



*Consultants in Waste Reduction,
Recycling and Composting*

PROJECT MEMO

To: Marjorie Clarke, Manhattan SWAB
From: James Frey, RRS
Date: 4/7/92
Re: Final Report

Attached are five bound copies of the Final Report and one unbound master copy. We have made every effort to respond to the comments received, however, we were not able to meet all demands for additional information either due to lack of time or budget. We believe that the Final Report that you now have best serves the role as an appendix to your Recycle First plan.

As we discussed before, RRS could provide additional services in further development of the plan and the case study report, in reviewing the recently released DOS report or in assisting with further adoption and implementation of the Recycle First plan.

I'm available by phone or fax should the need arise. It has been our pleasure to assist CRAB and the Manhattan SWAB in this important effort. Your work is timely - as I think the case studies have shown. Perhaps the Recycle First plan is a turning point for development of a long term commitment to "reduce, reuse, recycle" strategies for New York City.

RECYCLE FIRST PLAN

APPENDIX: CASE STUDIES SUPPORTING RECYCLE FIRST GOALS

OVERVIEW OF CASE STUDIES SELECTED

This appendix provides descriptions of case studies that demonstrate functional components of the following elements of the Recycle First Plan:

- Comprehensive Recycling and Composting
- Education/Promotion
- Waste Reduction
- Market Development

To assist the reader in understanding material recovery-specific terms, a glossary has been provided as Attachment A of this appendix.

Case Study Selection Methodology

To select appropriate case studies, the following methodology was used:

- RRS identified program subcomponents in each of the target areas of the Recycle First strategy and set these into a matrix which is included as Attachment B, Preliminary Listing of Case Study Components. Following is an example of the program subcomponent details for waste reduction in the Recycle First strategy.

- Information Center
- Waste Prevention Staff
- Residential Waste Prevention Education
- Commercial Waste Prevention Education
- Reuse and Repair Programs
- Purchasing Policies for Waste Reduction
- Commercial/Industrial Waste Audits/Technical Assistance
- Municipal-Industry Cooperative Efforts
- Grass Cycling Program
- Regulations, Incentives, Bans

- Next, RRS identified relevant case study program characteristics that could be easily compiled from available information from RRS in-house resources. These characteristics included:

- Urbanization
- Service Area (Population)
- Year Recycling Program Started
- Union or Private Sector Waste Collection
- Union or Private Sector Recycling Collection
- Union or Private Sector Compost Collection
- Long Term Goal for Diversion
- 1991 Level of Diversion (if known)

- Over fifty programs were then considered at this stage of the analysis. Consideration involved entering the program into the matrix and identifying relevant program characteristics and all program components that matched those included in the Recycle First Plan. RRS then selected, for further screening, programs for each of the target areas that showed strength in that area and had some characteristics similar to New York City demographics, or other overriding attributes that merited further consideration.
- RRS then proceeded to take this first screen set of programs in each target area and short list them by assigning a qualitative "scoring" to each program for each of a number of short listing criteria, as shown in Attachment C, Short List Screen of Case Studies. These short listing criteria differed slightly by target area but generally included the following:

Ease of Implementation
 Diversion Potential
 Application to the Urban Environment
 Track Record
 Program Scope

- To assist with the task of short listing, preliminary phone contact was made with most of the programs being screened. This contact was made to determine the quality and availability of information on the program and to assist in determining whether the program would be a suitable candidate for full case study research. Effort was also made to avoid duplication of programs in more than one target area if possible. At this point in the short listing process, the potential case studies were grouped into three categories.

#1	The first tier candidates for full case study research
Bundle	To be grouped or "bundled" with others as "mini-case studies"
No	Not to receive further consideration #1

Assignment as a #1 or bundled candidate for further research did not necessarily mean automatic inclusion into the final case study set. Some potential case studies were still not pursued due to inadequate information or lack of access to the right people in the time frame of this project. In other cases, a better case study emerged and gained priority status over a previously selected one. Not gaining final inclusion in this case study assessment is not a sign of inferior programs, but more a reflection of the need to limit the number of cases in order to collect quality information within the project schedule.

Summary of Programs Selected and Contact Information

Following is a list of the case studies covered in this document and the contacts or resource materials that provided the program details contained in this appendix.

Comprehensive Recycling and Composting

Collection

Case Study	Contact Information
Seattle, Washington	Lorie Parker, Director, Program Development, Seattle Solid Waste Facility, 710 Second Avenue, Seattle, WA 98104, 206/684-7639 Jenny Bagby, 206/684-7808
Pittsburgh, Pennsylvania	Sean McHugh, Env'l Planning, Maribeth Rizzuto, Recycling Coordinator, 917 City-County Building, Pittsburgh, PA 15219, 412/255-2631
Chicago, Illinois	David Robinson, Recycling Coordinator, Mick Snyder, Dir of Recycling Program and Plan, Streets and Sanitation: 744-4571 Warren Swing, 320 N. Clark, Rm 500, Chicago, IL, 312/744-8110 744-7606 (Comr) 744-3573
Metro Toronto, Ontario	Tim Michael, 439 University Ave, Toronto, Ontario M5G 1Y8, 416/392-8506 City of Toronto: Don Young, 406/392-7721

Processing

Case Study	Contact Information
DuPage County, Illinois	Eric Keeley, Recycling Coordinator, 550 N. Center Ave., Carol Stream, IL 60188, 708/682-7373
American Soils	Pat Kennedy, VP or Rob Young, Pres, PO Box 125, Parlin, NJ 08859, Block 92, Lot 40, Off Burke Road, Freehold Township, Monmouth County, NJ, 908/525-1103

RELEVANCE OF CASE STUDIES TO THE RECYCLE FIRST PLAN

This summary of case studies is provided to demonstrate that the Recycle First Plan represents real-world strategies for diverting material from landfill disposal or combustion. The Recycle First Plan is just that—a plan of action for the future. The case studies provided show how many of the necessary program components are working now in various communities across the U.S., in Canada and in Europe. The case studies show that other components of the Recycle First Plan are emerging as solutions in various locations, and pilots or demonstrations are cited to illustrate the validity of the strategic direction of the plan.

Comprehensive Recycling and Composting

These case studies demonstrate that the components of the Recycle First collection programs are working in selected areas across the U.S. where high labor costs and heavily urbanized working conditions require innovative recycling and composting solutions. Commingled collection of recyclables, bagged collection of wet and dry waste streams, and co-collection of bagged recyclables in the mixed waste stream are operating, either as permanent programs or as pilots.

Processing of loose and bagged commingled recyclables is demonstrated in state-of-the-art recycling facilities. Innovations are emerging in bag breaking technology, co-collection sorting, and wet/dry separation and processing systems, all resulting in the emergence of the integrated Material Recovery Facility or MRF as the centerpiece of an economically sustainable, aggressive four-stream collection, processing and disposal system. The recycling facilities that must be developed now need to be flexible in design to accommodate changes that will emerge in collection and processing technologies, especially as the higher waste diversion goals are targeted. This growth strategy for the recycling collection and processing infrastructure is consistent with the major features and advantages of MRFs and other types of advanced recycling processing facilities.

Education/Promotion

Case studies provided in the targeted performance area highlight the broad scope of programming being applied in large urbanized communities where aggressive waste diversion goals are being adopted. The features of the highlighted programs include high visibility marketing campaigns, comprehensive outreach programs and public information hotlines.

More importantly, these programs are specifically targeted at leveraging broad community support by encouraging adoption of the "reduce, reuse, recycle" perspective in all segments of the residential, commercial and institutional community. A similar level of effort is targeted at regional and state-wide cooperation as well. The outreach and education programs represent the most visible message of leadership that the City will be able to show in supporting the Recycle First Plan.

Waste Reduction

The waste reduction case studies have been assembled into a group of mini-case studies that best demonstrate the multi-faceted approach that is possible through aggressive waste reduction programming as proposed in the Recycle First Plan. Major features include use of economic incentives for waste reduction at the point of generation (household), regulatory bans via local ordinance on certain packaging materials, point of purchase "green dot" information programs supported by manufacturers, voluntary industry adoption of waste reduction approaches to packaging, encouraged by advanced disposal fees on non-recyclable packaging, and targeted public information campaigns coupled with supporting waste prevention and reuse regulations and services.

Market Development

The final set of case studies outlines strategies that large urban centers must pursue to integrate market development with increased recycling goals. This match of new demand to supply is partly a function of the types of regulatory mechanisms highlighted in the waste reduction case studies (e.g., incentives for recycled content) but is also a function of aggressive economic development strategies targeted at industries that can use recycled feedstock.

As a major supplier of material and a major buyer of consumer goods, the New York metropolitan area can and should exercise its market leverage to encourage increased demand for products made with recycled content. In fact, New York City has one of the most important features required for effective public sector action to encourage this market development—a great deal of control over the solid waste and recycling collection systems within its jurisdiction. What is needed is a strategy that builds on this potential market position to create market leverage that can result in a match of demand to meet the City's supply of material generated through the aggressive recycling goals of the Recycle First plan.

COMPREHENSIVE RECYCLING AND COMPOSTING COMPONENT OF THE NEW YORK CITY RECYCLE FIRST PLAN:

CASE STUDIES

This section describes case studies that demonstrate the functional components of the Recycle First Comprehensive Recycling and Composting element. The case studies analyze existing collection processing systems and provide a brief review of emerging systems.

Collection Systems

The following collection programs were studied:

Program	Key Characteristics
Seattle, Washington, Curbside Recycling Collection Program	<p>The Seattle program demonstrates two approaches to collection of commingled paper and commingled containers, either mixed together or separately, and then effectively recovered, processed and marketed. The City contracts with two private haulers, one of whom collects all materials commingled, while the other collects three commingled streams.</p> <p>The Seattle Curbside Recycling Program provides a working model of how a public agency in a large urban city can coordinate, sponsor and leverage public and private sector recycling services for the residential population.</p>
Pittsburgh, Pennsylvania, Blue-Bag Recycling Program	<p>The Pittsburgh program introduces the concept of commingled bagged recyclables being collected separately from solid waste in conventional rear loading compaction vehicles.</p> <p>This program demonstrates how recycling collection for the Recycle First program could be accomplished in a union setting with significantly lower costs and considerable flexibility in adding materials and tailoring the service to a variety of housing types.</p>
Chicago, Illinois, Blue Bag Co-Collection Recycling Program	<p>The Chicago program extends the Pittsburgh commingled recyclables approach to a system in which the bagged recyclables are "co-collected" with mixed solid waste. In a final procurement and startup phase, the program will be publicly sponsored and funded with public collection and privately operated/publicly owned processing facilities.</p> <p>This less tested approach could be compatible with all or a portion of the Recycle First collection strategy if certain technical challenges are overcome, resulting in an economical and flexible collection system yielding high diversion rates.</p>
Metro Toronto, Ontario, Apartment Recycling	<p>This program extends some of the commingled recyclables collection approaches to a wider variety of housing types including low-rise and high-rise multi-family housing. Some Metro Toronto municipalities are using a blue bag system. Municipal collection crews service the recycling depots at each apartment unit, hauling the recyclables to Metro's material recovery facility. The MRF is operated by New England CRInc.</p> <p>The Metro Toronto program provides an excellent working model of another urban area's apartment recycling strategy and has the added benefit of some experience with a blue bag system.</p>

Processing Systems

The following processing programs were examined:

Program	Key Characteristics
DuPage County, Illinois, Intermediate Processing Facility	<p>The DuPage County, Illinois, Intermediate Processing Facility (IPF) handles only residential recyclables and is financed in large part through a surcharge on tipping fees at the County's landfill. The IPF features a commingled container sort line, as well as a commingled paper sorting line.</p> <p>This IPF demonstrates the technical and economic feasibility of processing commingled paper and commingled containers tipped at the facility and then processed and marketed.</p>
American Soils, New Jersey, Composting Facility	<p>This privately owned 18-acre facility services a 10-county urban/suburban area, composts leaves and grass and recently received a permit to co-compost a total of 50,000 cubic yards (or 8,400 tons) per year of yard wastes, food wastes and paper wastes.</p> <p>This innovative facility demonstrates how yard waste and a broader range of organics (food waste, soiled papers, etc.) can be processed using conventional windrow composting technology. The windrow composting technology and methods used here could be applicable to the Recycle First approach if suitable sites can be identified and developed.</p>

Emerging Collection/Processing Systems

The following collection/processing systems reflect emerging technology that may be relevant to New York City:

Program	Key Characteristics
Guelph, Ontario, 2-Stream and 3-Stream Collection	Since 1989, Guelph has been running a pilot to test collection and processing systems and participation levels in 800 households, comparing 2-stream and 3-stream systems. The proposed wet/dry collection and processing system to be on line by 1994 would likely be handled by unionized City crews.
Halton Region, Ontario, 3-Stream Collection	Halton is piloting a 3-stream system with contracted processing and marketing of dry recyclables and local composting of compostables.
Mississauga, Ontario, 2-Stream and 3-Stream Collection	Four variations of 2- and 3-stream approaches are being tested.
Recycle Canada - Etobicoke Wet/Dry System	The Etobicoke program is a wet/dry 2-stream system targeted at industrial, commercial and institutional waste (ICI) in a Metro Toronto suburb.
Neunkirchen, Austria, Organic Waste Collection and Composting Program	The Neunkirchen, Austria, program is a pilot source separated organic waste collection and composting program.

Emerging Collection/Processing Systems (continued)

Program	Key Characteristics
Miami Beach, Florida, High Rise Trash Chute Recycling	A trash chute system installed at the LeTrianon condominium complex in 1991 demonstrates the potential for successfully integrating high rise trash chutes with municipal recycling.
King of Prussia, Pennsylvania, Mini MRF	The MCMRF in the King of Prussia is capable of receiving and sorting up to 20 tons of commingled recyclables per eight-hour shift in an area 20 feet long by 40 feet wide.
Newark, New Jersey, Buy-Back Centers	The City is developing recycling capabilities with a network of buy-back centers. Newark's housing and demographic characteristics are consistent with those of New York City. Buyback centers are one of the oldest forms of recycling and have been implemented in conjunction with curbside in large cities such as Chicago and Los Angeles.
Superior Soils, Inc., Monroe County, New York	Lawn and yard debris collected by both public and private haulers is hauled directly to four agricultural composting sites leased by Superior Soils, where the material is either windrowed or landspread. These small sites are exempt from New York State regulations which enables composting of 3,000 cubic yards or less without state permits.
California Prison Industry Authority Anaerobic Composting	In February of 1992, the California Prison Industrial Authority at Folsom State Prison began operation of a 5 ton per day anaerobic digester which is currently composting 10,000 pounds per day of prison food waste.

SEATTLE, WASHINGTON, CURBSIDE RECYCLING COLLECTION PROGRAM

Case Study Summary

The Seattle, Washington, Curbside Recycling Collection Program demonstrates two approaches to collection of commingled paper and commingled containers, either mixed together or separately, and then effectively recovered, processed and marketed. The structure of the Seattle program also demonstrates how a municipally sponsored program can be implemented in partnership with private sector service providers.

Program Service Area

Program Service Parameter	Description
Population	The program services a population of 516,259, consisting of 148,301 single-family households and 95,051 multi-family households.
Service Area	82 square miles of the Seattle Metropolitan area
Demographics	Highly diverse urban population with range of incomes, households and ethnic mix.
Waste Generation per Year	Approximately 754,200 tons from the following sectors: Residential: 270,700 tons Commercial/Industrial 483,500 tons
Collection System	The collection system for solid waste is privately operated through a contract with the City. Funding is via volume-based service fees. Collection frequency is weekly. For more information, see the Waste Reduction case study for Seattle.
Local landfill tipping fee	\$31.50/ton (City contract with County)

Program Description

Seattle has a goal of recycling, composting and reducing 60% of all solid waste by 1998. Curbside recycling specifically is to divert 7.8% of all MSW and 21% (RRS estimate) of residential waste in 1998.

Recycling Program Activities

The Seattle Curbside Recycling Program began in February 1988 and is publicly sponsored and funded with private operations under contract to the City. Program operation is characterized as described below.

Other Collection Characteristics

Materials Collected

Characteristic	Description
Collection type:	Source Separated Commingled Containers
Set-out method:	Three-bin system in north; one bin system (90-gallon toter) in south side of city.
Pick-up frequency:	Weekly in north side; monthly in south
Is pickup same days as refuse pickup?	No
Participation rate:	Not measured; 88% of eligible homes "signed up" for service
Is participation mandatory?	No
Enforcement mechanism:	None

ONP
Office Paper
OCC
Clear Glass
Green Glass
Brown Glass
PET
Aluminum
Tin

In the north side of the city, all materials are commingled into single bins. On the south side, all paper is commingled in one bin, all glass is commingled in a second bin, and all metal and plastic is commingled in a third bin.

The City contracts with Recycle America (Waste Management Inc - "WMI") to provide curb and alley residential recycling services in North Seattle. WMI provides residents with three stackable containers and weekly pickup.

In the south half of the city, the City contracts with Recycle Seattle (subsidiary of Rabanco, a local collection company) to provide a large 60 or 90-gallon wheeled toter for commingled recyclables with monthly pickup.

Both contractors promote their program in conjunction with city promotional efforts. Participation is not mandated. Within 6 months of startup, 55% of eligible customers were signed up and 2,600 tons per month were being diverted from the waste stream. During 1991, 88% of residents signed up with a total of 47,558 tons diverted from the waste stream. The 1992 recovery goal is 50,000 tons collected at curbside.

Each contractor has developed its own processing facility and is responsible for all marketing of materials.

In 1991, the City paid \$2,782,966 to the two contractors for collection (including processing and marketing) with the average payment to contractors calculated at \$58.90 per ton. This includes a marketing "relative risk" payment in which the City researches and establishes base market prices and the contractor keeps a percentage of revenues based on cost above or below base price.

The recovery rate per household (tons collected) is higher in north Seattle where a weekly 3-bin system is used, as compared to the south side where the monthly 1-bin system is used. A detailed analysis has not been completed but research on curbside recycling collection efficiency would suggest that factors include the frequency of service and the lack of an in-house container. Income levels are also lower in the south service area although it is not known if this is a factor.

The current 1-bin system provided in the south service area has all recyclables (including office paper, cardboard, etc) commingled into the toter cart. In 1993, Rabanco will be required to add an insert for glass due to the high glass content in the residue that is not recovered at the processing facility. Drivers will color sort glass at the truck.

The city plans to stay with two contractors for competitive reasons. Residents are used to the current systems (3-bin, toter) and it is easier not to change at this time.

Other Program Activities

The curbside systems are part of a comprehensive residential recycling program targeted at all sectors. The total residential recovery rate for 1990 was 119,606 tons which includes all programs (curbside and drop-off recycling, city and non-city-sponsored collection of recyclables, yard waste collection, etc). This includes 50,000 tons per year from curbside recycling.

The City operates drop-off stations at two transfer facilities. The City also has developed a system of diversion credits and equipment grants that encourages additional recycling activity. The City provides credit per ton recycled by non-profit and private sector recyclers in the City, including private contractors who service apartment buildings and buy-back centers. Weight slips are used as the documentation to apply for diversion credit compensation. The City also helps with equipment grants and education. In spite of a considerable administrative and planning effort to not take away the business of existing recyclers when the City's curbside program began in 1988, about one-half of the existing buy-back centers have gone out of business.

Program Performance

This summary of program performance presents the capital requirements and total annual budget, then analyzes financial performance on a per capita and a per ton of waste basis.

Total Capital Requirements

Seattle has not directly capitalized curbside recycling nor processing in the City. The City has, however, indirectly capitalized the two contractors' collection and processing capabilities through an overall fee paid for the recovery of materials. This fee is discussed in more detail below.

For the type of collection and processing facilities in Seattle, amortized capital costs typically represent 20-40% of annual expenses. While specific capitalization costs are not known, they can be approximated by taking 30% of the annual fee received by the vendors, or \$900,000 per year, and converting them into overall capital costs. Based upon previous RRS studies, an annual amortization fee of \$900,000 per year would translate into roughly \$5-6 million dollars of capital. This amount of capitalization is a loose estimate at best, as the processing facilities are used for commercial as well as residential recyclables. But this estimate does provide a useful benchmark for comparing costs with programs in other areas.

Total Annual Operating Budget

In 1991, the City of Seattle paid its two vendors an average fee of \$59 per ton collected and processed in 1991. These costs included a marketing "relative risk" formula in which the City establishes a base market price and the contractor keeps a percentage of revenues based upon that price. Usually, the City receives \$4-5 per ton of recyclables processed, and the contractor keeps any additional revenues.

Seattle, Washington, Curbside Recycling Collection Program

In 1992, the City's curbside program will divert an estimated 50,000 tons per year. This is a slight increase over the nearly 47,600 tons collected in 1991. Based upon projected diversion rates, and a slight increase of the average fee to \$60 per ton (RRS est.), the following 1992 operating budget can be projected:

Item	Projected 1992 Costs (RRS Est)
• City Annual Payments to Collection/Processing Contractors for Curbside Service	
- Estimated Capitalization Component (RRS Est)	\$ 900,000
- Revenues Paid by Contractors to the City (RRS Est)	(\$ 200,000)
- Labor, Residual Disposal, Other Costs (RRS Est)	\$2,300,000
Net Program Costs	\$3,000,000
Net Operating Costs (Less Capital Component)	\$ 2,100,000

The City also incurs administrative costs for this program, but these costs are not known. There are several (3-5) administrative City personnel who regularly work on the administration of the Curbside recycling program.

Performance Parameters

Seattle's curbside program is well on its way to achieving its 1998 goal of 7.8% diversion.

Waste Recovery Per Year within Service Area	Generation	Projected Recovery in 1992	% Recovery
Residential	270,700	50,000	18%
Commercial/industrial	453,500	n.a.	n.a.
Total	754,200	50,000	6%

Financial Performance

Based upon the estimated operational budget shown above, estimates of the Program's financial performance may be summarized as follows:

Item	1992 Program Cost	New York City Equivalent
• Operating cost (less capital) per capita serviced (RRS est.)	\$ 4	\$ 7
• Capital cost per capita population serviced (RRS est.)	\$ 10-12	\$ 19-23
• Operating cost (less capital) per ton residential waste generated (RRS est.)	\$ 8	\$ 15
• Operating cost (less capital) per ton of residential waste diverted (RRS est.)	\$ 42	\$ 80
• Capital cost per ton residential waste generated per year (RRS est.)	\$ 18-22	\$ 34-42
• Capital cost per ton residential waste diverted per year (RRS est.)	\$ 100-120	\$ 190-230

Seattle curbside collection/processing costs have been adjusted to account for the 90% cost-of-living increase between Seattle and New York City.

Summary of Case Study Relevance to the Recycle First Plan

The Seattle Curbside Recycling Program provides a working model of how a public agency in a large urban city can coordinate, sponsor and leverage public and private sector recycling services for the residential population. The system demonstrates the functional aspects of the recycling component of the Recycle First Plan in which commingled materials in either a single or 3-bin sort are collected by a separate truck. Despite its success, the system is somewhat dated in design given recent innovations in both collection and processing systems that are covered in other recycling case studies. WMI's 3-bin system could easily be consolidated into a 2-bin system given the types of processing equipment that the DuPage County MRF case study describes (later in this section). Rabanco's glass breakage problem could be addressed with the bag-based approach outlined in the Pittsburgh case study, discussed next.

PITTSBURGH, PENNSYLVANIA, BLUE-BAG RECYCLING PROGRAM

Case Study Summary

In the Pittsburgh, Pennsylvania, Blue Bag Recycling Program, unionized city crews collect residential recyclables in a clean, two-stream Blue Bag program using standard rear loading packer trucks. Pittsburgh residents put a blue bag of newsprint and a separate blue bag for commingled containers at the curb for weekly collection. Apartment dwellers put their blue bags into designated rear-load dumpsters.

The success of this approach outlines a variation of the Recycle First Plan which proposed a separate two compartment truck for commingled papers and commingled containers, respectively. The Pittsburgh case study may demonstrate an improvement in that approach. Conventional rear packing vehicles are adapted for the recycling routes, with the bags providing separation of fibers and containers, and bag breaking and further processing takes place at an advanced design MRF or IPC.

Program Service Area

Program Service Parameter	Description
Population	The program services a population of 370,000, consisting of about 102,000 single-family households and about 68,000 multi-family households (6+ units).
Service Area	City of Pittsburgh
Demographics	An urban population with households that range from single family to high rise and a geographic terrain characterized as having long, steep, and narrow stairways and walks.
Waste Generation per Year	Approximately 285,136 tons from the following sectors: Residential: 148,180 tons Commercial/Industrial 136,956 tons
Collection System	City crews collect residential solid waste; private haulers service commercial clients. The residential collection system operation is publicly funded through tax base and collection frequency is once per week.
Local landfill tipping fee	\$34.77/ton

The urban population has some of the characteristics that would apply to segments of the New York City population. The program design that was used attempted to creatively respond to the functional barriers to providing convenient recycling services to urban populations.

Program Description

Pittsburgh Blue Bag Recycling Program is a direct response to the Pennsylvania state passage in 1988 of Act 101 that mandated curbside recycling for all municipalities and required recycling programs to recover 25% of the total waste stream by 1997. The City wanted to achieve this goal with the most practical and cost effective system available and chose the "Blue Bag" approach as the means to diverting up to 11-12% of the City's waste stream. Selection of Blue Bag program was based largely on having unionized municipal crews, so containing collection cost was the most important objective.

After phasing the program into all single-family neighborhoods, the City has expanded service to multi-family complexes. Future goals include collecting additional materials such as OCC and other paper products.

Recycling Program Activities

Other Collection Characteristics

Characteristic	Description
Collection type:	Blue Bag
Set-out method:	ONP in one blue bag; all other commingled containers in separate blue bag.
Pick-up frequency:	weekly
Is pickup same days as refuse pickup?	Yes
Participation rate:	75% by month; 50% setout
Is participation mandatory?	Yes
Enforcement mechanism:	Fines, but not enforced yet, because they have achieved 75% residential participation.

Materials Collected

ONP in one blue bag
Commingled Containers in a second blue bag, including:
Clear Glass
Green Glass
Brown Glass
HDPE
Aluminum
Tin
PET
Refuse is collected in a second route.

Pittsburgh was the first city to use the "Blue Bag" system extensively. Glad Bags, a manufacturer of plastic bags, markets the "Blue Bag" system as an alternative to tote bin recycling collection systems. Once used, the Blue Bag is recycled through Union Carbide and other firms into other plastic products.

Pittsburgh's program started serving 80,000 households in September of 1990 and now services the entire city (170,000 households, including multi-family dwellings). Residents place in their Blue Bags all household clear, amber and green glass, aluminum, steel and tin cans, and all plastic bottles, jugs and jars. ONP was originally not included but has since been added, and residents are instructed to use a separate Blue Bag for the ONP. Other paper will be added eventually, including OCC.

Collection Program

The standard Blue Bag is 13-30 gallons in size. Many local supermarkets offer an 8-10 gallon plastic sack of the same blue color for free as a grocery sack, "paper, plastic, or Blue Bag?" This way, the bag doesn't cost the resident, city or store any extra money and has been an especially good service for senior citizens.

