

Improving Troy's Solid Waste Management Program

Analysis and Recommendations

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A Report of the

Green City Project

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Introduction

Troy's current municipal solid waste (MSW) program lacks necessary incentives to recycle and reduce the waste stream, preventing the City from reducing its trash disposal and landfilling expenditures and playing a more responsible environmental role in the region. Residents must pay \$29 for curbside recycling, an unfortunate situation in that recycling helps the City avoid trash disposal costs. The hidden cost of solid waste services—not itemized on residents' tax bills—impairs the City's ability to operate an efficient and modern MSW program.

In 1999, Troy homeowners each paid \$217 for their trash pick-up and disposal.¹ Because they cannot see this charge as a line item on their property tax bills, some residents have the misconception that garbage collection is free. Our survey of Troy residents showed that 35% of respondents were unaware that they paid for solid waste services in their property tax bill. There is no incentive to reduce the amount of landfilled waste if there is no promise of reduced cost from diverting materials from the trash. Residents will not understand the economic benefits of recycling unless they are aware of the cost to citizens for garbage collection and disposal.

Troy should consider the benefits of a volume-based municipal solid waste program. We provide here a proposal to implement such a "pay-as-you-throw" (PAYT) program, combined with analysis, based on an extensive months-long study, to support the proposal. There is nothing unusual about volume-based municipal trash systems, either in our own area or elsewhere. Most of the Towns of Rensselaer County rely on private haulers using pay-as-you-throw systems. There are currently over four thousand such programs in effect around the United States. They are both the state-of-the-art in MSW programs, and the wave of the future as landfills close and the cost of trash disposal climbs.

What follows first is our proposal itself. We then turn to more detailed explanation and analysis of the features and benefits of volume-based systems.

We have previously released *Improving Recycling in Troy* (June 2000), which made a number of recommendations for action. Combined with this report, key short term recommendations for city action include

- have the City take over administration of the recycling program from Waste Management;
- hire a Recycling Coordinator to oversee and expand the materials recycled;
- apply for grants to defray costs of the new program
- eliminate the annual fee for recycling
- itemize solid waste costs on the tax bills; and;
- adopt a volume-based, Pay as You Throw System for solid waste.

The report outlines a number of approaches that the City could adopt with respect to implementing a volume based, Pay as You Throw System. Due to a number of concerns that have been raised by Mayor Pattison, particularly with respect to the need have stable projections as to the revenues raised by the City for its solid waste program, we are recommending that the City initially adopted a system where the fixed costs related to the collection of municipal solid waste is included within the tax base, and that residents are charged a nominal per bag fee to pay for the landfilling costs.

We note that the annual municipal solid waste costs for the City of Binghamton, which has similar demographics to Troy, is \$350,000 less than the City of Troy. Our proposal will save tax dollars, increase recycling and promote a cleaner environment.

A Volume-based Municipal Solid Waste Program Proposal for Troy

Goals of the Program

- Save the City money by generating less trash: the less garbage the City hauls to the landfill, the lower its expenses;
- Save Troy residents money: with incentives to recycle, citizens will throw away less, reducing their trash bills;
- Demonstrate the City of Troy's commitment to environmental responsibility.

Recycling

The City will take over control of its recycling program from Waste Management, purchase three special trucks, hire a Recycling Coordinator, and eliminate the \$29 annual recycling fee. Improved recycling goes hand-in-hand with a volume-based MSW system by reducing the volume of trash thrown away. For further details on reforming the City's recycling system, see our "Improving Recycling in Troy: Analysis and Recommendations, June 2000," available from the Green City Project at the Rensselaer Ecological Economics, Values & Policy Program (contact information above). Strengthened recycling in the near future is essential as competition for landfill space is growing. There are now only 28 operating landfills in New York State (down from 294).ⁱⁱ Landfill space will grow even tighter when New York City's Fresh Kills landfill on Staten Island closes in 2001. Fresh Kills currently receives *one-third* of all municipal solid waste generated in New York State.ⁱⁱⁱ

Collection

The heart of a volume-based MSW program is standardized collection units, bins, cans or bags. We recommend Troy use 15 gallon and 32 gallon bags so that residents can continue using their current trash cans. The distinctly colored bags can be distributed by local shops and supermarkets as, for example, in the Town of Brunswick. The distributors do not make a profit from the sale of these bags, but distribute them at cost as a public service. The City can contract with a local company for the manufacture of the bags.

