



Complex Recycling Issues

Strategies for Record-Setting Waste Reduction in Multi-Family Dwellings



The Waste Reduction Record-Setters Project fosters the development of exceptional waste reduction programs by documenting successful ones. These programs can be used as models for others implementing their own programs to reduce waste. This fact sheet packet is oriented toward recycling coordinators, building managers and owners, and highlights record-setting multi-family dwelling (MFD) waste reduction programs.

Why are special multi-family dwelling (MFD) waste reduction programs necessary?

The U.S. has nearly 97.7 million occupied residential units, 15.9 million of which are located in buildings or complexes with five or more units.¹ Residents in these households are often left out of community curbside recycling programs because (1) programs where each household places materials at the curb for collection are not suited to many MFDs, and (2) commercial waste haulers, not local government, typically provide waste management services to MFDs. Yet, residents in MFDs often want the opportunity to participate in waste reduction programs and desire the convenience of curbside collection.

What is a MFD waste reduction program?

There is no single model for a MFD waste reduction program because of variation in building size, layout, resident characteristics, and trash disposal systems. Some programs collect both yard debris and other recyclables. Others collect only recyclables. Some require residents to deliver materials to a central location. Others provide collection from doorways or at curbs. In general, successful programs provide residents with the convenience of curbside collection while fitting into existing waste management systems.

Benefits of MFD waste reduction programs

- Decrease waste disposal costs for building owners and households;
- Bring buildings into compliance with applicable MFD recycling laws/regulations;
- Help achieve local and state recycling goals;
- Make recycling accessible to more of the community.



Implementing a record-setting MFD waste reduction program

Numerous strategies, policies, and procedures contribute to the success of the record-setting MFD waste reduction programs profiled in this fact sheet. These include:

Enacted state and local laws or requirements

State and local laws have encouraged communities to institute waste reduction programs among MFDs served by municipal trash programs and encourage buildings and complexes served by private companies to develop their own waste reduction programs.

- California's law requiring all cities to divert 50% of their solid waste by the year 2000 spurred San Jose to start its Recycle Plus Program in 1993. Under this program, the city offered recycling services to residents of MFDs for the first time.
- Leisure World, in Laguna Hills, California, instituted its waste reduction program the year after the state passed its law.
- The Syracuse Housing Authority instituted recycling in apartment buildings under its jurisdiction in response to state and local regulations.

Encourage resident participation

Just a few people who do not recycle correctly, contaminating recycling bins with the wrong items or throwing away recyclables, can greatly influence others. This is especially true in buildings with common recycling areas. Contaminated recycling bins, may send the message that the program is not serious.

The profiled record-setters have used fines, education, lease requirements, and incentives to encourage individual tenants to reduce waste.

- If the management at Blossom Hills Estates in San Jose, California, finds a lot of recyclables in trash from a particular household and the household does not begin to comply with the recycling program, the complex can fine the residents \$30.
- Syracuse Housing Authority (SHA) uses both fines and one-on-one education to encourage residents to reduce waste. For the first improper recycling offense, SHA fines residents \$5. SHA often dismisses appealed fines, but uses the opportunity to explain the importance of recycling and how to do it correctly.
- Saint Paul and Seattle both recommend that building managers require residents to recycle in all leases. San Jose Green Team

staff provide building managers with model lease agreements incorporating recycling requirements.

- The University of Michigan sponsors competitions among residence halls to reward conservation efforts, including waste reduction.

Seek management participation

Waste reduction programs need management commitment to succeed. Communities with record-setting MFD waste reduction programs use both incentives to encourage participation and disincentives to discourage non-compliance with program requirements.

- Both Seattle and San Jose charge volume-based fees for trash collection and provide recycling services at no additional charge. MFDs with successful waste reduction programs can save money on trash disposal.
- East Orange's local recycling ordinance allows the city to fine apartment management and/or discontinue both trash and recycling services for failure to comply with the city's requirements. Discontinuing service would force management to pay a private hauler for a service they have already paid for through city property taxes.

What qualifies as a record-setting MFD program?

This fact sheet packet profiles three types of MFD recycling programs; (1) community-wide programs, (2) single-building or -complex programs, and (3) a university residence hall program. Waste reduction levels vary within each profile type.

Of the nine profiled programs, the four community record-setters report waste reduction levels from 22% to 25%. A selected representative building participating in the Syracuse Public Housing MFD recycling program reached a diversion level of 20%. A recent U.S. EPA-funded study of municipal MFD recycling programs completed by the U.S. Conference of Mayors reported the average program diverted 15% of residents' waste from disposal through recycling.² Only 11 of the 40 communities studied achieved recycling rates of over 20%.³

Individual buildings and complexes have been able to achieve higher waste reduction levels than entire communities. The three building and complex programs profiled here are recovering between 50% and 65% of their waste, impressive recovery rates in any setting.

The one profiled university program, the University of Michigan, is achieving a 30% waste reduction level. This program is one of the oldest university residence hall recycling programs and may have the highest dormitory waste reduction level.



The University of Michigan uses these small recycling bins in its dormitory recycling program.

Implementing a record-setting MFD waste reduction program

Make programs convenient

Building layout and resident demographics may help determine program design. However, recycling coordinators stress convenience as an underlying theme for collection methods.

- The Commodore Club in Key Biscayne, Florida, uses a chute for trash and recyclables. Computer controls ensure source-separated materials drop into the proper receptacle. This system allows residents to deliver both trash and recyclables to the same place and eliminates the need for a recycling area on each floor of the building.
- Saint Paul uses the same set-out system, list of acceptable items, and instructions for preparation of materials throughout the city. This makes education easier, and it means that a resident who moves does not have to relearn recycling requirements.
- Syracuse Housing Authority has brought the convenience of curbside service to some of its public housing residents. Where space allows, residents receive door-to-door pick-up of both trash and recyclables. In some high-rises, residents receive door-to-door pick-up of recyclables, but must bring trash to a chute, which empties into a basement compactor.
- When buildings join the East Orange MFD waste reduction program, a city inspector evaluates the building and helps management tailor the program to the individual building layout and trash collection system.

Educate

Education is an important tool to encourage proper program participation in any waste reduction program. Because apartments have a higher turnover than single-family homes, education efforts must be continual, and more intensive than with single-family homes. Record-setting MFD waste reduction education programs use a variety of media vehicles to spread messages, repeat messages frequently, often use pictures or multiple languages in their outreach efforts, and spread the message within buildings through meetings and volunteers.

- The University of Michigan spreads waste reduction messages through signs in recycling areas, a newsletter, its Web page, displays on campus, and at student meetings. These educational efforts are on-going throughout the academic year.
- Managers at Blossom Hill Estates send informational mailings about waste reduction programs to every household three times a year and provide residents one-on-one training on an ongoing basis.
- Saint Paul's educational materials provide basic, clear guidelines and are available in many languages (including English, Spanish, Russian, Cambodian, Hmong, Chinese, Vietnamese, and Somali).
- Seattle uses MFD resident volunteers to spread recycling messages in their buildings through the city's "Friend of Recycling" program. Program volunteers attend a city training session, then serve as recycling advocates in their buildings.

Compost

Many MFDs have little landscaping but those with lawns, trees, and shrubs find composting can help them achieve high waste reduction levels and often saves money.

- Leisure World is a sprawling residential community where landscaping crews collect yard debris for composting. In fiscal year 1996, the complex diverted 30% of its waste through composting, avoided more than \$130,000 in disposal fees for the diverted material, and cut landscaping costs by using finished compost and mulch on-site.
- San Jose provides yard trimmings collection services to all of the city's household, including MFDs. Yard trimmings account for 66% of material diverted from the multi-family waste stream.

Provide feedback

Providing feedback to residents helps them understand that their efforts do indeed make a difference. Communicating successes and failures to building management in a timely manner can alert them to potential difficulties and help them solve problems before low participation or contamination jeopardize program viability.

- In Saint Paul, providing feedback is easy. The city requires haulers to report monthly pick-up information for each account served. The Saint Paul Neighborhood Energy Consortium distributes posters that building managers can use to graph these data and display recycling achievements.
- East Orange MFD recycling collection staff note decreases in amounts of materials recovered and increases in contamination at buildings on an ongoing basis. When collection staff report problems, city management work with building staff to rectify the problem.