The recycling trucks operated by the City's union work force are conventional rear packer trucks and the compaction ratio has been lowered to 2:1 - 3:1, compared to 5:1. Old refurbished city collection trucks were used originally, but the state will fund 90% of recycling equipment purchases so the city will purchase 26 new trucks. Each truck covers 1,200 pass-bys per route, stopping at 400 to 600 households.

Multi-family buildings, including high rises, are included in the program. The majority of multi-family buildings are 50-units or less. Residents take bags to a staging area at the end of the hall, and staff carry the bags downstairs to dumpsters. Trash chutes were used initially but caused too much breakage, although little research has been done on how to modify chutes to eliminate breakage. One possibility is to line the container at the end of the chute with foam.

The City has indicated that it is "saving over \$80/ton on collection costs compared to traditional recycling collection methods since container and truck purchases are unnecessary." Up-front capital is less, no special truck is required and \$2.5-\$3 million in bin costs are avoided. Collection time and motion study of commingled bag versus bin found 60% time saving per route, due largely to the need not to curb-sort materials or put the bin back on the curb.

The Department of Environmental Sanitation's recycling collection crews service 20 recycling routes with 2-person crews (one driver plus one assistant) along with a reserve pool. About half of the routes are completed with one trip to the MRF. Less than half require two trips to the MRF. The refuse collection operation has 42 refuse routes, down from 66 routes (1 driver plus two assistants) before implementing recycling and special bulk material collection.

Processing

The city has a contract with Chambers Development Corp to process and market recovered residential recyclables. The contract is rebid annually since there is competition for processing from both Waste Management, Inc. and Browning Ferris Industries. The area landfill is owned and operated by Chambers Development Corp.

The Chambers MRF is an 11,000 square foot building in town with 120 tons per day capacity and a current throughput of 55 tons per day. Facility staff is 28-32 people, with a line staff of 25 people who primarily consist of the following:

- 6 sorters who open ONP bags by hand;
- 6 sorters who open container bags by hand;
- 2 people who pick debris;
- 4 people who separate out shiny inserts from ONP before baling; and
- A sweeper, a baler, a helper, and a machine operator.

It should be noted that a number of companies manufacture mechanical bag breakers to save labor costs during processing.

Residue from the Blue Bag program has been found to be less than from loose commingled material dropped off from smaller cities in Allegheny County. In a study performed by Chambers, the Blue Bag was found to create less glass breakage (10-12% overall) when compacted in commingled form than when commingled loose (18-20%) due to the fact that glass is tightly packaged around other softer materials like plastic jugs. Residual waste for the MRF is closer to 4-5% of the incoming material stream.

During the first year of the contract, the City was paid \$2.80/ton by Chambers when only the commingled containers (including the higher value aluminum cans) were being collected. This has since shifted to the City paying Chambers a processing fee of \$3.77/ton now that ONP is included. The current contract period runs through December of 1992.

Commercial Activity

Businesses do not use the Blue Bag system but are required to recycle and to report total tonnage through signed contracts with haulers who then report to the City. If the businesses do not have a contract with the hauler, they must submit a report to the City documenting tip slips from self-haul to processors or markets. Although the program is mandated, there has been no enforcement push or advertisement of fines (\$5,000 per incident ceiling) yet.

Other Program Activities

The Pittsburgh Blue Bag Recycling Program receives general administrative support by staff who provide outreach and education as part of their overall management responsibilities.

Education Program Summary

The City provides administrative support through the 3 full-time management staff. This is general fund support and includes education. State grants also support general recycling education. Private support from large local corporations such as USS, Heinz, Giant Eagle and Chambers, especially with in-kind services, also contribute nearly 25% of the promotion and education effort.

Outreach includes presentations to community groups to explain the recycling program and encourage participation. The population is ethnically diverse but has not required multi-lingual outreach. They do provide recycling instructions in Braille. The City is developing strategies for educating low income housing authority residents.

Material Markets

There are some indications of high residue levels and difficulty in marketing materials. Glass breakage is 10-15% once it passes through the MRF, and ONP collection/processing still has bugs when bags are not tied and material slips out. Some of this also results from drivers increasing compaction rates resulting in additional bag breakage. Caps are also not removed from over 50% of the bottles, resulting in a lower price for collected plastic.

Program Performance

Pittsburgh's clean two-stream blue bag program is now provided to all of the City's 170,000 single-family and multi-family residents. In 1992, the program is capturing 70-75 tons per day, or 18,000 tons per year.

Total Capital Requirements

The additional capital costs for the blue bag system is for the purchase of 26 new collection trucks for \$2,000,000 (1992 dollars). These capital costs are not necessary, but are being incurred because the State is covering 90% of these costs through a recycling grant program. Pittsburgh is also using bags, as purchasing bins would require \$2.5-\$3 million in additional capital costs.

Total Annual Operating Budget

The blue bag program underwent aggressive expansion in 1991 and currently services the entire City. Accordingly, full-scale 1991 costs are not available and projected 1992 program costs will more accurately indicate the full-scale program costs for Pittsburgh's collection program.

Item	Projected 1992 Program Costs
• Direct Costs	
- Labor for Collection (RRS Est)	\$ 1,084,000
- Collection Equipment Operation and Maintenance (RRS Est)	\$ 125,000
- Payment to MRF Operator (\$3.77 per ton)	\$ 67,860
• Overhead	
- Administration	\$ 132,667
- Education, Promotion, Other	\$ 175,000
• Revenues	\$ 0
Program Net Annual Costs	\$ 1,584,527

Most 1992 cost projections for this program are not readily available, and were therefore estimated by RRS. Collection labor costs were extrapolated from costs provided for 1991. Collection equipment operation and maintenance costs are RRS estimates based upon the use of five rear-load packer trucks. Payments to the MRF operator are based on the negotiated fee of \$ 3.77 per ton for 18,000 tons. Overhead costs were provided by the City's recycling coordinator. No revenues are received by the City for recovered material.

Performance Parameters

The expected recovery of residential waste in 1992 will be approximately 18,000 tons, or 6% of total MSW generated.

Waste Generation and Recovery in 1992	Generation	Recovery	% Recovery
Residential	148,180	18,000	12%
Commercial/industrial	136,956	n.a.	n.a.
Total	258,136	18,000	6%

Financial Performance

The financial performance in 1992 of the Pittsburgh program as currently constructed may be summarized as follows:

Item	Projected 1992 Program Cost	New York City Equivalent
• Annual cost per capita population serviced	\$ 4	\$ 8
• Capital cost per capita population serviced	\$ 5	\$ 10
• Annual cost per residential ton waste generated	\$ 11	\$ 21
• Annual cost per ton residential waste diverted	\$ 88	\$ 171
• Capital cost per ton residential waste generated	\$ 13	\$ 25
• Capital cost per ton residential waste diverted	\$ 111	\$ 215

The program's costs have been adjusted to account for the cost-of-living difference between Pittsburgh and New York City.

It must be noted, however, that the probable costs to process the commingled materials is considerably more than the \$3.77 per ton charged to the City by Chambers. Estimates of actual costs, developed by RRS after interviews with the processor, range from \$50-90 per ton. Under most market conditions, the City would be charged a rate closer to the actual costs. However, the City may continue to enjoy unusually low processing costs due to competition among potential processors (Chambers, Waste Management, Browning Ferris Industries, and others) and the ability of those facilities to offset some losses through higher charges to commercial and other municipal clients.

Summary of Case Study Relevance to the Recycle First Plan

The Pittsburgh Blue Bag Recycling Program demonstrates how recycling collection in the Recycle First program could be accomplished in a union setting with significantly lower costs and considerable flexibility in adding materials and tailoring the service to a variety of types of housing. As with Seattle, Pittsburgh has leveraged additional recycling through mandated commercial recycling requirements coupled with a data management system to track compliance and performance.

CHICAGO BLUE BAG CO-COLLECTION RECYCLING PROGRAM

Case Study Summary

The City of Chicago, Illinois, proposes to advance the Blue Bag system another level by simultaneously collecting bags of commingled recyclables with collection of residential waste. Referred to as single compartment co-collection, this approach completely avoids a separate set of routes and trucks for the recycling pickup. Internal studies completed by the City have led to the conclusion that this achieves significant collection cost savings for a City sponsored recycling program with some negative, but acceptable, impact on recovery rates.

Because the Chicago effort is only in the early piloting stages, it is not known whether the cost saving assumptions are accurate or whether the bag loss and increased residue can be avoided in full scale MRF design. If it can, though, this approach may prove to be a major benefit to the Recycle First 4-container collection strategy, allowing one route to be used with:

- "Blue Bags" protecting commingled papers and commingled containers, and
- Wet strength paper bags protecting and isolating compostable organic materials.

Increases in processing costs to separate bags and then break and process material may be absorbed given the significant savings in collection routing.

Program Service Area

Program Service Parameter	Description
Population	The program will service a population of 2.8 million, consisting of 651,000 single-family households.
Service Area	230 square miles of urban Chicago.
Demographics	1.7 million in single family households and 500,000 people in 40,000 high rises (5+ stories), with the remaining 600,000 in low-rise multi-family units. The population includes a diverse range of income, education, language and ethnic backgrounds.
Waste Generation per Year	Approximately 3.9 million tons from the following sectors: Residential: 1.1 million tons Commercial/Industrial 2.8 million tons
Waste Collection System	Unionized city crews collect bulk (325,000 TPY) from single family households, and some institutions. Private haulers collect from multi-family housing. Funding for City services is general fund with no volume incentive for recycling. Collection frequency is weekly for residential.
Local landfill tipping fee	\$38/ton

Chicago represents an urban area with many of the same challenges as those that New York City will confront during implementation of the Recycle First Plan. Similarities include the large number of high rises, the unionized labor force, the diverse population, and the congestion of the urban environment.

Program Description

The Chicago program is intended to help meet part of the State of Illinois recycling requirements (15% by 1994 and 25% by 1996). It is designed to respond to steadily increasing costs for solid waste disposal in the region and continued closings of nearby landfills, which have resulted in longer hauls and confrontation with interstate waste disposal issues.

Once fully operational, Chicago's blue bag collection program is projected to divert approximately 8% of the City's residential waste, or roughly 88,000 tons per year.

The program is targeted at single-family households initially with a basic set of materials being collected. Additional materials will be added at a later date.

Recycling Program Activities

The Chicago Blue Bag Co-Collection Recycling Program will be publicly sponsored and funded with public collection and privately operated/publicly owned processing facilities. Program operation is characterized as described below.

Other Collection Characteristics

Materials Collected

Characteristic	Description
Collection type:	Co-collection of recyclables and refuse using Blue Bag for recyclables (ONP placed in paper or plastic bag prior to placement in blue bag)
Set-out method:	Curb, Alley or Dumpster
Pick-up frequency:	Twice Weekly
Is pickup same days as refuse pickup?	Yes
Participation rate:	84% Pilot Data Only
Is participation mandatory?	No
Enforcement mechanism:	None

Blue Bag #1:
 ONP
 Paper bags

Blue Bag #2:
 Clear Glass
 ONP
 Tin
 HDPE
 PET

Typically, the blue bag for commingled paper will be inserted into the blue bag for commingled containers.

Yard waste is also collected separately in kraft paper bags.

This system also collects loose and bagged refuse.

Chicago is beginning a final procurement and startup phase of a City-wide Blue Bag co-collection recycling system. The City conducted an 18-week pilot demonstration in 1,400 households in two wards for a total of 2,800 households, which had been receiving Blue Bin curbside recycling service (excluding newspaper) from the City Department of Streets and Sanitation (DSS) since October of 1989 (therefore, residents had already been trained and educated to source separate their recyclables). City collection crews (1 driver and 2 assistants) picked up recyclables twice weekly along with trash. Nearly 90% of pick-ups were in alleys behind homes, allowing most crews to service two sides of a street at once.

Once the route was completed, the recyclables and trash were dumped at a designated transfer station. The bags were separated from regular refuse at a transfer station, then forwarded to a private MRF for further processing.

Demonstration results show an average 35% set-out rate per week with an 84% participation rate per month. That is, 84% of households set out blue bags of recyclables during the month. At the transfer station 91% of the bags were recovered intact. At the MRF 11% residue was removed before final processing for markets. (The residue rate may have been lower because residents were accustomed to conventional recycling.) Markets indicated a high rating for the delivered material. The pilot resulted in diversion of 7.3% of the co-collected waste stream.

A City-wide program will enable 651,000 households to place mixed recyclables in separate blue bags for pickup with mixed waste twice/week in City owned and operated packer trucks with union crews. The MRF for the recyclables will be located at the transfer station, where bags will be moved to the MRF by conveyor. Bags would be available as grocery sacks at no cost through local stores. Program collection cost is estimated to be 25% of the regular tote-bin recycling system due primarily to fewer truck passes and fewer trucks needed. The use of bags instead of bins also reduced purchase and inventory costs.

DSS is scheduling a mid- to late-1993 start date for full City-wide service. DSS is negotiating with potential MRF operators at this time. High rises will not be served by the Blue Bag system provided by the City since the City does not provide refuse services to any multi-family housing. Instead the City will give technical assistance to businesses and high-rise multi-family housing. Each commercial or high-rise building unit must develop its own plan to implement recycling programs.

Program Performance

The blue bag pilot program operated by the City of Chicago in 1991 lasted a total of 18 weeks and focused upon determining the technical feasibility and effectiveness of co-collection. During the final 10 weeks of the pilot program, the program recovered an estimated 7.5% of materials from the waste stream in the pilot service area. Unfortunately, records of collection and processing costs for the pilot were not maintained, as the purpose of the pilot was to determine its technical feasibility and not its cost effectiveness.

Based upon this experience, the City has prepared extensive projections of the costs to operate a blue bag program for the City's 1.7 million single family homes. These projections are summarized below.

Total Projected Capital Requirements

Total capital costs for collection and processing of the co-collection blue bag system in Chicago is unknown at this time. Contracts are still being negotiated, and a detailed examination of collection costs has not been done.

The projected capital costs of the four facilities to be constructed is expected to be approximately \$20,000,000. These costs also include equipment replacement expenses and are amortized over a 7-year period. Additional collection equipment will not be required and is not capitalized.

Total Annual Operating Budget

The projected collection and processing operating budget for the City's program can be summarized over a 7-year period and is nearly \$14,000,000 as shown below.

Item	Projected Full-Scale Program Costs
• Direct Costs	
- MRF Capital Replacement	\$ 4,320,000
- MRF Operations & Maintenance	\$ 10,450,000
- Collection Labor Costs (RRS Est)	\$ 1,680,000
- Collection Vehicle Costs (RRS Est)	\$ 520,000
• Overhead	
- Administration (RRS Est)	\$ 200,000
- Education/Promotion	\$ 1,000,000
• Revenues (No revenues are assumed)	\$ 0
Annual Program Costs	\$18,170,000
Total Operating Costs (less capital component)	\$ 13,850,000

MRF capital replacement, operation and maintenance, and education/promotion costs projections were based upon provided cost projections. Residential collection costs were based on estimated collection labor and vehicle costs for the city (an RRS-estimated total of roughly \$27,500,000) multiplied by 8%—the quantity of recyclables to be pulled from the residential waste stream.

Performance Parameters

The full-scale program is projected to divert 8% of residential waste. This is not unlikely, as diversion rates of 7.5% were achieved during the pilot conducted in 1991.

Waste Recovery Per Year	Generation	Projected Full-Scale	% Recovery
Residential	1.1 million	88,000	8%
Commercial/industrial	2.8 million	n.a.	n.a.
Total	3.9 million	88,000	2%

Financial Performance

Based upon the projected capital and annual costs, the financial performance of the proposed collection and processing system can be summarized below:

Item	Full-Scale Program Cost	New York City Cost Equivalent
• Annual cost (less capital) per capita population serviced	\$ 5	\$ 9
• Capital cost (less capital) per capita population serviced	\$ 7	\$ 12
• Annual cost (less capital) per ton waste generated	\$ 13	\$ 22
• Annual cost (less capital) per ton waste diverted	\$ 157	\$ 270
• Capital cost per ton waste generated per year	\$ 18	\$ 31
• Capital cost per ton waste diverted per year	\$ 227	\$ 390

Chicago Blue Bag Program collection and processing costs have been adjusted to account for the 72% cost-of-living increase between Chicago and New York City.

Summary of Case Study Relevance to the Recycle First Plan

The approach that Chicago is taking is less tested and filled with unknowns that may provide minor technical challenges. These technical challenges include necessary improvements in bag recovery, bag breakage prevention, bag breaking procedures and prevention of contamination of marketable materials. Structurally, though, the approach could be very compatible with all or a portion of the Recycle First collection strategy if these technical challenges can be met. The result could be a very economical and flexible system that could develop, over time, into the type of high diversion collection and processing program envisioned by the Recycle First recommendation.

METRO TORONTO, ONTARIO, APARTMENT RECYCLING COLLECTION PROGRAM

Case Study Summary

The Metro Toronto, Ontario, Apartment Recycling Program demonstrates that apartment-based recycling programs, with or without a bag based approach, can be implemented in a large urban district.

To achieve the goals of the Recycle First Plan, all segments of the population must participate. New York has already made significant progress in servicing apartment buildings. Following is an effective apartment building recycling service model used in Canada that could evolve into the type required to meet the Recycle First collection requirements.

Program Service Area

Program Service Parameter	Description
Population	The program services a population of 383,000 multi-family households of which 60% are currently receiving recycling services.
Service Area	Metropolitan Toronto (total population of 2.2 million). This area is divided into 6 municipalities, each of which provides its own apartment recycling collection program.
Demographics	Diverse urban and suburban population living in multi-family housing
Waste Generation per Year	880,648 metric tons from the residential sector.
Collection System	Municipal haulers tip at a landfill owned by Metro. Private haulers have the option of tipping elsewhere. The collection system operation is public. Funding is through taxes. Collection frequency is weekly or as needed.
Local landfill tipping fee	\$153/metric ton (Canadian dollars)

The Metro Toronto service area is similar to New York City, with a large high-rise residential population and strong public sector involvement in service delivery.

Program Description

Metro Toronto has an aggressive waste reduction, recycling and composting goal targeted at the majority of the waste stream. Metro has set a goal of diverting 30,000 tonnes of material each year from apartment buildings and is currently about halfway to its goal.

Program Activities

The Metro Toronto Apartment Recycling Program is publicly sponsored. Program operation is characterized as described below.

Other Collection Characteristics

Materials Collected

Characteristic	Description
Collection type:	Apartment
Set-out method:	Varies
Pick-up frequency:	Scheduled/As needed
Is pickup same days as refuse pickup?	Varies
Participation rate:	Varies
Is participation mandatory?	No
Enforcement mechanism:	None

ONP
Clear Glass
Green Glass
Amber Glass
Aluminum
Tin/Steel Cans
HDPE
PET

Six municipalities comprising the Metro Toronto system are increasingly providing recycling collection service to apartment buildings. Of the 383,000 apartment units in the Metro area, about 60% are currently being provided recycling services. An estimated 15,000 tons (metric) were collected from these apartments in 1991.

Some of the municipalities are using a blue bag system (serving approximately 100,000 customers), which they prefer because the bags offer a similar profile to residents who have blue box recycling at the curb. In this system, residents are provided with a reusable plastic blue bag, paid for by the municipality (approximately \$3 per bag). The resident stores recyclables in the bag, transports the materials to a collection depot at the apartment building, and then is responsible for sorting the recyclables at the depot. For non-blue bag programs, residents generally use their own containers for storage of materials.

Municipal collection crews service the recycling depots at each apartment unit, hauling the recyclables to Metro's material recovery facility. The MRF is publicly owned, but operated by New England CRInc. Currently only containers are processed at this facility while paper is shipped to another vendor. By June of 1992, however, all recyclables will be processed at the Metro facility.

City of Toronto Apartment Recycling

In the City of Toronto, the largest of the six Metro Toronto communities, apartment recycling is nearing full-scale operation, with 108,000 of 124,000 apartment units currently on line. Originally planned for a two-year start-up, Toronto expects the entire program to be on-line within a one-year timeframe.

In 1991, the program recovered 6,300 metric tonnes of materials with the program just getting underway. In 1992, with 92% of units on line, the program is collecting an average of 700 tonnes per month, or a rate of 8,400 tonnes per year. Some institutions, such as fire halls and government buildings, are served along with apartment buildings.

A unique collection system has been designed to make it easy for residents in the apartments to store materials. In buildings of less than nine units, each unit receives the same blue box as customers on the curbside program receive. In most other larger apartment buildings, residents are given a blue reusable plastic bag made of reinforced polyethylene. Residents then empty their containers in centrally located bins. Some units use two 90-gallon curb carts (one for cardboard and newspaper, and one for mixed containers) while others use two-cubic-yard rear-load tipping carts. In especially large apartment buildings, 3.2 cubic yard front-end load dumpsters are used.

City crews service the apartment buildings once per week with existing rear and front load garbage trucks that are equipped with a loading arm for tipping the containers hydraulically (the garbage trucks are cleaned prior to being used to collect recyclables).

Containers (glass, plastic bottles and steel cans) are delivered to Metro's Material Recovery Facility while paper is taken to a Metro-contracted facility. Because the City of Toronto supports Metro through its general fund, no tipping fee is charged at the processing facility.

Toronto Apartment Education Efforts

Toronto is considered one of the most ethnically diverse cities in North America. Thus, educating apartment residents and others about recycling and especially controlling the quality of materials collected is a real challenge. City officials also report a 20% illiteracy rate, compounding the problem of having to educate citizens in many languages. To this end, the City has determined it will modify its current approach to informing apartment dwellers about how and where to recycle.

In 1991, the City distributed notices, flyers and posters to each building manager for distribution to building residents. In 1992, if the current budget request is approved, the City will shift its efforts to a more "picture" or "symbol" oriented outreach program. Already, a calendar has been produced with special recycling symbols and pictures to illustrate when to recycle and compost. This effort will be expanded to include stickers on bins, posters, pamphlets and other materials.

Program Performance

Because the Metro Toronto area is divided into six municipalities, only one city's performance and cost parameters was selected - the City of Toronto, the Metro area's largest municipality.

Total Capital Requirements for the City of Toronto

Capital costs for this program were not significant, as the City uses existing rear-load and front-load vehicles for collection.

Total Annual Operating Budget for the City of Toronto

As the program was initiated in 1991, operating costs for 1991 are used to accurately project 1992 full-scale program costs. These costs may be summarized as:

Item	Projected Full-Scale 1992 Costs (RRS Est)
• Operational Costs	
- Collection Labor and Equipment	\$ 1,000,000 CA
- Payments for Administration	\$ 400,000CA
- Education	n.a.
• Revenues	\$ 0
Net City Costs	\$ 1,400,000 CA

Performance Parameters

In 1992, the program will collect an estimated 8,400 tons from apartment dwellers in the City.

Parameter	Generation	Projected Recovery at Full Scale Operation	% Recovery
Waste Generation and Recovery in 1992 in the City of Toronto:			
Residential Multi-family Tonnes	108,000 (RRS Est)	8,400	8%

An estimated 250,000 residents (RRS est.) are located in multi-family complexes in the City of Toronto.

Financial Performance

Based upon projected 1992 costs and performances, the projected financial performance of the City's apartment collection program may be summarized as follows:

Item	Full Scale 1992 Program Cost	U.S. Equivalent
• Annual operating cost per capita serviced	\$ 6 CA	\$ 4 US
• Capital cost per capita population serviced	n.a.	
• Annual cost per tonne residential waste generated	\$ 13 CA	\$9 US
• Annual cost per tonne residential waste diverted	\$ 167 CA	\$114 US
• Capital cost per tonne residential waste generated per year	n.a.	
• Capital cost per tonne residential waste diverted per year	n.a.	

These Canadian program costs have been adjusted by 68% to account for the difference in exchange rates and tonnage weights.

Summary of Case Study Relevance to the Recycle First Plan

Extension of the Recycle First program to all apartment buildings, whether high- or low-rise, will require a system that is flexible and cost effective. The track record with multi-family recycling programs is growing rapidly, and a good deal of this progress has been right in New York City. The Metro Toronto program provides an excellent working model of another urban area's apartment recycling strategy and has the added benefit of some experience with a blue bag system similar to that used in Pittsburgh.

DUPAGE COUNTY, ILLINOIS, INTERMEDIATE PROCESSING FACILITY

Case Study Summary

DuPage County, Illinois, opened its Intermediate Processing Facility (IPF) in Carol Stream, Illinois, in 1991. The County paid cash for the IPF, financed in large part through a surcharge on tipping fees at the County's landfill. Designed to handle only residential recyclables, the IPF features a commingled container sort line, as well as a commingled paper sorting line handling newspaper, residentially generated corrugated cardboard containers, phone books and magazines.

The DuPage County IPF represents one of the newer generation processing facilities that shows the technical and economic viability of processing two of the four material streams that the Recycle First plan is recommending.

Program Service Area

Program Service Parameter	Description
Population	The program services a population of 371,076, consisting of 138,980 single-family households and 3,700 multi-family households.
Service Area	Two thirds of DuPage County and approximately 35% of additional service area outside of DuPage County
Demographics	Urban, middle to upper-income residential suburban neighborhoods
Waste Generation per Year in area serviced	Approximately 641,435 tons from the following sectors: Residential: 283,905 tons Commercial/Industrial 357,530 tons This is slightly less than half of the County's overall residential waste generation.
Collection System	The collection system operation is publicly and privately operated. Some communities have pay-per-bag system. Collection frequency is once/week in most communities; some twice/week, some in backyards.
Local landfill tipping fee	\$30/ton (\$7/cubic yard)

The service area has more suburban characteristics than the projected service area of the Recycle First plan and has a higher concentration of single family homes. The size of the population serviced, though, is consistent with the scale required for subsystems within the Recycle First service area.

Program Description

The DuPage County Intermediate Processing Facility is designed to handle residential recyclables and its not expected to process commercial recyclables. The facility will, however, expand its residential service area by adding a second shift during the summer of 1992.

Its commingled processing capability allows recyclable materials to be easily added to the collection system, further expanding the capability of DuPage County to divert material from landfill disposal in order to meet or exceed the target goals.

Recycling Program Activities

The DuPage Co. North Intermediate Processing Facility is publicly owned. Program operation is described below.

Other Collection Characteristics

Materials Collected

Characteristic	Description
Collection type:	Source Separated Commingled Containers Commingled Paper
Set-out method:	Commingled containers, commingled paper
Pick-up frequency:	Weekly
Is pickup same days as refuse pickup?	Yes
Participation rate:	Not Available
Is participation mandatory?	No
Enforcement mechanism:	County provides free curbside bins to communities which sign intergovernmental agreement, guaranteeing flow of recyclables to IPF; municipalities otherwise not required to use County facility

Commingled Fibers
ONP
OCC (Residential only)
Magazines
Other Paper
Commingled Containers
Clear Glass
Green Glass
Brown Glass
HDPE
PET
Aluminum
Tin

Program Overview

DuPage County's IPF is designed to receive, process and ship 150 tons of residentially generated recyclables per 8-hour shift. Since opening in September of 1991, the facility has been operating one 10-hour shift per day (five days a week, plus some Saturdays). As municipal collection programs in the County continue to expand, however, the IPF will likely add a second shift by the summer of 1992. The facility will not handle commercial recyclables.