Both garbage and recycling should be collected on the same day in each neighborhood. Residents will only have to devote one day to solid waste management per week, ensuring citizen compliance with the new program.

Budget

A volume-based municipal solid waste program introduces financial incentives to recycle and disincentives to discard recyclables with trash. Citizens purchase special bags in order to dispose of their solid waste. The more people recycle, the fewer bags they will have to purchase, and the more they will save. An increase in the recycling rate means increased revenues for the City from sale of the recyclables, and a decrease in tipping fee expenditures.

Troy spent \$1,160,000 for landfill tipping fees in 1999 (including \$874,760 for municipal solid waste), which accounted for fifty percent of the Bureau of Sanitation budget. The City spent \$375,000 for recycling services in 1999, utilizing Waste Management. With a recycling rate of 18% in 1999, the City avoided disposal costs of \$82,208. If the City of Troy had a recycling rate twice its current rate—still less than the New York State average—the City would have saved \$164,416. A rate such as 36% is eminently feasible for the implementation year of a volume-based program, based on results from Binghamton. Improvements in the recycling rate in future years are also likely (New York State DEC claims that the statewide average recycling rate was 39% in 1995).^{iv}

Troy Recycling Rates and Avoided Disposal Costs

Year	Recycling Rate	Avoided Disposal Costs
1992	9%	\$225,000
1993	11%	\$230,000
1994	14%	\$220,000
1995	14%	\$200,000
1996	15%	\$155,000
1997	19%	\$155,000
1998	17%	\$135,000
1999	18%	\$82,208

Source: "City of Troy Solid Waste Programs: General Financial Information," (spreadsheet printout) City of Troy Bureau of Sanitation, April 2000.

The avoided disposal costs decreased because the tipping fees for landfilling decreased.

In order to meet the Mayor's concerns that there be a reliable projection of the City's revenues for the solid waste program, we are recommending a system where the cost of picking up solid waste be included within the general tax base. We propose covering the cost of landfilling the municipal solid waste through citizen purchase of trash bags for less than 50 cents each.

Education

The City must educate residents about the environmental and economic benefits of a PAYT program prior to implementation. Pamphlets, leaflets, community meetings, and public hearings are all useful methods of increasing public awareness. The main goal of education should be to inform residents about how the new program works, and how it is superior to the current program. Education will increase compliance, and should be continued well after the program goes into effect. If desired, Green City Project personnel will consult with Troy on establishment of the education program.

Enforcement

In order to implement an effective PAYT program, there must be enforcement to ensure compliance, and prevent problems such as illegal dumping. We recommend Troy hire two enforcement officers. Many cities have found that after the first few years of a volume-based system, enforcement expenditures have been reduced or eliminated due to increased citizen compliance. Failure to recycle or use the special trash bags would result in written warnings, followed by fines. Tenant compliance would be the responsibility of landlords. Unpaid fines would be assessed against individual or landlord property tax bills.

MSW and Recycling Personnel and Equipment

Troy currently owns a total of eighteen sanitation vehicles:

- 4 automated collection vehicles
- 4 twenty cubic yard rear-loading packers
- 5 side-loading packers
- 2 side-loading packers (backup)
- 3 bulk refuse claw trucks

A total of nine sanitation vehicles collect solid waste five days a week. The Bureau of Sanitation collects from about 17,000 properties per week, including approximately 2,600 commercial properties.

Recycling is contracted with Waste Management. Waste Management collects recycling from about 11,000 residential properties per week. We recommend the City take over the recycling service, as we laid out in our separate report. To do so requires the purchase of three more trucks for about \$170,000, plus the salary for four recycling collectors, for a first year total cost of about \$250,000. This is approximately \$125,000 less than Troy spent on recycling in 1999. After the first year, this cost would reduce significantly because the trucks would be paid for. After the first year, the cost would decrease to the roughly \$100,000 for labor costs, saving the

City \$275,000. The City would also benefit by retaining all the profits from the recycling markets

The initial start-up cost of the City taking over the recycling program would be \$250,000, \$125,000 less than the City expended for recycling in 1999.

