

# **The City of Atlanta, Georgia SMART Waste Management**



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**Atlanta, Georgia  
SMART Guidebook to Unit Based Pricing Solid Waste Management**

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# City of Atlanta Georgia 'SMART' Unit Based Pricing Project

## 1. Introduction

### 1.1 Summary of Project

A SMART (Save Money and Reduce Trash) residential waste reduction program means incentivizing residents to reduce and recycle by charging per unit for trash disposal. A community is SMART if the residents can answer 'YES' to the question: "Do residents save money the more trash they recycle?" Currently, the City of Atlanta residents are not able to save money by recycling more. The SMART strategy empowers residents to take control of the amount they spend on trash. Generally speaking, SMART communities treat waste like a utility. Approximately 7,000 cities and towns in the U.S., along with many more worldwide, have implemented basic economic principles to address solid waste. When citizens have to pay by the unit they become more aware of the waste being produced, which triggers a long-term sustainable behavioral change. SMART communities create a proportional unit based pricing structure that includes all costs associated with waste and recycling. Residents pay as they go for trash, while unlimited recycling is available to all households with no additional cost.

It is the objective of a SMART waste management program to create a successful, sustainable, user-friendly, cost effective residential recycling program while working within the current collection infrastructure. We define **successful** as a "significant measurable increase in recycling," **sustainable** as a "recycling rate that continues on its own without a great deal of re-education effort," **user-friendly** as "easy to understand and participate," and **cost effective** in that "overall costs are less than alternative recycling programs."

The mission of this study is to:

1. Determine the feasibility of implementing a SMART Unit Based Pricing (UBP) solid waste management program. Compare a SMART UBP program with the current voluntary City recycling program, as well as with a mandatory curbside City managed recycling program.
2. Determine a cost effective approach (or series of approaches) that best provides sustainable waste reduction, increased recycling volume, and significant cost reductions.
3. Provide the city with options for implementing UBP that work within the existing collection framework and municipal solid waste (MSW) infrastructure in order to minimize expenditures and changes.
4. Provide rate structure design options that create a steady revenue stream to fund all or part of the solid waste and recycling collection costs.

Key characteristics of a SMART waste management strategy:

**Environment** — A significant positive environmental impact occurs as a direct result of waste reduction, increased recycling and composting, and reusing or repairing items when possible. UBP helps decrease a city's carbon footprint by reducing overall green house gas (GHG) emissions between 3% and 5%. As recycled materials are manufactured into new products, environmental degradation caused by extracting raw materials from the earth is reduced.

**Equity** — Residents generating smaller amounts of trash because of better waste management or household size do not subsidize the costs of residents that generate larger quantities of trash.

**Economics** — Similar to a public utility, individual costs are based on each customer's usage of the service. The opportunity for cost control is now available to residents by improved waste management.

**Education** — UBP encourages consumers to understand local recycling guidelines by prompting them to read, listen, and learn enough to make changes that provide monetary rewards. Inaction costs them more. Education about the new program through various media should begin as early as possible to aid in transitioning. Types of media include public meetings, public service announcements, articles published in the local newspapers, and mailings or flyers to each customer.

**Enforcement** — Effective planning includes both funding and a plan for enforcement of all provisions in the program, including illegal dumping.

## **1.2 Methodology**

The information and suggestions proposed in Atlanta's SMART Guidebook were determined using the Environmental Protection Agency's 6 step planning process:

1. Gather community solid waste and population characteristics.
2. Identify and compile existing municipal solid waste program costs.
3. Identify and compile MSW program revenue sources.
4. Develop alternative rate structures.
5. Project MSW revenues based on alternative rate structures.
6. Evaluate the sustainability of the alternative rate structures based on revenue requirements.

