environmentally preferable procurement policy for the city; hold hearings to develop comprehensive procurement legislation 2005: Pass comprehensive procurement legislation
<i>Strengthen Commercial Recycling & Create Waste Franchise Districts Citywide</i>	Cost savings and business retention; improved commercial recycling infrastructure.	2005: Advance legislation requiring commercial carters to offer expanded recycling services. 2006: Research policy options to create additional incentives/regulations for commercial recycling, including lower carting rate caps for recyclables. Pass legislation to set-up waste franchise districts citywide. 2007: Implement new policy options to promote commercial recycling.
<i>Bigger Better Bottle Bill</i>	Increases revenue and diversion	2004: Advocate for the passage of the Bigger Better Bottle Bill 2009: Advocate for legislation to increase the deposit to 10 cents 2019: Advocate for legislation to increase the deposit to 15 cents
<i>Extended Producer Responsibility</i>	Manages materials with no taxpayer dollars; encourages design for recyclability and low toxicity.	2005: Evaluate findings of waste composition studies; conduct Council hearings on EPR targets 2006: Advance an EPR legislative package targeting

		<p>disposable products, consumer packaging and electronics</p> <p>2007: Advance an EPR legislative package targeting carpets and mercury containing products (batteries, fluorescent light bulbs, etc.)</p> <p>2008 and bi-annually thereafter: Based on waste characterization data, identify one additional product/packaging category and advance EPR legislation</p>
<i>Disposal Bans</i>	Increases diversion of materials targeted for recovery programs.	<p>2004: Ban the disposal of grass clippings with waste (couple with education on the benefits)</p> <p>2005 and years thereafter: Advance disposal bans for other materials as effective recovery infrastructure is developed</p>
<i>Construction and Renovation Diversion Initiatives</i>	Provides incentive to reuse, recycle and compost as much C& D material as possible	<p>2005: Initiate contractor education</p> <p>2007: Implement deposit program for construction and renovation projects</p>
<i>Special Event Diversion Initiatives</i>	Provides incentive for event organizers to reuse, recycle and compost as much as possible.	<p>2005: Initiate special event organizer education</p> <p>2007: Implement deposit program for special events</p>
<i>Legislate Market Development</i>	Supports recycling program; spurs investment in recycling-based manufacturing	<p>2005: Advance mandatory minimum content legislation for products that can use recovered glass</p> <p>2007 and thereafter: Identify materials in need of market development and advance legislation to establish minimum content standards</p>
<i>Remove Barriers to Reuse</i>	Greater diversion of reusables; reduced costs to key sectors	<p>2005: Conduct review of policies and regulations related to disposition of materials or purchase of products</p> <p>2006: Advance a package of regulatory reforms that support reuse. Conduct hearings; pass legislation</p>
<i>Reused Item Sales Tax Exemption</i>	Improves competitiveness of reuse industry.	<p>2005: Advance legislation to establish an exemption from sales tax for reused items</p>

<i>Eliminate Virgin Materials Subsidies</i>	Makes recycled materials more competitive	2005: Work with other states, attorney generals, and public interest organizations to develop network of support for the elimination of these subsidies Advocate in Congress for the elimination of federal subsidies for virgin materials extraction, including the 1872 Mining Law
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11.

Research and Data Gathering

The success of waste prevention and recycling in New York City has been limited by inadequate information and analysis. Data gathering and research enable program managers to assess and evaluate zero waste programs. Continual evaluation and iteration of programs facilitates improved performance and increased waste diversion.

In some cases the City has functioned without basic information. The Local Law that required DSNY to conduct a commercial waste study that would determine how much commercial waste the City is actually producing, was a response to this lack of necessary information for solid waste planning. In some areas, like program costs, public information gaps remain. DSNY has changed the methods it uses from year to year, making it impossible for anyone to comprehensively evaluate costs and provide oversight. Research has too often been conducted without public input, adequate study design and methods, or appropriate sharing of findings in a timely fashion.