Currently, the IPF serves about two-fifths of DuPage County residents, as well as some haulers and municipalities outside the County. Ultimately, the facility will service two-thirds of county residents. In its first six months of operation (September 1991-February 1992), the IPF marketed 16,249 tons of materials (73% paper products). Since start-up, the facility has had only one shutdown.

A tipping fee surcharge collected at the DuPage Forest Preserve District Landfill provided the majority of funding for the IPF, allowing the County to provide free tipping for all users, public or private, in-County or out-of-County (35% of the materials processed each month have been from outside the County). The surcharge dollars in addition to a \$2 million loan from the County's general fund allowed the County to pay cash up front for the facility.

For 1992, it is estimated the facility will handle between 200 and 250 tons of incoming materials per day. Although municipalities in the County are not required to bring recyclables to the IPF, some have signed intergovernmental agreements guaranteeing flow of materials to the County IPF. These agreements typically involve the designation of the IPF as the only processor for residential recyclables collected in the municipality. In exchange for processing, the County provides free curbside bins. Some municipalities in the County are using other processing facilities (an estimated total of 46,000 tons of recyclables were collected from curbside programs in the County in 1991, including the DuPage IPF and other facilities).

The facility is privately operated by a MRF vendor, New England CRInc, who also supplied the container sort line equipment.

Sorting Systems

The commingled container sort system is based on the Bezner equipment (German) and handles commingled glass, steel and bi-metal cans, aluminum cans and foil, clear and colored #2 HDPE plastic, clear and colored #1 PET plastic. The automated sort system includes electromagnetic separators, eddy current separators and screen and gravity separation. Manual sorting is also employed to separate glass by color and plastics by resin types, and to remove non-recyclable items.

The commingled paper sorting line is Bollegraaf equipment (Holland) with an elevated conveyor-based sorting platform for manual sorting of commingled newspaper, residential corrugated cardboard, brown paper bags, magazines, and phone books. The facility will be adding chipboard (also known as paperboard or grayboard such as cereal and shoe boxes) at a later time. The material is sorted into bins and fed into automated baling equipment. The line is rated at 100 tons per 8-hour shift; actual levels have reached 110-115 tons per 8-shift.

Operating Parameters

New England CRInc responsibilities include operation of building, marketing of materials and management of all employees. The facility employs 19-21 people working 10-hour days including all on-site (or non-County) administrative staff. The employees include scale person, billing person, manager, mechanic, 2 bobcat/loader drivers on tip floor, fork truck driver, and 12-14 pickers (5-6 pickers on paper line).

The County responsibilities include waste removal and disposal of up to 8% of incoming materials (to date residuals have been 4.5% by weight). The County also covers electricity, water, utilities, and maintenance up to predetermined limits.

The County pays New England CRInc a processing fee of \$18.63/ton for paper and \$42.29/ton for mixed containers. CRInc gets 10% of gross revenues from sale of materials to market, with the County receiving the remaining 90% of material revenue up to design capacity.

The administration of the private contractor by County personnel cost requires an estimated 1.2 full time staffing equivalents estimated at \$25,000-\$30,000 plus benefits.

Other Program Activities

An education program supplements the County's IPF. This began with a detailed residential survey about waste management in 1988, includes printing of a "Yellow Pages" publication with a comprehensive newspaper format covering all aspects of the solid waste program. The County has just signed a new contract with University of Illinois Cooperative-Extension Agency for \$150,000 to provide additional education services including a targeted multi-family education program which is expected to include a bi-lingual brochure.

Program Element	Description
Population served by education program	781,000
Is the education program multi-lingual?	Yes
Does the education program include a media campaign?	Yes
Number of employees working on the education program:	A percentage of the recycling coordinator's time is spent on education; also signed contract with University of Illinois Cooperative Extension Service to provide broad outreach program.
Education program cost per capita	\$0.19

Program Performance

This summary of program performance presents the capital requirements and total annual budget, then analyzes financial performance on a per capita and a per ton of waste basis.

Total Capital Requirements

Total capital costs for the processing facility are \$10.4 million. These costs include more than \$5 million for the building, \$1 million for the site, \$0.8 million for the commingled paper line, and \$2.6 million for the commingled container line.

Total Annual Operating Budget

As the MRF started in September of 1991, an accurate cost picture can only be given based upon the full-scale operational costs that will be incurred in 1992.

Item	Projected Full-Scale 1992 Costs (RRS Est)
• County Annual Costs	
- Payments to MRF Operator (Labor, Management, etc.)	\$ 1,228,000
- Other County Costs (Residue Disposal, Utilities, Maintenance)	\$ 175,000
- Administration (1.2 FTE)	30,000
- Education (Contract with Univ. of Illinois)	\$ 150,000
Total Costs	\$ 1,583,000
• County Revenues (\$25 per ton)	(\$ 1,187,500)
Net County Costs	\$ 395,500

The County pays the MRF operator fees of \$18.63 per ton of commingled paper and \$42.29 for mixed recyclables. In 1992, it is estimated that 50,000 tons will be received by the facility. Of this, approximately 33,000 tons will be commingled paper, 14,500 tons will be commingled containers, and 2,500 tons will be residue.

As a result, the County may expect to pay the MRF operator approximately \$615,000 in 1992 for commingled paper, and \$613,000 for commingled containers.

In addition, the County may expect to spend \$75,000 to landfill residue, and another \$100,000 for utilities and maintenance of the MRF. Administration costs will be roughly \$30,000, and education costs will be at least \$150,000. Accordingly, the annual cost to operate the MRF in 1992 may be as much as \$1,583,000.

The County is given 90% of revenues from material sales, which will amount to roughly \$25 per ton sold.

Performance Parameters

Once operating at full-scale capacity, the MRF will divert approximately 17% of the residential waste stream in the MRF's service area, and 8% of the overall MSW in the service area.

Waste Generation and Recovery in 1992 within Service Area	Generation	Projected Recovery at Full Scale Operation	% Recovery
Residential Tons	283,905	50,000	17%
Commercial/Industrial Tons	357,530	n.a.	n.a.
Total MSW Tons	641,435	50,000	8%

Financial Performance

Based upon projected 1992 costs and performances, the projected financial performance of the MRF may be summarized as follows:

Item	Full Scale 1992 Program Cost	New York City Equivalent
• Annual operating cost per capita serviced*	\$ 4	\$ 7
• Capital cost per capita population serviced	\$ 28	\$ 48
• Annual cost per ton residential waste generated*	\$ 6	\$ 10
• Annual cost per ton residential waste diverted*	\$ 32	\$ 55
• Capital cost per ton residential waste generated	\$ 36	\$ 62
• Capital cost per ton residential waste diverted per year	\$ 208	\$ 358

* when revenues are included, net costs are 25% of total operating costs.

Du Page County MRF costs have been adjusted to account for the 72% cost-of-living increase between Chicago and New York City.

Summary of Case Study Relevance to the Recycle First Plan

The Recycle First Plan will require that commingled paper and commingled containers be delivered to a facility and then processed and marketed.

The DuPage County IPF demonstrates that this is technically and economically viable. The processing equipment is available from a number of vendors, and the design requirements of the facility are not difficult to meet. A number of these vendors also have the ability and equipment to debag recyclables before processing although the DuPage IPF does not include this capability. The operation of the facility can be provided for through private contract with at least 10 vendors able to provide the service in the New York metropolitan area. A number of these vendors are willing to provide a unionized work force if required to do so in the facility bid documents.

AMERICAN SOIL, INC. COMPOSTING FACILITY, NEW JERSEY

Case Study Summary

The American Soil, Inc. Composting Facility in Freehold Township, Monmouth County, New Jersey, services a market that includes a ban on leaves being disposed of in area landfills. Serving this market and expanding windrow composting to other organics is the short-term goal of this facility. In the long run, this facility also plans on the use of in-vessel composting systems.

The Recycle First Plan recommends that an organic stream of material be co-collected with unrecyclable solid waste. Processing that organic stream could take one of several directions—windrow static aerated, in-vessel composting or anaerobic composting (which uses less space). Windrow-based composting has a strong tradition of being applied to yard waste, but extensive land requirements result in site location and development barriers that must be overcome. Increasingly, though, other organic materials including food waste and soiled paper products (tissues, wet ONP, waxed OCC, etc.) are being incorporated into windrow systems. The American Soil, Inc. Composting Facility is one of a growing number of examples of private facilities that compost food and other organics along with yard waste.

Program Service Area

Program Service Parameter	Description
Service Area	ASI services a 10 County area within 70 mile radius
Demographics	Urban and suburban service area
Waste Generation per Year in service area	Unknown
Collection System	Private and public sector collection
Local landfill tipping fee	\$125 per ton

The Recycle First Plan describes a long distance haul of organic material to distant compost facilities. The 10-county service area of this facility provides a working example of such an arrangement.

Program Description

Program Activities

The American Soil, Inc. Composting Facility operation is characterized as follows:

Other Collection Characteristics

Materials Collected

Characteristic	Description
Collection type:	Commingled and Source Separated
Set-out method:	uncompactor roll-offs
Pick-up frequency:	Daily
Is pickup same days as refuse pickup?	n.a.
Participation rate:	n.a.
Is participation mandatory?	yes
Enforcement mechanism:	n.a.

Commingled food waste, wood and paper
Source separated brush, leaves and grass

This privately owned 18-acre facility started out in September of 1987 composting leaves. Grass was added in mid-1988. The facility has recently been granted a 6 month demonstration permit to co-compost a total of 50,000 cubic yards (or 8,400 tons) per year of yard wastes, food wastes and paper wastes, with food waste and paper products not to exceed 20% of that total volume. ASI has a current customer base for the pilot project that brings them about 3,000 cubic yards of food and paper wastes. As part of the demonstration permit ASI is gathering field data for the NJDEP on the impacts of handling, transporting, processing and composting these materials. As of mid-March, a disagreement had emerged between ASI and NJDEP on the operation of the site and food and paper waste was temporarily being landfilled.

In the pilot operation, the composting process begins with grinding of food, paper, leaves and grass with a portable Universal grinder. After mixing and windrowing, the material is then turned with loader at one week intervals for a 5 to 9 month compost cycle. Brush is ground separately and sold as mulch. Ten counties bring material to the site.

The company offers full-service packages to municipal and private clients that include loading and transportation of stockpiled yard waste to the site from a distance not to exceed 70 miles one way. Average distance is 20 to 30 miles. Food and paper haul distances in the pilot range from 5 to 30 miles.

To reduce leakage of liquids from collection vehicles, wet food wastes are placed in large capacity biodegradable paper bags by generators such as produce markets, grocery stores, and restaurants. Non-yard waste organics consist mostly of regular and waxed cardboard and small amounts of miscellaneous paper (paper plates, circulars, office paper, newspaper) at 60-70%, with food (produce trimmings, spoiled fruit, coffee grounds) and wood waste (packing crates and cartons) making up 20-30% of the total.

The facility works within limits placed on it by the local County solid waste management plan regarding the amount of material, size of windrow (6' high by 14' wide), and turning frequency (minimum once every 2 weeks). The facility is located over 1/2 mile from any resident. Facility operators are working with the NJDEP and Rutgers University on a \$1.25 million research project funded by Proctor & Gamble and other companies regarding marketing of end products, how to package organics and how to educate store operators and municipalities on what can be separated for composting. NJDEP is working with them on marketing of services and how to educate stores and municipalities on what can be separated and how to package organics.

Other Program Activities

ASI support activities focus on expanding the capabilities of the facility to handle new organic materials and continuing the development of new finished compost markets.

Material Markets

Finished compost is marketed to topsoil markets in the New Jersey area. Prices paid for finished compost are largely driven by the current topsoil market price. If the program is municipally run, the compost can be used in parks, thereby avoiding disposal costs. If the program is privately run, the City could ask for materials as a host benefit.

Market Development Efforts

ASI supplies compost to Rutgers for study (1,000 tons over 6 years of the program). Rutgers does additional screening of material and then runs growth trials as part of an effort to document finished compost characteristics and match it to new market opportunities.

In addition, ASI representatives visit golf courses and other potential end users to establish market customers.

Program Performance

This summary of program performance presents the capital requirements and total annual budget, then analyzes financial performance on a per capita and a per ton of waste basis.

Total Capital Requirements

The ASI site comprises a total of 18 acres, 10.5 of which are actively used. On the site, the operation utilizes a portable grinder, 2 loaders, and a screen. Total capital costs for the facility, including site development costs, were roughly \$695,000.

Total Annual Operating Budget

As food waste composting was initiated at ASI starting in January of 1992, the use of 1991 cost figures would not be an accurate accounting of food/yard waste co-composting costs. Accordingly, projected 1992 costs are used, based largely upon current experiences of the firm.

The annual operating budget for the ASI facility can be estimated best for specific aspects of the operation.

Item	Projected 1992 Program Costs
• Direct Costs	
- Transfer of Organics to the Site	\$ 15-20 per ton
- Pre-processing	\$ 20-25 per ton
- Composting of Yard Waste	\$ 15-30 per ton
- Co-composting of Food Waste	\$ 35-75 per ton
- Screening	\$ 8-10 per ton
• Revenues	
- Tipping Fees for Yard Waste	\$ 10-20 per ton
- Tipping Fees for Food Waste	\$ 40-50 per ton
- Sale of Composted Materials	\$ 10-20 per ton
Net Costs for Composting Operation	\$ 20-50 per ton

These costs include labor expenses for 9 employees, including 4 equipment operators and 3 site managers.

Performance Parameters

In 1991, the facility composted (and sold) roughly 5,000 tons of material. In 1992, the throughput of the facility is expected to rise to 50,000 cubic yards, or approximately 8,400 tons of material.

Waste Generation and Recovery in 1992	Generation	Projected Recovery in 1992	% Recovery
Total	n.a.	8,400 tons	n.a.

Financial Performance

Based upon the capital and annual costs described above, the estimated financial performance of the facility is presented below:

Item	1992 Program Cost	New York City Cost Equivalents
• Annual cost per capita population serviced	n.a.	n.a.
• Capital cost per capita population serviced	n.a.	n.a.
• Annual cost per ton waste generated	n.a.	n.a.
• Annual net capital and operating cost per ton waste diverted	\$ 20-50	\$ 40-100
• Capital cost per ton waste generated	n.a.	n.a.
• Capital cost per ton waste diverted	n.a.	n.a.

* These costs have been doubled to reflect the increased cost of living in New York City.

Summary of Case Study Relevance to the Recycle First Plan

Windrow composting of yard waste is now a widespread commercial practice. Extending windrow technology to food waste and mixed paper is an emerging commercial practice with more applications coming on line each year. Desirable features include the flexibility the system has to accommodate different mixes of material that require variations in treatment for optimal volume reduction through composting. Land requirements, especially buffer zones, do present very real barriers to continued development of this approach to composting organic material. If these challenges can be overcome, the Recycle First recommendations for separate collection of organic material, long haul transfer, and processing at compost facilities can be implemented using windrow based technology and methods such as those in use at the American Soils facility.

EMERGING COLLECTION/PROCESSING SYSTEMS

A number of programs in the U.S. and Europe are moving toward innovative 2-stream and 3-stream collection and processing systems that are consistent with the recommendations of the Recycle First Plan. In a 2-stream system, wet wastes include all organics such as food scraps, soiled packaging, yard wastes, wood, disposable diapers, sanitary products, pet litter, and vacuum cleaner catchings. The dry stream includes ONP, papers and magazines, glass, food and beverage containers, OCC, plastic film and containers, metals, textiles, ceramics, rubber, leather, box board, and other recyclable material as feasible. In a 3-stream system such as that used in Guelph, Ontario, generators sort out wet wastes (excluding soiled packaging, pet droppings, diapers, and sanitary products), the dry fraction (same as for the 2-stream approach), and "refuse" (all other wastes).

Another trend is towards down-sizing of collection and processing technologies to a scale that is more adaptive to the demands of urban space constraints and program development logistics. This section also outlines new approaches to collecting recyclables from apartment high-rises, small scale "mini-MRFs" and buy-back centers, and two variations on compost processing using either aerobic or anaerobic systems.

Because these programs are on the cutting edge, they do not always have full documentation of costs and a track record of performance of any significant duration. Much of the available information is from pilot programs operating as a simulation of full scale approaches. Following are a series of such examples that provide New York City with a perspective on emerging trends in the collection and processing of recyclables, compostables and solid waste.

Guelph, Ontario, 2-Stream and 3-Stream Collection Mini-Case Study

Ontario Province mandates that communities show 50% reduction in wastes requiring disposal. Guelph has a population of 80,000 in the City, with a total population including the surrounding area of 150,000. The area generates approximately 136,587 metric tons from both residential and commercial sectors each year. Area tipping fees at \$96 CA/tonne.

The City handles its own garbage collection but a private hauler provides blue box curbside recycling services. Commercial service is provided primarily by private sector haulers. Collection frequency for households is weekly with same-day service for recycling and solid waste collection.

Since 1989, Guelph has been running a pilot to test collection and processing systems and participation levels in 800 households, comparing 2-stream and 3-stream systems. While the wet stream has been composted continuously since the outset of the project, there has been no regular processing and marketing of the dry side. Occasional "dry sorts" have been done to test processing systems and the composition, characteristics and volumes of the dry stream. More recently a pilot dry waste sorting project is planned to simulate the full-scale sorting facility.

Initial findings showed that the 2-stream system recovered 12% more organics and 14% more recyclables than the 3-stream system. The pilot has tested bags versus bins for both wet and dry materials. The capture rate for both is over 80%, with 2-stream higher, but with 4.8% versus 1.5% contamination of dry materials. The collection system with the lowest cost is 2-stream with a dual compartment truck making a single pass. The City expects about 60% recovery from the residential sector under full-scale 2-stream operation for the total waste stream. Two-stream shows higher contamination levels for both wet and dry streams. The City is still assessing whether the process can accommodate those contamination levels.

Rigid carts are used for collection with all organics currently placed in plastic bags. Carts are tipped hydraulically and taken to the facility. Organics were originally debagged manually

before composting, but the facility has switched to an automated slow speed shear for debagging, as part of continual testing of equipment concepts.

A temporary facility has been used for pre-processing and composting the wet stream using a Beltsville aerated static pile system in a series of concrete bays. Pilot dry waste sorting and testing has been done sporadically throughout the pilot, and 100% dry sorting was done for 3 months to test handling systems, composition, etc. The existing Blue Box program will stop when the wet/dry system comes on line, at which time the dry stream will be set out in bins or bags. It is estimated that 50-60% of dry material delivered to the MRF will be recovered and the rest landfilled. As markets develop, the recovery rate is expected to increase to 70-75% of the dry stream. Projections are that 80-90% of the wet stream would be composted and the rest landfilled.

The proposed wet/dry collection and processing system to be on line by 1994 would likely be handled by unionized City crews. The full-scale collection system and processing facility for both wet and dry streams are projected to have a capital cost of \$32.9 million CA. This capital investment includes land, MRF, composter, scale house, collection equipment, household hazardous waste center, site development, and all engineering, supervision and testing. Projected operating costs are \$5.4 million CA per year in 1991 dollars. Residue disposal in the first year of operation is projected to cost an additional \$3.5 million CA.

A planned full-scale facility would eventually handle up to 142,000 tons per year, with a theoretical maximum of 70% recovery using a 2-stream system for residential and commercial waste streams. This would provide a recovered tonnage of 99,400 annually.

Financial Performance

The projected financial performance of the full-scale facility could be summarized as follows:

Item	Projected Cost CA	Projected Cost US
• Annual cost per capita population serviced	\$36	\$ 29
• Capital cost per capita population serviced	\$217	\$ 174
• Annual cost per tonne/ton waste generated	\$38	\$ 28
• Annual cost per tonne/ton waste diverted	\$54	\$ 39
• Capital cost per tonne/ton waste generated	\$229	\$ 167
• Capital cost per tonne/ton waste diverted	\$328	\$ 239

Halton Region, Ontario, 3-Stream Collection Mini-Case Study

The Halton pilot is a 3-stream system. Dry recyclables are collected in a large cart (side loaded on a conventional truck), and processed and marketed by the Region's recycling contractor under a 10-year agreement.

The organics are bagged and taken to a local composting site where hand and mechanical debagging is completed before composting. Types of materials in the organics stream were scaled up from clean yard waste at the beginning with food scraps added later on. Further additions of organics will occur at later dates. This approach to incremental additions to the organic stream has resulted in a well-educated population and relatively clean organic material.

Time constraints did not allow further documentation of program specifications and costs.

Mississauga, Ontario, 2-Stream and 3-Stream Collection Mini-Case Study Summary

In the Mississauga pilot program, four different routes are being used to test variations of 2-stream and 3-stream approaches. There is presently no processing of dry recyclables, and only occasional sorting to test composition, characteristics and volumes of the dry stream.

From households, organic material is collected with rigid curbside carts alone, carts with paper bags, and carts with plastic bags on different routes. The City is considering working on switching to kraft paper bags with a cellophane liner, which is expected to be more compatible with the composting system.

The routes include one high-rise apartment building and one hospital. In apartments, residents are given a 5 gallon bucket with a lid and paper bags with handles to fit into the bucket. The 17-story apartment building participating in the pilot has 154 units. Recyclables and wet wastes are carried by each resident to the common bins stored outdoors on the ground floor. Because the paper bags leak if too much liquid is placed in them, only baked goods, coffee, tea, egg shells, fish and poultry, meats and bones, vegetable and fruit, and cheeses are acceptable. Gravy, sauces, dairy products with high liquid content, soups, and other liquids are not allowed because they leak through paper bags. The pilot is fully funded by the Provincial government, and it has not been determined whether residents or the government would pay for the paper bags under full-scale operation.

Organics are removed from the hospital's cafeteria in rigid 20-gallon buckets that weigh about 60-80 pounds when full. These buckets are rolled into a refrigerator and kept there until collection day; the refrigerator can store up to 35 buckets (2 metric tons per week). The buckets are then placed onto a 16 cubic yard roll-off for hauling to the compost site where they are emptied and returned without washing. Hospital staff must clean buckets before reusing.

Composting takes place on a 5-acre site within city limits using windrows turned with loader and Scat mechanical turner, depending upon weather. Plastics are debugged by hand.

Recycle Canada - Etobicoke Wet/Dry System Mini-Case Study

The Recycle Canada - Etobicoke program is a wet/dry 2-stream system targeted at industrial, commercial and institutional waste (ICI) from the surrounding population of 5 million people. Etobicoke is a suburb of the Metro Toronto area. The program and facility are a project of Waste Management, Inc. (WMI) and the facility is not currently open to other haulers.

WMI haulers do their own educating of generators to assist them in preparing materials per facility requirements. White bins 2-8 cubic yards in size are given to businesses who are instructed to place all items "dry to the touch" in those bins (except excluded items such as paint cans, etc.). Garbage and wet waste (including bathroom tissues, yard waste and food waste) are placed in the WMI burgancy bins of the same size. Collection is handled by a front-load packer truck.

The facility opened in February of 1991, cost \$25 million and is said by WMI to be the largest in the world and the first of its kind. It is permitted for 1,000 tons per day and is allowed to dispose of 200 tons per day of residue. All wet waste is currently being disposed of as residue while the wet system is being developed. Currently 300 tons per day are being received and 60 percent of that is recycled with the balance disposed of as residue.

The landfill bans of 7 materials in Ontario (ferrous, wood, cardboard, glass, paper, drywall, and aluminum) have driven the market for these services. The Ministry of Environment for Ontario Province is circulating a position paper on mandatory ICI recycling province wide, which is currently receiving comments from the public. The program may be adopted in 1992, further driving the ICI services that the WMI facility provides.

Neunkirchen, Austria, Organic Waste Composting Program Mini-Case Study

This case study describes the goals and objectives, service area, activities and performance of the Neunkirchen, Austria, program.

The Austrian Waste Act requires organic waste to be collected separately. A pilot source separated organic waste collection and composting program has been underway in Vienna for over two years and will eventually include 400,000 to 500,000 City residents. A similar program exists in Salzburg. There is one dedicated compost processing plant in Vienna and another under construction in Salzburg. Under the time constraints of this case study project further information was not available.

Neunkirchen's wet/dry system started operation in 1986. This two-stream system operates as a 50-50 joint venture between the local government and a paper mill company.

The dry materials are placed in a 240-liter plastic bin, while the wet stream can be placed in plastic or metal bins or plastic bags. No paper bags are used. The wet and dry fractions are processed in one facility, with recent expansion into a larger capacity compost plant. Overall residue from the system is 30-35% of incoming material, and this residue goes into the government-owned landfill. The wet stream in this program produces 20-25% residue.

The tip fee for material brought to the facility is \$61/metric tonne. Capital cost in 1986 was \$3.7 million in U.S. dollars. Recyclable materials currently recovered include paper (ONP, mixed, OCC), glass, metals, a very small amount of plastic film. (Plastic containers are now landfilled, but will be recycled when the green dot system goes into effect.) Compost is used as landfill cover and given free of charge to wineries because coal ash from eastern Germany in the wet stream has heavy metals which contaminate the compost.

The system, based on 1985 technology, has functioned well. Consideration should be given to changing to a 3-stream system (because of the coal ash) in order to improve the quality of the compost. With a 3-stream system, the "bio fraction" or wet stream would have only 5% residue, and although the system overall would produce 40-45% residue, the improvement in compost quality would be worth the reduction in overall recovery.

Miami Beach, Florida, High-Rise Trash Chute Recycling Mini-Case Study

A system installed at the LeTrianon condominium complex in 1991 demonstrates the potential for successfully integrating use of high rise trash chutes with municipal recycling.

In this system, an electric control panel in the chute room on each floor adjusts a turntable at the bottom of each chute which contains receptacles for each selected recyclable and trash. For example, a resident depositing glass pushes the "glass" button, which places the glass container directly below the chute opening.

Further, the system allows for the gathering of accurate generation and recovery of data through electric counters that automatically record each container section. Before the system was installed, monthly disposal costs averaged \$909. Once the system was installed and a participation rate of over 65% was achieved, disposal costs fell to \$397 per month, with a \$21 per ton average revenue from recyclables.

New York has an abundance of high rise apartment buildings. The reduction in labor and material handling costs brought about by the chute system may assist in containing cost and material contamination in these apartment programs. The chute system is adaptable to variations of the Recycle First collection approaches as described earlier in this set of case studies

King of Prussia, Pennsylvania, Mini MRF Mini-Case Study

Some small processing facilities have been designed with the advantages of low cost, quick on-line capability and adaptability. The MCMRF in the King of Prussia is capable of receiving and sorting up to 20 tons of commingled recyclables per eight-hour shift in an area 20 feet long by 40 feet wide. The facility offers variable-speed screens, conveyors, and air classification equipment to separate commingled materials at a total cost of approximately \$100,000.

Mini or mobile processing facilities may afford the opportunity for decentralized processing on vacant neighborhood lots or in vacant buildings while employing area residents. The small facility also may be utilized as an intermediate step for the Recycle First Strategy to phase in processing while a larger facility is financed, designed and constructed.

Newark, New Jersey Buy-Back Centers Mini-Case Study

Some larger cities have chosen to develop recycling capabilities with a network of buy-back centers.