Bins for recyclables at a MFD complex in Saint Paul, Minnesota

Model Programs — Some Numbers and Descriptions

Record-Setting Program	# Households	% Waste Stream Recovered	Materials Recovered	Collection Strategy
Blossom Hill Estates, San Jose, California	736	65% in one complex 50% in second complex	ONP; OCC; OMG; mixed paper; glass container; cans; juice and milk cartons; plastic bags, bottles, and jugs; polystyrene packaging; scrap metals; empty aerosol cans; textiles; yard trimmings	sets of three 96-gallon recycling bins (one for each: newspaper, mixed paper, and other recyclables)
Commodore Club Condominiums, Key Biscayne, Florida	187	59%	ONP; aluminum; steel cans; glass food and beverage containers; #1,2, & 3 plastics	chute in laundry room on each floor empties into containers in basement. Computer delivers container for newspaper, cans, glass, or plastics under chute as needed.
East Orange, New Jersey	6,236	22%	ONP, OMG, phone books, cans; #1 & #2 plastics, glass containers	sets of two 90-gallon carts (paper products in one; containers in the other), approximately one set per 30 households
Leisure World, Laguna Hills, California	12,736	50%	ONP, OMG, aluminum, glass food and beverage containers, white goods, scrap metal, laser cartridges, yard trimmings	various methods for different building types: curbside collection; common collection containers; centralized drop-off site
Saint Paul, Minnesota	27,114	23%	ONP, OMG, OCC, phone books, mail, paperboard, glass	clusters of six 90-gallon wheeled carts; at least one cluster for every 100 households
San Jose, California	80,440	25%	ONP; OCC; OMG; mixed paper; glass container; cans; juice and milk cartons; plastic bags, bottles, and jugs; polystyrene packaging; scrap metals; empty aerosol cans; textiles; yard trimmings	one set of three 96-gallon recycling bins (one for each: newspaper, mixed paper, and other recyclables) for every 25 households
Seattle, Washington	54,900	23%	ONP, OMG, mixed paper, glass containers, cans. Two out of four contracted collection companies also collect #1 and #2 plastic bottles	each contractor has a slightly different system but buildings joining now require residents to sort materials into four streams. Containers used included dumpsters and totes.
Syracuse Housing Authority, Syracuse, New York	2,600	Not available for all buildings: 20% for Toomey Abbott Tower (293 households)	ONP, OMG, OCC, mixed paper, glass and metal food and beverage containers, aluminum foil and pans, aerosol cans, milk and juice cartons	buildings have different methods: door to door pick-up; common collection rooms on each floor of building
University of Michigan, Ann Arbor, Michigan	5,000	30%	ONP, OCC, OMG, mixed paper, glass, #1 & #2 plastics, aluminum, aerosol cans, juice and milk cartons, ceramics, scrap metal	common collection rooms on each floor of residence halls. Students separate OCC, mixed paper, mixed other recyclables

ONP = newspaper

OCC = corrugated cardboard

OMG = magazines and catalogs

Note: Comparisons of program data should be undertaken with care. It is not valid to compare different types of programs with each other. For example, community-wide recycling rates are not comparable with rates in single-building programs. Furthermore, cost data presented in the profiles are not meant to be comparable among programs. Data are presented in order to compare costs of waste management elements in each individual program.

Creating and maintaining a record-setting MFD recycling program

Some questions and answers

Q Can recycling help decrease my costs?

A By disposing fewer tons, disposal charges can decrease. Building owners and managers often can save money by reducing trash pick-up frequency and/or dumpster size. In addition, higher recovery rates lead to lower per ton costs for recycling. A recent study reported that as community-wide MFD diversion levels increased, per ton collection costs for recyclables decreased.⁴

Q Will I have huge start-up costs?

A Not necessarily. Start-up costs can vary considerably and need not be large. Some community MFD programs provide collection containers and bins and/or provide educational tools and assistance. Some private haulers also provide or rent collection containers. In contrast, installing a new chute system or other system with high equipment costs will be more expensive in the short run and may have a longer pay-back period. In all cases though, the higher your diversion, the shorter your pay-back period will be.

Q We just completed a big educational program. When do I need to do another one?

A Start tomorrow. Because of high resident turnover in MFDs and difficulty identifying individuals that are not participating, education efforts must be continual and more intensive than with single-family homes. New tenants will need concentrated educational efforts to help them up the

learning curve. In-person contact is best. Some coordinators spend time with residents going through their trash and going over what is and is not recyclable.

Q Which MFD waste reduction system works best?

A There is no one system that works in every building or community. Building layout and area fire and health codes and zoning regulations may dictate program design. Special considerations may also need to be made for typical residents. For example, programs designed for senior citizen housing should take into account that residents often have limited strength and mobility. Finally, the program may need some adjusting to get it just right. You may find that you need more collection containers than originally planned, or that your signs are a bit confusing. Listening, evaluating, and adjusting will help you create a high diversion, cost-saving program.

Q Why is designing a convenient program so important?

A Residents and staff may not want to participate if they perceive the program requires more time or effort than just throwing materials away. Placing recycling containers close to trash containers and allowing residents to commingle recyclables can enhance convenience.

Q Our residents want to recycle but the maintenance staff are opposed. How can we sell the program to them?

A Involve the staff in program planning. If you already have a program, ask the staff how they would improve it. Collection staff may have insight into how to solve problems, increase participation, and make the program more efficient. Asking for and using staff advice can create program buy-in, potentially save money, and help you reach higher waste diversion levels.

Q My community offers waste reduction programs for MFDs, but many buildings and complexes do not participate. How can we get everyone on board?

A All of the profiled community record-setters mandate waste reduction in MFDs or provide financial incentives for successful waste reduction. Mandates can include state or local community requirements that MFDs offer waste reduction opportunities to residents; requirements that private waste haulers provide waste reduction services to their customers; or requirements that all residents, including those in MFDs, participate. Financial incentives for building management and owners can include charging for trash based on weight or volume and providing waste reduction services at a lower rate or no extra charge or charging more for trash services at buildings and complexes that do not participate in waste reduction programs.

Tips from record-setters

- Involve residents in program planning and implementation.
- Provide waste reduction education and information to new residents when they first move into units.
- Educate people on what needs to be done and why. Recycling will help the environment in many ways.⁵
- Provide clear, simple explanatory materials.
- Use multiple means of getting the message out — including tenant meetings, newsletters, lease clauses, posters celebrating achievements, and direct mailings.
- Help people learn. Work with people. Explain in person how and what to recycle.
- Re-educate whenever programs change. For example, hand out flyers whenever new materials are added.
- Use in-building volunteers to communicate with other residents about program difficulties and successes.
- Make participation simple and convenient.
- Reach residents by placing information where the residents are, such as on or near recycling containers.
- Encourage or reward resident participation.
- Require that residents recycle through their lease agreements.
- Ensure management support and long-term commitment.
- Pay attention to the needs of your collection staff; they are an important

Notes

- ¹ U.S. Census Bureau, 1995 American Housing Survey. Available at <<http://www.census.gov/hhes/www/ahs.html>>.
- ² Stevens, Barbara J., Ph.D., Multi-family recycling: The data are in. *Resource Recycling*. April 1998, pp. 14-18.
- ³ Stevens, Barbara J., Ph.D., personal communication, April 28, 1999.
- ⁴ Stevens, op. cit.
- ⁵ See the U.S. EPA publication *Puzzled about Recycling's Value? Look Beyond the Bin* (EPA530-K-98-008) for more information about the benefits of recycling.

element in a successful recycling system. Be open to letting workers create systems that work for them. Listen... listen... listen!

- Pay attention to the ergonomics of handling. Do not be afraid to go into debt to capitalize equipment that improves efficiency and safety.
- Keep careful cost and tonnage records in order to recognize true cost savings.
- Focus on recovering materials with high volume and high value.
- Provide feedback. Mail residents letters and talk to them.

Tips for municipal planners to promote MFD waste reduction

- Mandate waste reduction program availability and participation.
- Require haulers to provide recycling services to MFDs.
- Create a mechanism for encouraging owners or managers of buildings to comply with recycling requirements.
- Be flexible in program design. Fit the system to each building.
- Consider using municipal employees to implement the program because of the opportunity for increased oversight.
- Show owners that they can realize big savings through recycling.
- Educate building owners. Owners can only use services they know about.
- Accept the same materials and use a consistent sorting system for all program participants in your community.
- Produce educational materials using simple graphics.
- Produce educational materials in multiple languages if some of the local population does not speak English.
- Be persistent. Maintaining high diversion levels at multi-family homes requires ongoing efforts from recycling coordinators and building managers.
- Have a mechanism to deny service if complexes consistently set out contaminated materials.
- Develop good relationships with the processors of your recyclables.