Valuable information and research, when completed, is frequently allowed to gather dust, rather than being used to provide feedback to programs and policy decisions. For example, Science Applications International Corporation completed a series of excellent reports on waste prevention for DSNY. One of these reports identifies millions of dollars in potential savings for City agencies—yet little follow-up has occurred to realize these savings (Science Applications International Corporation, NYC Sen\$e, 2000). There is currently no mechanism that requires DSNY or other departments to report research findings or what they intend to do with them. The Mayor's Management Report could be modified to fulfill this function.

Other sections of this report recommend that a variety of research and pilot projects be pursued to gain better information on everything from multi-family recycling to commercial waste. A listing of these projects is provided at the end of this chapter. In all cases, the City should structure research and pilot projects so that they learn about, analyze, pilot test, and optimize options and strategies to determine how -- not whether -- to best implement zero waste programs.

To ensure that research is valuable and useful, it must address the following key elements:

- Research projects should be carefully designed to produce clear answers to research questions and identify paths to move forward, not simply to justify the City's preferred actions;

- Development and execution of such projects should involve key stakeholders and provide a means for public input when the study is being designed, and before it is finalized;
- Where appropriate, research projects should be performed by universities, consultants, not-for-profit institutions, and/or local businesses;
- All research projects and pilots should include peer review by academics and experts and should use scientific methods;
- Research projects and the information they generate must be completely transparent and available for public review;
- Research reports should include why the research was done, how it was done, all relevant findings, and agency or Mayoral recommendations arising from findings;
- All research findings should be used to improve effectiveness and incorporate lessons learned for better zero waste programs.
- Regular, recurring information needs should be addressed by consistent and transparent methods.

The City's next Solid Waste Management Plan in 2014, must a close look at its progress toward zero waste as required by the NYS Solid Waste Management Act. At that point, the City should consider what sectors and methods need to be addressed more aggressively to achieve zero waste in the decade that follows.

Key fundamental research and information needs include:

- Waste Characterization study: frequent and comprehensive analyses of the materials that are entering the waste stream, as well as what is being diverted by zero waste programs.
- Accurate, standardized data, that is publicly transparent and useful for implementing and evaluating all zero waste programs--including clear and decipherable information on cost and performance of various zero waste programs, as well as of waste disposal.
- Incremental Cost Analysis to ensure that programs are compared on their net costs, not gross costs, which can distort the real competitiveness of zero waste programs.
- Life Cycle Costing in Purchasing, so that products that cost more initially, but are more durable or longer lasting, can compete for City contracts.

Waste Characterization Studies

The most critical piece of information to plan for a zero waste future is a detailed and accurate waste characterization study for all waste streams, including residential, institutional and commercial generators. The City must understand the composition of its waste. The waste characterization program described below will create a consistent flow of information on what material is in our waste stream and what is diverted, so that planners can evaluate the existing programs and design new programs to divert remaining materials. In effect, the program creates a feedback loop that allows the City to constantly evaluate its progress toward zero waste, measuring success and improving diversion.

DSNY recently entered into a contract with a consulting firm, to produce a detailed waste characterization study of the residential and institutional sectors. Unfortunately, the recently completed commercial waste study focused on detailed characterization of this waste stream, but on facilities, operations and broad categories of waste. This leaves a large gap for any zero waste plan.

Any waste characterization study should identify materials that shouldn't be present, like hazardous waste, as well as materials that the City could take steps to prevent from entering the waste stream. Durables, nondurables (including disposable items), preventables, reusables, recyclables, packaging, and compostables should all be identified by weight and volume. Products and packaging posing particular problems should simultaneously be identified as possible targets for Extender Producer Responsibility (EPR) legislation. Greater attention needs to be paid to quantifying various types of organics in the waste stream and identifying which are most suitable for recycling, e.g., scrap wood, and which would be best composted, e.g., food scraps.