In 1999, the City employed 23 drivers/sanitation men and 1 Supervisor. On any given day the number of employees could be as low as 15 drivers/sanitation men. A volume-based program decreases the amount of scheduled pick-up days, and also the amount of manpower necessary. Economically, it makes sense to have a volume-based system, which generally decreases spending on the operation of vehicles (gas, mileage on trucks, pollution, and labor

Tipping Fees

Troy landfills its solid waste in the Town of Colonie. For 1999, Colonie charged \$50 per ton for Municipal Solid Waste, \$60 per ton for bulk refuse/ construction and demolition, and \$20 per ton for contaminated soils.⁸ The number of tons landfilled for Troy in 1999 are shown in the table below.

City of Troy 1999 Landfill and Recycling Quantities

Landfilled	Tons	Recycled	Tons
MSW	17,495.16	Paper	1,084
Bulk Refuse/C&D	3,472.23	Co-mingled	559.68
Contaminated Soils	256.27	Metal/White goods	129.35
		Tires	24.41
		Yardwaste	2,975.0
Total	21,223.66	Total	4,772.44
% of wastestream	81.6%	% of wastestream	18.4%

Source: "City of Troy Solid Waste Programs: General Financial Information," (spreadsheet printout.) City of Troy Bureau of Sanitation.

The City of Troy spent \$874,758 for tipping fees for municipal solid waste in 1999. The avoid of disposal for that year was only \$82,208, with 81.6% of their total waste stream being sent to the landfill. Binghamton, NY a city with similar demographics to Troy, was able to recycle 10,483 tons for 1999, and landfill 12,399 tons. Recycling was 45% of their wastestream and landfilled waste was 55%. Troy landfilled 58% more waste than Binghamton and recycled 45% less.

If Troy's numbers were similar to Binghamton, solid waste costs in 1999 would have been \$367,399 less. A volume-based program could give Troy the savings that Binghamton has seen, making it economically feasible, especially with increasing tipping fees.

General Overview of a Pay-As-You-Throw Program

Definition of a Volume-Based System

Under a volume-based system, residents are charged for waste collection based on the number and size of waste containers that they use.³ In some communities, households are charged directly for waste collection (usually through direct billing) based on the number of bags or cans set out at the curb. Others require residents to purchase special trash bags, tags, or stickers that include the cost of waste collection in the purchase price. Communities basing their programs on trash volumes typically select a rate structure design that includes one of these two options.

Many communities consider a Pay-As-You-Throw (PAYT) program in order to find a solution to the closing of a town landfill or an unexpected increase in solid waste costs. In a PAYT program, if households generate more waste, they pay more. Without the incentives of pay-as-you-throw, when residents generate more waste, they still pay the same amount. This leaves a city's revenues constant, despite increases in solid waste costs.

In many communities, collection frequency can be reduced from twice to once per week, and the time it takes to collect trash may also decrease. The use of standardized containers can speed up collection. Each of these benefits leads to savings through reductions in equipment and overhead costs, such as labor, fuel, and maintenance.

Typical PAYT Pricing Systems

Linear Pricing: Households pay a set price for each can or bag set out. Estimated annual program costs are incorporated into the bag price.

Two-tiered Pricing: The fixed costs of an MSW program are financed by a flat fee or through taxes, while residents pay a set per-container fee that covers disposal charges and other variable costs of the program. In some communities, the fixed costs include some level of trash collection per week before the per-container fees are levied.

Multitiered Pricing: As with two-tiered pricing, residents pay a fixed cost plus a per-container fee for each bag or can collected. Multitiered systems also charge different fees for containers of different sizes.

Benefits of Volume-based MSW Programs

When PAYT systems are introduced, some residents respond negatively, believing that they are being unfairly charged. This is especially the case when their solid waste services have been paid as part of their taxes, and are therefore often regarded as free. A city official in Loveland, CO, commented that two weeks after implementation of PAYT, he received phone calls from residents apologizing for their harsh initial reactions to PAYT. Most residents changed their minds once they understood the benefits of the program. The PAYT program gives residents control of their garbage bill. Those who generate more waste pay more

Before adopting PAYT, Falmouth, ME paid \$146,000 annually for garbage collection. In the first year of the PAYT, collection costs were only \$116,000, a 20% reduction. Tipping fees or disposal costs also decreased as the amount of waste landfilled decreased, saving the City \$50,000-88,000 per year. Dover, NH budgeted \$1.2 million for solid waste in 1990, and in 1991, when the PAYT was implemented, Dover spent only \$878,000.