In 1988 Newark, New Jersey with a population of nearly 400,000 including a large number of low income residents in multi-family units implemented a unique recycling buyback program, utilizing different approaches for different neighborhoods.

In the south ward which is composed of densely populated high rise apartments, the City is utilizing neighborhood buy-back centers operated by two recycling companies. The City pays the company for each ton of material recycling. Generally buy-back centers are limited to one or two high value materials.

In other neighborhoods consisting of one to two family homes, Newark requires residents to sort newspapers, glass and aluminum at curbside. These goods are picked up by employees of the Occupational Center, a local non-profit organization that employs handicapped individuals to pickup recyclables. This summer the program will be expanded to service apartment high-rises.

Newark's housing and demographic characteristics are consistent with those of New York City. Buy back centers are one of the oldest forms of recycling and have been implemented in conjunction with curbside in large cities such as Chicago and Los Angeles.

Superior Soils Incorporated, Monroe County, New York Mini-Case Study

Superior Soils is a consortium of private hauling companies in Monroe County, New York, formed in 1990 to collect, process, and market high quality composted lawn and yard debris. Lawn and yard debris collected by both public and private haulers is hauled directly to four agricultural composting sites where the material is either windrowed or landspread. These small sites are exempt from New York State regulations which enable composting of 3,000 cubic yards or less without state permits.

Superior Soils has written lease agreements with each landowner specifying payments or tipping fees, processing responsibilities, and portioning the finished material between the landowner and Superior Soils. Public and private haulers in turn have lease agreements with Superior Soils for use of the company's composting sites.

Beginning in the Spring of 1992, Superior anticipates operating a centralized quick lawn and yard debris transfer station in conjunction with the Town of Brighton, New York, where material will simply be tipped and transferred prior to hauling to the composting site. Eventually the company will accept institutional food waste at a larger centralized site.

The benefits of cooperative privatized, decentralized composting include: 1) limited site requirements or preparation, 2) ready access to compost markets, 3) decreased transportation costs from source to site, and 4) shared risk in capital investments such as processing equipment and site development. For example, one skid mounted windrow turner owned by Superior Soils moves from site to site on a weekly basis. Additionally, use of small 3,000 cubic yard exempt sites provides for a transition period to educate residents while a larger site is identified.

California Prison Industry Anaerobic Composting mini-Case Study

Anaerobic composting of organic solid wastes has potential as a cost-effective and environmentally sound alternative to windrow composting to assist communities in achieving +50% in municipal solid waste streams.

Anaerobic composting is a gentle, biological waste decomposition process which takes place within a controlled digester (tank) in the absence of air. Continuous mixing of the organic feedstock is necessary in the anaerobic process as opposed to the periodic turning associated with aerobic composting. Solid waste can be totally composted by the anaerobic process in 15 to 30 days by which time two byproducts are produced. The first is a useful, reusable, marketable methane gas which can be applied to produce steam or electricity. Approximately 55% of the gas is methane and 45% carbon dioxide. The second product is a high nutrient organic soil additive which can be sold to the public as a natural organic fertilizer. A number of additional benefits are associated with this technology which may be encompassed in the Recycle First plan:

1. Minimal land and building is required for the operation of the anaerobic process. It is estimated that roughly 2 to 4 acres are necessary for a full-scale anaerobic digestion facility, depending on the size of the facility and the anticipated throughput. This reduces land acquisition costs, a major capital cost element of aerobic composting which can require many acres of land.
2. Since the decomposition takes place within an enclosed tank, there is virtual elimination of odors.
3. The process operates at 45 to 50 degrees Centigrade and provides for complete elimination of pathogens.
4. Application of the biogas and recirculation of the effluent water creates a virtually self-sufficient system which does not waste energy or water.

A variety of organic wastes can be mixed together within the anaerobic digester with loading rates and recipes. These organic solid waste elements include food waste, lawn and yard debris, sludge, soiled waste paper, and diapers.

In February of 1992, the California Prison Industrial Authority at Folsom State Prison began operation of a 5 ton per day anaerobic digester which is currently composting 10,000 pounds per day of prison food waste. Four to five prison inmates operate the anaerobic digester which over the course of a 10-day period totally decomposes one day's feed stock. The prison system was paying approximately \$40 per ton to dispose of the material at the local landfill and is now saving between \$150 and \$200 per day in avoided disposal costs.

Additionally, the local utility company is in the process of tying a generator to the prison's electrical panel, thus converting approximately 12,000 cubic feet of gas a day to energy. Later this year, the Prison Authority will begin expanding to a 100 ton per day facility which will accept municipal solid waste from Folsom and surrounding municipalities.

The Department of Civil Engineering at the University of California Davis is currently under contract with the Prison Industry Authority of the State of California to demonstrate the technical feasibility of the anaerobic composting process for the processing of organic municipal solid waste. The Pilot University of California Davis program consists of four types of organic feed stock: newsprint, yard waste, mixed office paper and food waste. The characteristics of both the feed stock material and the end product in terms of quality and quantity of biogas generation and nutrient quality of the compost is currently under analysis.

During the first 7 months of the pilot test program, the digester was deemed to be relatively easy to operate and the digesting process relatively stable. In fact, it has been found that the compost humus material is excellent for use as a soil amendment and would assist the state in meeting state and federal diversion and reuse goals. Additionally, because of the relatively high energy content of the humus, it appears that the material can also be fired directly into a boiler when mixed with other fuels or pelletized for use as a fuel source.

The Village of Bergen, New York, and Comstock Foods, Inc. have received tentative approval from the New York State Energy and Research Development Authority for a demonstration 5-10 ton per day anaerobic composting facility in the Village of Bergen, New York. The facility will test-process source separated household food waste, soiled paper, lawn and yard debris, and diapers. Additionally, the facility will examine the feasibility of processing industrial food waste feedstock such as corn and beans.

The total estimated capital cost for equipment installation for the Bergen demonstration project is approximately \$335,000. It is estimated that the Village of 1,000 residents through a combination of recycling and organic composting of MSW and sludge will save approximately \$23,000 per year and produce an average of \$7,800 in compost for use on village projects yielding a total cost savings in the range of \$32,000 per year.

Given the scarce availability of land in and around New York City for aerobic windrow-based composting, the anaerobic technology had the potential to achieve substantial diversions for organic food waste and soiled waste paper from the municipal waste stream. It is possible to construct an anaerobic facility near a city hospital, college, or other institution and convert the institution waste to compost while additionally generating biogas which can be converted to a source of renewable energy for the institution. This conversion of organic waste to energy takes place in the absence of any incineration or burning. It should be noted that anaerobic composting has already achieved a high degree of commercial success in Europe with full-scale plants operating in France (Valorga) and Belgium (Dranco).

Summary of Mini-Case Studies' Relevance to the Recycle First Plan

The mini-case studies just covered outline the cutting edge of multiple stream collection and processing systems. These approaches build on subcomponents of the more established case studies included in earlier parts of this section. The Recycle First recommendations suggest an evolution of the collection and processing system to higher levels of recovery over time as the infrastructure is put in place for recycling and composting and as markets develop for certain less commonly recycled materials.

MRF technology that would enable commercialization of the next generation of collection/processing systems is rapidly developing. Innovations in collection system design, using variations of the 2- and 3-stream approaches combined with selective bagging of material, are also opening up opportunities for achieving aggressive recovery levels in the future. Pilots of these most advanced systems are running, and all appear to have the serious commitment of the sponsoring municipalities.

SUMMARY AND CONCLUSIONS FOR COLLECTION AND PROCESSING

Information from leading recycling communities across the country indicate that conventional waste reduction, recycling and composting strategies implemented in residential, commercial and industrial sectors in a community can result in diversion of 50% of the waste stream. Innovations such as those described in this series of mini-case studies indicate that further diversion of solid waste through recycling and composting can reach an additional 30 to 35% of the waste stream. This would bring the total waste diversion through waste reduction, recycling and composting into the 80 to 85% range.

Class of Material Recovery Facilities (MRFs)

Almost exclusively these goals are possible only through adaptation of the collection programs just described and continued evolution of MRF capabilities into a full scale wet and dry stream processing facility with capability for further recycling and composting (or transfer of organics to remote composting site). RRS uses an in-house MRF classification approach to distinguish between the many options available in development of these facilities and to show the progression of MRF capabilities that could be achieved through flexible MRF design. In this classification approach MRFs are separated into five types as shown in the following exhibit.

Classification of Material Recovery Facility Types

MRF Class	Materials Accepted	Processing Capabilities	Waste Transfer and Disposal Capability	Source of Waste	Contribution to Total Diversion
I	Source separated: <ul style="list-style-type: none"> • Newspapers • Aluminum and tin cans • Corrugated cardboard • Glass (one or more colors) • Office paper 	<ul style="list-style-type: none"> • Baling of newspaper, aluminum and tin cans, cardboard, office paper • Crushing of glass 	Small dumpster(s)	<ul style="list-style-type: none"> • Residential • Small amount of commercial 	<ul style="list-style-type: none"> • <10 %
II	Same as above plus: <ul style="list-style-type: none"> • Plastic • Clean commingled 	Same as above plus: <ul style="list-style-type: none"> • Line sorting for commingled materials 	Small dumpster(s)	<ul style="list-style-type: none"> • Residential • Medium amount of commercial 	<ul style="list-style-type: none"> • 10 - 20%
III	Same as above plus: <ul style="list-style-type: none"> • Partially contaminated loads • Yard/Wood waste • Metals 	Same as above plus: <ul style="list-style-type: none"> • Aluminum-separating equipment • Shredding of yard and wood wastes in preparation for composting 	Could range from open-top roll-off to 125-cubic-yard transfer semi-trailer	Equal amounts of residential and commercial	<ul style="list-style-type: none"> • 20 - 40%

Classification of Material Recovery Facility Types (continued)

MRF Class	Materials Accepted	Processing Capabilities	Waste Transfer and Disposal Capability	Source of Waste	Contribution to Total Diversion
IV	Same as above plus: <ul style="list-style-type: none"> Large contaminated loads 	Same as above plus: <ul style="list-style-type: none"> Enlarged drop-off area Buy-back station Preparation of organics/food waste for composting 	Advanced transfer and disposal facilities to handle residual and by-pass wastes for shipment to landfill or Class V facility	Equal amounts of residential and commercial	<ul style="list-style-type: none"> 40 - 60%
V	Same as above plus: <ul style="list-style-type: none"> All municipal mixed waste 	Same as above plus: <ul style="list-style-type: none"> Increased mechanization for sorting and processing of dry and wet fractions. Potential for production of refuse-derived fuel (RDF) 	Advanced disposal and transfer facilities to handle residual waste	Equal amounts of residential and commercial	<ul style="list-style-type: none"> 40 - 70%

Class I, II and III facilities are similar to recycling facilities that are commonly seen under development across the United States and Canada in recent years. An intermediate processing center (IPC) serving as a source separated buy-back center would be an example of the Class I MRF. The DuPage County recycling facility with its two stream commingled recyclable processing capacity is a good example of the Class II MRF. The Marin County, California, MRF complex including commercial recycling building, waste transfer building and residential recycling building is an example of a Class III MRF. (The Marin County MRF was not selected for inclusion with this set of case studies.)

Class IV Material Recovery Facility

The Class IV MRF differs from Class I, II and III facilities in three ways:

1. Mixed waste loads that are not going to be sorted or recycled are received at the site for transfer and disposal.
2. The facility encompasses a much broader range of processing functions—one variation being the capability to handle food and other wet waste in compost processing systems.
3. If the site allows expansion, a Class IV MRF can be upgraded to a Class V MRF with the addition of other mechanical processing and sorting equipment.

This facility accepts unsorted municipal solid waste and a greater amount of commercial waste, in addition to the materials received by the Class I, II, and III facilities. A large percentage of the loads of waste generated in a urban area can be processed in a Class IV MRF—with a significant percentage of the throughput still being transferred to landfills. Materials enter the facility through a large drop-off area which accommodates public, commercial, and residential vehicles.

Capital investment at this stage continues to increase beyond those required in Class II and III MRFs. Space and building requirements are greater and equipment investment is higher. The tasks of removing recoverables from the waste and transferring waste become substantially more mechanized at this level, increasing the required capital and labor investment.

Loads of mixed waste are selected for sorting on the basis of the materials present in the loads and the origin of the materials. Loads or portions of loads comprised mainly of recoverable materials are separated from the mostly non-recoverable, heavily contaminated loads, which are uneconomical to sort. The unprocessable loads are pushed to an adjacent transfer area in the building for subsequent removal. The processible loads are sorted both manually and mechanically. Certain items are hand-sorted, with the remaining material processed by screens, magnets, and other mechanized processing systems.

The facility may be large enough to benefit from additional processing of recoverables to address more lucrative markets. Examples include granulation of plastics or beneficiation of glass to produce furnace-ready cullet. Mixed waste loads may be diverted through additional mechanical separation equipment to remove a mixed paper fraction or a wet organic fraction for further composting.

As in a Class III MRF, wood and yard waste is dropped separately from other waste and then shredded for composting or sold to other industries to be burned for steam and electricity.

The focus of a Class IV MRF is on processing a large fraction of the waste stream. The Class IV MRF is developed as an entry-level facility whose capabilities will be scaled up and expanded as justified by the changing economics of waste disposal, the expansion of markets, and developments in processing technology.

Because a substantial amount of waste still may be unprocessable, transfer equipment handles the residual and by-pass wastes. One of the main features which distinguishes the Class IV and V facilities from a Class III MRF is the ability to use the transfer capabilities as part of a contingency plan in the event that the processing/recycling module is temporarily out of service. If this were to happen, waste would continue to enter the MRF and go directly to the transfer facility without being processed. Haulers would experience no change in their waste hauling practices.

Class V Material Recovery Facility

The Class V MRF is the most sophisticated and mechanized facility to process recyclables and mixed wastes from the municipal solid waste stream. It is distinguished by the advanced development of the processing technology employed in the facility and by the high percentage of the waste stream that is diverted from landfill disposal. A Class V MRF may incorporate production of pulp substitutes for paper mills, refuse-derived fuel (RDF) or co-composted solid waste.

The Class V facility accepts the same types of materials which enter the Class IV facility. The main difference between the two is that this MRF has the ability to process mixed waste loads which the Class IV MRF would have to transfer to disposal facilities.

A Class V MRF requires a significantly higher investment in capital equipment and site development due to the high percentage of the waste stream that is handled.

Waste is dumped onto a tipping floor where oversized items are removed and sorted into containers by a loader. Remaining materials are placed onto a conveyor feeding a mechanical size-sorting device. These materials are then further sorted by machine or hand to recover containers, paper, metals, and plastics. The recovered materials will vary with the loads and the markets being addressed.

The unrecovered materials are shredded to produce uniform-size pieces. A magnetic separator is used to remove any remaining ferrous metal. Materials are then separated according to density. The light fraction consists mostly of paper and film plastic; the heavy fraction consists of mainly wet organics, rubber, glass, plastics, and other materials which were missed in the sorting process. If the processing plant is feeding an energy recovery facility, the light fraction of the waste would end up as a cleaned fuel, in either a fluff form or as transportable pellets. If cleaned carefully, this light fraction could instead be marketed as a pulp substitute to a paper mill.

The heavy fraction made up of both inert inorganic material and wet organics may be landfilled or composted and then screened, with only the materials removed by the screen going to the landfill.

A minimum amount of by-pass waste leaves the Class V facility; most of the waste is processed on-site. The majority of waste which must be transferred from the facility for land disposal is residual waste from the heavy fraction. As mentioned above, the Class IV and V facilities have the ability to transfer all waste which is brought to the MRF, with no disruption of service to the various haulers should the facility be shut down unexpectedly.

Integrating New York City Processing Capacity

Initial MRF development will need to take place at a group of facilities. Expansion of MRF capabilities over time, as just described, will require greater reliance on waste transfer capabilities and can build on existing in-city MSW transfer facilities. Initial MRF development can be integrated into the same site or adjacent sites as those existing facilities. Use of decentralized mini-MRF's can be used to scale up the collection and processing capacity while facilities are being developed. Once developed, these integrated MRF/transfer facilities will be able to accommodate traffic and material flow considerations with the goal of efficient and cost-effective operation while still leaving the expansion options open for long-run development of the more advanced Class IV and Class V MRF systems.

Over time, the MRF sites would be expanded to take advantage of the emerging trends in MRF capabilities as commercial application and economic viability proceeds to improve. This could include the addition of front-end sorting systems to handle full scale implementation of bag based collection systems, further development of secondary recycling technologies, incorporation of wet waste composting, and integration of value added recovery systems.

This type of evolving system of collection programs and MRFs will become the foundation for sustainable achievement of the Recycle First recycling and composting goals.

WASTE REDUCTION COMPONENT OF THE NEW YORK CITY RECYCLE FIRST PLAN:

CASE STUDIES

This series of "mini-case studies" describes the goals and objectives, service areas, activities and performance of Waste Reduction initiatives in a number of locations across the U.S., Canada and Europe. These are part of a set of case studies developed in an effort to identify programs that have achieved a high level of waste diversion and that have potential to support goals of the Recycle First Plan. Where possible, efforts have been made to quantify the levels of waste diversion and estimate the corresponding quantity of waste diversion possible for New York City.

The waste reduction programs that are cited achieve impressive results using three basic approaches—all of which should be incorporated in a Recycle First waste reduction strategy. The first approach uses pricing of solid waste services to create disincentives for creating waste and incentives for reducing waste. The second approach introduces variations of packaging bans, restrictions and regulations to target waste reduction initiatives. The third approach introduces a range of public outreach efforts to leverage broad community understanding, support and implementation of waste reduction strategies.

Following is a series of mini-case studies that, taken together, demonstrate a comprehensive approach to waste reduction as part of the Recycle First Plan:

Program	Key Characteristics
Seattle, Washington, Solid Waste Utility: Variable Rate Fee	The Seattle program features a point-of-generation waste reduction message using economic incentives including volume based fee systems and services.
Maine Ban on Aseptic Packaging	The Maine ban on sale or distribution of aseptic packaging materials has resulted in direct removal of material from the waste stream, as alternative containers to aseptic packaging are being recycled.
Germany Packaging Legislation	The German legislation places responsibility for reducing the quantity and increasing the recyclability of the packaging waste stream directly on the industry that creates it. In response, German businesses organized nationwide recycling of household cast-off packaging, using a "green dot" system to identify packages that can be recycled.
The Netherlands Packaging Legislation	Dutch legislation consists of a voluntary agreement between packaging industries and the government in which industry will roll back the total amount of packaging to the 1986 levels, reduce the rate of one-trip packaging to 1986 levels, and end landfilling of certain types of packaging materials completely.
Florida Advance Disposal Fee	The Florida law requires that an Advance Disposal Fee (ADF) be charged by retailers for all containers that are not being recycled at the sustained rate of 50%. The intent is to provide a direct incentive to the manufacturer and distributor of consumer products to reduce packaging, to increase its recyclability or recycled material content.

Program	Key Characteristics
Minneapolis, Minnesota, Packaging Legislation	The Minneapolis legislation institutes a prohibition to sell or convey at the retail level, or possess with intent to sell, any food or beverage that is placed, wrapped or packaged in or on packaging which is not "environmentally acceptable" (degradable by natural biochemical processes, returnable for reuse as same food or beverage container at least once, or recyclable).
Berkeley, California, "Precycle"/ Urban Ore	The "Precycle" program, which teaches residents to reduce waste at the source, coincided with the initiation of a local ban on polystyrene foam packaging. Urban Ore, a mutually supportive waste prevention program, has been granted contractual access to Berkeley's waste stream at the City owned transfer station to salvage wood and other reusable items.
Metro Toronto, Ontario, Waste Reduction Office Program	Metro Toronto's Waste Reduction Task Force developed a plan that calls for the allocation of resources to waste reduction initiatives, and the creation of a waste reduction office exclusively dedicated to implementing ongoing waste prevention programs.

SEATTLE, WASHINGTON, SOLID WASTE UTILITY: VARIABLE RATE FEE MINI-CASE STUDY

Since 1961, when the Solid Waste Utility in Seattle was established, Seattle has had regulated residential garbage rates. The Utility operates as an enterprise fund under the Department of Engineering. In addition, it operates as an independent Utility, and as such, must be self-supporting, with no subsidies from general funds and tax revenues.

The Utility provides solid waste services for residential dwellings in the City of Seattle. Collection is provided through contracts with private haulers. Billing for residential households is handled by the Utility.

In 1981, the Utility moved away from a fixed charge system and established its variable can (volume-based) rate structure. The City credits the structure with helping to accomplish waste reduction and to support a 26% recycling rate by 1987 prior to start-up of any city-wide curbside programs. Overall, Seattle calculated a reduction in the waste set-out per household of 24%. In field-based sampling in which Seattle weighed participants' trash, individual participants' waste was further reduced by 15% reflecting the actual waste reduction level as opposed to increased volume compaction by the participant. City-wide measurements have shown tonnage disposed, ratios of tonnage to population and ratio of tonnage to households decreased in the 1987-88 time period. It should be noted that total waste disposed decreased between 1977 and 1981, but actually increased between 1981 and 1987 (reflecting nationwide trends), due to a number of factors including increases in households and household income. Overall, Seattle has concluded that as rates increased, customers disposed of less waste "holding all other factors constant."

After the rate structure was introduced, the average number of cans per residential subscriber dropped from 3.5 to just over 1 can.

The variable-can rates were instituted for all single-family households and some multi-family units as well. In the single-family structure, generators rent large, medium, small or "mini" cans from city which are emptied once per week. "Extra" cans can be added for an extra fee (currently \$9.00 per extra can).

Seattle provides a sticker for a fee, to residents who need to set out more trash in a given week than they have subscribed for. Residents can also pay extra for special backyard service. Residents do not receive any extra charge for their curbside recycling service, but must pay \$2 per month if they want separate yard waste collection.

In past years, a limited number of residents could sign up for a "zero" can service if they could demonstrate they disposed of no waste. The qualifications for the zero can were stringent, because the rate was traditionally heavily subsidized, and the City sent inspectors to visit customers wishing to qualify for the zero can. Hauling waste to a transfer station was not considered an acceptable option for the zero can. In 1989, the fee for a zero can option jumped from \$1.50 per month to \$5.95 per month to support Utility programs other than waste collection (such as landfill closure and recycling). As of 1991, the zero can is no longer offered as an option.

In the multi-family rate structure, a per-apartment rate is established based on a decision by the apartment building owner on how many whole cans or dumpsters are needed. Service level options for these smaller apartment buildings are few, and this program is extended to a limited number of apartment buildings in the city.

Seattle recommends establishing special rates for low-income citizens to build "lifeline" components into the rates. The Utility offers special subsidized rates to low-income elderly and low-income handicapped customers (77% off basic rates).

A study of Seattle's fee structure in 1989 indicated the following allocation of program costs: for the average charge on the one can rate (then \$13.75/month), 16.4 % of the cost went to landfill closure; 7.6% to recycling; 14.9% to disposal; 24.6% to collection; 10.9% to administration/miscellaneous costs; 17.5 to taxes and net income and low-income subsidy; and 10.2% to billing costs.

Rates for single-family waste collection experienced a dramatic rise (over 80%) between 1985 and 1987. The most dramatic changes in tonnage, subscriptions and recycling were noted during and after this period. According to a report from the Utility, "The rates seemed to reach a level that caused customers to take notice. In addition, the recycling alternatives were starting to mature. The new rates were necessitated by increased tipping fees and financing the closure of landfills. Awareness of recycling alternatives was increasing. Also, customer ability to compress waste may have begun to reach its limit."

In the late 1980's, Seattle changed its collection system from a per-can system to a system where contractors provided semi-automated "toters" sized to the subscription level paid for. This system greatly simplified enforcement, because any waste that is not in the official toter is not paid for and generally not collected.

Recently, Seattle has experimented with a weight-based system. Trash bins were labeled with bar codes, and scales were installed on the collection truck and used an automatic data collection system to record the weight of waste for each household. Households were then sent a weekly record of the amount of waste they generated and the cost they would pay "by the pound." This system so far has indicated an additional decrease in waste set out for disposal.

For many years, Seattle relied on the honor system to enforce service levels. As rates increased, however, illegal dumping in ravines, vacant lots, parks and other areas increased. Charitable organizations also reported unwanted donations and garbage left at unattended drop stations. Surveys of service level compliance conducted by the utility have shown between 14-22% of customers are placing out more cans for collection than they pay for. These percentages were offset, however, by customers who put out fewer cans than they were paying for.

Seattle has extensively studied its own system as well as other variable rate structures and offers this advice:

- Make charging for solid waste service mandatory.
- Ban illegal dumping and burning.
- Assure there are convenient public and private recycling alternatives.
- Create a sensible rate structure based on system costs and desired changes in disposal behavior.
- Implement extensive public education efforts and prepare for changes within the utility/city solid waste department itself.

Other planning and start-up recommendations include:

- Expect confusion and resistance from citizens, especially those who are not used to paying monthly bills or are unwilling to change behavior.
- Work with the media and prepare mailers.
- Require a minimum level of service and a fee for all households to share in total program costs.

MAINE BAN ON ASEPTIC PACKAGING MINI-CASE STUDY SUMMARY

An outright ban on sale or distribution, targeted at a carefully selected single or groups of packaging materials, can be an effective cornerstone to a waste reduction strategy. Industry estimates are that the State of Maine was consuming and disposing of 10 million aseptic packaging (e.g. the "juice box") containers a year out of 4 billion discarded each year nationally. The State of Maine banned the use of aseptic beverage packs, effective September of 1990. Certain drinks, such as soy-milk, are exempt from the ban.

The action was instigated by the State's consideration for expanding Maine's existing container deposit legislation to cover aseptic packaging. It was determined that applying the deposit system to aseptic beverage packages would have added significant management and program credibility problems since, at the time, there was no recycling infrastructure for aseptic packages anywhere in the United States. Instead a proposal to eliminate aseptic beverage containers by banning their sale or distribution in the State was considered and put before the voters where it received strong support.

The ban has resulted in direct removal of material from the waste stream as more juice bottles are being recycled. It is very visible to consumers throughout the State, yet provides them with a simple alternative in less packaging-intensive juice containers, including concentrates, larger volume containers and convenient single serving and recyclable glass, aluminum or tin containers. The State estimates that 140 tons per year are diverted from their waste stream by the ban.

Public relations and consumer education were not difficult since the issue had already gained significant public exposure through the state-wide ballot initiative that was used to pass the law. The aseptic packaging industry group worked with the state and the major grocery chains were prompt in clearing shelves of the product.

Enforcement is handled by the Department of Agriculture, Division of Regulations, Consumer Food Inspection Unit, which already had been charged with inspections of all food distribution outlets. Nine full-time staff handle on-site inspections and the bottle bill was already a very small part of their overall duties. No additional staff were added after the ban. Noncompliance with the law carries a civil penalty of a fine of up to \$100 on any unlawful sale of aseptics. There was a year between passage and the effective date to allow retailers time to comply.

The aseptic packaging industry has tried twice to remove the ban first by presenting information on recyclability and then by showing a rapidly assembled system of demonstration recycling plants across the U.S. and offering to put a demonstration facility in Maine as well.