To ensure that these analyses inform program planning and lead to increased diversion, the current waste characterization study, and any others, must be followed up on and confirmed through ongoing evaluations at the curb and at transfer stations. Frequent spot inspections in different districts, at institutions and transfer stations can provide valuable information about what is in the waste stream.. This was illustrated clearly when members of the public toured City-owned marine transfer stations and found truck loads almost totally comprised of reusable furniture and recyclable cardboard being tipped into barges (Warren, 2000). Moreover, progress on zero waste will be fostered by engaging reuse, recycling, composting and prevention organizations to collect and report data on the materials they divert.

Full characterization studies addressing all streams (residential, institutional and commercial) and including many categories of preventable waste, reusables, recyclables and compostables should be performed every five years. These will be extremely valuable in program planning and evaluation by enabling the City to determine how well it is capturing recyclable, reusable, durable and compostable materials, and how well it is preventing needless packaging and disposables. Characterization studies will also identify unanticipated new materials, products or packaging entering the waste stream. Future characterization studies should also address the toxic components in the waste stream and be used to develop strategies to eliminate them.

Implementation Schedule:

2005: Complete waste characterization study, including study of commercial waste.

2006-2008: Perform frequent spot checks to verify and update characterization data; gather diversion data from zero waste operations.

2009: Perform a full waste characterization study, including toxic components of the waste stream.

2010-2013: Perform frequent spot checks to verify and update characterization data; gather diversion data from zero waste operations.

2014: Perform a full waste characterization study.

2015: 2014 detailed waste composition analyses used to develop programs, regulation and legislation; Modifications to all programs in order to reach 2024 ZERO GOALS.

- 2015-2018: Perform frequent spot checks to verify and update characterization data; gather diversion data from zero waste operations.
- 2019: Perform a full waste characterization study; 2019 Waste composition analysis informs plans for final 5 years in order to reach ZERO WASTE
- 2020-2023: Perform frequent spot checks to verify and update characterization data; gather diversion data from zero waste operations.
- 2024: Perform a full waste characterization study.

Accurate, Standardized, Useful and Publicly Transparent Information

If we are to accomplish even interim goals toward a zero waste future, the City must develop consistent, accurate and reliable methods for gathering and reporting information to the public and elected officials. Over the years since the Recycling Law was passed in 1989, various reports and solid waste plans have included almost annual changes in basic methods of gathering and presenting information. This problem would not have occurred if the *Waste Plan* model for costs developed by the Tellus Institute, had not been subsequently abandoned after the 1992 Solid Waste Management Plan was completed (City of New York Department of Sanitation, 1992). If we had continued with *Waste Plan*, we would have a full decade of consistent cost information. In addition, the kinds of information we collect must be useful for developing, improving and evaluating all zero waste programs. For example, measurable outcomes must be developed for use in the Mayor's Management Report. There should include outcomes not exclusively related to traditional solid waste handling, but also to market development for recyclable and reusable materials, such as the monetary value of goods transferred for reuse.

In addition to developing new information, planning for zero waste would be greatly enhanced by making more information that DSNY currently collects available and transparent. At the November 2002 Roundtable on the Future of Recycling in NYC, a panel of national experts was unable to provide detailed recommendations on how to improve the cost-effectiveness of recycling because little information was available, and much of what was available was contradictory, e.g., differing collection and program cost estimates from the City's Office of Management and Budget (OMB) and DSNY (Center for Economic and Environmental Partnership, 2002). A new analysis by the City's Independent Budget Office has added to the confusion regarding true costs of these programs (New York City Independent Budget Office, 2004).

To correct these problems, the City must provide detailed, accurate, and decipherable data to the public on the costs of all zero waste programs, including recycling, reuse, composting and waste prevention, as well as trash handling and disposal. Publicly available data for all zero waste programs should include, at a minimum:

- Regular Materials Markets Updates (what, where, who, how much capacity, etc.) for all reuse, recycling, remanufacture and other end user industries. This should include service voids, such as lack of composting capacity.
- The truck shift costs (labor, maintenance, etc) for collection and transportation.