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The U.S. Conference of Mayors and Ecodata, Inc. provided data and much of the program information for the East Orange, Saint Paul, and Seattle profiles. This information was developed as part of a national study funded by the U.S. EPA.

Resources

Multifamily Recycling: A Golden



Opportunity for Solid Waste Reduction (EPA530-F-99-10) and *Multifamily Recycling: A National Study* (EPA530-R-99-11). Both published by the U.S. EPA and available from the RCRA Hotline at (800) 424-9346 .

Success with Multifamily Recycling: A Handbook for Owners and Managers. 1992. Produced by Metro Solid Waste Department, Portland, OR. (503) 797-1700.

Strength in Numbers. A 10-minute video available from Association of New Jersey Environmental Commissions, (973) 539-7547.

Guide for Preparing Solid Waste Reduction and Recycling Plans for Multi-family Residential Units. Produced by OSCAR, the Rhode Island Department of Environmental Management, (401) 277-3434

Multi-Residence Recycling Guide. Produced by the New York Department of Environmental Conservation and the Cornell Cooperative Extension. (518) 457-7337.



Blossom Hill Estates San Jose, California

50% and 65% Waste Reduction Rate



A California law requiring all cities to divert 50% of their solid waste by 2000 led the managers of Blossom Hill Estates to city hall to try to fight recycling. When they realized they could not, they decided to implement a strong model program. Now, working with the recycling program is one of the highlights of their job. Residents of the two complexes that comprise Blossom Hill Estates recycle over 50% of their solid waste. The first complex began recycling in 1993; the second began in April 1997. Since implementing recycling, Blossom Hill Estates I and II have reduced total disposal costs by 40% and 41% respectively.

Program Description

In San Jose, Green Team, a local company contracted by the city, provides multi-family dwellings with sets of three specially marked 96-gallon bins: one for newspaper; one for mixed paper; and one for other mixed recyclables. At Blossom Hill Estates, residents bring recyclables to bins kept next to the trash containers in outdoor trash corrals. Building maintenance staff bring both trash and recycling containers into the alley once a week on pick-up day.

Since 1980, CMS Properties, a local landscaping company, has taken care of all the landscape work at Blossom Hill Estates II. CMS brings yard trimmings to a commercial composting company and then buys back finished compost for its landscaping work. There is no landscaping at Blossom Hill Estates I.

When recycling began at Blossom Hill Estates II, the first of two complexes to recycle, building managers sent residents information about what and how to recycle. After two months, managers sent letters to every household that had not recycled properly. Letters explained that

residents should recycle, what they should recycle, and how and where to do it. Staff identified "violators" by going through trash bags and finding an item with the resident's name on it. Reaching a 50% diversion rate took a year.

When the program began at the second complex (Blossom Hill Estates I), whenever the trash container was full and recycling containers were not, management staff sent a letter to every resident in the complex as well as to the landlord explaining the recycling program and encouraging residents to recycle. After two months, managers began a new tactic. Now, if they find a lot of recyclables in

Materials Collected

- Newspaper
- Corrugated cardboard
- Mixed paper (magazines, catalogs, paper bags, telephone books, paperboard, colored and white paper, envelopes, mail, paper egg cartons)
- Glass containers
- Cans
- Juice and milk cartons
- Plastic bottles and jugs
- Polystyrene packaging
- Scrap metals (including aluminum foil and pie pans, metal can lids, small metal appliances, hubcaps, metal pots)
- Textiles
- Yard trimmings

trash from a particular household, they send that resident and the landlord a letter. The letter contains notice of a \$30 fine for not recycling as well as an explanation that if a resident can recycle properly for 90 days, the resident does not have to pay the fine. Residents reached a 50% diversion rate within 90 days of program implementation.

Outreach Activities

At both complexes, building managers spend time with residents going through residents' trash, explaining what is recyclable, how to prepare it, and where to put it. In addition, building management staff send informational mailings to every household and the landlord three times per year.

Costs/Benefits

Start-up costs were minimal. Operating costs, including mailings to every resident three times per year, are also low. The city provides recycling collection containers, and does not charge extra for recycling services. The trash fees MFDs pay cover recycling services. Trash fees have been fairly consistent from 1993 to 1997. During the first year of program implementation at Blossom Hill Estates II, building management spent \$2,000 on stamps sending letters to all residents.

Total disposal and composting costs at Blossom Hill Estates II were \$77,500 per year before the recycling program; total trash and waste reduction costs dropped by 41% to only \$45,300 in 1997. Disposal costs at Blossom Hill Estates I were \$67,000 per year before the recycling program; trash and diversion cost \$40,000 in 1997, representing a 40% reduction in costs.

In total, Blossom Hill Estates avoids almost \$60,000 per year on disposal costs and diverts more than 50% of its waste at a cost of less than \$14,000.

Of the money that Blossom Hill Estates pays for landscape services, approximately \$1,100 per month is for composting services.

Tips for Replication

- Show owners that they can realize big savings through recycling.
- Educate people on what needs to be done and why. Explain that nobody is making more land for landfills. Recycling will help the environment.
- Help people learn. Show them how to prepare recyclables. Work with people.

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Program Summary

	Blossom Hill Estates II		Blossom Hill Estates I	
	1993		1997	
Start Date	1993		1997	
Type of Multi-Family Buildings	4 units per building, 86 buildings in complex		4 units per building, 98 buildings in complex	
Households Served	344		392	
	Before Recycling	1997	Before Recycling	1997
Total Waste Generated (Tons)	595	595	624	624
Disposed	520	208	624	312
Diverted*	75	387	0	312
Total Diverted (%)	13%	65%	0%	50%
Recycled*	0%	52%	0%	50%
Composted*	13%	13%	0%	0%
Average Generation (lbs./HH/day)	9.5	9.5	8.7	8.7
Disposed	8.3	3.3	8.7	4.4
Diverted	1.2	6.2	0.0	4.4
Fees per Year	\$77,472	\$45,336	\$67,200	\$40,133
Disposal	\$64,272	\$32,136	\$67,200	\$39,504
Diversion	\$13,200	\$13,200	\$0	\$629
Net Costs per HH per Year	\$225	\$138	\$171	\$102
Disposal services per HH	\$187	\$93	\$171	\$101
Diversion services per HH	\$38	\$45	\$0	\$2
Savings per HH		\$87		\$69

HH = household

Note: Numbers may not add to total due to rounding.

*ILSR estimated tons recycled and composted. Recycled tonnage was set equal to the reduction in trash disposal at Blossom Hill Estates during the period studied. ILSR converted volume of yard trimmings to weight using the following conversions: 1 cubic yard brush = 300 lbs.; 1 cubic yard of grass clippings = 702 lbs.



Commodore Club Condominiums Key Biscayne, Florida

59% Waste Reduction Rate



Residents of the 187-household Commodore Club Condominiums in Key Biscayne, Florida, an island suburb of Miami, have been recycling since 1992. Using a modified trash chute system, which accommodates trash and separated recyclables, residents recycle approximately 59% of their solid waste. This saves the condominium approximately \$1,500 per year in disposal costs and an estimated \$3,000 per year in indirect costs, such as pest control.

Program Description

Residents of Key Biscayne Commodore Club condominiums in Key Biscayne, Florida (population 8,854, 1990 census), have been recycling using a modified trash chute system since 1992. Residents separate newspaper, aluminum cans, glass food and beverage containers, and #1, #2, and #3 plastics for recycling. Each material goes down the chute into its own receptacle.

The system, designed by Hi-Rise Recycling Systems, Inc., works as follows: a computer panel with buttons for trash, newspaper, glass, plastics, and cans is located next to the door of a chute in the laundry room on each floor. Bins corresponding to each type of material sit on a rotating platform under the chute opening in the basement. When a resident wants to throw away trash, she pushes the trash button on the panel. This causes the platform in the basement to rotate the trash container directly under the opening. When the container is in place, a light appears on the computer panel, the chute door unlocks, the resident opens the door and throws away her trash. Next, she may push the

button for newspaper recycling. The platform in the basement rotates so that the newspaper container is under the chute opening, and the system is ready for her recyclable newspaper. The platform contains two containers for trash and four for recyclables.