The ban has had a very significant impact on the aseptic packaging industry nation-wide. They now have at least seven recycling demonstration collection plants in other states, most affiliated with schools. Recyclability into marketable commodities has been researched, covering methods of grinding up the multi-layered material, screening out the plastic film layer, recovering the aluminum layer and producing a fiber based commodity from the paper layer. A project in Toronto had been recycling aseptic packaging into plastic linoleum tiles although that project is reportedly now limited to other types of recycled plastics.

However, none of these efforts was operating at the time of the ban. And they remain only demonstration plants with questions about their long term economic sustainability. Even if they were operating at full processing capacity, they would only have captured 40% of used aseptic packaging in target areas of the state (major population centers), so it would not have been a comprehensive solution with long term assurances and commitments. Meanwhile the deposit law recovers 90-95% of the other types of juice containers it targets.

GERMANY PACKAGING LEGISLATION MINI-CASE STUDY SUMMARY

In April of 1991, Germany passed one of the most ambitious pieces of packaging legislation to date. The initiative requires retailers to take back packaging from customers, manufacturers to retrieve packaging from retailers, and packaging companies to reclaim it from manufacturers. It places responsibility for reducing the quantity and increasing the recyclability of the packaging waste stream directly on the industry that creates it.

Once the system is in place, it requires that by 1995, 80% of all packaging must be collected. Of the materials collected, 90% of glass, tin and aluminum and 80% of other packaging must be separated and recycled. Incineration is not counted as an acceptable technique in the accounting system.

In response, German businesses have formed a group called "Duales System Deutschland" (DSD) to organize nationwide recycling of household cast-off packaging. Trade associations have set up separate companies to collect particular kinds of packaging such as cardboard and plastic from shipping containers.

A special fee (between a 1¢ and 2¢) will allow a "green dot" to be displayed on each package that can be recycled. Householders separate items with the dot from the rest of their trash and put them in special yellow trash cans at curbside. Contractors collect the contents and take them to one of 200 sites now under construction. The material is sorted and sent back to the originating companies for further recycling. A fifth of all household waste will be collected. If the capture rate of 90% of packaging does not occur, a system of deposits will apply to all packages containing liquids (including items such as paints and pesticides).

Already, the green dot program is having an important waste reduction impact on retailers and manufacturers alike. Because of the inconvenience, retailers are going back to suppliers and asking them to eliminate unnecessary secondary packaging altogether. A good example is toothpaste; manufacturers now have designed the toothpaste tube with a peg to hang on a display rack, thus eliminating the carton altogether.

The new German system is also having an effect on packages outside the country, as importers scramble to meet the new regulations. For example, Hewlett-Packard in California has redesigned its office-machine packages worldwide to meet German requirements, including replacing some plastic with cardboard and reducing the overall quantity of packaging as much as possible.

Supporting efforts are underway in most major German cities, demonstrating the need to integrate local and state initiatives and combine regulatory approaches with targeted education and services.

Cities like Heidelberg have aggressive municipal procurement programs, and in almost every big city, sanitation departments offer mobile washing units for street festivals to do away with one-way containers/dishes. The city buys whole loads of dishes and a mobile washing unit and then leases the washing vehicle and dishes for special events.

The local waste authority in Heidelberg has been conducting a study looking into which products were most wasteful and is developing programs to address reduction opportunities for top priority items. One of the products at the top of this list is disposable diapers. Some communities now offer one week of free diaper service to families with newborns. Reduction of yard waste is also a target for many German cities which have programs to give away free backyard composting units.

THE NETHERLANDS PACKAGING LEGISLATION MINI-CASE STUDY SUMMARY

Legislation adopted in 1988 in the Netherlands has set a series of targets for waste reduction in consumer packaging. The Dutch system is an example of the leverage that packaging legislation can create with industry and has resulted in development of a "packaging covenant" negotiated with industry that includes a series of initiatives to reduce waste with specific measurable objectives.

This voluntary agreement between packaging industries and the government includes a commitment from industry to roll back the total amount of packaging to the 1986 levels and to end landfilling of certain types of packaging materials completely.

The rate of one-trip packaging will also be forced back to 1986 levels by the end of the century, resulting in a 10% reduction in packaging weight. Moreover, manufacturers have agreed to take back 90% of all used packaging by the end of the century by accepting responsibility for either reducing its generation in the first place or building a sustainable recovery system for recycling or composting of the packaging materials.

To support the program, a series of product life-cycle analyses will be conducted by a third party on a minimum of 27 packaging types and the results used to establish baselines for measurement of program progress and success.

FLORIDA ADVANCE DISPOSAL FEE MINI-CASE STUDY SUMMARY

Legislation adopted by the State of Florida in 1988 mandated recyclability for certain types of packaging containers with a per unit fee charged for those that didn't meet the requirements. Targeted packaging includes glass, aluminum, plastic (SPC codes 1-7), plastic-coated paper, and other metals. The goal of this advanced disposal fee (ADF) is to reduce litter while avoiding a bottle bill.

The law, which also included comprehensive recycling requirements for businesses and municipalities, requires that an Advance Disposal Fee (ADF) of 1¢ per container be charged by retailers for all containers that are not being recycled at the sustained rate of 50% starting on October 1, 1992. The fee is increased to 2¢ per container if the 50% rate is not achieved by October 1, 1995.

The intent of an ADF is to provide a direct incentive to the manufacturer and distributor of consumer products to reduce packaging, to increase its recyclability or recycled material content, or, if necessary, to attach an ADF fee to the product to collect and shift funds to other programs that will contribute to waste reduction and recycling performance.

The ADF approach allows industry to ramp up these changes in packaging over time in their regular course of introduction of new products and marketing campaigns. In the early stages it is expected that more ADF funds will be accumulated. ADF proceeds go to the "Container Recycling Trust Fund," which will use the monies to further the goals of the legislation through grants and loans to encourage waste reduction, market development and additional recycling.

Although the law has not yet taken effect, some indicators of progress are evident in the form of a product shift to more aluminum because it is likely to be the first container type to be exempted due to high recovery rates. Current recovery rates for the targeted containers are:

- Glass - 13.4%
- Aluminum - 39%
- Plastic bottles - 6.8%
- Plastic-coated paper - 0%
- Other metals - information not available

The Florida Department of Environmental Resources, Waste Reduction Section, determines which containers would be subject to the ADF charge, then registers redemption centers where these. The Florida Department of Revenue will collect the fee, administer reimbursements, and make sure each redemption center operates correctly. ADF funds go to capital recycling grants to counties, litter education and litter control. One person currently administers the start-up phase; when the law takes effect, estimates are that from 9 to 16 full-time staff will administer the program, with a budget of \$300,000 to \$600,000.

MINNEAPOLIS, MINNESOTA, PACKAGING LEGISLATION MINI-CASE STUDY SUMMARY

Minneapolis, a community of 290,000, adopted an Environmentally Acceptable Packaging Ordinance that institutes a prohibition to sell or convey at the retail level, or possess with intent to sell, any food or beverage that is placed, wrapped or packaged in or on packaging which is not environmentally acceptable.

The term "environmentally acceptable" is defined as degradable by natural biochemical processes, returnable for reuse as same food or beverage container at least once, or recyclable. Recyclable means that it is separable from solid waste by the generator or the recyclables collector and is currently collected for recycling in an organized fashion in a municipally sponsored program within the City of Minneapolis.

Having packaging that is not environmentally acceptable on the premises of a retail food establishment constitutes an intent to sell or convey the packaging (i.e., violates the ordinance). Manufacturers and suppliers who do not sell food or beverages at retail are exempt from this provision.

The law was to take effect in July of 1990. This was later modified to include a phased in compliance schedule as follows:

- June 1991 for milk jugs, soft drink bottles, ice cream, yogurt, bottled water (three resin types of plastics) for grocery stores, and disposable items used by dine-in customers at restaurants such as polystyrene.
- October 1991 for other grocery items, most of which were handled by expansion of the curbside program servicing the municipality.
- December 1991 for additional grocery items.

The law allows businesses to apply for exemptions if they need more time. Paper (even with plastic coating) is exempt.

The law was written primarily to address reduction and/or recycling of plastics which, at the time of passage, were not being recycled at any significant level. Since then recycling of HDPE containers (milk jugs, detergent containers, etc.) and PETE (beverage containers) has advanced rapidly and is now exempt from the legislation.

The City public works department tracks recycling and solid waste volumes using data collected through the reporting and recycling rebate programs. The solid waste tonnage is down far more than known recycling can account for:

Material	1990	1991	Difference
Material Recovery			
ONP, OCC, cans, glass, plastic (plastics recovery started in 11/90; ban took effect in 7/91)	20,178	20,490	312
Appliances	1,041	2,322	1281
Yard waste	17,282	17,959	677
Material Recovery Subtotal	38,501	40,771	2270
Material Disposal	112,814	101,783	(11,031)

The drop is probably a result of many trends including the recession, changes in buying habits and the success of other waste prevention and recycling activities that are not easily measured. There has been some percent of switching to paper products with the exemption of wax coated paper commonly used in fast food restaurants as a substitute for polystyrene. A composting program that is able to handle these paper products, which typically have low value in the recycling marketplace, would make this switch more acceptable.

The main unresolved targeted item is food packaging for take-out food with two types of rigid plastic, which is not collected regularly and for which no strong markets are in place. These two types are oriented (clear) polystyrene and expanded (foam) polystyrene. Businesses have to find their own recyclers and trash collectors and will be responsible for polystyrene reduction or recycling. Progress has been made since polystyrene is the primary waste for many fast food places. Enforcement was held off on restaurants until December 1991, and some retailers are not yet in compliance. As of December 1991, sanitarians have begun checking for recycling compliance as they conduct routine restaurant inspections.

BERKELEY "PRECYCLE"/URBAN ORE MINI-CASE STUDY SUMMARY

The Berkeley "Precycle"/Urban Ore Reuse program is targeted at a population of 103,000 including a mix of college students and well educated but demographically diverse urban/suburban residents within a much larger urbanized metropolitan area. Total waste generation is estimated to be 133,000 tons per year, including commercial/industrial sources.

In addition to its comprehensive curbside recycling programs, the City of Berkeley also offers its residents and businesses a variety of source reduction and reuse alternatives. Its high-visibility, media-intensive "Precycle" campaign in 1989 focused on teaching residents to reduce waste at the source. "Precycling means making intelligent, environmentally sound decisions at the store." The campaign coincided with the initiation of a local ban on polystyrene foam packaging, which also required businesses to offer in-store recycling opportunities. Urban Ore, an innovative reuse center, and several other local reuse opportunities in the Berkeley area, reportedly recover 87% of the available reusable discards (any reusable item in the waste stream, such as furniture or clothing) from the waste stream.

These efforts are also assisting the City in meeting the requirements of California law AB 939, the California Integrated Waste Management Act, which requires documentation of specific source reduction and recycling program elements that will divert 25% of the solid waste stream by 1995 and 50% by the year 2000.

Precycle and the Polystyrene Ban

The Precycle program was started in 1989 as part of a broad community waste reduction strategy to support a new ban on certain types of packaging in the community. The "Precycle" education campaign relied on the power of the mass media to get the word out under the direction of a public relations firm. Campaign organizers wanted a "splashy" introduction for the project, and staged major media events and a news conference to kick off the new slogan, followed by a 4-6 month intensive advertising effort.

Public Information Campaign

The public information campaign used a variety of methods to educate the public about source reduction, including:

- Newspaper advertisements with the slogan "Precycle—do it right from the start"
- A poster and artwork showing the relationship between patterns of consumption and the solid waste crisis
- Buttons and store posters
- A traveling trash archaeology exhibit "then and now"; and
- Exhibits showing, for example, the amount of plastic generated by a typical Berkeley household.

Costs for the individual elements of the public information campaign in the first year were:

- \$35,000 for program development and design (paid to consultant)
- \$17,000 for advertising (full-page ads)
- \$10,000 for printing poster
- Staff costs were not available.

In 1990, the campaign continued by emphasizing consumer action through the distribution of Precycle tips in local publications. Supermarkets began printing Precycle tips on grocery bags (some of the larger chains refused to do so). Some stores started developing their own waste reduction tips. Increasingly, Berkeley retailers began integrating waste prevention activities into the way they did business, with many groceries providing discounts for customers bringing their own bags, and restaurants giving a five-cent discount for customers bringing their own coffee cups.

Polystyrene Foam Ban

Of equal importance in 1990, Berkeley began enforcement of its ban on polystyrene foam. This ban requires all restaurants and retail food vendors to provide containers for recyclables and "50% of packaging in which prepared food or takeout food is provided to customers, or which is kept, purchased or obtained for this purpose must be degradable or recyclable." Businesses are required to keep records which the city does inspect for compliance. When businesses receive their operating license renewal, they must sign a commitment not to use polystyrene. City health inspectors provide a quarterly inspection.

Effect of Budget Cuts

Since 1990, the City has not dedicated education staff to follow-up on the original Precycle campaign. Staffing has been cut, and information regarding educational materials (numbers of copies and distribution, for example) are not available. Currently, a recycling coordinator answers public calls about the program, but maintains that few calls are coming in. While no surveys have been conducted to determine the impact of the Precycle campaign, it is apparent that rigorous enforcement of the local packaging ordinance since 1989 has had a greater impact on waste reduction and attitudes and that the Precycle campaign served as a supporting component of this multi-pronged waste prevention initiative.

Urban Ore

The Precycle campaign built on other existing and mutually supportive waste prevention programs. One of the best known and most innovative reuse facilities in the U.S., Urban Ore has been called a working prototype for an industry that services the waste reuse needs of the demolition, hauling and recycling industries. This company, which has been granted contractual access to Berkeley's waste stream at the City owned transfer station, concentrates on recovery of wood (doors, windows, lumber, cabinets) and salvages other reusable items as well.

Urban Ore's two sites include a Building and Materials Exchange and a Discard Management Center. To supply both sites, the privately owned company receives drop-offs, salvages materials from the transfer station floor (mostly from loose uncompacted loads tipped at the facility) and buys materials from contractors and haulers. Recently, Urban Ore leased a large building that adjoins the Building Materials Exchange, allowing consolidation of all retail sales on one site. Berkeley's 1991 Draft Integrated Waste Management Plan classified 67% of Urban Ore's estimated annual tonnage as waste reduction and 33% as recycling. The plan credited Urban Ore with reusing and recycling 5,000 tons a year compared to the curbside recycling program which handles a little more at 6,000 tons annually.

Sales of reusable materials reimburse Urban Ore for 100% of the cost to handle and market them; worker payrolls total one-third of annual operating budget; staff average wage is \$12 per hour (with a fully paid health plan); staff size is 15 full-time employees, the overall annual budget is currently at \$900,000, and the ratio of employees to annual income is one per \$60,000. The business is labor intensive. The reuse and salvage industry claims the "industry can reliably recover materials worth \$700 per ton, and estimates "immediately recoverable quantity of reusable goods to be on the order of five percent of the total discard supply."

Estimated Berkeley Diversion Rates

The City has estimated diversion from landfill disposal for 1991 to be approximately 21% of the total waste stream, with 16% attributed to recycling (including 1.5% for salvaged items), 2% to composting, and 3% to source reduction. By 1995, the City's goal is to divert 8.5% of the waste stream through source reduction activities, and 13.5% by the year 2000.

METRO TORONTO, ONTARIO, WASTE REDUCTION OFFICE MINI-CASE STUDY

The Metro Toronto Waste Reduction Office program promotes efforts to reduce waste at the source by reaching out to community organizations, ethnic groups and individuals. The program has been highly successful and should serve as an excellent model for New York City. This case study is also an example of how agencies have worked together to share costs and avoid duplication of efforts.

Program Description

The program services an urban/suburban area consisting of six municipalities. The population of the Metro Toronto area is 2,200,000, consisting of 450,000 single-family households and 383,000 multi-family households. Residential waste is estimated at 880,648 metric tons per year.

Each of the six municipalities which make up Metro Toronto provide its own waste collection, with a local tipping fee of \$153/metric ton (Canadian dollars).

Program Goals and Objectives

Metro Toronto's Waste Reduction Task Force in 1991 delivered its report titled "It can be done: 50-percent diversion achieved by 1993." Among other things, the plan calls for the allocation of resources to waste reduction initiatives, and the creation of a waste reduction office exclusively dedicated to implementing ongoing waste prevention programs. The Plan proposes targets for the year 2031: 35% reduction; 10% reuse; 30% recycling; 30% composting. As currently proposed, Metro will spend approximately \$2.2 million on reduction and reuse efforts between 1992 and 1994.

Waste Prevention Program Activities

The Metro Toronto Waste Reduction Office supports a broad effort by Metro to prevent waste at the source, consisting primarily of:

- Public education in conjunction with ongoing recycling and composting information
- Community Action Waste Reduction Grants Program
- Distribution of backyard composting units on a cost-share basis; public workshops; Master Composter training program
- School education program
- Greater Toronto Area Waste Reduction Campaign
- Commercial and industrial technical assistance program (including waste audits)

Metro Toronto will also strive to achieve its ambitious waste reduction and reuse goals (45% by 2031) by working cooperatively with the Greater Toronto Area (GTA- made up of Metro and four surrounding regional governments) and the Province of Ontario, which has established a Waste Reduction Office within the Ministry of the Environment.

GTA Waste Reduction Campaign Efforts

A broad waste reduction effort for the GTA was started in late 1989, when a Solid Waste Interim Steering Committee (SWISC), made up of municipal politicians began meeting. SWISC was to look at bigger issues such as landfill capacity, but also decided that public education about waste reduction should be coordinated by an umbrella group to avoid overlap of efforts. Later, the Province stepped in and eventually funded 50% of the cost of the \$2.5 million public education campaign, with Metro Toronto funding the rest of the program and serving as implementor. From December of 1990 to December 1991, the ambitious, high-profile campaign featured television, radio, print and transit advertising.

The GTA campaign emphasized the 3R's theme with the slogan, "Reduce. Reuse. Recycle. It's worth it!" Ads featured topics ranging from encouraging a "green" Christmas, to "Shopping the 3R's Way," to leaving grass clippings on the lawn. A series of 3R's ads were also aimed at GTA businesses, featuring testimonials from corporate presidents. Later in the spring, other mini-campaigns emphasizing alternatives to household hazardous waste and shopping wisely were added. Radio ads in Italian, Chinese, Greek and Portuguese were also featured.

The GTA Waste Reduction Campaign for 1992 is currently under negotiation with a spring start-up scheduled. The expanded media campaign will place greater emphasis on source reduction and reuse if funding issues can be resolved.

Community Action Waste Reduction Grants Program

One highly effective aspect of Metro's waste reduction efforts is the Community Action Waste Reduction Grants Program. Since January 1991, 44 grants totalling \$167,000 were approved by the Metropolitan Council for 3R's projects in the Metropolitan community. The program funds innovative ideas for reducing waste produced in neighborhoods. Community-based groups such as church groups, ethnic associations, youth groups, parent-teacher associations and other non-profit organizations may apply for a maximum of \$2,000 to cover the capital and operation costs of their projects. Large, non-profit organizations with proven experience in waste reduction may apply for up to \$20,000. The Metro Works Committee and Metro Council are now reviewing extension of the grants program and program criteria. Metro employs an individual full-time to coordinate the grants program.

Metro's advisory group for the Solid Waste Environmental Assessment Plan (SWEAP) had challenged Metro to come up with initiatives that would encourage reduction and reuse. The community action grants program was suggested as an inexpensive method of getting grass roots involvement underway. Success of the program in terms of tons of materials diverted is difficult to measure; however, the amount of waste disposed at Metro's landfill has been reduced and officials are attributing some of it to the 3R's program. Other reductions at the landfill are likely due to the recession and to high tip fees for the private sector (municipalities pay no tip fee, but support Metro through taxes). Landfill tip fee surcharges help fund the grants program and other waste prevention efforts. Metro officials are concerned about this funding source, however, since experiencing a 90 percent reduction in waste disposed by the private sector, primarily due to a high tip fee (\$153 per metric ton), but also due in part to landfill bans on corrugated cardboard and other commercial/industrial waste materials.

Other measures of success for the grants program are reflected in the overwhelming response of grant requestors, as well as in numbers of individuals attending workshops, seminars and special events which have been staged with grant dollars. Grant recipients represent many ethnic groups, and culturally unique programs have emerged. In one program made up of local parent groups, \$900 was spent to print environmental information in four languages on fliers inviting residents to attend a special waste prevention workshop at a local high school. More than 1,000 people attended, with success attributed to advertisements in multiple languages. Another grantee runs an adventure playground where kids use manufacturing off-cuts (production scraps and damaged products) and old theater sets to build chairs or other creations. Another highly popular program teaches Chinese immigrants how to compost, with program literature printed in Chinese.

Backyard Composting and Yard Waste Reduction Efforts

From 1989 through 1991, Metro sold more than 67,000 backyard composting bins at a subsidized cost (\$20) to area residents. Most of the bins were the Soil Saver variety, but some were a Green Cone brand capable of handling food waste without attracting pests or causing odor problems. Residents attended workshops about backyard composting, or picked up their bins at demonstration programs held in Metro parks on Sunday afternoons. Volunteers staffed the demonstrations, displaying 10 to 12 different types of backyard units. In the first year of the program, more than 72 workshops were held, reaching 5,000 people in just a few months. Some 53,000 additional backyard bins will be distributed in 1992.

Initial program costs were estimated at \$5 per household, and \$11 per ton of waste diverted. In 1991, Metro officials estimated that 16,660 tons of waste were diverted from the landfill through backyard composting.

Metro's Master Composter project has been another effective way of spreading the work of reducing yard and food waste generation. Volunteers attend 40 hours of training, then serve as a community resource to help with compost display booths at fairs, serve as speakers for civic groups and work at demonstration programs. Each volunteer is asked to donate 40 hours back to the community in exchange for the training.

Public Outreach and Education Efforts

As a subset of its larger solid waste outreach and education efforts, Metro promotes waste reduction in a number of educational publications, videos and other formats.

Solid waste management resource centers have been established in 18 public libraries throughout the Metro area, allowing citizens direct access to information about reduction, reuse, recycling and composting.

Metro waste prevention publications include:

- Beyond the Blue Box: Guide to Waste Reduction and Recycling in Metro Toronto (available in Italian and coming soon in Chinese and French); this publication includes an "A to Z" list of creative ways to reduce, reuse and recycle everything from automotive products, to books, to paints and solvents.
- Be Good to Your Garden: Compost! A how-to guide on backyard composting.
- Waste Matters - bi-monthly newsletter on solid waste management, programs and issues.
- How to Get Rid of Obnoxious House Guests - household hazardous waste reduction.

Other Metro waste prevention materials include

- Videos: topics include "The garbage crisis"; "Where your garbage goes"; "Composting"; and "Pulling Together", a video about commercial/industrial waste prevention.
- Daily two-minute radio program - tips from Ecologist Marjorie Lamb.

Other Metro Waste Prevention Programs

In October of 1991, Metro participated in Waste Reduction Week, an event organized by the Recycling Council of Ontario (RCO). The event focused on the amount of garbage individuals produce and how each can do something about it by incorporating the 3R's into their daily lives. To help achieve these goals, Metro declared October 2, 1991, as "Zero Garbage Day" during which residents were encouraged to refrain from producing any garbage. In addition, the RCO launched a "Junk Mail Free Zone" campaign to address the problem of unwanted and unsolicited direct mail.

As part of Waste Reduction Week, schools promoted a "2031- Near-Zero Waste" short story and picture contest. Students were asked to draw pictures or create stories about what their community would be like in the year 2031 with virtually no waste. Winners were given prize packages that included a selection of T-shirts, buttons, posters, lunch pouches, buttons, magnets and mugs.

Metro has also established a comprehensive effort to minimize commercial and industrial waste. In addition to banning a number of materials from its landfill, Metro provides free waste audits to area businesses to help them develop waste reduction plans and implement programs. Metro also provides a "Reduce Your Waste Size" guidebook for businesses, as well as promotional posters and recycling markets directory. Metro Recycling Advisors also assist businesses with waste exchange activities.

Summary of Case Study Relevance to the Recycle First Plan

Measuring waste prevented at the source will always be a challenge for any program implementing waste prevention efforts. Metro has determined that broad public education will be needed to change wasteful behaviors over time, in order to meet its ambitious waste reduction goal by the year 2031. Using a combination of approaches which include advertising in the mass media, funding innovative community group projects and school education, Metro is determined to reach its citizens in a variety of ways with as many messages as possible. It may take years to realize the true effect of these programs. For example, children exposed to waste prevention messages now will not become true consumers for some time.

Metro's broad efforts to educate its citizens have a direct correlation to New York's Recycle First plan, with its ambitious waste prevention goals. Metro's population is culturally and ethnically diverse, as well as reflecting a range of educational levels. Clearly, one important example for New York to be gained from Metro is the partnerships developed at the regional and provincial level, as well as at the local and even neighborhood levels.

WASTE REDUCTION MINI-CASE STUDIES RELEVANCE TO THE RECYCLE FIRST PLAN

The Recycle First recommendations include a strong waste prevention component targeting 15 to 20% of the waste stream. Case studies have been provided that effectively target waste prevention opportunities and organize education, regulatory and service resources to take advantage of those opportunities.

Effective Waste Reduction Strategies: User Fees , Packaging Legislation and Education

The most significant step that can be taken to reach waste reduction goals is to institute a pricing mechanism for solid waste disposal that rewards individual waste reduction efforts by applying volume based user fees to waste generated by each household. This mechanism leverages individual household problem solving measures to select the most appropriate waste reduction solutions, especially when coupled with supporting waste reduction information, packaging regulations and services to guide those choices.

Packaging is a very difficult part of the waste stream to affect with traditional recycling programs. Packaging legislation is an important tool for "designing the waste stream" of all households in the City to remove a targeted material from the disposable fraction by increasing its recyclability or compostability or eliminating its use entirely.

Packaging legislation is one of the most powerful steps that can be taken to encourage waste reduction. It has symbolic power in setting a tone for business and residential waste generators. In addition, it has a proven track record of attracting the serious attention of those industries responsible for the underlying driving forces which create a more disposable-oriented, less waste-conscious local economy. This is true even with municipal as opposed to state or national application. Finally, packaging legislation provides a powerful negotiating tool to leverage voluntary participation in additional waste reduction initiatives by business and industry of all sizes and types. Your total program is taken very seriously when accompanied by packaging legislation initiatives.

Packaging legislation, implemented on its own, without supporting programs, can be very effective in creating real reductions in the waste stream. But when combined with supporting economic incentives, education/communication programs, viable recycling alternatives and seed funding to encourage waste reduction innovation, the effectiveness of the same packaging legislation initiatives can be multiplied many times.

Relevance of Case Study Components to New York City

Waste reduction oriented outreach campaigns, coupled with waste prevention ordinances, targeted consumer incentives and supporting reuse and waste prevention service opportunities, are the basic tools of a municipally based waste prevention program. Components of this strategy are demonstrated in the case studies presented in this section.