- The “relay” costs, or the labor and transportation costs, of transporting waste and recyclables to long-distance facilities, such as transfer stations and incinerators in New Jersey.
- An accounting of overtime expenses allocated to different programs.
- Detailed Information on truck routes, including kinds and amounts of materials collected and types of trucks used on particular routes.
- Information on collection efficiencies (i.e., how full the trucks are at the end of a route) and compaction rates, etc.
- Direct collection costs per ton and by volume for waste and recycling (with no overtime included here, since overtime is a management decision).
- Total debt service and administrative costs and how they are allocated to different programs.
- Disposal and/or processing costs per ton.
- Revenues received from recyclable materials.
- Total waste cumulatively prevented through waste prevention from previous years (where quantifiable) should be included in the evaluation of relative costs of zero waste programs vs. trash disposal. For example the NYCHA Leave it on the Lawn program continues to benefit the City year after year and those benefits and savings should be captured in any economic analysis performed.

Only with this level of data can advocates, consultants, experts, and elected officials offer valuable insight on how to contain costs and enhance efficiencies. Furthermore, this information will provide more specific indicators of participation rates, capture rates, and other important data that can be used to identify low-performing neighborhoods and design appropriate education, enforcement, and other measures to improve performance.

Implementation Schedule:

2005: Identify information needs, standardized methods and useful milestones to be used for regular reporting on progress toward zero waste: include strong public participation in this effort.

2006 and beyond: Provide regular reporting of accurate, standardized, useful and publicly transparent information through various venues. Annually release detailed and decipherable data on program costs and performance.

Incremental Cost Analysis/Full Cost Accounting

The US Environmental Protection Agency recommends a method for full cost accounting that is based on incremental costs (Government Finance Officers Assoc. & US Environmental Protection Agency, 2000). The federal agency encourages states and municipalities to use the same accounting method so that costs for various cities and states can be compared. Incremental cost analysis is generally accepted in the national arena as a fair and accurate way to compare different solid waste management options. These methods measure a program’s total direct expenses against the savings realized in other operations as a result of the program, to arrive at a net cost. The City should compare zero waste programs to solid waste handling on an incremental cost basis, not based on fully loaded costs, as is the current practice.

For example, an incremental cost analysis of the recycling program would consider direct recycling collection and processing costs, as well as disposal cost savings resulting from diversion and revenues from the sale of recyclable materials, to derive a net cost of the recycling program. The City should deal primarily with direct costs and savings when evaluating zero waste programs. This would avoid the year to year inconsistent methods that have also allowed a greater proportion of debt service, administrative and solid waste planning costs to be “assigned” to the recycling program.

One major problem with the comparative analysis of curbside recycling vs. waste collection and disposal costs is that it fails to account for waste prevention activities already implemented, but costing nothing today. For example, the New York Housing Authority (NYCHA). Leave It on the Lawn program continues to divert 8,000-15,000 tons of grass clippings annually from the waste stream (City of New York Department of Sanitation, 2001). As we move toward a Zero Waste future, we should be accounting for all zero waste program benefits that can be quantified, not just curbside recycling. A similar situation relates to the separate containerized recycling program – costs on this program are no longer supplied to us. Yet DSNY reported in the early 1990s that containerized recycling was much less costly than curbside. Such lack of reporting means that we cannot take advantage of what could be much more cost-effective collection systems. The City should conduct incremental cost analysis for the combination of all zero waste programs vs. waste collection and disposal. Failing to properly account for such benefits means that waste prevention will continue to be underfunded.

Furthermore, the Mayor’s Management Report and other reporting tools should make use of the standardized EPA methods and add comparisons to the performance of other cities.

Implementation Schedule:

2004 and beyond: Utilize EPA full cost accounting methodology to determine incremental cost of all zero waste programs combined.