Waste Management of Dade County picks up trash every Monday through Saturday, and recyclables once a week. The company picks up trash more frequently than recyclables to avoid odor and vector problems. There is very little contamination of recyclables. Although Waste Management can charge the building for contaminated loads, Commodore Club Condominiums has never been charged. The building manager, in charge of running the recycling program, believes that the fast, easy collection system encourages high participation rates and high-quality separation of recyclables.

Building staff service the basement trash/recycling room twice a day to switch bins if necessary and ensure the system is running properly. They pressure clean the bins monthly.

Materials Collected

Newspaper
Aluminum
Steel cans
Glass food and beverage containers
Plastics # 1, 2, & 3

Outreach Activities

Many residents were involved in choosing this recycling system and became interested in participating. Once they chose the system, a representative from Hi-Rise Recycling conducted a workshop at the complex, explaining how the system worked, what the county accepted for recycling, how materials should be separated, the plastics coding system, and what residents needed to do to ensure a successful program.

During the program's first three months, the Hi-Rise representative visited Commodore Club at least every-other day to check the containers in the basement and talk to residents as needed. She put a new reinforcement poster in each chute room every two weeks. After three months, she sent every resident a letter congratulating them on their recycling efforts.

On an ongoing basis, Hi-Rise supplies literature, which building staff leave in common areas, including instructions for how to recycle at the chutes.

Costs/Benefits

In 1991, before implementing the recycling system, Commodore Club paid an estimated \$2,130 per month in trash hauling charges. The condominiums also paid approximately \$7,300 in labor costs per year relating to trash collection and removal. Hauling and labor costs before the recycling program were approximately \$32,900 per year.

In 1998, Commodore Club paid \$714 per month for the Hi-Rise system. This included installation and maintenance. This is a lease-to-own rate and, in 1999, Commodore Club will have paid for the system. Although Commodore Club will continue to pay a monthly maintenance fee, this will be much lower than its current monthly rental charge, and savings over previous

trash costs will increase. In addition to the monthly fees, Commodore Club pays \$1,750 in hauling charges per month, based on a per container pick-up charge for both trash and recyclables. Commodore Club also pays approximately \$1,800 per year in labor costs relating to trash and recycling services. Because building services staff used to pick up trash on each floor, concentrating all trash and recyclables in one place has greatly reduced labor time for pick-up and maintenance. In total, for trash and recyclables service, Commodore Club pays approximately \$31,400 per year.

Since implementing its recycling program, Commodore Club has saved approximately \$1,600 per year in trash costs in addition to an estimated \$3,000 per year in indirect costs such as reduced cleaning and pest control in the trash rooms on each floor.

Tips for Replication

- Make recycling easy. In order to reach high recovery rates, recycling has to be easy for residents.
- Simplify separation and recovery procedures.
- Ensure management support. Management support makes a huge difference in program success.

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Program Summary, 1998

Start Date	1992
Type of Multi-Family Building	12-story building, built circa 1972
Households Served	187; 139 2-bedroom units, 24 3-bedroom units, 24 1-bedroom units
Total Waste Generated (Tons)	89
Disposed	37
Diverted	52
Total Diverted (%)	59%
Materials Recovered (Tons)	52
Newspaper	42
Mixed glass	4
Aluminum cans	1
Plastics	6
Average Generation (lbs./HH/day)	2.6
Disposed	1.1
Diverted	1.5
Cost per year*	
Before recycling program	\$33,000 (estimated)
With recycling program	\$31,400 (estimated)
Cost per HH per year	
Before recycling program	\$176 per HH per year (estimated)
With recycling program	\$168 per HH per year (estimated)

HH = household

Numbers may not add to total due to rounding.

* Costs represent labor costs for Commodore Club employees who spend time handling trash and recycling, hauling contractor costs, and Hi-Rise system rental fees (with recycling program).



East Orange, New Jersey

22% Waste Reduction Rate in Multi-family Dwellings



East Orange, New Jersey, offers recycling services to all its residents. The city-run program serving residents of multi-family households in complexes with 50 or more units began in 1992. Residents receive weekly collection of newspaper, magazines, phone books, aluminum and ferrous cans, #1 and #2 plastics, and clear, green, and brown glass bottles and jars. In 1996, residents served by this recycling program diverted 22% of their waste from disposal.

Program Description

East Orange, New Jersey (population 73,000), is located about 15 miles west of New York City, and is a highly urban community.

Well over 50% of households in East Orange reside in multi-family buildings. All multi-family households receive curbside recycling service, with a combined single-family/small multi-family service provided under contract, and a separate recycling collection to complexes with 50 or more units provided by municipal employees. A private firm, under city contract, collects trash for the entire city.

East Orange instituted single-family recycling in 1989, and followed with a MFD recycling program three years later. Recycling is mandated by state law which requires communities to offer recycling services and residents to separate recyclables from trash. East Orange's local recycling ordinance allows the city to fine apartment management for failure to comply with the city's recycling requirements and allows the city to discontinue both trash and recycling services for non-compliance. The city has fined some complexes but has never discontinued service to a building.

The single-family program and

each recycle the same materials, in a two separation set-out. The city provides its multi-family customers with sets of 90-gallon carts, with each set of two carts serving about 30 households. Paper products go in one cart and commingled containers in the second. These carts are typically placed near trash receptacles in complexes with common trash areas. In buildings with trash chutes, city staff usually place small recycling containers on each floor and building maintenance staff are responsible for emptying these containers into the central containers for collection by city crews.

City crews use six-cubic-yard rear-loading packer trucks to provide weekly collection service to East Orange's MFDs. They collect paper on one pass and commingled containers on a separate pass. City crews deliver collected recyclables to a materials recovery facility (MRF), which a private firm operates. The city pays no tip fee at the facility and receives 10% of revenues from the sale of its paper.

Materials Collected

- Newspaper
- Magazines
- Phone books
- Aluminum and ferrous cans
- #1 and #2 plastics
- Glass bottles and jars

This profile is part of the fact sheet *Complex Recycling Issues: Strategies for Record-Setting Waste Reduction in Multi-Family Dwellings* (EPA-530-F-99-022).

the multi-family recycling programs



Outreach Activities

East Orange staff closely monitor each building's participation in the recycling program so educational resources can be targeted where they are most needed. When buildings join the program, a city inspector evaluates the building and helps management tailor the new program to the individual building layout and trash system. City staff also distribute a brochure on the city's MFD recycling program to each household when a new building joins the program.

Collection staff note decreases in amounts of materials recovered and increases in contamination at buildings on an ongoing basis. When collection staff report problems, city management either issue a clear, courteous letter, with a name and phone number to contact to rectify the situation or personally visit the building. As a result of this close monitoring of recycling set-out quality and quantity, East Orange has few problems with contamination of recyclables and maintains its high waste reduction level among its MFDs.

Costs/Benefits

Recycling from large multi-family complexes in East Orange cost the city \$13 per household in 1996. This cost includes the costs of collection (on a full-cost accounting basis, including depreciation of capital equipment such as vehicles and carts), costs of processing (to the city), less revenues remitted to the city by the processor. Per household costs for trash management were \$92. Trash costs reflect payments to the city's trash contractor and trash tip fees. The overall cost of trash disposal and recycling collection in East Orange's multi-family program averaged \$106 per household in 1996. If the city did not recycle and disposed of all waste generated in MFDs, conservative estimates indicate that total costs per

multi-family household would be \$111.

On a per ton basis, trash cost \$154 per ton in 1996 compared to only \$81 per ton for recycling services. Recycling is cheaper on a per ton basis because the city pays no tip fee for recyclables delivered to the MRF while trash disposal tip fees were nearly \$75 per ton.

East Orange finances all trash and recycling services from regular property tax assessments.

Tips for Replication

- Mandate recycling program availability and participation.
- Provide education and outreach materials to all residents on a regular basis.
- Create a mechanism for encouraging owners or managers of buildings to comply with recycling requirements.
- Be flexible in program design. Fit the recycling system to each building.

- Consider using municipal employees to implement the program because of the opportunity for increased oversight.