- The Seattle volume based fee systems demonstrate how pricing of solid waste services can set the stage for waste reduction, creating a consumer-based interest in waste reduction and recycling opportunities.
- The Maine Ban on Aseptic Packaging demonstrates the important role played by a simple ban on selected target materials. When appropriately applied, with substitute products and approaches available, the ban is easily executed and very effective. It sends an important message to industry and to consumers regarding waste prevention and recycling.

- The Netherlands Packaging legislation demonstrates the leverage that can be achieved with legislation and a negotiating process with industry to gain voluntary binding commitments to waste reduction goals. A "hammer" is needed, but often a great deal is accomplished without exercising that power.
- The German system demonstrates the waste reduction role to be played by "green dot" style point of purchase tax systems, developed in cooperation with industry but driven by regulatory leverage. Industry and municipal sponsorship of supporting programs also plays a key role in the success of a comprehensive waste reduction strategy.
- The Florida Advance Disposal Fee approach outlines a "carrot/stick" methodology that allows industry to back away from strict recycling requirements yet pay a price for not meeting predetermined goals. This shows greater flexibility than outright bans or fixed mandates, yet still is a very powerful influence on the marketplace approach to waste reduction. An added benefit is the accumulation of funds through the ADF that provides a system for municipal encouragement of alternate approaches to waste reduction.
- The Minneapolis Packaging Legislation provides insight into some of the practical aspects of implementing required waste reduction steps. One of the most important lessons is the flexibility shown as enforcement dates shifted to account for transition time required for practical compliance by the business community.
- The Berkeley example demonstrates the ability of a mix of all the waste prevention strategies to support an aggressive waste prevention goal. The Berkeley program included regulation via ordinance, aggressive education via the "Precycle" initiative and supporting service programs as part of a network of services providing local reuse opportunities.
- Finally, the Toronto example illustrates how the leadership of an overseeing agency can be extended into the community through a multi-faceted waste reduction outreach system and then leveraged regionally through cooperation with state agencies and surrounding municipalities.

The track record of these programs is difficult to document. However, specific results have been reported in selected cases, ranging from Seattle's 25% reduction to Berkeley's 3%. These communities have integrated their waste reduction strategies into their total solid waste management system by instituting a systematic tracking system to document waste generation rates, disposal activity and diversion through reduction, reuse, recycling and composting. Moreover, these communities, having already reached significant waste reduction results, continue to pursue even more aggressive goals that are as high as Metro Toronto's 45% reduction and reuse target for the year 2035.

Such programs, however, must be tailored to local conditions which present both unique opportunities and barriers. Volume based fee systems will need to be adapted to the constraints of building types and local pricing practices. Ordinances will need to be New York City specific in terms of enabling statute, targeted activities, definitions, conditions, penalties and enforcement. Media campaigns, on a much larger scale, must be responsive to local culture. Building a network of local waste prevention and reuse services needs to take advantage of the considerable reuse services that are already in place. Barriers presented by real estate prices may require appropriate municipal action to support reuse service enterprises.

For example, policies and ordinances could be adopted that require all solid waste services provided by the public and private sectors to be charged to households and businesses using volume based fee systems. Other ordinances could ban targeted wasteful types of packaging. These actions could be used to leverage further waste reduction commitments by manufacturers, distributors and retailers of consumer goods servicing the City's population.

City wide procurement policies would be adopted to leverage supplier cooperation in reaching waste prevention goals and as a means of encouraging extension of those features to other large purchasers in the City. An accounting system that applies a surcharge to all waste generated in the City could be used as the source of funds for grant awards to innovative waste reduction programs and services, sending the message that waste generation carries a price—and waste reduction efforts are rewarded. Finally a record keeping system would establish a benchmark for waste generation to facilitate tracking of progress towards waste prevention goals, and revisions as needed to both goals and target dates.

The institutional barriers to effective waste reduction are not insurmountable challenges, just critical issues that require creative program design using the tools available to any municipal entity seeking to achieve a significant 15 to 20% reduction in the waste stream. These institutional requirements do, however, represent a major shift in the standard way of doing business. This shift is best driven by restructuring the underlying economic and regulatory forces that guide individual household waste generation practices in New York City. By linking this institutional restructuring with public and private programs and services to ensure availability of quality waste reduction opportunities, the City will be establishing leadership and direction for individual household waste reduction decisions.

EDUCATION/PROMOTION COMPONENT OF THE NEW YORK CITY RECYCLE FIRST PLAN:

CASE STUDIES

This section describes case studies that demonstrate the functional components of the Recycle First Comprehensive Education/Promotion element. The case studies include the following programs:

Program	Key Characteristics
Seattle, Washington	Seattle's program features a high visibility marketing campaign including direct mail, television spots, an upbeat message, coordination of efforts among municipal agencies, well-staffed public information hotline and a strong volunteer program.
Metro Toronto, Ontario	Metro Toronto's comprehensive outreach program features day-to-day promotion of Metro waste reduction efforts, including ongoing promotion of the blue box recycling program, advertising about leaf composting, practical information on backyard composting, and displays, publications and special events about reducing waste in general.
Metro Portland, Oregon	Metro Portland supplies information and materials to the public, businesses, government agencies, teachers and students and maintains an extensive Information Center that is being computerized. Metro also conducts demonstration projects, waste reduction programs, and a new program to encourage builders and contractors to recycle construction and demolition debris.

SEATTLE, WASHINGTON, EDUCATION PROGRAM

Case Study Summary

The City of Seattle, Washington, began a multi-faceted Solid Waste Education program in 1988 to increase participation in its Curbside and Alley Recycling Program. Partly due to the volume-based rate structure for trash collection and an ambitious outreach and education program, the city achieved the following in 1988: 88% of Seattle's customers voluntarily signed up for the recycling program, and 62% signed up for yard waste service (yard service required an extra \$2 per month charge).

After the first year of education efforts, the city targeted moderate and low participation neighborhoods, and made an effort to maintain visibility and awareness. It also attempted to identify customers who weren't using any of the yard waste disposal options. As a result, 86% of Seattle customers are now on the one-can-or-less system for garbage pickup (see the Waste Reduction case study regarding Seattle's variable rate fee).

A principal lesson that the Seattle Case Study provides for the Recycle First Plan education/promotion element is the value of comprehensive, consistent and targeted outreach and education in supporting increased use of infrastructure improvements for the collection and processing of recyclables.

Program Service Area

Seattle represents a service area with a large urban population center and a highly diverse population residing in a mix of single and multi-family housing. Although smaller than the New York service area it represents a close match for case study comparisons.

Program Service Area Parameter	Description
Population	The program services a population of 516,259, consisting of 148,201 single-family households and 95,051 multi-family households.
Service Area	82 square miles of the Seattle Metropolitan area
Demographics	Highly diverse urban population with range of incomes, households and ethnic mix.
Waste Generation per Year	734,200 tons from the following sectors: Residential: 270,700 tons Commercial/Industrial 453,500 tons
Waste Collection System	The collection system for solid waste is publicly operated. Funding is via volume-based service fees. Collection frequency is weekly. The city contracts with private sector crews; residents who must sign up (with the City) for collection on a volume-based rate (choices include 20-gallon mini-can; one 30-gallon can; two cans or 60-gallon toter; three-cans or 90 gallon toter) 1,000 people in city were allowed to sign up for "zero cans".
Local landfill tipping fee	\$31.50/ton (City contract with County)

Program Description

The City of Seattle's Solid Waste Utility began an educational program in 1988 to increase participation in its Curbside and Alley Recycling Program (see the recycling program description at the end of this section) and to meet the following goals:

- Achieve high participation, resulting in higher recycling tonnage and lower garbage tonnage;
- Minimize customer questions, thereby reducing telephone staff time;
- Establish the correct customer preparation of and reduce contamination of recyclables; and
- Build a strong and influential support constituency for solid waste diversion programs.

In addition, the program set future recycling goals of 40% of all commercial and residential waste by 1991; 50% by 1993; and 60% by 1998.

Program Summary

Seattle's curb-alley recycling program services every single-family household in the city. Two private contractors each service half the city. Seattle's residential solid waste is managed by a city utility and financed through an enterprise fund. The City has a contract with the County to dispose of waste (\$31.50/ton). Partly due to the volume-based rate structure for trash collection and an ambitious outreach and education program, the city achieved the following in 1988: 80% of Seattle's customers voluntarily signed up for the recycling program; 62% signed up for yard waste service.

In 1988, Seattle was already recycling 25% of its waste stream. Market research, however, determined there remained a need for basic recycling education. Because residents had to sign up for the new recycling and yard waste collection service, and the City did not plan to implement mandatory recycling, special education efforts were determined to be needed.

After the first year of education efforts, the City targeted moderate and low participation neighborhoods, and made an effort to maintain visibility and awareness. It also attempted to identify those who weren't using any of the yard waste disposal options.

Convenience was given high priority. Citizens were provided with a recycling bin and educational information, as well as a free backyard compost bin and an hour of free instruction in effective methods of composting. At City transfer stations, residents can deliver mattresses, waste oil, wood waste, lawn mowers, cardboard and motor oil. The household hazardous waste drop-off fee is subsidized, and the city is considering moving to free drop-off.

The City has also provided economic incentives to encourage behavior change. A mandatory fee is charged on purchase of new auto batteries, unless the person brings in old battery. Elementary schools compete for grants of \$5,000 to design waste reduction/recycling programs.

To make the best use of limited budgets, the city approached the comprehensive education campaign they knew they would need with market research. Focus group interviews were conducted to identify potential messages and perceived barriers to new recycling and waste collection programs. The marketers then tested the visual messages created for the "Curb Waste...Recycle" campaign in several demographically diverse areas (rural, urban, ethnic, age, gender). Seattle then budgeted \$2-\$3 per household per year for ongoing promotions, and another \$1 to \$2 per household per year for new or start-up programs.

Research also showed that a majority of people get information through direct mail. The City distributes a four-page newsletter (in five languages) to 144,000 single family households twice a year. The promotion program also includes use of print display advertising, bus cards, billboards and a variety of other public relations and promotional efforts.

The program is staffed by four full-time employees whose duties include promotion of all the City's solid waste programs. Per-capital education program cost is \$3-4 per household for ongoing outreach; and \$1-2 per household to kick-off new programs (includes all solid waste outreach efforts).

Promotion Campaigns

Follow-up market research has helped Seattle more effectively target its outreach efforts. Promotion strategies need to be tailored to target audiences. The 1991 survey results showed the following:

- Respondents learned about Seattle's curb/alley program through a variety of sources;
- More than two out of five respondents obtained information about the program in the mail (46.8%) or through the newspaper (44.1%);
- Nearly 40% knew about the program through word of mouth from friends and neighbors;
- Television was frequently mentioned as a source of information (37.8%);
- In-store notices and outdoor advertising were given a low priority rating; and
- Small community events and "blitzing" of specific neighborhoods was successful.

The survey also gave planning officials information revealing that residents from different parts of the city had learned about the program from different sources.

In late 1987, Seattle selected a public relations firm using a Request for Proposal process. A public relations group was hired to create a campaign theme and identity. Since 1987, that group has assisted the Utility with all aspects of communications strategies, including market research (no information about the dollar amount of the contract was available)

Seattle's early market research had included "focus group" interviews (with recyclers and non-recyclers) instead of surveys in order to get more in-depth information. This approach helped determine that an "upbeat" positive tone was needed for an information campaign. The groups liked "Be part of the solution" and "It's not garbage until you throw it away." Researchers determined two issues should be kept in mind in refining messages: 1) Recycling makes people feel good and 2) most people are nostalgic about their early recycling experiences. Don't imply recycling is THE solution to the solid waste problem, rather it is the one way people can participate directly.

Survey participants indicated they would like to see a reduction in their garbage rates as a reward for recycling; they expect rates to increase and this makes them unhappy; people also want some form of recognition for recycling (this may involve neighborhoods as well as individuals).

Direct mail has thus become the central focus of Seattle's promotion efforts, although program planners there warn that direct mail works in Seattle but may not elsewhere. The Utility does get a few complaints about generating "junk mail," but mailers and other print materials are always printed on recycled paper with vegetable-based inks and include a reminder to recycle them. A direct mail piece is usually supported by paid and public service advertising in newspapers, and on radio and TV.

The Utility uses several other approaches, tailoring campaigns to targeted goals and audiences. Feature stories are solicited for the Utility's newsletter. The Utility may emphasize a program or campaign at community events, request time at meetings of community organizations, or even organize its own neighborhood informational meetings. City inspectors and collection drivers also leave informational tags on curbside containers.

Coordination of Efforts

The Utility holds a monthly meeting with the curbside collection contractors, customer contact staff and public information staff to make sure everyone is up to date and everyone has a consistent understanding of program direction. All education campaign materials are reviewed by the collection contractors and Utility telephone information staff. Before every major program kickoff or educational campaign, the Utility also meets with staff from City agencies who will receive questions from residents. The Mayor's Office for Senior Citizens always receives a briefing, because senior citizens frequently call there first for explanations of City programs.

Public Information

A staff of 20 answers telephone calls with information about Seattle's variable rate fee, recycling and yard waste programs. The Utility provides periodic customer service training for phone staff and monitors the performance of the collection drivers. Problems are identified and customer information efforts are increased. For example, collection contractors were "missing" a lot of garbage and yard waste because customers were not placing their containers close enough to the curb. The Utility launched a full-scale educational and enforcement effort: customers were mailed a folding "3 foot" ruler, Utility inspectors tagged containers that were too far from the curb, and the Utility mounted a general promotion campaign to support those activities. Collectors reported an immediate, visible improvement in containers being placed at the curb.

Reaching a Diverse Audience

Age, learning styles and cultural backgrounds are taken into account with all of Seattle's programs. Promotional materials use fairly large print so they can be read without difficulty. Because different people learn differently, the Utility varies its outreach efforts by presenting information verbally, graphically, through hands-on experiences, and through print media and radio.

Research is also underway to determine how to communicate effectively with non-English speaking and English as a Second Language customers. The Utility has discovered that its general media approach relying on print materials did not reach all of its customer groups with equal effectiveness. The approach was not as effective with working class and ethnic minority customer groups. The Utility has designated a work team whose mission is to deliver effective campaigns to targeted cultural communities and neighborhoods with lower program participation.

Friends of Recycling

Seattle relies on its Friends of Recycling (FOR) program and a citizens advisory group to fine-tune programs and program promotion.

FOR volunteers educate residents about recycling, working both in their neighborhoods and at community events. When FOR volunteers reported that residents had many questions about which plastics were recyclable, the Utility increased its efforts to educate residents about plastics recycling. The Utility added more information to the signs at plastic recycling drop sites, included plastics articles in subsequent customer newsletters, and produced an exhibit on plastics recycling for use at community events.

The FOR program began in 1989 as a pilot project, modeled after a similar program in Boulder, CO, and later expanded it city-wide. A full-time project manager at the Utility recruits, trains and coordinates volunteers. More than 150 volunteers help with recruitment of new customers, neighborhood activities and a recognition and rewards program.

A marketing plan developed for the FOR program includes advertising in both print and electronic media, with a basic slogan of "talk trash to your neighbors." Volunteers attend a two-hour training session before beginning their work. "Work" includes volunteering at special community events to staff booths and displays, or conducting intercept interviews at local supermarkets about waste reduction efforts.

Seattle spends between \$60,000 and \$90,000 each year on the FOR program, not including two-thirds of a full time employee.

Other City Outreach Efforts

The City has begun a new program to work with retailers to develop a highly visible, consumer oriented education campaign on smart shopping choices. The campaign features bright yellow and green mobiles suspended from ceilings that offer shoppers the waste reduction "Tip of the Month," as well as point-of-purchase "shelf-talker" information pointing out recycled, recyclable or recycled content packaging and products. Information is provided on how to recognize recyclable plastics. Decals remind shoppers to bring back shopping bags.

The City also sponsors recycling education through the schools, which consist of 66 elementary schools and 22 middle and high schools. Each year, the City provides up to \$1,500 to each of 15 to 20 schools (20 in 1992) for field trips to recycling related sites, and \$500 incentive awards to reduce garbage. The City also contracts with a professional performer to provide schools with recycling-related magic shows. For each school, the City provides a learning box with curriculum materials and 8 training sessions for teachers worth 3 credit hours.

Overview of Seattle Recycling Program

Seattle's curb-alley recycling program services every single-family household in the city. The Seattle Solid Waste Utility contracts with two private sector programs which each service approximately half the city. Drop-off and buy-back centers are provided throughout the city, and some apartment dwellers receive service.

Program Characteristic	Description
Collection type:	Source Separated Commingled Containers
Set-out method:	3-bin system in north, 90 gallon tote in south
Pick-up frequency:	Weekly in north; monthly in south
Is pickup same days as refuse pickup?	No
Participation rate:	88% of eligible households are signed up to receive services (actual participation rates are now calculated)
Is participation mandatory?	No

For more information on Seattle's recycling program, see the Waste Reduction case study for Seattle in this appendix.

Program Performance

This summary of program performance presents an estimated annual budget, expenditures on a per capita basis, and estimated cost equivalencies for New York City.

Item	Projected 1992 Program Cost	Per Capita Program Cost	New York City Program Cost Equivalent
• On-Going Program Costs (RRS est.)	\$ 1,000,000- 1,500,000	\$ 2-3	\$ 1,900,000- 2,900,000
• Start-up Program Costs (RRS est.)	\$ 500,000- 1,000,000	\$ 1-2	\$ 950,000- 1,900,000
• Other Expenses	n.a.	n.a.	n.a.

Summary of Case Study Relevance to the Recycle First Plan

Seattle's program represents one of the best examples of the role that education and promotion play in setting the foundation for successful waste reduction, recycling and composting programs. The descriptions just provided cover only a portion of the total program scope. The New York Recycle First Plan has included an emphasis on education and promotion programs of similar scope and these Seattle programs serve as a model for some of the programs that could be implemented as part of Recycle First for New York.

METRO TORONTO PROMOTION AND EDUCATION PROGRAM

Case Study Summary

Metro Toronto, an authority consisting of six municipalities in the metropolitan Toronto area, has for several years conducted one of the most comprehensive outreach and education efforts in North America. Beginning with the promotion of its blue box recycling program in the late 1980's, Metro has expanded its efforts to include promotion of backyard composting, household hazardous waste education and source reduction and reuse, as well as providing general solid waste information. In spite of a proposed budget cut for 1992, Metro will spend nearly \$3 million on promotion and education efforts.

In order to achieve its goal of 25% diversion, Metro's blue box program will be expanded to add more materials; recycling will be expanded at apartments; backyard composting education and bin distribution will be increased; waste prevention campaigns will be stepped up.

Program Service Area

The Metro Toronto service is very similar to that of New York: a large urban center with heavily populated sub-sectors, each having a diverse mix of households by income, education, housing type and ethnic background.

Program Service Parameter	Description
Population	The program services a population of 2.2 million of the total 3-4 million in the Greater Toronto Area.
Service Area	Metropolitan Toronto
Demographics	Diverse urban and suburban population living in single and multi-family housing
Waste Disposed per Year	880,648 metric tons from the residential sectors.
Waste Collection System	Municipalities are responsible for waste collection. Metro provides disposal of waste and processing of recyclables. Member municipalities pay Metro through their general fund budgets.
Local landfill tipping fee	\$153/metric ton (Canadian)

A broader waste reduction outreach effort for the Greater Toronto Area (GTA) is described in the Metro Toronto Waste Prevention Case Study.

Program Description

Promotion and Education Program Summary

In 1988, Metro Toronto began a comprehensive media blitz and public education program for its blue box campaign, using a series of television commercials and print advertising. In 1989, Metro Toronto formally established a communications group following the startup of the blue box recycling collection program, and other composting and waste reduction efforts.

With the kickoff of the blue box program, Metro Toronto determined that a broader public education campaign was necessary, aimed at changing attitudes and behaviors for the Metro population of 2.2 million residents and businesses. Metro reviewed proposals from six consulting/advertising companies and eventually selected both a consultant and an ambitious outreach strategy. The consultant developed three scenarios for the proposed public education program at costs of \$3.1 million, \$5.9 million and \$8.8 million. A summary of Plan A, as revised (\$2.5 million in the first year), follows:

- TV, radio, newspaper, ethnic publications: \$400,00 for creative production
\$1.7 million for purchase of advertising
\$12,000 for research
- Media training and 10,000 press kits \$18,000
- Printing/publications/letterhead \$44,000
- Video Partial funding for waste reduction) \$16,000
- Awards/grants \$10,000
- Commercial/industrial program \$135,000
- Posters \$20,000
- Tours/newsletter \$41,000
- Contract staff \$200,000
- Communications consultant fee \$120,000

The \$3.12 million budget was established to launch the campaign. Initially, the blue box portion of the campaign was to last 1.5 years, but has become an ongoing program. Other educational and promotional activities began to focus on day-to-day promotion of Metro waste reduction efforts, including advertising about leaf composting, practical information on backyard composting, and displays, publications and special events about reducing waste in general.

Following a first year program splash, Metro has continued its comprehensive outreach efforts. Major activities of the 1991 education and promotion program were as follows:

- Displays have visited more than 120 venues;
- The composting hotline has received over 4,000 calls, resulting in 3,000 mail-outs (direct requests). Over 200 presentations have been made on composting, as well as 12 workshops. Metro has staffed 47 different bin distribution events, with a \$10 cost to public and the remainder subsidized cost by the Province and Metro.
- The program conducted 81 landfill tours and made 80 presentations;
- General information requests numbered 2,500 phone calls, without even publicizing the general information number. The program has recently established an automated hotline, so this number will increase dramatically.

The Metro Toronto promotion/education budget per year is \$2-3 million. Last year Metro spent \$1.5 million on recycling and composting education programs (including backyard composting), and an additional \$2.3 million on other waste reduction efforts. Of the later budget, 50% is reimbursed by the Province. This year Metro will spend between \$2-3 million on education programs. The budget is broken down as follows:

- Advertising: \$1.2 (current);
- Printed materials: \$400,000 (includes newsletter, a dozen or so different brochures, fact sheets)
- Other materials, including 7 displays, video loan project, more multi-lingual translations
- Staff Costs: wages plus benefits equal about \$700,000; 13 full time staff consisting of a Manager of Communications; Asst. Manager; two communication coordinators (production, liaison with ad agency, etc); 8 information officers (front line); general public information officers; one full-time person responsible for displays, staff hotlines, and presentations; and a clerk to distribute materials.

There is general agreement that overall solid waste disposal has been greatly reduced, attributed to a combination of drastically increased tip fees at landfill, recession, and material bans. Municipal residential solid waste has only dropped 5-10%, but commercial waste is down 90%. Recovery of materials through composting, recycling, salvage, etc. is estimated at 16.9 % for 1991.

Metro Toronto Recycling Program Characteristics

Program Characteristic	Description
Collection type:	Commingled Containers Commingled Paper
Set-out method:	Blue box system from residential neighborhoods, servicing every household in Metro Toronto area; approximately 60 percent of multi-family units also serviced
Pick-up frequency:	Weekly
Is pickup same days as refuse pickup?	Yes

Program Performance

This summary of program performance presents an estimated annual budget, expenditures on a per capita basis, and budget cost equivalencies in U.S. dollars.

Item	Projected 1992 Program Cost	Per Capita Program Cost	U.S. Program Cost Equivalent
• Advertising	\$ 1,200,000 CA	\$ 0.54 CA	\$ 900,000 US
• Staffing/Administration Costs	\$ 700,000 CA	\$ 0.32 CA	\$ 525,000 US
• Printed Materials	\$ 400,000 CA	\$ 0.18 CA	\$ 300,000 US
• Other Costs (RRS est.)	\$ 700,000 CA	\$ 0.32 CA	\$ 525,000 US

Summary of Case Study Relevance to the Recycle First Plan

Metro Toronto's education and promotion initiative represents a comprehensive, multi-media approach using both the power of grassroots communication techniques and the most sophisticated communication tools of our modern high-technology media. Such an approach sets the tone for the general public attitudes about the waste reduction, recycling and composting initiatives on the part of the general public, community leaders, business and elected officials. Again, this support increases the effectiveness of all other investments made in infrastructure for collection and processing of materials.

METRO PORTLAND, OREGON, EDUCATION AND PROMOTION PROGRAM

Case Study Summary

This case study describes the goals and objectives, service area, activities and performance of the Metro Portland, Oregon, Education and Promotion program. This case study is part of a set of case studies developed in an effort to identify types of programs that have achieved a high level of waste diversion and rank their potential to support goals of the Recycle First Plan.

Metro Portland supplies information and materials to the public, businesses, government agencies, teachers and students and maintains an extensive Information Center that is being computerized. Metro also conducts demonstration projects, waste reduction programs, and a new program to encourage builders and contractors to recycle construction and demolition debris.

Program Service Area

Program Service Parameter	Description
Population	The program services a population of 1,200,000, with 489,000 households.
Service Area	3-county region; 24 communities including Portland, Oregon
Demographics	Mix of urban, suburban and rural population in a variety of housing types
Waste Generation per Year	1,606,555 tons from the following sectors: About 1.2 million tons of solid waste were delivered to disposal facilities in 1991, with 32% diversion is estimated through recovery of 17% of construction and demolition waste delivered for disposal; 31% residential waste delivered for disposal; and 52% non-residential waste delivered for disposal. Total waste disposal is 1,084,919 tons.
Waste Collection System	Private. All residential is franchised; commercial is franchised except in Portland. Funding is through volume-based collection fees from those serviced. Collection frequency varies in the region from bi-weekly to monthly.
Local landfill tipping fee	Transfer Station - \$68/ton; Type III Landfill - \$55/ton.

Program Description

To meet a 60% recycling goal, the Metro Portland education program includes recycling promotion, hotline referrals based on a well-developed Information Center, surveys and demonstrations.

Metro supplies information and materials to the public, businesses, government agencies, teachers and students. Metro's Information Center tracks 300 mostly private recycling depots, drop-off sites, buyback centers and pick-up services available in the region. Metro's demonstration projects have included home compost education centers and in-store clinics. Waste reduction programs, coordinated with Metro Challenge Funds, include multi-family dwelling recycling, high-grade paper recycling, a curbside container program, Christmas tree and phone book recycling, and yard debris composting. A new program has begun to encourage builders and contractors to recycle construction and demolition debris.

The Metro Portland Education and Promotion program is funded through the solid waste general budget. Program funding has been recently reduced, so the program is developing a strategy for cooperating with other cities, counties and state government to increase utilization of existing communication tools.

Education/Promotion Program Activities

The centerpiece of Metro's waste reduction and recycling promotion and education efforts is its Recycling Information Center, one of the most active in the U.S. A full-time staff of four handles tens of thousands of calls per year, not just from the Metro area, but throughout Oregon. The Metro Portland information center is open 6 days/week, 8:30 -5. Saturday service has proven very popular, but an experiment with Sunday service revealed much less demand.

A nearly completed computerized geographic information system will allow staff to give referrals for locations at which a caller can drop off recyclables based on the caller's zip code. The system displays a map for staff to use when providing route information. Another computer component provides information on hazardous waste disposal, legislation, a mailing list of recyclers, franchise boundaries for people new to the area, days of pick up, and other information. The new computer system start-up is scheduled for May 1, followed by ongoing conversion of historical data into the system.

The Information Center also provides markets information, including materials buyers and price ranges.