Life Cycle Costing in Purchasing

Procurement of environmentally preferable products would be enhanced by the use of life-cycle costing. That is, the purchaser analyzes a product’s value not only on the upfront costs, but also on its costs over the entire life cycle. This method ensures that durable and longer lasting products are more competitive than disposable and more wasteful products. New York State adopted a life-cycle costing requirement for state agency purchases in 2000 (New York State Laws of 2000). The City’s consultant, SAIC, also looked at life cycle costing analysis (Science Applications International Corporation, Life Span Costing Analysis Case Studies, 2000).

Implementation Schedule:

2005: Establish life-cycle costing policy for agency purchasing.

Recommended Research and Pilot Projects

The City should pursue research projects including, but not limited to, the following:

Chapter 1: Waste Prevention

- Develop specifications and identify environmentally preferable products for City purchases for a product guide and website;
- Assess current City agency purchases of hazardous materials and recommend safer alternatives where feasible; hire two coordinators to promote the program to City agency purchasers (one coordinator would have specific expertise in toxics).
- Complete waste audits that identify current agency and institutional practices regarding waste and purchasing and opportunities for improvements.
- Gather information, pilot test and survey to address research and information needs identified by various waste prevention coordinators in the Waste Prevention chapter—schools, HHC, etc.
- Study the feasibility of installing dishwashing systems and using reusable dishes or transitioning to the use of compostable service ware where dishwashing is not feasible in agency and institutional cafeterias.

Chapter 2: Reuse

- Better understand the existing network of reuse businesses in NYC.
- Pilot collection of durables that preserves quality of goods collected and evaluate best scheduling frequency.
- Develop “Seal of Approval” for reusable goods.

Chapter 3: Recycling

- Support market development efforts.
- Improve recycling collections efficiency and cost-effectiveness by testing various compaction ratios for impacts on efficiency, quality and marketability of materials, by testing single stream collection, and by testing new routes and truck technologies.
- Evaluate and pilot test different options for public space recycling and develop an implementation strategy.
- Identify the best methods of improving multi-family recycling in different housing stocks and pilot test and implement improved programs and strategies.
- Identify and pilot test incentives for City agencies, such as shared revenue/shared savings models used at the federal level.
- Identify and correct problems with commercial recycling.
- Study and pilot test alternative means of increasing the availability of special waste (i.e., household hazardous waste) collections.

Chapter 4: Composting

Pilot test and implement methods to decrease collection costs for the Christmas tree program.

- Pilot test options and develop an implementation strategy for expanding yard debris collections to the spring and summer seasons.
- Identify the best composting technologies.

- Determine the capacity needs and operational issues of food scrap composting facilities.
- Pilot test source separated organics collection and mixed waste composting collections, including impacts on compost quality and collection costs, and develop an organics collection implementation strategy. Examine the impact of locking bins to control rats. Include an evaluation of the success and possible expansion of organics drop-offs.

Chapter 5: Economic Development

- Develop model program for NYC with adequate staffing and financial resources
- Provide multiple services in one place- a “virtual industrial park”
- Develop traditional industrial parks housing various complementary zero waste businesses.

Chapter 6: Education

- Evaluate all educational programs and provide feedback. Include consumer opinion research on public perceptions of reuse, recycling, waste prevention, and composting to inform zero waste programs and campaigns; and university-based educational research-to evaluate success of targeted campaigns and identify barriers to public participation.
- Block Leader/Building Leader Program: to pilot test strategies for recruiting and utilizing zero waste education volunteers.
- Evaluate success of consumer campaigns and modify accordingly.

Chapter 7: Enforcement

- Evaluate whether enforcement efforts are achieving desired results in terms of modifying behaviors, particularly at agencies and institutions and multifamily dwellings.