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Program Summary, 1996

Start Date	1992
Type of Multi-Family Buildings	All buildings and complexes in East Orange with 50 or more units are eligible to participate. In 1996, approximately 75 buildings and complexes were enrolled in the program.
Households Served	6,236
Average Persons per HH Served	1.58
Total Waste Generated (Tons)	4,772
Disposed	3,729
Diverted	1,043
Total Diverted (%)	21.9%
Average Generation (lbs./HH/day)	4.2
Disposal	3.3
Diversions	0.9
Average per ton SWM costs	\$137.94
Trash collection and disposal	\$153.99
Recycling	\$80.60
Cost per HH per year	\$105.56
Trash collection and disposal*	\$92.08
Recycling	\$13.48
Estimated Costs per HH per Year without Waste Reduction**	\$111.21

SWM = solid waste management HH = household

Note: Numbers may not add to total due to rounding. Data represent buildings in the city MFD trash and recycling program.

* The city paid a trash tip fee of \$74.72 per ton for disposal in 1996.

** In order to estimate what per household costs might have been if East Orange had no recycling program, Ecodata assumed that all waste generated would be handled as trash and the marginal collection cost per ton of material that was recycled would be equal to 50% of the per ton trash collection cost in the present system.



Leisure World Laguna Hills, California

50% Waste Reduction Rate



Thanks to an aggressive program installed, maintained, and encouraged by property management, the Leisure World residential community in Laguna Hills, California, has cut its waste stream in half. One of the keys to Leisure World's success is its composting program. Landscape trimmings account for 25% of the community's waste stream, with mixed residential recyclables (newspaper and commingled containers) accounting for another 25%.

Program Description

Leisure World is a sprawling residential community located on more than 700 acres of land with approximately 18,000 residents. Building types range from single-family units up to 24-unit buildings. This poses an unusual challenge for management who has devised a combination centralized collection for commingled materials, drop-off system for newspapers, and curbside program for the single-family units.

Varied building configurations result in three different trash collection systems. Residents of three-story buildings use trash chutes. Residents of other multi-family units bring their trash to three-cubic-yard containers in enclosures located throughout the premises. Residents of single-family units put their trash at curbside for collection. Outside contractors collect trash twice per week.

While Leisure World has a strong recycling program of typical home-generated recyclables, what drives its recycling rate to 50% is its composting operation. This program began in 1990. Leisure World's landscaping staff collect all landscaping debris and grind, process, and compost it

on site. They use the finished compost as potting soil in the on-site nursery, and mulch for landscaping purposes. Staff use several source reduction techniques, including direct mulching when cutting grass, and planting drought resistant species.

Leisure World's residents recycle beverage containers, magazines, and telephone books at one centralized drop-off site at the maintenance service center, driving distance for most residents. At this site there are nine recycling collection containers, one or two for each commodity. The containers are three-cubic-yard metal bins. The material collected here accounts for less than 5% of the total recyclables diverted.

In-house staff collect newspapers curbside from the single-family units. The remaining population, who reside in multi-family structures, place their newspaper in one-cubic-yard covered metal bins. Approximately 450 of these bins, custom designed for Leisure World, are distributed throughout the complex

Materials Collected

- Glass
- Aluminum
- Newspaper
- Magazines
- Yard trimmings
- White goods
- Scrap metal
- Laser printer cartridges

alongside trash containers. Private contractors collect this material.

Other materials collected for recycling including white goods, scrap metal (such as old hot water heaters, sinks, and other fixtures generated by the maintenance department), and laser cartridges. Management also plans to implement a cardboard collection program using one four-cubic-yard container on the premises.

Staffing needs for the recycling program are met with existing staff. Because outside contractors handle the collection of recyclables (except yard trimmings), only a small amount of staff time is devoted to cleaning the centralized collection location. The composting program has two dedicated staff: one for materials collection, the other for tub grinder operation.

Outreach Activities

The program involves community residents through governance committees that oversee all aspects of operations on the premises. This direct involvement gives residents a direct stake in the success of the program. Interested residents often bring contamination issues to the attention of the program manager.

All recycling containers are labeled with stickers indicating which materials to deposit. Management promotes the program through articles in the community newspaper and bulletins on the community cable channel.

Costs/Benefits

The centralized collection program minimizes costs. Leisure World also receives top dollar for its newspaper as it is clean and uncontaminated. For instance, in 1996 management spent \$95,000 on newspaper pickup, but received \$123,000 in revenue for this newspaper and saved \$82,000 in tipping fees, netting an overall savings of

\$109,000 for newspaper alone. Savings are passed on to residents through lowered operating costs. As of 1996, nine years after implementing the recycling program, Leisure World realized \$80,445 savings in operating expenses. All program costs include equipment (tub grinder and tractor to turn windrows), start-up costs (grading of compost site), and labor (two staff for composting program).

The yard trimmings collection program results in lower hauling and tipping fees, reduced need for soil amendment purchases, and reduced water needs. Careful records of the flow of materials and costs allow staff to understand the true cost savings of recycling. The program coordinator tracks tonnage by requiring waste slips from the contractor who has a scale on its truck. The in-house composting staff also weigh yard trimmings with an on-board scale.

Tips for Replication

- Ensure a committed management staff is on hand.
- Encourage residents to make the extra effort to recycle.
- Keep careful cost and tonnage records in order to recognize true cost savings.
- Focus on recovering materials with high volume and high value.

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Program Summary, FY96

Start Date	1987 (yard trimmings added 1990)	
Type of Buildings	318 single-family buildings and 2,231 multi-family buildings; multi-family buildings range from 2 to 24 units and from 1 to 3 stories	
Households Served	12,736	
Total Waste Generated (Tons)	FY86	FY96
Disposed	>14,500	15,755
Diverted	14,500	7,800
Total Diverted (%)	NA*	7,955
Materials Recovered	NA	50%
Yard trimmings	0	4,711
Newspaper	NA*	3,043
Other recyclables	0	201
Average Generation (lbs./HH/day)	>6.24	6.77
Disposed	6.24	3.35
Diverted	NA*	3.42
Fees per Year	>\$815,522	\$735,077
Disposal	\$815,522	\$562,077
Diversions	NA*	\$173,000
Net Costs per HH per Year	>\$64.03	\$57.71
Disposal services	\$64.03	\$44.13
Diversions services	NA*	\$13.58
Net Costs per Ton	>\$56.24	\$46.66
Disposal services	\$56.24	\$72.06
Diversions services	NA*	\$21.75

FY = fiscal year HH = household NA = Not available

Note: Numbers may not add to total due to rounding.

*Leisure World had a newspaper recycling program before 1986, but did not track tonnage or costs.



Saint Paul, Minnesota

23% Waste Reduction Rate in Multi-family Dwellings



Saint Paul, Minnesota, began its multi-family recycling program in 1986. Local ordinance requires that all apartment complexes offer residents recycling services. City-sponsored multi-family recycling services are available to buildings with twelve or more dwelling units. As one of the oldest programs in the United States, it is also one of the most developed. In 1997, over 27,114 units in 1,056 buildings received the recycling service and the program collected 3,418 tons of recyclables, representing a greater than tenfold increase from the 290 tons collected in 1988. In 1997, Saint Paul achieved a multi-family waste diversion rate of 23%, collecting 22 pounds of recyclables per multi-family unit per month.

Program Description

Recycling came to Saint Paul in 1986. The program was established by a not-for-profit neighborhood coalition — the Saint Paul Neighborhood Energy Consortium (NEC). From the start of the program, planners decided to offer on-premises recycling to all city residents, regardless of whether they lived in single-family houses, condominiums, high-rise apartments, or even houseboats.

Originally multi-family properties had to sign up to participate in city recycling programs. In 1992, the program became mandatory, in that all complexes must offer the services. Participation by individual residents is voluntary.

NEC contracts with Super Cycle to provide collection services. The firm collects source-separated recyclables using sets of six ninety-gallon wheeled carts at each recycling station. One recycling station, which receives weekly or every other week pickup, serves up to 100 households.

A key to the success of the program is city-wide uniformity of the program — there is the same set-out system, list of acceptable

items, and instructions for preparation of materials throughout the city. This makes education easier, and it means that a resident who moves does not have to relearn recycling requirements.

Saint Paul's multi-family recycling program is truly a group effort with the city providing the containers, NEC managing education and the contract with the hauler, and Super Cycle doing the collection. NEC works with the manager of each complex to be sure the property manager understands his or her responsibilities (keep containers accessible, clear away snow, provide move-in packages to new tenants), signs a contract with the owners of the complex, and recommends recycling be included in all leases.