The volume of calls to the information center continues to rise (from 14,000 calls in 1986 to 81,000 calls in 1991), so the new computer system is vital. Information updates will be received from recyclers who will receive a form containing their information and a request to call in changes. Recyclers are expected to be responsive because Metro provides so much free advertising and sends private recyclers so much business.

Program staffing includes 2 FTE plus 12 volunteers, plus interns (.9 FTE). Recycling Information Center staff = 5.5 FTE and there are additional support staff in graphics to design and print materials. Secretary time not included and is less than .5 FTE.

Calls on construction/demolition debris and other materials calls are becoming more common as tip fees rise. The program has allocated 1 FTE for commercial waste audits. Boxes are available to businesses at cost.

Metro Portland contracted with an advertising agency from 1989-91 for its outreach and promotion campaign (budget constraints have prevented contract renewal for 1992, but \$500,000 was spent over the first two years). Major program themes included:

- Developing awareness of the solid waste problem;
- Explaining how to do curbside recycling;
- Addressing the business audience ("Paper Train Your Staff" had biggest impact on the waste stream, with paper recycling jumping from 23% of generated waste to 49% in 1990, excluding OCC and ONP);
- Emphasizing procurement of recycled-content materials;
- Avoiding contamination problems at the curb;
- Promoting the slogan, "Recycling Will Make You Feel Better," and
- Billboards focusing on environmental aspects (Monet, Van Gogh landscapes), which were very effective.

Paper products collected in Portland Metro area programs include ONP, OCC, office paper, and other paper. Container materials collected include clear, green and amber glass, HDPE, PET, other plastic, aluminum and tin. Organic materials collected include grass, leaves, brush, wood waste and holiday greenery. A household hazardous waste collection center has just opened, 3 days/week year-round.

Metro Portland Recycling Program Characteristics

Program Characteristic	Description
Collection type:	Source Separated
Set-out method:	3 baskets provided to all residents; bags etc to separate further. Strong system of drop offs and buy-backs.
Pick-up frequency:	Weekly
Is pickup same days as refuse pickup?	Yes
Participation rate:	28%, w/ 60% goal
Is participation mandatory?	No
Enforcement mechanism:	Mandatory for haulers to provide opportunity

Program Performance

This summary of program performance presents an estimated annual budget, expenses on a per capita basis, and a cost equivalency for New York City.

Item	Projected 1992 Program Cost	Per Capita Program Cost	New York City Program Cost Equivalent
• Staffing Costs	\$ 91,900	\$ 0.08	\$ 181,000
• Education and Promotion Activities	\$ 208,400	\$ 0.17	\$ 410,550
• Other Related Expenses	\$ 390,850	\$ 0.32	\$ 770,000

Summary of Case Study Relevance to the Recycle First Plan

The Portland Metro program has some particularly strong services that can be directly applied to the Recycle First Plan. One of the best of these is the recycling information hotline with the computerized geographical information system. This has served as a centerpiece of the program's education and promotion effort and provides high value, service and visibility per dollar, even in tighter budget times.

RECYCLING MARKET DEVELOPMENT COMPONENT OF THE NEW YORK CITY RECYCLE FIRST PLAN:

CASE STUDIES

This section describes case studies that demonstrate the functional components of the Recycle First Market Development element. The case studies include the following programs:

Program	Key Characteristics
City of Los Angeles, California	The City of Los Angeles has developed an aggressive five-part Action Plan for recycled material markets. Market development activities to date focus on encouraging existing industries to use recycled materials as a feedstock, and siting new industries in the City that will be secondary markets for Los Angeles recyclers. Much of the market development is geared more towards commercial and industrial sectors than residential sectors.
Province of Ontario	The Province's Waste Reduction Office market development program focuses on reuse and recycling secondary market opportunities for a wide range of recyclables. The centerpiece of the program is an extensive grant program whose purpose is to share a portion of the risk associated with the undertaking, not to replace conventional financing means.
Hennepin County Market Development Program	Hennepin County market development activities focus on establishing markets for post-consumer newsprint and plastics. The primary effectiveness of this program is in increasing the awareness of the business community in which Hennepin County is seeking to establish local secondary markets. The program's ability to site businesses is hampered by its inability to guarantee supplies to prospective markets.

CITY OF LOS ANGELES MARKET DEVELOPMENT PROGRAM

Case Study Summary

This case study describes the status of the City of Los Angeles Market Development program. New York City represents a major player in the markets for recycled materials on the east coast. Los Angeles carries a similar role in west coast markets. The examples provided here in the LA program could be used as a model example of market development initiatives within the Recycle First Plan recommendations.

Program Description

Action Plan

Each jurisdiction in California must submit a detailed plan demonstrating how it will divert 25% and 50% of the waste entering landfills by 1995 and 2000, respectively. The City of Los Angeles has gone beyond the minimum requirements of AB 939, the State's recycling act, by developing an aggressive five-part Action Plan for recycled material markets, which the City believes is critical to the development of a recycling friendly orientation. The five elements of the Action Plan are:

- **Leadership and Commitment to a Recycling Program.** Adoption of recycling and the use of recycled materials should be a priority of the Mayor, the City Council and all City offices and should become standard procedure in the workings of all departments.
- **Overcoming the Barriers to Business Startup and Expansion.** Los Angeles is generally not perceived as a business friendly city. The size of the city, the complexity of the many city agencies and regional agencies, and the competing needs of business and residential communities create barriers to business startup and expansion. All agencies in the City would need to play a role in making an environment conducive for recycling.
- **Improving the Ability of Recycling Businesses to Access Capital for Startup or Expansion.** Loans and technical assistance should be made more easily available to finance new and existing businesses interested in using secondary materials in their production.
- **Building Partnership Opportunities.** The business community, universities, nonprofit organizations, community groups and local schools should be actively involved in the recycling effort.
- **Establishing the Image of Los Angeles as a Pro-Business, Recycling Friendly City.** Los Angeles has a negative image regarding the business environment, deterring the formation of new and expanded businesses. The city should actively publicize its intention to be a recycling friendly city. The city should also publicize its intention to assist those industries that have the potential to remove large amounts of materials from the waste stream by using them in their production. The city should actively support businesses which are innovative and entrepreneurial in their use of post-secondary materials.

Current Activities

Los Angeles is the largest manufacturing area in the United States, and its market development activities to date focus on encouraging existing industries to use recycled materials as a feedstock, and siting new industries in the City that will be secondary markets for Los Angeles recyclers. Much of the market development in Los Angeles is geared more towards commercial and industrial sectors than residential sectors, largely because commercial/industrial wastes comprise two-thirds of total trash, by weight.

Part of the City's Integrated Solid Waste Management Unit, the market development program's current and past activities include:

- Establishing an Enterprise Zone that emphasizes secondary markets, located at a large harbor site (250 acres) that is currently a municipally owned industrial park. This industrial-zoned site is already partially developed—the infrastructure is in place and there is a lot of room for growth. Some existing businesses on the site are being asked to use recycled materials as feedstock, and other new businesses are being approached about moving into the site.

The City is also submitting an application to the California Integrated Solid Waste Management Board to have this harbor site declared a Recycling Zone. Such a designation will give participating companies tax breaks and additional benefits.

- In another enterprise zone (there are five in the City), the market development program helped establish a plastic lumber company in 1991. This company uses a new extrusion technology to convert plastics collected from curbside programs and processed at material recovery facilities into a plastic product with good structural qualities. The city is currently helping to find markets for the structural lumber.
- The market development program is working with an existing company to use glass cullet provided by haulers to use as a roadbed aggregate.
- The program hires consultants to provide market development studies and to assist the program in establishing its direction and resources.
- The program works with the City's procurement units to increase the purchasing of locally produced goods made with recycled feedstocks.

The market development program facilitates the process through which businesses become end users of post-consumer recyclable materials. The City's program works extensively with the State and other local organizations to facilitate their efforts. It maintains regular contacts with the State to overcome financing, permitting, and other common barriers, and works with local Chambers of Commerce and economic development organizations to gain access to business grants and loans, ensure business-community support, and provide necessary services, and similar support activities.

Resources

Four full-time employees are devoted to the City of Los Angeles market development program, although 12 staff personnel are involved to some degree with the program. Students, volunteers and other support people are also involved in the program.

The program also utilizes technical expertise provided by consultants and others to resolve particular problems or answer specific market development questions.

The program provides no direct financial support to businesses, but assists businesses in finding financial resources available in the form of grants and loans from other City and State programs.

Program Performance

This summary of program performance presents a projected 1992 budget, expenditures on a per capita basis, and estimated cost equivalencies for New York City.

Item	Projected 1992 Program Cost	Per Capita Program Cost	New York City Program Cost Equivalent
• Staff and Administrative Resources (RRS Est)	\$ 200,000	\$.03	\$ 340,000
• Grants, Loans, Other Financial Assistance:	\$ 0	\$ 0	\$ 0
• Other Expenses	n.a.	n.a.	n.a.

Relevance to the Recycle First Plan

Los Angeles has integrated the issue of development of recycling markets with the overall business climate and economic development strategy for the region. Key features to the success of the program are the use of recycling and enterprise zones, working cooperatively with other State and local organizations, and bringing in additional expertise when needed. Such an approach represents a working model for how the Recycle First Plan recommendations would address market development.

PROVINCE OF ONTARIO MARKET DEVELOPMENT PROGRAM

Case Study Summary

This case study describes the status of the Province of Ontario Market Development Program. This program is one of the most aggressive market development programs in North America, with an extensive financial grant/loan program as its centerpiece.

Program Description

Ontario has a population of 9.5 million, generating about 10 million metric tonnes per year of residential and commercial waste. The tipping fee in the Province is \$180/tonne in Toronto and \$25-\$80 per tonne in outlying areas. In Ontario, half the 1,400 active disposal sites will be closed by 1995 and the area has a moratorium on the construction of incinerators.

Program Goals

The Province of Ontario has developed the following aggressive waste diversion goals:

- By 1992: 25% diversion through reduction, reuse, recycling;
- By 2000: 50% diversion.

Today, 70% of Ontario's residents (2.8 million households) receive weekly curbside recycling service although participation is not mandatory. Service areas include 280,000 apartment units that participate as well. In 1990, a blue box network diverted over 300,000 metric tonnes from landfills. By 1993, 90% of the 4 million households in the province are expected to be on line.

In addition to providing recycling services, the Province has committed significant resources to developing secondary markets in Ontario. The Province's Waste Reduction Office market development program has taken a comprehensive approach to market development, looking at reuse and recycling secondary market opportunities for a wide range of recyclables. The program has focused particular attention on materials such as newsprint, office paper, cardboard, wood waste, food, yard waste, pulp mill sludges, and tires.

This program has existed since 1974 as part of a recycling effort, but expanded significantly in 1988. The source of grant funds is general revenues, although a special fee is charged on tires for the development of used tire markets.

Grant Program

The centerpiece of this market development program is an extensive grant program. The purpose of this program is to develop new/improved industrial processes, methods, and applications for waste diversion, and to provide "seed" funding for new business undertakings that will divert commercial/industrial waste. The intent of the grant program is to share a portion of the risk associated with the undertaking, not to replace conventional financing means.

In 1991, the grant allocated funds in the following manner:

Category	Funding for Capital Expenses	Market Development Studies	Research and Development	Total for Each Category
Plastics	\$ 400,000	\$ 300,000	\$ 700,000	\$ 1,400,000
Newsprint/Fine Paper	\$ 4,700,000	\$ 300,000	\$ 500,000	\$ 5,500,000
Wood	\$ 600,000	\$ 100,000	\$ 500,000	\$ 1,200,000
Tires	\$ 200,000	\$ 200,000	\$ 3,400,000	\$ 3,800,000
Miscellaneous				\$500,000
Program Totals	\$ 5,900,000	\$ 900,000	\$ 5,100,000	\$ 12,400,000

Municipalities, businesses, and business organizations may apply for grants, which will fund up to 50% of capital and operating costs in some instances, and up to 100% of research and development projects. About 250 grants have been provided for a range of commercial/industrial activities, from recycling foundry sands to helping hospitals switch to cloth diapers, to paint and solvent reuse programs and construction/demolition recovery. These programs have been further augmented through funds from industry groups and the federal government.

Research and development funds are made available for many approaches. Wood wastes have been evaluated for market development opportunities. The same has been true for fine paper, ONP, OCC, boxboard and glass. A wet waste component includes food, yard waste, pulp mill sludges, etc. Projects often focus on development of new production processes and new products. Like private companies, the Province must establish a market development plan in order to seek capital funding just as with any new venture or economic development initiative.

In addition to the grant program, the market development program promotes a "Buy Recycled" campaign through Environmental Canada, another federal agency. The program is also considering providing a clearinghouse for products in future program initiatives.

Program Performance

This summary of program performance presents a projected 1992 budget, expenditures on a per capita basis, and estimated cost equivalencies for New York City.

Item	Projected 1992 Program Cost	Per Capita Program Cost	U.S. Program Cost Equivalent
• Staff and Administrative Resources (RRS est.)	\$ 250-350,000 CA	\$.02-04 CA	\$ 188-262,000 US
• Grants, Loans, Other Financial Assistance:	\$ 12,400,000 CA	\$ 1.30 CA	\$ 9,300,000 US
• Other Expenses	n.a.	n.a.	n.a.

Relevance to the Recycle First Plan

The Ontario approach represents a very comprehensive effort to develop expertise, capitalize facilities, and leverage buying power in its market development initiative. A grant program is the most significant tool for this effort. The Recycle First Plan outlines aggressive market development efforts, and the Ontario model provides a good working example of how to encourage innovation in that approach through the provision of financial assistance.

HENNEPIN COUNTY MARKET DEVELOPMENT PROGRAM

Case Study Summary

This case study describes the status of the Hennepin County Market Development Program. Hennepin County is the largest of the four counties in the Twin Cities' metropolitan area. The Hennepin County program was established in early 1989. Like the program in Los Angeles, the Hennepin County program focuses on encouraging existing businesses to use recycled materials as a feedstock, and siting new secondary markets in the County.

Program Description

Program Activities

As part of the the Hennepin County Department of Environmental Management, four County personnel spend a portion of their time (adding up to roughly 1 full-time-equivalent) conducting market development activities. These activities focus on establishing markets for post-consumer newsprint and plastics, and include:

- Advertising Hennepin County as a municipality that generates a large, reliable supply of recycled materials and is therefore an ideal site for businesses to locate their facilities.
- Working with the Minnesota Office of Waste Management and the Twin Cities' Metropolitan Council to assist businesses with securing financing from the State and other sources, obtaining permits, finding locations, identifying supplies, etc.
- Creating forums where local recyclers, processors and secondary markets can meet.
- Encouraging the County's procurement office to purchase goods produced with recycled feedstock recovered from the Hennepin County area.

The primary effectiveness of this program is increasing the awareness of the business community in which Hennepin County is seeking to establish local secondary markets. The program's ability to site businesses, however, has been hampered largely by its inability to guarantee supplies to prospective markets.

Hennepin County's recycling system is largely set up to rely on private sector recycling services. Materials collected in the County are generally owned by the haulers, and the County does not own the MRF. This arrangement leaves the County without market leverage as its influence on supply while it negotiates with potential industries that could use locally generated materials.

This impediment has thwarted the County's efforts to site a plastics recovery facility and a cellulose insulation company. The County has had more success helping an existing company to utilize glass cullet in a glassphalt process.

The County also worked with the Minnesota Office of Waste Management to persuade AMG Resources Corporation, a steel can detinning company, to locate a prep plant (not a full-scale detinning plant) in Hennepin County. This facility shreds and bales post-consumer steel cans prior to going to Pittsburgh for final processing.

Program Performance

This summary of program performance presents a projected 1992 budget, expenditures on a per capita basis, and estimated cost equivalencies for New York City.

Item	Projected 1992 Program Cost	Per Capita Program Cost	New York City Program Cost Equivalent
• Staff and Administrative Resources	\$ 30,000	\$.03	\$ 54,000
• Grants, Loans, Other Financial Assistance:	\$ 0	\$ 0	\$ 0
• Other Expenses	n.a.	n.a.	n.a.

Relevance to the Recycle First Plan

The Hennepin Case study makes the point that market development efforts must be coordinated with the overall recycling collection and processing activities to maximize success. This requires that some control be exercised by the public sector over recycling activity. In Hennepin County, this level of control and influence did not exist and was considered a barrier to the success of market development efforts. The case is provided not necessarily as a success story in itself but instead to suggest that the Recycle First Plan should consider coordinating and integrating the development of local secondary markets with the development of the City's recycling infrastructure. Because of the great degree of public sector involvement with development of the recycling infrastructure in New York, any market development effort is likely to be successful if well designed.

ATTACHMENT A

GLOSSARY OF TERMS

ATTACHMENT A:

GLOSSARY OF TERMS

AERATION: The process of exposing bulk material, such as compost, to air. Forced aeration refers to the use of blowers in compost piles.

AEROBIC: A biochemical process or condition occurring in the presence of oxygen.

ANAEROBIC: A biochemical process or condition, such as composting, occurring in the absence of oxygen.

BALER: A machine used to compress recyclables into bundles to reduce volume. Balers are often used on newspaper, plastics, and corrugated cardboard.

BALING: Compressing and wrapping a material with wire, twine, or string to form a unit which is more readily handled, stored and transported.

BIODEGRADABLE MATERIAL: A material that can be broken down by bacteria into less complex, sometimes less hazardous chemical compounds or basic elements.

BOTTLE BILL: A law requiring deposits on beverage containers. See Container Deposit Legislation.

BROKERS: Agents or intermediary buyers who acquire scrap materials and bulk products from processors and recyclers and arrange delivery to the end users.

BROWN GLASS: Universal term for amber glass produced and used by the container industry.

BUFFER ZONE: Neutral area which acts as a protective barrier separating two conflicting forces. An area which acts to minimize the impact of pollutants on the environment or public welfare. For example, a buffer zone is established between a composting facility and neighboring residents to minimize odor problems.

BULKING AGENT: A material used to add volume to another material to make it more porous to air flow. For example, municipal solid waste may act as a bulking agent when mixed with water treatment sludge.

BULKY WASTE: Large items of refuse including, but not limited to, appliances, furniture, large auto parts, non-hazardous construction and demolition materials, trees, branches and stumps which cannot be handled by normal solid waste processing, collection and disposal methods.

CENTRALIZED YARD WASTE

COMPOSTING: System utilizing a central facility within a politically defined area with the purpose of composting yard wastes.

CO-COMPOSTING: Simultaneous composting of two or more diverse waste streams, such as yard waste and sludge.

COLLECTION: The act of picking up waste materials or recyclables at homes, businesses or industrial sites, and hauling them to a facility for further processing, transfer to larger vehicles, or disposal.

COLLECTION CENTER: A facility designed to accept reusable, recyclable or compostable materials from public or private sources.

COLLECTION PROGRAMS: Programs which collect recyclable or compostable materials. These are either pick-up programs (business or curbside; see curbside) or drop-off programs. Drop-off programs may have a permanent location or be conducted at shopping centers, malls, public buildings, or other sites.

COMMERCIAL WASTE: Waste materials which originate in wholesale, retail, or service establishments, such as office buildings, stores, markets, theaters, hotels and warehouses.

COMMINGLED RECYCLABLES: A mixture of several recyclable materials in one container.

COMPACTOR: Power-driven device used to compress materials to a smaller volume.

COMPOST: Relatively stable, decomposed organic material. Also referred to as humus.

COMPOSTING: A waste management technique which utilizes natural processes to convert most organic materials, such as yard wastes and food scraps, to humus by microorganism activity.

COMPUTER PRINTOUT (CPO): A paper grade: computer paper, white or with green bars.

CONSTRUCTION WASTE: Waste material produced in the construction of homes, buildings, industrial plants, etc. These materials include asphalt, brick, concrete, lumber, metal parts, sheet rock, etc.

CONTAINER DEPOSIT LEGISLATION: Laws that require monetary deposits to be levied on beverage containers. The money is returned to the consumer when the containers are returned to the retailers.

CONTAMINANT: Any material that has a deleterious effect on a product or the usability of a waste material. Many contaminants can be removed by special processing techniques, but some cannot, thus rendering considerable amounts of material nearly useless for recycling.

CORRUGATED CARDBOARD (OCC): Brown "cardboard" that is readily identified by its "baffles," the structural paper material shaped in parallel furrows and ridges for rigidity.

CULLET: Clean, color-sorted, crushed glass. Cullet is added to raw materials during glass-making since it can increase the rate of heat gain, thus reducing melting time and fuel costs.

CURBSIDE PICKUP PROGRAM: A program that schedules pickup of presorted or commingled recyclable materials from residential curbsides, either voluntarily or mandatorily. Materials are taken to a processing facility to be readied for markets.

DEALERS: Those who accumulate scrap from numerous collectors, segregate manually and mechanically into various categories, then offer it to processing and brokerage operations.

DECOMPOSITION: Breaking down into component parts or basic elements.

DISPOSABLE PRODUCT: Any product which cannot be recycled, refilled or renewed.

DIVERSION CREDITS: Fees paid by a municipal or other government to a recycler as compensation for avoided costs of waste collection and disposal.

DIVERSION RATE: A measure of the amount of material being diverted for recycling compared with the total amount that was previously thrown away.

DROP-OFF CENTER: A method of collecting recyclable or compostable materials in which the materials are taken by individuals to collection sites and deposited into designated containers.

F.T.E.: Full-time equivalent. Term used when personnel resources are allocated. For example, a task requiring one F.T.E. may have one person working full-time or two people working half-time.

FERROUS METALS: Metals which are predominantly composed of iron. Most common ferrous metals are magnetic. In the waste material stream, these usually include steel or "tin" cans, automobiles, old refrigerators, etc.

FILE STOCK: A grade of paper waste, essentially consisting of mixed office papers; this grade is frequently recycled into tissue products.

FLINT GLASS: Container industry term for colorless glass.

FRACTION: Refers to a particular component of the waste stream.

GARBAGE: Spoiled or waste food that is thrown away, usually defined as wet food waste.

GENERATOR: A source of any type of waste or recyclable materials .

GRADE: Term applied to a recyclable material which is ranked on its use, appearance, quality, manufacturing history, raw materials, performance or a combination of these factors. Many grades have been officially identified and described.

GREEN GLASS: Container industry term for green glass.

HAULER: A garbage collection company which offers complete refuse removal services; many haulers now offer to serve as collectors of recyclables.

HAZARDOUS WASTE: Waste material that may pose a threat to human health or the environment, the disposal and handling of which is regulated by federal law.

HEAVY METALS: Hazardous elements including cadmium, mercury and lead which may be found in the waste stream as part of discarded items such as batteries, lighting fixtures, colorants and inks.

HIGH-DENSITY POLYETHYLENE (HDPE): Most milk bottles and soft drink bottle base cups are made of this plastic substance. HDPE can be recycled to produce lumber-like plastic boards, traffic barrier cones, golf bag liners, trash cans, etc.

HIGH-GRADE PAPER: Relatively valuable types of office papers such as computer paper, laser printout, white ledger and tab cards. White ledger includes most copier paper, letterhead and non-glossy non-newsprint.

HUMUS: Organic materials resulting from decay of plant or animal matter. Also referred to as compost.

INCINERATOR: Facility in which the combustion of solid waste takes place.

INCINERATOR ASH: The remnants of solid waste after combustion, including non-combustibles (e.g., metals) and soot.

INORGANIC WASTE: Waste composed of matter other than plant or animal (contains no carbon).

INSTITUTIONAL WASTE: Waste materials originating in schools, hospitals, prisons, research institutions and other public buildings.

INTEGRATED SOLID WASTE

MANAGEMENT: A practice of using several alternative waste management techniques to manage and dispose of specific components of the municipal solid waste stream. Waste management alternatives include source reduction, reuse, recycling, composting and landfilling.

LANDFILL: Disposal of solid wastes by burying in earth. The term is used to designate the buried depositories of waste.

LEACHATE: Liquid that has percolated through solid waste or another medium and has extracted, dissolved, or suspended materials from it, which may include potentially harmful materials. Leachate collection and treatment is of primary concern at municipal waste landfills.

LOW-DENSITY POLYETHYLENE (LDPE): Usually in a "film" form of plastic, it is commonly found as bread, grocery, and trash bags, diaper backing, dry cleaner cover sheets, and dairy, bakery, and food containers. LDPE is not commonly recycled today, but will be as collection and processing systems are developed.

MAGNETIC SEPARATION: A system to remove ferrous metals from other materials in a mixed municipal waste stream. Magnets are used to attract the ferrous metals.

MANDATORY RECYCLING: Programs which by law require consumers to separate trash so that some or all recyclable materials are not burned or dumped in landfills.

MANUAL SEPARATION: The separation of recyclable or compostable materials from waste by hand sorting.

MARKETS: End user industries or businesses that buy secondary goods as the material to create a product for sale or utilization.

MASS BURN: A municipal waste combustion technology in which solid waste is burned in a controlled system without prior sorting or processing.

MATERIALS RECOVERY: One of the concepts of resource recovery where the emphasis is on separating and processing waste materials to be sold for various purposes.

MATERIALS RECOVERY FACILITY: Processing center that takes either separated recyclables or recyclables mixed with wastes from residential or commercial waste streams for sorting, aggregating, and preparation of secondary materials for shipment to recyclables markets. Also known as MRF.

MECHANICAL SEPARATION: The separation of waste into various components using mechanical means, such as cyclones, trommels and screens.

METHANE: An odorless, colorless, flammable, and explosive gas produced by municipal solid waste undergoing anaerobic decomposition. Methane is emitted from municipal solid waste landfills.

METRIC TON: One metric ton equals 1.102 short tons, which are used in the U.S.

MIXED PAPER: Scrap paper of various grades, weights and colors. Includes most waste paper that does not fit any other category, such as envelopes, direct mail items, magazines, clean paper towels, and uncontaminated household paper. To be recyclable, limits must usually be placed on the inclusion of some types of paper.

MULCH: Ground or mixed yard wastes placed around plants to prevent evaporation of moisture and freezing of roots and to nourish the soil.

MUNICIPAL SOLID WASTE (MSW): This includes residentially generated waste, and that part of commercially generated waste which is collected by, or on behalf of, municipal officials.

NIMBY: Acronym for "Not In My Back Yard"—expression of resident opposition to the siting of a solid waste facility based on the particular location proposed.

NONFERROUS METALS: Metals which contain no iron. Scrap metals are usually aluminum, copper, brass, bronze, lead etc.

OCC: Paper industry term for "old," or post-consumer corrugated cardboard. (See corrugated cardboard).

ONP: Paper industry term for "old," or post-consumer newspaper.

OLD CORRUGATED CONTAINERS: A grade of paper, generally consisting of corrugated cardboard having a ruffled inner liner between two layers of kraft paper. Does not include linerboard or paperboard such as cereal boxes or clothing liners.

OLD NEWS: A grade of newsprint, suitable for recycling into boxboard, paperboard and many construction and packing materials.

PAPERBOARD/BOXBOARD: "Cardboard" containers (but not corrugated) that are lightweight and typically white or gray in color.

PAPER STOCK: Scrap, or waste papers that have been sorted or baled into specific grades. The term paper stock is commonly used interchangeably with the term waste paper.