In 1994, South Kingstown, RI made the switch to a volume-based MSW program. In 1995, the annual amount of waste landfilled dropped to 2,175 tons (a reduction of 71% from the 1992 figure of 7,608 tons). Mount Vernon, IA began using PAYT in 1991. After the program was instituted, residents sent almost 40% less garbage to landfills. Holland, MI was able to increase recycling to 50% through the PAYT program along with curbside and drop-off recycling, yardwaste collection, and community education. Fort Collins started a PAYT program in 1995. In the first six months, the percentage of households that recycled increased 53.5% to 79%. Los Angeles, CA has the largest volume-based program nationwide that serves 3,485,398 residents.

As of 1995, 4,033 communities across the United States have adopted PAYT programs of their own. There are currently 157 volume-based programs in New York State. After implementing a PAYT, communities typically report 20% to 35% reductions in waste generation.

Opposition and Solutions

A PAYT program initially concerns many residents. They fear an increase in costs for themselves and an increase in revenues for the City. Potential barriers and solutions to a PAYT program are as follows:

Potential Barriers	Solutions
Illegal dumping/burning	-Educate residents about pay-as-you-throw -Provide several legal diversion options -Develop enforcement plan
Uneven revenues/revenue: shortfalls as residents generate less waste	-Use multi-tiered pricing -Plan for reduced waste amounts in steady-state when setting prices -Drop in revenues more than offset by drop in disposal costs
Multi-family housing (Landlord/Tenants)	-Include charges in rent -Under a bag-based system, have tenants purchase bags -Use bar code readers on building garbage chutes
Perception that waste collection is free/PAYT is a tax increase	-Educate residents about PAYT -Set prices at levels residents will accept
PAYT is regressive/low-income residents feel greater impact	-Offer these residents rebates, coupons, or discounts -Offer free bags to recipients on general assistance
Overstuffing of containers	-Set weight limits on containers
Lack of support from private waste haulers	-Involve haulers in the planning process -Pass ordinance mandating haulers offer variable rates -Get rid of private haulers and have City pick-up garbage

Educating the Community⁴

Education is a key element to the Pay-As-You-Throw program. Residents need to know that a PAYT is necessary, fair, and not an added tax. They need to be educated about the logistics of the program. If solid waste service costs are included in the general tax levy, there must be a clear, corresponding reduction in the tax levy that is well publicized to the residents.

Residents should be shown that the current MSW program is not sustainable. A PAYT program will save money, and is easy to participate in. Flyers posted around town, public meeting, press releases, invited community participation, and brochures are all means of education.

Media should also be convinced of the necessity of a PAYT program in that community. The PAYT should be portrayed as having multiple benefits: it will give both residents and the municipality money, reduce waste, and is fairer to residents. Press releases/press kits, briefings for reporters, inviting reporters to town meetings and community meetings are ways of generating positive media coverage.

Enforcement

Introduction

Any solid waste program—whether or not it includes pay-as-you-throw (PAYT)—typically has an enforcement component.⁶ Possible compliance issues include exceeding size or weight limitations of containers placed out for collection and placing items into recycling bins that are not listed for recycling under the program.

One of the first enforcement steps planners often take is to ensure that residents find complying with PAYT easy. During the education and outreach stages, planners can seek input from residents about how to arrange the new program, such as where the residents would like to purchase the bags. The survey of Troy residents conducted by the students for the project showed that most residents would want the bags sold at local stores rather than an office. Convenient procedures can then be established for waste collection, sale of bags or stickers, and other details. This can be one of the most effective preventions to compliance difficulties.

In addition, communities usually make sure that relevant local ordinances or other legal arrangements are in place. These ordinances are designed to discourage any activities that might undermine the program's effectiveness. For example, ordinances prohibiting illegal dumping and burning are often adopted by communities offering variable rates for trash services. While communities may find it helpful to review ordinances from other cities and towns, the particular language needs to be customized to fit local circumstances.

Public Education Component of Enforcement

Public education and outreach is an essential part of enforcement. Many communities have found that the potential for lack of compliance is much less of a concern once residents clearly understand how the program works and what is expected of them. The municipality needs to clearly communicate to residents details about the PAYT program including: limits on the acceptable size and weight of filled containers, how payment is made, and how trash in excess of a household's subscription level should be handled. Clear, easy-to-follow instructions presented repeatedly tend to be most effective.