Outreach Activities

NEC actively manages the outreach for Saint Paul's multi-family recycling programs. NEC provides educational materials including flyers, posters, displays and leadership for resident

Materials Collected

- Newspapers
- Telephone books
- Mixed paper (including mail, office paper, magazines and catalogs, and paperboard)
- Glass Containers
- Cans
- Corrugated cardboard



mailings. Most educational materials provide basic, clear guidelines and are available in many languages (including English, Spanish, Russian, Cambodian, Hmong, Chinese, Vietnamese, and Somali).

The program provides ongoing feedback to residents — via monthly data on quantity of materials recycled by complex (the hauler is required to provide NEC with monthly pickup information for each account served). These data can be graphed on a poster provided by NEC, and displayed for residents to see. NEC staff also attend tenant meetings to speak about the MFD program upon request.

NEC also encourages residents of MFDs to reuse household items. It has helped complexes set up exchange tables where residents leave items for free retrieval by other residents. NEC also publishes lists of drop-off locations where residents can donate used clothes, furniture, and other reusable items.

Costs/Benefits

Recycling in multi-family dwellings in Saint Paul is financed by a city tax of \$13 per dwelling unit per year, billed to MFD property owners on their property tax bills. In 1996, Saint Paul paid the NEC \$12.17 per household served, NEC in turn paid Super Cycle \$9.81 per household for recycling collection and marketing and used the remaining monies to fund its outreach and educational programs.

The per ton cost of MFD recycling is approximately \$94 in Saint Paul, compared to \$119 per ton for trash (collection averaged \$70 per ton and disposal cost \$49 per ton). Although the per ton cost of the recycling program is greater than the per ton cost of collecting trash, total trash costs are higher because of disposal tip fees. Furthermore, if recycling were eliminated and all discards were collected as trash, conservative estimates indicate that total

costs per multi-family household would essentially be unchanged. In 1996, the total cost of the trash collection and disposal and recycling programs was \$64 for multi-family households; the costs for trash collection and disposal of all waste generated at MFDs would have been at least \$63. Saint Paul has designed a system where recycling programs are delivered at essentially no additional cost to the community, and where significant diversions prolong the life of disposal facilities.

Tips for Replication

- Accept the same materials and use a consistent sorting system for all program participants in your community.
- Produce educational materials using simple graphics.
- Use multiple means of getting the message out — including tenant meetings, newsletters, lease clauses, posters celebrating achievements, and direct mailings.

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Program Summary, 1996

Start Date	1989, reached 100% of MFDs served in 1995
Type of Multi-Family Buildings	All buildings and complexes in the city with 12 or more units
Households Served	27,114
Average Persons per HH Served	1.44
Total Waste Generated (Tons)	15,371
Disposed	11,849
Diverted	3,522
Total Diverted (%)	22.9%
Average Generation (lbs./HH/day)	3.1
Disposed	2.4
Diverted	0.7
Average per ton SWM costs	
Trash Collection*	\$70.50
Trash Disposal	\$49.00
Diversion**	\$93.69
SWM Cost per HH per Year	\$64.39
Disposal*	\$52.22
Diversion**	\$12.17
Estimated Costs per HH per Year without Waste Reduction***	\$63.14

HH = household SWM = solid waste management
Numbers may not add to total due to rounding.

*Ecodata estimated costs based on discussions with private haulers serving the MFD sector in Saint Paul.

**Represents \$12.17 per household fee paid by the city to the Saint Paul NEC.

***In order to estimate what per household costs might have been if Saint Paul had no recycling program, Ecodata assumed that all waste generated would be handled as trash and the marginal collection cost per ton of material that was recycled would be equal to 50% of the per ton trash collection cost in the present system.



San Jose, California

25% Waste Reduction Rate in Multi-family Dwellings



San Jose, California's multi-family sector recovered 25% by weight of its solid waste in FY97. By contracting with private haulers, the city of San Jose offers weekly collection of more than 26 recyclable materials, including yard trimmings, to every multi-family household in the ethnically diverse city. In order to maximize participation, San Jose offers financial incentives to its haulers and MFD building owners for waste reduction, and the city and its contractors conduct on-going education programs aimed at building managers and residents.

Program Description

Driven by a California law requiring cities to divert 50% of their waste by the year 2000, San Jose added multi-family dwellings to its residential recycling program. It began

yard trimmings pick-up in 1991 and pick up of other recyclables in 1993.

Green Team, a local company, collects trash and recyclables other than yard trimmings from multi-family dwellings. Green Team provides buildings with approximately one set of three (one for each: newspaper, mixed paper, and other recyclables) 96-gallon recycling bins for every 25 households. Building managers usually place bins near dumpsters and in other convenient locations.

Occasionally, when bins are contaminated with trash or the wrong recyclables, the collection driver leaves a sticker on the bin explaining why materials were not collected. The driver also sends a non-collection letter to the building contact, with tips on how to correct the problem.

Yard trimmings account for 66% of material diverted from the multi-family waste stream. Building maintenance staff put yard trimmings either in the street along the curb or in burlap tarps. Crews from one of two

companies bring yard trimmings to two privately owned composting sites. Trimmings are either windrow composted or ground into mulch. Finished compost and mulch are sold or used as soil amendment on farms and city parks.

Outreach Activities

Outreach activities comprise two main components: providing educational and instructional material, and conducting on-site visits. Outreach activities have essentially two audiences: building managers and residents. For managers, Green Team staff provide building managers with tools to help them take an active role in recycling. These include signs, information on volume-based trash fees, model lease agreements incorporating paragraphs

Materials Collected

- Newspaper
- Corrugated cardboard
- Mixed paper (magazines, catalogs, paper bags, telephone books, paperboard, colored and white paper, envelopes, mail, paper egg cartons)
- Glass containers
- Cans
- Juice and milk cartons
- Plastic bottles and jugs
- Polystyrene packaging
- Scrap metals (including aluminum foil and pie pans, metal can lids, small metal appliances, hubcaps, metal pots)
- Textiles
- Yard trimmings



about recycling, and a service agreement packet containing brochures listing services provided and tips for dealing with contamination.

The city produces all outreach materials, including posters and informational brochures, in English, Spanish, and Vietnamese. In addition, Green Team makes site visits and presentations whenever requested, and puts on recycling carnivals for children. The Environmental Services Department (ESD) runs a recycling customer service line.

Costs/Benefits

The ESD's operating costs for multi-family waste management services include payments to Green Team for trash and recycling services; payments to haulers and processors for yard trimmings collection and composting; landfill fees for trash disposal; billing and customer service; and overhead costs for rent, staff salaries and benefits, administrative support, and supplies. In FY97, these multi-family waste management costs totalled \$11,000,000. Of this, disposal services cost approximately \$6,300,000 and diversion services cost approximately \$4,500,000.

ESD incurred no capital costs for the program, as contractors provide all equipment.

One of the main goals of the San Jose recycling program is to divert trash from the landfill, extending its life. To maximize diversion, ESD charges building owners volume-based fees for trash pick-up and nothing for recyclables pick-up. Building owners with high participation rates save money by reducing their trash. One building complex, for example, saves over \$10,000 in disposal costs per year by recycling 62% of its solid waste.

Tips for Replication

- Involve building management. Programs improve significantly when managers actively promote recycling.
- Educate building owners. Owners can only use services they know about.
- Sell program economics to building owners.
- Keep it simple. If the program is intuitive, higher recovery and participation rates usually result.
- Be persistent. High diversion recycling programs at multi-family homes require energy from recycling coordinators and building managers.
- Reach residents by placing information where the residents are, such as on or near recycling containers.

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Program Summary, FY97

Start Date	Yard trimmings phased in Sept. 1991 to Sept. 1992; other recyclables July 1993
Buildings in Program	3,400 buildings
Type of Multi-Family Buildings	All buildings with 4 households or more, mobile homes, condominiums, and townhouses
Households Served	80,440
Households per Building	2,400 buildings have 4-10 households 650 buildings have 11-50 households 150 buildings have 51-100 households 200 buildings have 101 or more households
Total Waste Generated (Tons)	103,124
Disposed	77,544
Recycled	8,714
Composted	16,866
Total Diverted (%)	25%
Recycled	8%
Composted	16%
Average Generation (lbs./HH/day)	7.0
Disposed	5.3
Recycled	0.6
Composted	1.1
Net Costs per HH per Year*	\$133.55
Disposed	\$77.73
Diverted	\$55.82

HH = household

Note: Numbers may not add to total due to rounding.