PARTICIPATION RATE: A measure of the number of people participating in a recycling program compared to the total number that could be participating.

PERCOLATE: To ooze or trickle through a permeable substance. Groundwater may percolate into the bottom of an unlined landfill.

PHOTODEGRADABLE: A material which undergoes destruction of its chemical structure when exposed to light. Typically, the materials become brittle with time and fragment into small pieces or powder.

PLASTICS: Man-made materials consisting of large molecules called "polymers" containing primarily carbon and hydrogen with lesser amounts of oxygen, nitrogen, or other elements frequently compounded with various organic and inorganic compounds such as stabilizers, colorants, filler and other ingredients.

POLYSTYRENE: Type of hard or foamed plastic used for cups, plates, and other food containers and as foam board for insulation. Impact modified polystyrenes find broad application in appliances, toys, and household utility items, Commonly called "styrofoam" by the general public.

POST-CONSUMER RECYCLING: The reuse of materials generated from residential and commercial waste, excluding recycling of material from industrial processes that has not reached the consumer, such as glass broken in the manufacturing process.

POST-CONSUMER WASTE: Products which have served their intended purpose, and are then discarded, as opposed to scrap which results from manufacturing, or fabricating operations. Also refers to waste which is derived from the consumption of final products, rather than as processing residuals from industrial refining, or manufacturing activities. Can also mean any product that has gone through its useful life, served the purpose for which it was intended, and been discarded by the user. Waste or scrap created in a manufacturing or converting operation is not considered post-consumer. Post-consumer waste is generated in homes, commercial establishments, industrial plant offices, institutions, government offices and the like.

POTENTIALLY RECOVERABLE QUANTITY: Is an estimate, or imprecise measure, of a specific material or materials, which could be recovered through intensive collection practices.

PROCESSORS: Those companies that convert the various forms of scrap to meet specific requirement of steel mills and foundries. Often use large equipment such as balers, shears, shredders and presses. The scrap processing sector is the most important segment of the scrap industry, since without its conversion, scrap would be of little use or no use to the scrap consumer.

PROCUREMENT POLICY (RECYCLED PRODUCTS): Purchase policy emphasizing buying goods made from recycled materials. Such policies usually have goals of specific percentages of products to be purchased.

RECLAIMED OIL: Used oil that has been cleaned of insoluble contaminants for use as an industrial grade lubricant or fuel.

RECOVERABLE MATERIALS: Materials which can be separated from waste for reuse, recycling or composting. These may include production scrap, corrugated cardboard containers, office papers, pallets and many other materials.

RECOVERY: Processes for recovering usable materials from wastes. Usable portions are isolated from unusable materials by mechanical or manual separation, and chemical or thermal separation processes.

RECOVERY RATE: Is a term used to express the quantity of a waste fraction recovered, as a percentage of the quantity of that waste estimated to be available for recovery .

RECYCLABLE: Goods, products, or scrap that are made of materials that can be salvaged and made into new products. Goods that are technically "recyclable" may be waste materials if they are not economically feasible to collect, process, and remanufacture them.

RECYCLING: The recovery and reuse of useful materials that might otherwise be discarded as waste. As such, it includes the reuse of a product in its original state—i.e. a refillable container, as well as the use of a waste product as a raw material substitute in the manufacture of a 'new' product. Recycling is a system of interrelated parts (see recycling system).

REMANUFACTURING: The creation of a product from collected, post-consumer, recyclable materials, This is the production step/phase in the recycling system.

RESERVES: Known and currently exploitable resources, both mineral and scrap.

RESIDENTIAL WASTE: Waste materials generated in houses and apartments. The materials include paper, cardboard, food and beverage containers, plastics, food wastes, glass, garden and yard wastes, etc.

RESIDUE: Materials remaining after processing, incineration, composting or recycling have been completed. Residues are usually disposed of in landfills.

RESOURCE RECOVERY: The extraction of discarded materials for use in the manufacture of new products or as a fuel or energy source. An "umbrella" term for recycling, composting, waste-to-energy and other alternatives to landfilling.

RETREADING: A process whereby a worn tread is removed and a new tread is placed on an undamaged tire casing.

REUSE: Use of a product at least twice without changing its original form.

ROLL-OFF CONTAINER: A large waste container that fits onto a tractor trailer that can be dropped off and picked up hydraulically. Often used at drop-off stations where recyclables are collected.

SANITARY LANDFILL: Land waste disposal site that is located to minimize water pollution from runoff and leaching. Waste is spread in thin layers, compacted, and covered with a fresh layer of soil each day to minimize pest, aesthetic, disease, air pollution and water pollution problems.

SCRAP: Discarded materials which can be economically recycled.

SCRAP CONSUMER: A company or "end-user" which receives scrap and processes into useable products.

SCRAP TIRE: A tire considered unroadworthy by virtue of worn tread or damaged carcass.

SECONDARY PRODUCTION: The production of materials or products substantially from scrap.

SHREDDING: Size reduction by shearing action.

SOLID WASTE: Any garbage, refuse, certain sludges and other discarded materials, including solid, liquid, semisolid, or contained gaseous materials resulting from industrial, commercial, residential, mining, and agricultural operations. Does not include liquid or semi-liquid hazardous wastes which are regulated under the Resource Conservation and Recovery Act (RCRA).

SOLID WASTE MANAGEMENT: The overseeing and regulation of the entire process of generation, storage, collection, transportation, processing, reclamation, and disposal of refuse.

SOURCE REDUCTION: The philosophy or practice of not creating or generating waste materials; increasing efficiency, substituting materials or changing processes so that fewer waste materials are produced.

SOURCE SEPARATION: Refers to the segregation of specific waste materials from other refuse, or waste, at the point of generation. The point of generation may be the household, the office or a commercial establishment.

SPECIAL WASTE: Refers to items that require special or separate handling, such as household hazardous wastes, bulky wastes, tires and used oil.

STRUCTURAL PLASTIC LUMBER: Material generally made from HDPE plastic and used for park benches, docks and fencing.

STYROFOAM: (See polystyrene). This is a trade name of the Dow Chemical corporation referring to foam board insulation.

"TIN" CAN: A steel can with a tin (approximately .0015 inch) coating. Although the tin comprises only .25 to four percent of a can's weight, it represents one-third of the recycled value of the can. Both the tin and the steel are recovered when the can is recycled.

TIPPING FEE: A fee, usually dollars per ton or per cubic yard, for the unloading or dumping of waste at a landfill, transfer station, recycling center, or waste-to-energy facility. Also called a disposal or service fee.

TIPPING FLOOR: Unloading area for vehicles that are delivering municipal solid waste or recyclables to a transfer station or materials recovery facility.

TONNE: Metric ton equivalent to 1.102 short tons.

TRASH: Material considered worthless, unnecessary or offensive that is usually thrown away. Generally defined as dry waste material, but in common usage it is a synonym for garbage, rubbish or refuse.

TUB GRINDER: Machine to grind or chip wood wastes for mulching, composting or size reduction.

URBAN SOLID WASTE: Urban solid waste is defined to include the aggregate (sum) of residentially, commercially, and industrially generated solid waste.

USED OIL: Oil that has been used and may or may not be suitable for recycling or re-refining.

VARIABLE CONTAINER RATE: A charge for solid waste services based on the volume of waste generated measured by the number of containers set out for collection.

VOLUME REDUCTION: Compaction or densification of waste or recoverable materials by baling, shredding and/or compaction.

WASTE: Surplus, obsolete, off-specification contaminated or otherwise unneeded or unwanted material earmarked for disposal.

WASTE ASSESSMENT OR AUDIT: A study to determine the source, composition, quantities and destination of materials in a waste stream.

WASTE EXCHANGE: A computer and catalog network that redirects waste materials back into the manufacturing or reuse process by matching companies generating specific wastes with companies that use those wastes as manufacturing inputs.

WASTE PAPER: Means the by-products of paper converting operations, or the remains of paper products, after they have served their intended purposes.

WASTE PAPER GRADE: Classifications of waste paper. Specifications for waste paper grades are available from the Paper Stock Institute of America, a Commodity Division of the National Association of Recycling Industries, Inc., 330 Madison Ave., New York, New York 10017; and the Canadian Pulp and Paper Association.

WASTE REDUCTION: The reduction of waste at-source by changing buying habits industrial processes, technologies and product components with the specific objective of minimizing generation of waste.

WASTE RECYCLING: Methodology of recovering wastes as resources. Includes the reuse of wastes or the collection and treatment of a waste product for use as a replacement of all or part of the raw material in the manufacturing process.

WASTE STREAM: Waste, from the point of generation to a final destination.

WHITE GOODS: The generic term for large appliances, including refrigerators, stoves, and washing machines.

WHITE LEDGER: White sulphite or sulphate ledger paper: includes copier paper, letterhead and white notebook paper.

WINDROW: A large, elongated pile of composting material.

YARD WASTE: Organic waste materials such as leaves, branches and grass. May also include stumps and brush, but these materials are not normally handled at composting facilities.

ATTACHMENT B

PRELIMINARY LISTING OF CASE STUDY COMPONENTS

The attached five page matrix matches possible Case Study Programs to selected features of the Recycle First Program. Characteristics of the possible Case Study Programs are tracked that could help establish similarities to New York City demographics and economic conditions. The check-off made for a particular program was made based on available written information from RRS in-house information sources. Interviews and other research was used later on in the short listing process.

Preliminary Listing of Case Study Components, pg. 1

General Description	Case Study Programs										
	Seattle WA	Portland OR	Metro/Toronto ONT	Islip NY	Newark NJ	Chicago IL	San Diego CA	San Frans. CA	Madison WI	Austin TX	DuPage Co IL
Urbanization (1-Low, 2-Med., 3-High)	3	3	3	2		3	3-Jan	3		2	2
Service Area (Population)	500,000	470,000	1.5 M	300,000			1.1M	741,000	150,000	450,000	
Year Recycling Program Started	1986	1987		1978/80	1988	1988	1990	1980	1972		1991
Union or Private Sector Waste Collection	priv			priv		DSS		priv		union	
Union or Private Sector Recycling Collection	priv	priv		priv		DSS/priv	pub+priv	priv		union	
Union or Private Sector Compost Collection	priv					DSS					
Goal	60% 1998		50% 2000	50% 1990			30% 1990	50% 2000		40% 1994	
Waste Prevention											
Information Center	x	x	x	x	x		x	x		x	
Waste Prevention Staff	x		x							x	
Residential Waste Prevention Education	x	x	x	x				x		x	x
Commercial Waste Prevention Education	x	x	x					x			
Reuse and Repair Programs			x								
Purchasing Policies for Waste Reduction											
Comm'l/Ind'l Waste Audits/Tech Asst		x	x				x	x			
Municipal-Industry Cooperative Efforts		x	x				x	x			
Grass Cycling Program			x	1992		x					x
Regulations, Incentives, Bans	x	Y-1	x	x	x	x	x		x	x	x
Ongoing Public Education and Outreach											
Basic Information on Recycling/Prevention	x	x	x	x		x	x	x	x	x	x
Recycling Regulations	x		x	x		x	x		x		
Local Reduction Guidebook	x		x					x			
Media Advertising Campaign	x	x	x		x		x	x	x		
Ads and Brochures	x		x	x	x	x	x	x	x	x	x
Multi-lingual Ads and Brochures	x		x		x					x	
Market Studies	x	x						x	x		x
Education/Outreach Staff	x	x	x	x	x	x		x	x	x	x
Utilization of Existing Organizations	x		x	x	x	x	x			x	
Environmental Education at Schools	x		x	x	x	x	x				
Funding/Institutional Support	x	x	x	x		grants	x				x
Recycling											
Curbside Recycling Collection	x		x	x	x	x	x	x	commingle	x	x
Drop-off Recycling Collection	x		x			x	x	x	x	x	
Buy-back Centers	x					x	x	x		x	
Build and/or operate MRF	priv		x	x	x	x	priv				x
Commercial Recycling/Multi-family	CR/MF	x	x	x			x	x			
Building Design for Recycling				x			x				
Economic Development through Recycling											
Construction/Demolition Debris Facility			?				pilot				
Composting Technologies											
Curbside Composting Collection	x	x		x		x	x				x
Drop-off Opportunities for Businesses	x	x		x		x	x		x		x
Backyard Composting/yard waste reduction	x	x	x	1992		-		x	x		x
Build and/or operate Compost Facility	x	priv		x		x	x		x		x
Food Waste	home	x	x								
Marketing and Market Development											
Expand Purchasing of Recycled Products			x	x		x	x				
Require Agencies to Purchase Recycled Prod.						x				x	
Price Preferences for Recycled Products						-					
Minimization/Recycling in Specifications				x		x	x				
List Recycled Products Locally Produced											
Product Labelling to Promote Recycling											
Lobby Federal Government						x					
Attract End-markets to Local Area						x					
Build End-Markets/Processors into City Plan			x				x				
Encourage Exhibits of Recycled Products						x					
Give Awards to Aggressive Purchasers											
Encourage and Publicize Recycled Products						x					
Publicize Waste Prevention Products											
Unusual Features											
Mixed Waste Processing/MSW Composting			pilot								
Variable Fee/Bag-Tag Trash Collection	x	x				to study		x			
Wet/Dry Collection System			x			Blue Bag					
Amount Diverted in 1991 (If Available)	10% 1988 re	24% 1987		32% 1988	57,000 Tons	5% 1990		25% 1990	46% 1992	4% CS	

Preliminary Listing of Case Study Components, pg. 2

General Description	Case Study Programs										
	Pittsburgh PA	Guelph ONT	Berkeley CA	Berlin, W.Germ	San Jose, CA	Cham-Urb IL	Rochester NY	Arcata CA	Itasca CO MN	Babylon NY	Montg Co MD
Urbanization (1-Low, 2-Med., 3-High)	3	2	2		2	2		1		2	3
Service Area (Population)	400,000	87,500			738,000	110,000	241,000	14,500	40,000	215,000	633,000
Year Recycling Program Started	1990	1987	1973	1983		1987-88		1971		1987	
Union or Private Sector Waste Collection			Union		priv					priv	
Union or Private Sector Recycling Collection			Union		priv					priv	
Union or Private Sector Compost Collection					priv						
Goal			50% 2000		50% 2000					40% 1997	
Waste Prevention											
Information Center			x		x	x					
Waste Prevention Staff			x								
Residential Waste Prevention Education			x	x	x						
Commercial Waste Prevention Education					x	x			x		
Reuse and Repair Programs			x					x			
Purchasing Policies for Waste Reduction			x						x		
Comm'l/Ind'l Waste Audits/Tech Asst					x				x		
Municipal-Industry Cooperative Efforts			x		x	x		x	x		
Grass Cycling Program											
Regulations, Incentives, Bans			x	"Poll Pays"	x					x	
Ongoing Public Education and Outreach											
Basic Information on Recycling/Prevention			x		x	x		x	x	x	
Recycling Regulations			x		x					x	
Local Reduction Guidebook						x					
Media Advertising Campaign			x		x						
Ads and Brochures			x		x					x	
Multi-lingual Ads and Brochures			x		x						
Market Studies				x							
Education/Outreach Staff			x		x						
Utilization of Existing Organizations			x		x	x		x			
Environmental Education at Schools			x		x					x	
Funding/Institutional Support					x						
Recycling											
Curbside Recycling Collection	1-bag	x	x		x	x				x	
Drop-off Recycling Collection			x		x	x		x		x	
Buy-back Centers			x		x			x			
Built and/or operate MRF	x				x					x	
Commercial Recycling/Multi-family	MF	CR/MF	x		x			CR		x	
Building Design for Recycling										x	
Economic Development through Recycling					x			x			
Construction/Demolition Debris Facility					x						
Composting Technologies											
Curbside Composting Collection					x	x				x	
Drop-off Opportunities for Businesses					x	x					
Backyard Composting/yard waste reduction											
Built and/or operate Compost Facility					x	x				x	
Food Waste											
Marketing and Market Development											
Expand Purchasing of Recycled Products			x		x			x			
Require Agencies to Purchase Recycled Prod.											
Price Preferences for Recycled Products					x						
Minimization/Recycling in Specifications											
List Recycled Products Locally Produced											
Product Labelling to Promote Recycling			x								
Lobby Federal Government											
Attract End-markets to Local Area					x			x			
Build End-Markets/Processors into City Plan					x						
Encourage Exhibits of Recycled Products								x			
Give Awards to Aggressive Purchasers											
Encourage and Publicize Recycled Products			x								
Publicize Waste Prevention Products			x					x			
Unusual Features											
Mixed Waste Processing/MSW Composting				Green Dot							
Variable Fee/Bag-Tag Trash Collection				Fee System	1993		1978				
Wet/Dry Collection System				packaging							
Amount Diverted in 1991 (if Available)			20% 1985		8% 1990					34% 1989	

Preliminary Listing of Case Study Components, pg. 5

Case Study Programs

General Description	Newport S	Okla City	Sonoma Co	Tokyo	Brattleboro	Santa Mon	High Pt	"Bundled" Mini
	CA	OK	CA	Japan	VT	CA	NC	Case Studies
Urbanization (1-Low, 2-Med., 3-High)				3		2		
Service Area (Population)	70,000					96,000	73,000	
Year Recycling Program Started	1974					1981	1991	
Union or Private Sector Waste Collection	priv							
Union or Private Sector Recycling Collection								
Union or Private Sector Compost Collection								
Goal	50% 2000					50% 2000	40% 2001	

Waste Prevention

Information Center				x				
Waste Prevention Staff				x			x	
Residential Waste Prevention Education			x				x	
Commercial Waste Prevention Education					x		x	
Reuse and Repair Programs		x		x	x	x	x	
Purchasing Policies for Waste Reduction							x	
Comm'l/Ind'l Waste Audits/Tech Asst								
Municipal-Industry Cooperative Efforts		x						
Grass Cycling Program							x	
Regulations, Incentives, Bans							x	

Ongoing Public Education and Outreach

Basic Information on Recycling/Prevention					x	x		x
Recycling Regulations						x		x
Local Reduction Guidebook								
Media Advertising Campaign								
Ads and Brochures						x		
Multi-lingual Ads and Brochures								
Market Studies								
Education/Outreach Staff								
Utilization of Existing Organizations								
Environmental Education at Schools						x	x	
Funding/Institutional Support								

Recycling

Curbside Recycling Collection						x		x
Drop-off Recycling Collection			x			x	x	
Buy-back Centers						x	x	
Built and/or operate MRF								
Commercial Recycling/Multi Family						CR/MF		CR/MF
Building Design for Recycling								
Economic Development through Recycling								
Construction/Demolition Debris Facility								x

Composting Technologies

Curbside Composting Collection								
Drop-off Opportunities for Businesses								
Backyard Composting/yard waste reduction								
Built and/or operate Compost Facility								
Food Waste								

Marketing and Market Development

Expand Purchasing of Recycled Products				x				
Require Agencies to Purchase Recycled Prod.								
Price Preferences for Recycled Products								
Minimization/Recycling in Specifications								
List Recycled Products Locally Produced								
Product Labelling to Promote Recycling								x
Lobby Federal Government								
Attract End-markets to Local Area								x
Build End-Markets/Processors into City Plan			x					x
Encourage Exhibits of Recycled Products								
Give Awards to Aggressive Purchasers								
Encourage and Publicize Recycled Products								
Publicize Waste Prevention Products								x

Unusual Features

Mixed Waste Processing/MSW Composting						MWP		
Variable Fee/Bag-Tag Trash Collection								
Wet/Dry Collection System								

Amount Diverted in 1991 (If Available)

	13% 1990							
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ATTACHMENT C

SHORT LIST SCREEN OF CASE STUDIES

The attached matrix matches a preliminary list of possible Case Study Projects for each targeted performance area to a list of screening criteria. Qualitative grading was assigned to each case study to assist in grouping them into #1 Case Studies that would be researched through one-on-one interviews, bundled Case Studies that are combined into a group of appropriate "mini" research projects, and Case Studies that are set aside. Phone interviews were used to assist RRS in short listing Case Studies at this stage in the analysis.

Group I - Waste Prevention Projects

Project Name	Program type					Program Ranking					Priority Grouping
	Targeted Education	Reuse/Repair	Disincentive bans/tax/qbuf	Incentive grants, prizes	Technical Assistance	Ease of Implement.	Diverston Potential	Applicable to Urban Env.	Track Record	Progr. Scope Waste Prev	
Berkely, CA Precycle	x	x	x		x	high	medium	medium	high	high	Bundle
Seattle, WA	x		x			high	high	high	high	high	Bundle
San Jose, CA	x		x	x	x	high	medium	medium	high	medium	Bundle
Toronto Metro, ONT	x	x	x	x	x	medium	high	high	high	high	#1
West Berlin, Germany	x	x	x		x	medium	high	high	high	high	#1
Tokyo, Japan	x	x				high	low	high	medium	low	No
Portland Metro, OR	x			x	x	high	medium	high	high	high	Bundle
Islip, NY	x		x	x		high	medium	med	medium	medium	No
San Diego, CA	x			x	x	high	medium	high	medium	medium	Bundle
San Francisco, CA	x		x		x	high	medium	high	high	medium	Bundle
Austin, TX	x			x		medium	medium	med	medium	low	No
Ontario, CAN	x		x	x	x	medium	high	high	high	high	Bundle
Itasca Co, MN	x			x	x	high	medium	medium	high	medium	No
Los Angeles, CA	x		x		x	medium	high	high	medium	medium	No
Montgomery Co, OH	x		x		x	high	high	high	high	medium	Bundle
Maine, USA			x			high	high	high	medium	medium	Bundle

Group II - Education and Promotion Projects

Project Name	Program type					Program Ranking					Priority Grouping
	Multi-media approach	Low-income multi-lingual	Special event On-go promo	Coop. Effort w/org, comm	Technical Assistance	Ease of Implement.	Diverston Potential	Applicable to Urban Env.	Track Record	Progr. Scope Ed/promo	
Berkely, CA	x			x	x	high	medium	medium	high	high	No
Seattle, WA	x		x	x	x	medium	high	high	high	high	#1
San Jose, CA	x	x	x	x	x	medium	high	medium	high	high	No
Toronto Metro, ONT	x		x	x	x	medium	high	high	high	high	#1
Newark, NJ		x	x			high	medium	high	high	high	Bundle
Milwaukee, WI		x				high	high	high	medium	medium	Bundle
Portland Metro, OR			x		x	high	medium	high	high	high	No
Islip, NY			x			medium	medium	medium	high	high	No
San Diego, CA		x	x			high	medium	high	high	high	Bundle
San Francisco, CA	x	x	x		x	high	high	high	high	high	Bundle
Ontario, CAN	x		x	x	x	high	med	medium	high	high	No
MI OWRS			x		x	high	high	high	high	high	No

Group IIIa - Recycling Collection Projects

Project Name	Program type					Program Ranking					Priority Grouping
	Curbside SS/Comming	Blue bag/ single pass	Wet-dry 3-stream	Multi-family commercial	Buy-back drop-off	Ease of Implement.	Diversion Potential	Applicable to Urban Env.	Technical viability	Recycling prog scope	
Chicago, IL		x		x	x	high	medium	high	low	medium	#1
Guelph, Ont.	x		x	x		medium	high	high	high	high	No
San Jose, CA	x			x	x	medium	high	medium	high	medium	No
Santa Monica, CA	x			x	x	medium	medium	low	high	medium	No
Seattle, WA	x			x	x	medium	high	high	high	high	#1
Istip, NY	x			x		medium	medium	medium	high	medium	No
Berkeley, CA	x			x	x	medium	high	medium	high	high	No
Mecklenburg Co, NC	x			x		medium	medium	medium	high	medium	No
Twin Cities Metro, MN	x			x	x	medium	high	high	high	high	#1
St. Cloud, MN	x					high	high	low	high	medium	No
Pittsburg, PA	x	x				high	high	high	high	high	#1

Group IIIb - Recycling Processing Projects

Project Name	Program type					Program Ranking					Priority Grouping
	Commingled container sort	Paper sort system	Blue-bag processing	Commercial element	Mixed waste processing	Ease of Implement.	Diversion Potential	Applicable to Urban Env.	Technical viability	Scope of process prog	
DuPage Co, IL	x	x				high	high	high	high	high	#1
Montgomery Co, MD	x					high	high	high	high	medium	No
Ocean Co, NJ	x					high	high	high	high	medium	No
Pittsburgh, PA			x			high	high	high	high	high	#1
Seattle, WA	x					high	high	high	high	high	#1
Portland, OR	x			x	x	medium	high	high	medium	medium	No
Twin Cities Metro, MN				x	x	high	high	high	high	high	#1
Austria		x			x	medium	high	high	medium	high	#1
Guelph, Ont.		x	x	x		medium	high	high	high	high	#1

Short List Screen of Case Studies

Group IV - Composting Projects

Project Name	Program type					Program Ranking					Priority Grouping
	Home/Onsite Waste Reduct	Drop off Com'l/Indiv	Curbside Leaf/YW/Wet	Windrow Processing	Enclosed Vessel	Ease of Implement.	Diversion Potential	Applicable to Urban Env.	Track Record	Scope of total composting	
Guelph, Ont.	x	x	YW/Wet	x	x	high	high	high	low	high	#1
CRD, Brit. Col.	x	x	Wet		x	high	high	medium	low	medium	No
Portland Metro, OR	x	x	MSW/YW	x	x	medium	high	medium	medium	high	#1
DuPage Co, IL		x	YW	x		high	medium	medium	high	medium	No
Mecklenburg Co, NC		x	YW	x		high	medium	medium	high	medium	No
Montgomery Co, MD	x	x	YW	x		high	medium	high	high	medium	No
ASI, Parlin, NJ		x	YW+	x		high	high	high	high	high	#1
Chicago, IL		x	YW	x		medium	medium	high	high	medium	No
San Diego, CA	x	x	YW	x		high	medium	medium	low	medium	No
Berlin, W. Germ.		x	Wet		x	medium	high	high	high	high	#1
Islip, NY	x	x	YW	x		medium	medium	medium	medium	medium	No

Group V - Market Development Projects

Project Name	Program Type					Program Ranking					Priority Grouping
	Procurement policy/practi	Outreach-buy recycl camp.	Cooperative Marketing	Build local markets	Legislation/policies	Ease of Implement.	Diversion Potential	Applicable to Urban Env.	Track Record	Scope of total market efforts	
Ontario, CAN	x	x			x	medium	high	medium	high	high	#1
Los Angeles, CA				x		medium	high	high	high	medium	#1
Chicago, IL	x	x			x	medium	low	high	medium	low	No
Philadelphia, PA				x		high	high	high	medium	low	No
Berkeley, CA	x	x				high	medium	medium	high	medium	No
San Jose, CA				x		high	medium	medium	high	medium	No
Arcata, CA		x	x	x		medium	high	low	high	high	Bundle
Sonoma, CA				x	x	medium	medium	medium	medium	medium	No
Bundled Studies	x	x	x	x	x	high	high	high	high	high	Bundle
Washington, D.C.				x		medium	medium	high	medium	low	No
W. Berlin, Germany					x	medium	high	high	medium	high	No
Twin Cities Metro, MN	x			x		medium	high	high	high	high	#1