Chapter 8: Transportation

- Make the municipal collection system more efficient and cost-effective through better routing and collection frequency adjustments.
- Pilot test and develop an implementation strategy for commercial collection franchise districts.
- Identify the most viable clean vehicle/fuel options for DSNY fleets, private carter fleets, and marine vessels and develop implementation strategies for each sector.
- Evaluate the feasibility of using existing and proposed rail lines to transport reusables, recyclables and compostables and, if feasible, develop an implementation strategy.
- Pilot test biodiesel in DSNY and MTA fleets and to evaluate the feasibility of a biodiesel production facility in the City; if feasible, develop a strategy to attract a biodiesel production facility.
- Evaluate truck design options for varying for composting, reuse or recycling collection needs.

Chapter 9: Financing

- Pilot test possible Pay As Your Throw (PAYT) systems for different housing stocks and develop implementation strategies targeting each type of housing (i.e., 1-4 family, small multi-family and high rise).

- Evaluate potential for commercial waste franchise districts and appropriate fees.
- Evaluate potential for establishing fees for service.

Chapter 10: Legislation and Regulation

- Assess current government purchasing patterns and contracts; assess purchase of toxic chemicals.
- Evaluate Extended Producer Responsibility (EPR) efforts in other jurisdictions and develop legislation.
- Review policies and regulations (including building codes) related to the disposition, purchase or use of reused materials to identify and eliminate barriers to increased reuse.
- Support legislative and regulatory efforts as needed.

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<p><i>Waste Characterization Studies</i></p>	<p>Provides data on what materials are in the waste stream to inform zero waste programs</p>	<p>2005: Complete waste characterization study, including study of commercial waste. 2006-2008: Perform frequent spot checks to verify and update characterization data; gather diversion data from zero waste operations. 2009: Perform a full waste characterization study, including toxic components of the waste stream. 2010-2013: Perform frequent spot checks to verify and update characterization data; gather diversion data from zero waste operations. 2014: Perform a full waste characterization study. 2015: 2014 detailed waste composition analyses used to develop programs, regulation and legislation; Modifications to all programs in order to reach 2024 ZERO GOALS. 2015-2018: Perform frequent spot checks to verify and update characterization data; gather diversion data from zero waste operations. 2019: Perform a full waste characterization study; 2019 Waste composition analysis informs plans for final 5 years in order to reach ZERO WASTE 2020-2023: Perform frequent spot checks to verify and update characterization data; gather diversion data from zero waste operations. 2024: Perform a full waste characterization study.</p>
<p><i>Accurate, Standardized, Useful and Publicly Transparent Information</i></p>	<p>Enables decision makers, consultants and stakeholders to analyze program performance.</p>	<p>2005: Identify information needs, standardized methods and useful milestones to be used for regular reporting on progress toward zero waste: include strong public participation in this effort. 2006 and beyond: Provide regular reporting of accurate, standardized, useful and publicly transparent information through various venues. Annually release detailed and decipherable data on program</p>

		costs and performance.
<i>Incremental Cost Analysis/Full Cost Accounting</i>	Provides accurate comparison of zero waste and disposal program costs	2004 and beyond: Utilize EPA full cost accounting methodology to determine incremental cost of all zero waste programs combined.
<i>Life Cycle Costing in Purchasing</i>	Favors durable products over disposable and wasteful products	2005: Establish life-cycle costing policy for agency purchasing.

APPENDICES

APPENDIX A**PARTICIPATING INDIVIDUALS AND ORGANIZATIONS ***

Carlos Alecea	Eve Baron
Eddie Bautista	Micaela Birmingham
Frieda Bradlow	Joan Byron
Antonia Bryson	Cecil Corbin-Mark
Kendall Christiansen	Dr. Marjorie Clarke
Elena Conte	Susan Craine
John Culpepper	Christine Datz-Romero
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Katie Falgoust	Stefanie Gitter Feldman
Omar Freilla	Gertrude Gonesh
Laura Haight	Eva Hanhardt
Kimberly Heismann	Christina Hemphill
David Higby	Leslie Hoffman
Neal Kronley	Timothy J.W. Logan
Joan Levine	Eve Martinez
Deborah Masters	Bob Muldoon
Maureen O'Brien	Marta Panero
The Reverend Joe Parrish	John Pearson
Jaime Rivera	Sandra Robishaw
Shannon Stone	Kate Sutter
Kathryn Swan	Nicole Tai
Larry Tilley	Anna Vencenzy
Nancy Walby	