*Costs represent the ESD's payments to contractors for disposal and diversion services, landfill tip fees, billing, customer service, overhead costs for rent, staff salaries and benefits, administrative support, and supplies.



Seattle, Washington

23% Waste Reduction Rate in Multi-family Dwellings



Seattle, Washington, is a large urban, metropolitan center with a long history of recycling programs. The city contracts with private firms to provide multi-family trash and recycling services. Apartment complexes must request recycling services, and as of 1997, complexes representing more than half of multi-family households had done so. Residents must deliver recyclables to centrally located areas. In 1996 residents participating in Seattle's multi-family recycling program diverted approximately 23% of their household waste from disposal.

Program Description

Seattle started its single family recycling program in 1988, and initiated the multi-family recycling program a year later. Recycling in Seattle is completely voluntary — each household or multi-family complex must

request service. To encourage recycling, Seattle offers a variable fee trash service (with fees based on the size of the container for trash) to both single- and multi-family customers, and provides recycling service at no additional charge.

The city contracts with four private companies to provide multi-family recycling services; two companies serve residences in the north of the city, two others serve residences in the south. Each collection company uses a different sorting and container system but the companies largely collect the same materials (all of the contractors collect newspaper, other mixed paper, glass containers, and cans but only two of the four companies accept #1 and #2 plastic bottles). The city is trying to standardize the system; all buildings joining the program now require residents to sort materials into four streams: separate totes for clear, green, and brown glass, and a dumpster for all other materials.

Contractors provide the dumpsters

and/or 95-gallon carts used in the program.

Collection frequency also varies by material, complex, and hauler. For example, a hauler may collect paper from a complex every week but only collect glass bi-weekly or even monthly.

Haulers deliver collected recyclables to material recovery facilities (MRFs) or directly to market. Contractors report the tonnages recycled each month by commodity. The contractors are paid a fixed amount for their collection and processing services. Seattle assumes the risk for market variation in commodity prices by reimbursing the contractors if prices fall below a set level and reducing payment by the amount prices rise above the same level.

Although the city relies on the private sector to deliver the recycling services, the city staff enforce the contracts and enroll the individual complexes in the recycling program. City staff also collect and compile program data.

Materials Collected

- Newspaper
- Mixed paper (including catalogs, magazines, mail, paperboard, phone books, paperback books, office paper, and paper bags)
- Glass containers
- Cans
- #1 and #2 plastic containers*

*Plastics collected by only two of the four haulers serving multi-family residences.



Outreach Activities

Seattle tries to use incentives rather than enforcement to encourage recycling. The city also maintains an on-going education program about the apartment recycling program. One component of this education program is the "Friend of Recycling" volunteer program. Program volunteers attend a city training session, then serve as recycling advocates in their buildings. Volunteers also monitor recycling containers for contamination. Seattle issues an annual \$100 rebate on trash bills to the management of buildings with Friend of Recycling volunteers.

Seattle uses multiple messages to encourage recycling. The city encourages MFD management to get involved in order to protect the environment and save money. The city also reports that building managers have found implementing recycling helps keep trash areas clean.

In cases of consistently contaminated recyclables at an apartment building, the city has terminated recycling service as a last resort. Service has been terminated at between 50 and 100 buildings.

Costs/Benefits

In 1996 recycling from MFDs in Seattle cost an average \$19 per household. During the same period, trash management costs averaged \$64 per household. These costs include fees paid to the contractors for collection of trash and recyclables, estimated tip fees paid for trash disposal, and city administration.

If recycling were eliminated and all discards were collected as trash, total costs per multi-family household would be at most 6% lower. In 1996, the total cost of the trash collection and disposal and recycling programs was \$83 per multi-family household; the costs for trash collection and disposal of all waste

generated at MFDs would have been at least \$79. Seattle has designed and implemented a system where MFD recycling programs are delivered at little additional cost to the community, and where significant diversions prolong the life of disposal facilities, support local economic development, and slow resource depletion.

Tips for Replication

- Use in-building volunteers to communicate with other residents about program difficulties and successes.
- Require that residents recycle through their lease agreements.
- Provide waste reduction education and information to residents when they first move into units.
- Produce educational materials in multiple languages if some of the local population does not speak English.

- Have a mechanism to deny service if complexes consistently set out contaminated materials.

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Program Summary, 1996

Start Date	1989
Type of Multi-Family Buildings	All residences in buildings with 5 or more units are eligible to participate but they must sign up for service
Households Served	56,025 out of 101,150 total units in the city
Average Persons per HH Served	1.69
Total Waste Generated (Tons)	35,856
Disposed*	27,729
Recycled	8,127
Total Diverted (%)	22.7%
Average Generation (lbs./HH/day)	3.5
Disposed	2.7
Diverted	0.8
SWM Costs per HH per Year**	\$83.43
Trash Collection	\$25.75
Trash Disposal	\$38.54
Diversion	\$19.14
Estimated Costs per HH per Year without Waste Reduction***	\$78.88

HH = household SWM = solid waste management

Notes: Data represent only those households participating in the MFD recycling program. Numbers may not add to total due to rounding.

*Contractors collect trash from single- and multi-family customers in the same vehicles on blended routes. Ecodata estimated trash generation for single- versus multi-family residences.

**Trash and recycling collection costs reflect fees paid to collection contractors and city administration costs. Trash disposal costs reflect a tip fee of \$78, the prevailing rate charged at private transfer stations in the Seattle area in 1996. In 1996, the city charged a per ton tip fee of \$94 at its transfer stations, therefore; trash costs may be underestimated.

***In order to estimate what per household costs might have been if Seattle had no recycling program, Ecodata assumed that all waste generated would be handled as trash and the marginal collection cost per ton of material that was recycled would be equal to 50% of the per ton trash collection cost in the present system.



Syracuse, New York Public Housing

20% Waste Reduction Rate at Toomey Abbott Tower



Residents in Syracuse Housing Authority's (SHA) public housing have been recycling since 1990. Programs are designed uniquely for each building and include door-to-door pick-up of both trash and recyclables in some high-rise buildings. In 1997, an estimated 80-90% of all SHA households recycled. At Toomey Abbott Tower, SHA's largest building, residents recycled an estimated 20% of their solid waste in 1997, allowing SHA to avoid over \$6,000 in disposal charges.

Program Description

In 1990, responding to a number of local and state regulations, the Syracuse Housing Authority (SHA) instituted recycling in apartment buildings under its jurisdiction. In 1997, residents in Toomey Abbott Tower, SHA's largest building (308 households on 22 floors), recycled an estimated 20% of their solid waste.

Because SHA buildings vary in size, type, age, available space, and resident make-up, recycling programs are different in each building. Where space allows, residents receive door-to-door pick-up of both trash and recyclables. In some high-rises, residents receive door-to-door pick-up of recyclables, but must bring trash to a chute, which empties into a basement compactor.

In 1997, Toomey Abbott Tower residents brought trash and recyclables to a common collection room on each floor. In this building and similar high-rise buildings, residents put mixed containers in 95-gallon bins, mixed paper in brown paper bags either next to or in the larger container, and flattened corrugated cardboard next to containers. Maintenance staff collect containers and bring them

outside for SHA's contractor to pick up. SHA contracts with Raite Rubbish Removal, a local company, for trash and recyclables pick-up from all SHA buildings.

Before the program began, SHA distributed 5-gallon pails for recyclables to apartments and 14-gallon bins to town homes. These containers, paid for by the Onondaga County Resource Recovery Agency (OCRRA), are labeled by unit number.

SHA buildings have little landscaping. Grounds crews leave grass clippings on lawns; they put the small amount of raked leaves and the occasional downed branch into buildings' regular trash bins.

Outreach Activities

Before program inception, SHA representatives attended tenant meetings where they announced and explained the

Materials Collected

- #1 and #2 plastic bottles
- Glass food and beverage containers
- Metal food and beverage containers
- Aluminum foil and pans
- Aerosol cans
- Newspaper
- Mixed paper (office paper, greeting cards, magazines, wrapping paper, single-ply cardboard)
- Milk and juice cartons
- Corrugated cardboard



forthcoming recycling program. In many buildings, SHA began new trash collection procedures at the same time it began recycling. At the program outset, SHA created outreach materials by adapting some of the county's literature and writing some of its own materials. (SHA now uses Onondaga County-produced outreach literature.) In addition, OCRRA and SHA staff conducted one-on-one resident training by going door-to-door and explaining to tenants what to recycle, how to prepare it, and where to put it. Implementation went very smoothly.