Conducting a pilot program can help to increase residents' understanding of how the PAYT works. Pilot programs are usually implemented in a few neighborhoods or for specific program components. Building acceptance within the community leads to fewer enforcement problems in the future.

There are other methods communities use to ensure compliance. Publishing violations in the newspaper can be effective. Establishing special collections for certain wastes (for example,

bulky items or materials such as paints, pesticides, and other items considered to be household hazardous waste) can help prevent illegal dumping or burning. Activities such as citizen cleanup days or adopt-a-highway projects create citizens' interest in maintaining and improving their community and often sparks environmental ethics.

Because trash generated by residents of apartments/multi-family housing is often collected from common dumpsters rather than directly from the units, including these households in a PAYT program can be difficult. There is no guarantee that residents of apartments/multi-family housing will choose to participate; in many cases, they can simply continue to put their trash into the building's dumpster if they wish. It can be difficult to enforce the use of PAYT. In addition, multi-family buildings may not receive the same level of recycling and other complementary services as single-family housing units. These residents might therefore have fewer avenues for waste reduction.

Despite these potential difficulties, options are available to include residents of apartments/multi-family housing. Planners might work with building managers to offer a waste reduction incentive tailored for the building's residents. Under this approach, if residents generate less trash, some of the building manager's reduced waste disposal fees would be passed on to the tenants in the form of lower rents or fees, or even a direct cash rebate. The incentive is somewhat diluted with this option, however, because the cost savings would be spread among all building residents—regardless of whether they threw away less trash. Another approach is to modify buildings' waste collection systems. Dumpsters or garbage chutes could be altered to operate only when a magnetic card, trash token, or other proof of payment is used.

Illegal Dumping & Burning Issue

Most communities with pay-as-you-throw (PAYT) have found that illegal dumping has proven to be less of a concern than anticipated and that there are steps they can take to minimize its occurrence. Typically, communities report that illegal diversion can be an issue regardless of the way in which residents are charged for solid waste management.

Communities with or without PAYT sometimes must deal with waste residents have dumped by roadsides or in undeveloped areas, burned in their backyards, or deposited into commercial dumpsters. Illegal dumping often occurs prior to implementing PAYT and tends to persist at some level following implementation as well. Research conducted about illegal dumping supports this position.

In a study by researchers at Duke University, communities with PAYT indicated that the dumping and burning of trash was a smaller problem than anticipated. Forty-eight percent of the cities and towns saw no change in illegal diversion, while 6 percent felt it declined after PAYT was implemented. Just 19 percent felt it increased. (Twenty-seven percent had no information.)

According to communities with PAYT programs, the key to minimizing the potential for illegal diversion is to create a significant obstacle. Communities often implement fair but aggressive enforcement policies at the same time as the PAYT program. The most common step solid waste planners take is to pass ordinances (if they do not already exist) or take other legal steps that clearly establish illegal diversion as a violation. These measures often allow enforcement personnel to search abandoned trash for indications of its origins. Fines or other penalties also are usually included as part of these ordinances.

In addition to legal action, other measures include sending letters to violators or even publishing violations in the local newspaper. Some deterrents are relatively simple to implement. To prevent residential waste from being left in commercial dumpsters, for example, planners can encourage or assist local businesses to lock up these units.

Communities with PAYT often find that one of the most effective deterrents is simply to ensure that residents have as many legal options for waste reduction as possible. Recycling, composting of yard trimmings, and other complementary programs allow residents to significantly reduce trash disposal amounts and save money making illegal dumping less likely.

Along with enforcement, communities typically report that public education and outreach can help to prevent illegal practices from becoming a problem. Simply informing residents about the program and how they can participate will facilitate greater compliance with its rules and procedures. To help reduce residents' concerns, communities also can include information in their outreach efforts about how they plan to use enforcement and penalties to control illegal actions.

Three Cities Report on Illegal Dumping

In Mansfield, Connecticut, officials report that illegal dumping did not increase significantly with the introduction of a PAYT system. To prevent illegal dumping, Mansfield has relied primarily on public education. When necessary, however, the solid waste department also has worked with the police department to track license plates and identify violators.

Seattle, Washington has also found no association between implementation of PAYT and an increase in illegal dumping. In fact, 60 to 80 percent of the illegal dumping incidents in the city are associated with remodeling waste, old refrigerators, and construction debris—waste that the city suspects comes from small contractors who do hauling on the side.