Organizations

Astoria Residents Reclaiming Our World (ARROW)
 Bronx Solid Waste Advisory Board
 Brooklyn Green Party
 Brooklyn Solid Waste Advisory Board
 Bronx Solid Waste Advisory Board
 Citywide Recycling Advisory Board
 615 Community Garden
 Consumer Policy Institute / Consumers Union (CU)
 Earth Pledge

Environmental Advocates of New York
 Federation of Civic Assoc. (SE Queens)
 GrassRoots Recycling Network
 Green Worker Cooperative
 Lower Eastside Ecology Center
 Lower Washington Heights Neighborhood Association
 Manhattan Solid Waste Advisory Board
 Metropolitan Waterfront Alliance
 Morningside Heights / West Harlem Sanitation Coalition
 Municipal Art Society, Planning Center
 Municipal Waterfront Alliance
 Neighbors Against Garbage
 New York / New Jersey Environmental Watch
 New York Academy of Sciences
 New York City Environmental Justice Alliance (NYC EJA)
 New York City Waste Prevention Coalition
 New York Lawyers for the Public Interest
 New York Public Interest Research Group (NYPIRG)
 Nos Quedamos
 OUTRAGE
 Pop Sustainability
 Pratt Institute Center for Community and Environmental Development (PICCED)
 Recycle This!
 Reuse Alliance
 Staten Island Citizens for Clean Air
 Sierra Club (NYC Group)
 South Bronx Clean Air Coalition
 Sustainable Enterprise
 Sustainable South Bronx
 The Planning Center at the Municipal Art Society
 West Harlem Environmental Action (WEACT)
 Williamsburg Watch

PARTICIPATING INDIVIDUALS AND ORGANIZATIONS *

In preparing this report, the authors held a series of meetings to solicit input from organizations with expertise in solid waste matters. All of the organizations who attended these meetings, listed below, support the principles of zero waste. Attendance at these meetings, however, does not imply endorsement of every analysis and recommendation contained in this report.

APPENDIX B

GUIDING PRINCIPLES FOR THE CITIZENS PLAN FOR ZERO WASTE

This Citizens Plan for Zero Waste in New York City is intended to offer a positive alternative to New York City's waste management system, which results in huge quantities of materials and taxpayer dollars being wasted. This plan accepts that disposal will be occurring while positive alternatives are developed and implemented. However, it aims to develop a system in which disposal is not necessary. As a result, the plan does not address disposal, but instead focuses on the programs and policies that will lead to comprehensive waste prevention, reuse and recycling and eliminate the need for waste disposal.

1. The Plan lays out detailed steps or specific actions to achieve a zero waste goal (or darn close to it) by 2024. The City should move as creatively, efficiently and quickly as possible toward a goal of zero waste, in order to reduce disposal costs and overall costs for solid waste management.
2. A comprehensive approach to diversion from the waste stream must address commercial, institutional and residential streams.
3. A zero waste system must minimize environmental impacts and ensure that the burdens and benefits of the zero waste system are equitably distributed.
4. Recommendations must be environmentally sustainable, practically implementable, economically viable, and socially responsible.
5. Zero waste systems should direct materials to their highest value and best end use.
6. A comprehensive plan must include local neighborhood-specific implementation programs as well as policy recommendations for all levels of government.
7. Zero waste systems should strive toward locating handling and processing capacity within the city to the greatest extent feasible.
8. A comprehensive plan must recognize that disposal facilities (landfills, incinerators, gasification facilities, etc) compete directly for financial and material resources with more promising solid waste options- waste prevention, reuse and recycling facilities - undermining a zero waste future. A zero waste plan must therefore direct public and private investment to waste prevention and recycling infrastructure to recover materials and add value, instead of disposal facilities that destroy materials and eliminate their economic value.
9. Zero waste systems should strive to attain the greatest economic development benefit for the city (jobs, increased tax base, etc.).
10. Government resources- personnel, funding and time- must be committed to development and operation of waste reduction, recycling and composting programs and education as preferred solid waste options.
11. A zero waste system should seek to reduce the toxicity of products and packaging through effective government purchasing and extended producer responsibility.