SHA has a Property Care Ticket program whereby SHA staff can ticket residents for various offenses, including not disposing of trash or recycling correctly. For the first improper recycling offense, SHA fines residents \$5. In the first year of recycling, SHA issued 224 fines. Residents can appeal the fine. Generally, any appeal will result in fine dismissal. SHA believes the opportunity to explain the importance of recycling and how to do it correctly is of more value than collecting the \$5.

SHA's one recycling coordinator works 9-1:30 daily. She inspects recycling containers in buildings where trash and recyclables are picked up door-to-door. When she finds an apartment where residents are not recycling correctly she speaks to the people who live there or leaves a Property Care "reminder ticket." The reminder ticket tells people what they've done wrong and how to correct it. If residents continue to recycle improperly after numerous reminder tickets and verbal warnings, the recycling coordinator will report residents to the Housing Authority, which will then fine residents.

Buildings have a high turnover. New residents get some recycling training when they move in, but may need more. The recycling coordinator conducts individual training when she

finds problems, and encourages people to continue participating.

Costs/Benefits

SHA contracts directly with the hauler for trash and recycling service. In 1990, SHA issued an invitation to haulers to bid for a new, well-documented trash and recycling contract. The winning bid included a stipulation that SHA would pay for services based partly on the number of apartments rented each month. This contract saved SHA \$120,000 per year over its previous trash contract. Through most of 1997, 293 of Toomey Abbott Tower's 308 apartments were rented.

At buildings with door-to-door pick-up, SHA pays its contractor \$0.30 per container for recycling. For other buildings, SHA pays from \$0.70-\$0.76 per 95-gallon container pick-up. At Toomey Abbott Tower, SHA pays \$0.76. The recycling coordinator's salary is included in SHA recycling costs. Although not included in recycling fees, SHA's costs for maintenance staff have not increased since it began recycling.

For trash at Toomey Abbott Tower, SHA pays the hauler a tip fee plus a \$40 per dumpster pull. In summer 1998, SHA paid an \$81 per ton tip fee.

In 1997, SHA paid approximately \$26,180 for trash removal and approximately \$460 for recycling service at Toomey Abbott Tower. Based on 293 occupied households, this translates into approximately \$187 per ton and \$90 per household for trash service. Recycling service cost approximately \$13 per ton and \$2 per household.

Tips for Replication

- Involve residents in program.
- Provide clear, simple explanatory materials.
- Interact with residents. Explain in person how and what to recycle.
- Hand out flyers when new materials are added.
- Provide feedback. Mail residents letters and talk to them.

Contact:

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Program Summary, Toomey Abbott Tower, 1997

Start Date	1990
Type of Multi-Family Buildings	22 story high-rise
Households Served	293
Total Waste Generated (Tons)	175
Disposed	140
Diverted	35
Total Diverted	20%
Average Generation (lbs./HH/day)	3.3
Disposed	2.6
Diverted	0.7
SHA Costs (per Ton)	
Disposal	\$187
Diversion	\$13
SHA Costs (per HH per Year)	\$91
Disposal	\$89
Diversion	\$2

HH = household SHA = Syracuse Housing Authority
 Note: ILSR converted trash amounts from volume to weight using the conversion factor 2 cubic yards = 750 pounds. ILSR estimated recyclables tonnage from volume data using the conversion 1 cubic yard of recyclables = 246 pounds.



University of Michigan Ann Arbor, Michigan

30% Waste Reduction Rate from Residence Halls



Michigan law mandates a 30% waste reduction for "major waste generators," including the University of Michigan. An enthusiastic and involved student body, a program design that is flexible and accommodates the needs of the collection staff and changes in collected materials, and a very visible outreach program all contribute to the success of the University of Michigan's student housing recycling program, which diverts 30% of the residence hall waste.

Program Description

The University of Michigan (U-M) is one of the largest academic campuses in the country, with over 36,000 students. Approximately 10,000 students live in dormitories.

Students bring recyclables to trash/recycling closets on their floor. Each closet contains a shelf for corrugated cardboard and separate containers for mixed paper and mixed containers. Housing Facilities staff collect trash and recyclables on each floor of the 15 student residence halls on campus.

Housing Facilities staff bring the material from recycling closets to containers on the loading dock. They collect from the loading dock once a week and bring materials to the nearby city-owned material recovery facility (MRF). Grounds Department staff collect yard trimmings and bring them to the city-owned compost facility.

On residence hall move-in days, students discard large quantities of cardboard boxes. U-M instituted special collections for this cardboard, and in 1997 students recycled 52 tons of material during move-in days.

When students vacate their dorms for the summer or at graduation they often discard loft

wood, toiletries, furniture, carpets, food, clothing, and other items that they cannot store or transport. Thus, these items often ended up in the trash. Now the University collects and donates these materials to charitable organizations, except for loft wood and carpet, which are stored on campus grounds. Ann Arbor residents are encouraged to take these materials.

Other campus recycling efforts include: collection of pallets, scrap wood, and metals; a worm bin composting project; a food discard composting trial; and recycling at the football stadium. In addition, a Recycling Task Force works with the U-M Purchasing Department to utilize and sell more recycled-content products.

Outreach Activities

One of the keys to program success is U-M's active outreach efforts, which include:

Materials Collected

- Mixed paper (including virtually all types of paper: high grade, glossy stock, mail)
- Newspaper
- Corrugated cardboard
- Glass
- #1 and #2 plastics
- Aluminum
- Juice boxes
- Ceramics
- Scrap metal

student town meetings, training sessions with staff, a recycling newsletter, an email address to answer questions (recycle.help@umich.edu), an extensive Web page, and the Ecolympics, a competition between residence halls that rewards conservation efforts. Residence hall outreach includes displays at new student orientations and table tents in dining halls, presentations upon request, and signs in residence hall trash/recycling closets.

Turnover of the student population is an obstacle to even higher recycling rates. New education efforts are needed every year.

Costs/Benefits

When U-M's recycling program began in 1989, its actual total cost for disposal from the residence halls was \$239,200 per year. The University spent \$200,000 in 1989 to modify buildings to create recycling closets and to purchase containers. In 1997 its total cost for residence hall disposal and recycling was \$245,900 (including move-out day costs of approximately \$11,000 per year and equipment pay back). Adjusting 1989 figures to 1997 dollars, the University's total solid waste management costs for residence halls decreased approximately \$53,800 per year. This is explained in part by improved collection systems and in part by avoided disposal costs through recycling.

In spring 1998, markets for commingled containers were poor, so the University paid a higher tip fee at the MRF for these materials than trash. Tipping fees at the MRF were \$2.64 per ton for paper (newspaper, old corrugated cardboard, mixed paper), \$18.92 per ton for commingled containers, and \$17.11 per ton for trash. Although the tip fee for containers was higher than trash, the tip fee for mixed paper was \$15 per ton less than trash disposal. Overall, recycling costs averaged \$35 per ton while trash costs average \$48 per ton.

Tips for Replication

- Pay attention to the needs of your collection staff; they are the most important element in a successful recycling system. Be open to letting workers create systems that work for them. Listen...listen...listen!
- Pay attention to the ergonomics of handling. Do not be afraid to go into debt to capitalize equipment that improves efficiency and safety.
- Keep good records of material flow. Keep track of costs.
- Develop good relationships with processors of your recyclables.

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Program Summary, FY97

Start Date	September 1989	
Buildings in Program	15	
Type of Multi-Family Buildings	2- to 8-story residence halls	
Households Served	5,000	
Residents served	10,000	
	FY89* (Before program)	FY97 (With program)
Total Waste Generated (Tons)	5,750	5,552
Disposed	5,750	3,893
Diverted	0	1,659
Total Diverted (%)	0%	30%
Fees per Year	\$299,700	\$245,900
Disposal	\$299,700	\$187,921
Diversion	\$0	\$57,978
Net Costs per HH per Year	\$60	\$49
Disposal services	\$60	\$38
Diversion services	\$0	\$12
Net Costs per Ton	\$52	\$44
Disposal services	\$52	\$48
Diversion services	\$0	\$35

FY = fiscal year

HH = household

Note: Numbers may not add to total due to rounding.

*FY89 costs have been normalized to FY97 using the gross domestic product deflator.