The city of Pasadena, California reports similar findings. A survey conducted at the city's landfill indicated that Pasadena was disposing of one-third more trash than was indicated in a waste generation study completed in the city. Pasadena suspects that this waste is made up of construction and demolition debris dropped off by small contractors.

CASE STUDY #1¹⁰

Portland, ME

Contacts: Troy Moon, Solid Waste Coordinator (207) 874-8467

Peter Dewitt, Portland Public Relations Coordinator (207) 756-8173

Portland, Maine of population 65,000, adopted a multitiered volume-based system of waste management in July of 1999 through a City Council decision. Two sponsored committees within the City Council introduced the idea in 1997. The committee first reviewed solid waste issues broadly, then concentrated on Pay-As-You-Throw exclusively. The volume-based system was introduced along with curbside recycling, which was a request of many citizens.

The recycling program is contracted with Waste Management. There are 6 trucks, which run 4 days a week. Recyclables are co-mingled and the trucks having three separate sections for different materials.

Solid waste is collected by 4 trucks, which run 5 days a week; previously Portland used 6 trucks 5 days a week. Bulky waste is picked-up free of charge, as long as the resident calls the information line to let the City know. The bag system is used, it costs \$0.68 for a 30-gallon bag and \$0.34 for a 15-gallon bag. Bags are sold in rolls of 5 and 10, 5 30-gallon bags for \$3.40 and 10 15-gallon bags for \$3.40. Retailers do not make any profits from bag sales. The cost of the weekly collection is included in the residents' property taxes.

Troy Moon, the Solid Waste Coordinator for Portland, commented that the response to the program was good. There were no major compliance issues such as illegal dumping and no fines have been handed out. The Public Relations Coordinator, Peter Dewitt worked with many different citizens groups, along with visiting over 100 classrooms and community events where he could give out recycling information.

The city also worked closely with the Landlord Association in Portland. Each landlord was invited to help city officials develop the program and educational material for tenants. Portland city officials also agreed to talk to tenants, although no landlord has taken advantage of this offer thus far. Commercial areas are not contracted with the city and must have their own waste management system.

There is a crew of officers responsible for enforcement of the volume-based program. Under the Code of Enforcement, these 12 officers are responsible for their own section of the city, which includes trash, building maintenance, public works, etc. Should an officer identify a material as improper, they proceed to knock on the person's door and ask them to remove it within 4 hours. If the resident fails to remove the object, the city will pick it up. If this occurs three times, there is a fine of \$100 that is mailed to the resident. Should a tenant fail to comply, the fine will be given to the landlord, in which case it will be their responsibility to speak to the tenant.

Since the Pay-As-You-Throw program has been implemented in July of 1999, Portland, ME has saved almost \$500,000 in avoid of disposal fees. Tipping fees have decreased by 45% in less than a year and they have a goal, which they meet of 70-90 tons of recycled materials each week. The city feels that the program is set-up fairly, and that all residents have equal opportunity to save cost, whether they are a family of two or ten. The city provides recycling, composting of yard waste, free bulky waste pick-up, and hazardous waste collection days, giving people ample opportunity to reduce their landfilled waste. After less than a year of the Pay-As-You-Throw program, Portland, ME has had minimal setbacks and maximum rewards.

CASE STUDY #2¹¹

Binghamton, NY

Contact: Gregory Precopio, First Deputy Commissioner (607-772-7201)

Binghamton, New York has a population of about 55,000 people, a comparable size to that of Troy, NY. Binghamton adopted a volume-based system of waste management in 1991. The Pay-As-You Throw program (PAYT), has saved the city over \$3 million in avoid of disposal costs over the past nine years. The current recycling rate is 45.8% and is in the top 20% in the state.

The city operates the bag system, selling 8-gallon bags for \$0.36, 16-gallon bags for \$0.63 and 32-gallon bags for \$1.17. The fixed cost of the weekly collection is paid for in the property taxes, while the price of the bags covers the variable disposal costs. The bags fund 50% of the solid waste program. The revenue from bag sales pays for the tipping fee, the cost of a recycling and garbage inspection staff, and bag production. Weekly services include garbage (yellow bags only), recycling, yardwaste, and trash (items which are too large or too heavy to fit into the yellow city bag). The revenue from the garbage bags equates to \$1.2 million dollars per year.