Program	Benefits/Rationale	Implementation Schedule
<i>Waste Disposal Surcharge</i>	Generates revenue for commercial waste prevention programs; increases incentive to reduce and recycle.	2005: Identify the means to implement a commercial waste transfer tax (i.e., regulation, legislation, etc.); establish “set-aside” funding commitment for municipal residential/institutional stream. 2006: Pursue the implementation of a waste disposal surcharge
<i>Franchise Fees</i>	Generates revenue for commercial zero waste programs; enables improved oversight of commercial carting services; reduces truck miles on city streets.	2006: Conduct groundwork to implement commercial franchise system 2007: Propose regulatory changes. Establish districts and fees for franchise system 2008 and beyond: Implement commercial franchise system citywide.
<i>Grants</i>	Generates revenue from state and federal government sources.	2005 and beyond: Establish a zero waste grants unit with appropriate staffing; monitor state, federal and private grant programs; apply for grants.
<i>Fee-for-Service</i>	Generates revenue for services already provided by the city.	2005: Examine options for fee-for-service revenues, including yard debris removal. 2007: Implement other fee-for-service programs as appropriate.
<i>Partnership with Industry</i>	Generates revenue or offsets expenses; engages those who have a stake in our recycling program in helping to finance it.	2005: Research models of industry/municipality partnership toward zero waste goals. 2006: Determine which types of partnership are the most viable and valuable to the city and work with industry to pursue those. 2007: Begin implementing partnerships with industry toward zero waste goals.
<i>The Bigger Better Bottle Bill</i>	Generate \$75 million in revenues.	2004: Advocate for the passage of the Bigger Better Bottle Bill. 2005: Plan for redemption centers in NYC
<i>Changing the Way We Pay for Garbage Services: Pay As You Throw (PAYT)</i>	Reduces waste stream; generates revenue for zero waste programs; incentive to reduce and recycle.	2005: Begin planning effort for institutions and city agencies 2006: Complete plans for program roll-out to institutional

		<p>sector; outreach & education; start waste audits/technical assistance; implement larger fines for institutions; target several city agencies for piloting shared savings program</p> <p>2007: Begin institutional PAYT program</p> <p>2008: Using lessons learned from pilots, rollout City agency modified “PAYT” program.</p>
<i>PAYT – 1-3 Family Residential</i>	Reduces waste stream; generates revenue for zero waste programs; incentive to reduce and recycle.	<p>2005: Inform homeowners of costs of waste disposal system</p> <p>2006: Perform pilot test in five districts (one per borough)</p> <p>2007: Expand pilot to all low density districts in one borough; plan for roll out in other boros</p> <p>2008: Implement PAYT in all low density districts</p>
<i>PAYT – Multi-Family and High Rise Residential</i>	Reduces waste stream; generates revenue for zero waste programs; incentive to reduce and recycle.	<p>2005-2007: Task Force deliberations and implementation recommendations for pilots.</p> <p>2008: Begin pilot scale implementation in select districts (one per borough), including use of locking containers where rats are a priority problem.</p> <p>2009: Using lessons learned, expand pilot to additional medium and high-density districts, while continually working to solve problems that arise.</p> <p>2010: Report on the Task Force deliberations and the results of pilot projects; decide appropriate next steps.</p>