The initial recycling staff consisted of the recycling coordinator/user fee manager, and four inspectors. In 1999, Binghamton employed two inspectors. In 1991, the city maintained a fleet of 12 garbage trucks, 5 recycling vehicles, a transfer station, 3 transport trailers, and 8 supervisory and inspection vehicles. In 1998, the city collected once per week for the following items: garbage MSW, recycling, yardwaste and trash. Of the total waste stream for 1998, 13,050 tons were landfilled, 4,747 tons were recycled, 5,200 tons were recycled yardwaste, and 400 tons were recycled metals. The total tipping fee was \$524,668 and had an overall recycling rate of 44.28%.

The PAYT program in Binghamton is enforced through a strong local ordinance that is directed by the Recycling Department. A staff of inspectors works with the city collection crews to tag any violations at every collection. Violations are tagged with a sticker, giving the residents 24 hours to bring the violation into compliance. The violator is also called that same day. After 24 hours the violation is rechecked and photographed if not removed. The city then collects the item and bills the property owner. Violators have the right to appeal in writing within ten days. Greg Precopio stated that the fines are arbitrary, the only set fine is \$6 a bag. He also commented that they could not have successfully implemented a volume-based system without enforcement. If the violation is not paid within 30 days, it will be added to the violator's property tax bill. A recycling hotline is set-up to maintain public relations. Non-compliance has not been a problem in Binghamton. The following table gives a break down of Binghamton's solid waste program, and compares the results with the City of Troy for fiscal year 1997.

Comparison of Binghamton to Troy with Respect to Solid Waste (1997)

1997	Binghamton	Troy
Population	53,000	55,000
College School pop.	12,000	7,500
Off campus living	6,500	4,800
Landfill Cost	\$40/ton	\$45/ton
MSW collected	Weekly	Weekly
Curb side recycling	YES	YES
Yard Waste Collection	YES	YES
MSW collection by	City	City
Total MSW trucks/crew	12/12	9/18
Recycle collection by	City	Private
Total Recycling (trucks/crew)	6/12	3/3
Total waste generated	23,582	20,541
Recycling rate	46%	10.3%
Recycling tons	5,675	1816
Yard waste collected	5,000	110
Tons landfilled	12,741	18,762
Avoid of disposal	\$357,000	\$92,842
Recycle Revenue	\$254,820	\$84,870

In 1990, a pilot program was run in a few areas of Broome County, which includes Binghamton. In 1991, the city distributed numerous education pamphlets and flyers in order to inform the residents of the program. Also, in 1991, the whole county converted to the bag system. There were limited extra costs, only a few extra employees to cover the recycling. The City of Binghamton was already maintaining their own waste collection, having their own trucks and crew. In 1990, the city maintained a fleet of 12 garbage trucks, a transfer station, 3 transport trailers, and 4 supervisory vehicles. In 1991, the city maintained a fleet of 12 garbage trucks, 5 recycling vehicles, a transfer station, 3 transport trailers, and 8 supervisory and inspection vehicles. In 1991, the recycling rate was 37%, by 1999 it was 45.8%. In 1999, the city landfilled 12,399 tons and recycled 10,483 tons, which included the curbside pick-up, yardwaste, and metal goods.

Demographically, Binghamton and Troy are very similar. Binghamton has been participating in a PAYT program for 10 years, saving \$3 million in avoid of disposal fees. The program has proven to be an overwhelming success at reducing the waste stream. Since the program has been implemented in 1991, landfilled waste has been reduced by over 50%. Binghamton has also been an example to other communities such as Utica, NY and Holyoke, MA, who both based their entire volume-based programs around Binghamton. The above information shows that Troy can successfully adopt a volume-based system.

CASE STUDY #3¹²

Seattle, WA

Seattle, Washington of population density 539,700, began their volume-based system in 1988. At that time, two of their landfills were being closed and the city needed to establish a plan to decrease their waste stream. Seattle adopted a can-based program along with the standard tag system for volume-based solid waste management, curbside recycling, and yardwaste composting.

Curb/Alley service is the standard garbage collection service within the City of Seattle. Containers must be set out on your regular day of collection by 7:00 am. Garbage is discarded waste items, prepared per city regulations that are NOT hazardous waste, yard waste, food waste or dead animals weighing over 15 pounds. Containers should be within 3 feet of the curb and be easily accessible to garbage collectors.

The Mayor and City Council decided to adopt a mini-can (20 gallon container) service priced at \$12.35/month. If customers use the city's curbside recycling programs effectively, they can use the mini-can and save \$3.85/month (the difference between the mini-can and single can rate). Like the single can rate, the mini-can rate includes the cost of the curbside recycling program.

In 1992, the city began offering an even smaller level of service called the "micro can". This container is 12 gallons and was originally \$9.37/month. Stickers (tags) cost \$5.00 and are used for any waste that exceeds the size of the can. Stickers are to be placed directly on any bags exceeding the garbage cans.

All residents within the City of Seattle are required by the Seattle Municipal Code to have garbage containers and pay for garbage service. The cost of the service depends on the number and size of garbage containers as detailed in the following tables: Residential, Multi-Family. Residents with 60 and 90-gallon containers will be charged for two and three 32 gallons. Garbage is billed every other month in advance.

2000 Monthly Residential Rates

Service Level	Collection Type	
	Curb/Alley/mo	Backyard/mo
Micro-can	\$10.05	N/A
Mini-can (20 Gal.)	\$12.35	N/A
One can (32 Gal.)	\$16.10	\$22.50
2 cans (32 Gal. Each)	\$32.20	\$45.00
Additional per can	\$16.10	\$22.50
Yard waste	\$4.25	N/A

Multi-Family Rates

Service Level	Collection Type	
	Curb/Alley/mo	Backyard/mo
Micro-can	\$10.05	N/A
Mini-can (20 Gal.)	\$12.35	N/A
One can (32 Gal.)	\$16.10	\$22.50
2 cans (32 Gal. Each)	\$32.20	\$45.00
3 cans (32 Gal. Each)	\$48.30	\$67.50
Additional per can	\$16.10	\$22.50
Yard waste	\$4.25	N/A

Seattle, Washington has found no association between implementation of PAYT and an increase in illegal dumping. In fact, 60 to 80 percent of the illegal dumping incidents in the city are associated with remodeling waste, old refrigerators, and construction debris—waste that the city suspects comes from small contractors who do hauling on the side. Seattle experienced increased illegal dumping for several months after rate increases in 1987 and 1989. There is no proof that variable can rates contributed to this problem (it may have resulted from higher rates at the city's transfer stations). While problems were not substantial, they did raise concerns among city officials. In response, the city passed an Illegal Dumping Ordinance to prohibit and control dumping. The Utility maintains a small staff to monitor illegal dumping complaints and enforce the ordinance.

Eighty-nine percent of the city's single family garbage customers subscribe to one-can or mini-can service (64% are one can customers, 25% are mini-can customers). Only 1% of the citizens subscribes to two or more cans of service. These percentages contrast with 1988, when 60% of single family customers subscribed to one can and 39% subscribed to two or more cans. Recycling and yard waste collection tons have increased dramatically over the past two and a half years. The increases were most dramatic in 1989, when the min-can rate, yard waste collection program, and \$9.00/month additional can rate were introduced.

Of the 765,000 tons of waste generated in 1995, 19,000 tons were composted, 33,000 tons were recycled, and the remaining 426,000 tons went to landfills. Recycling has increased from 28% in 1988 to 44% in 1995; single-family homes recycled 60% of their wastestream. From 1988 to 1995 the waste being landfilled has decreased by 8.5% and the waste being recycled and composted has increased by 84%. Seattle, Washington is an excellent example of how a large city can conquer solid waste problems through a volume-based system.

ⁱEndnotes

Interview with Bill Chamberlian, April 2000.

ⁱⁱ “Are We Throwing It All Away? A Call for New York to recommit to Recycling,” Office of the Attorney general of New York State, April 2000, p. 2.

ⁱⁱⁱ “Are We Throwing It All Away? A Call for New York to recommit to Recycling,” Office of the Attorney general of New York State, April 2000, p. 3.

^{iv} NYSDEC, “New York State Solid Waste Management Plan 1997-98 (March 1998).

⁸ “Colonie Landfill: Tipping Fees,” (spreadsheet printout) Town of Colonie Public Works Department, April 2000.

³ www.epa.gov (April 20, 2000).

⁴ www.epa.gov (April 20, 2000).

⁶ www.epa.gov (April 20, 2000).

¹⁰ www.ci.portland.me.us (April 20, 2000).

¹¹ “City of Binghamton: Solid Waste Management—Summary Report,” City of Binghamton Department of Public Works.

¹² www.ci.seattle.wa.us