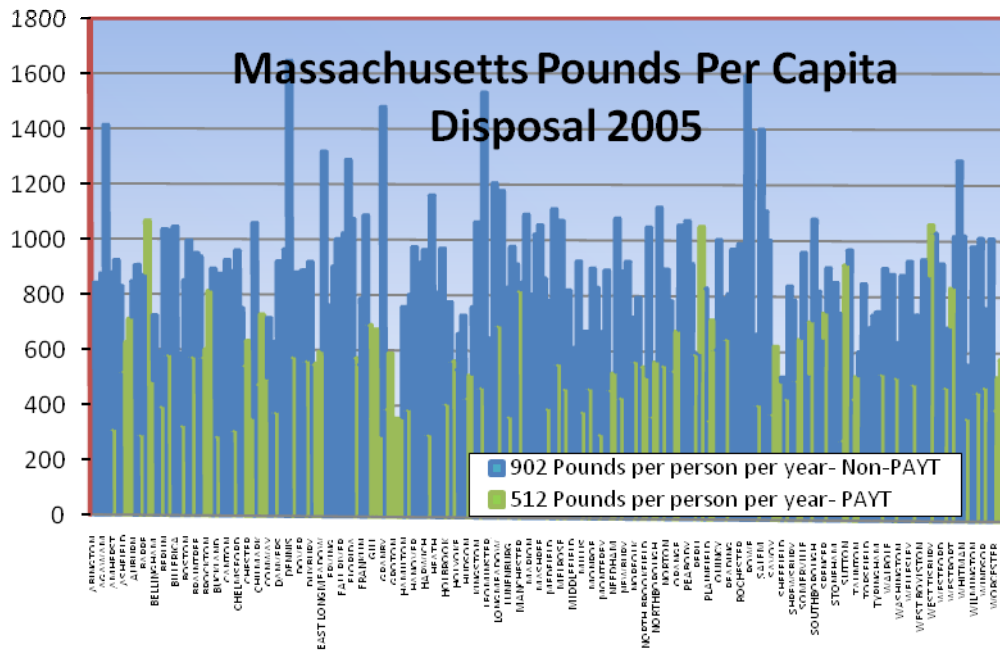
## **2. Rate Structure and Program Options**

### **2.1 Per Capita Disposal Measurement**

The methodology for determining expected disposal reductions from the implementation of a SMART Unit Based Pricing (UBP) waste management program is per capita disposal. Per capita disposal is the total tons disposed divided by the number of individuals participating in the program, then divided by 2000 (pounds per ton). Using per capita residential disposal as the benchmark number allows for an apples to apples comparison, which can be examined state to state or even internationally. The EPA hierarchy for waste minimization prioritizes reduction, reuse, and recycling as the first three options. Measuring only diversion or only recycling can be misleading. Comparing recycling numbers from region to region is like comparing oranges and apples. Per capita disposal is a fair and simple measurement approach. For the purpose of this guidebook, waste disposal for the City refers to the total residential tonnage brought to the transfer station.

The per capita residential disposal information from the Massachusetts Department of the Environment (including 89 communities that have strict unit based pricing for trash) indicates an average of 512 pounds per person per year disposal in UBP communities. A further review of disposal tonnages from a variety of unit based residential programs across the country indicates similar per capita numbers between 400 and 600 pounds per person per year. The Massachusetts case study is commonly used by the EPA as a baseline for expected results in UBP programs.

**Image 1. Massachusetts Per Capita Disposal**



The average resident in a UBP community within the state of Massachusetts disposes of 44% less waste than residents in communities without a unit based structure for garbage. Source MA DEP 2005.

## 2.2 Unit Based Pricing

In this section the Rate Structure Systems are presented in terms of benefits/advantages and risks/disadvantages. The use of a table format allows for clearer understanding and easier comparison among systems.

**Image 2. Implementation of a Unit Based Pricing Program**

Benefits/Advantages	Risks/Disadvantages
Customers gain a true understanding of the cost of MSW.	Some confusion during start up of program is likely to occur.
Customers have the ability to reduce their own cost of waste collection and disposal through improved waste management.	Perceived fear about the possible proliferation of more fees for other City services in addition to property tax.

## 2.3 Rate Structure Systems

Within the unit based pricing programs, three specific rate structure systems are currently in use in similar communities: proportional; two tiered (proportional); and variable. A SMART waste management strategy builds all the costs associated with trash, recycling, and management into the pricing structure.

**Proportional Rate** — Proportional systems create the most direct relationship between trash volume and price. Residents are charged the same amount of money for each unit of trash they set out for collection. A proportional rate can be achieved either through a special city trash bag or a container, depending on the desired method of collection.

Trash bags are a very effective unit base. Customers pay a fee by purchasing “official” distinctively marked, standard-sized trash bags. Bags can be purchased from municipal offices or retail stores. Only official bags are collected. Trash services require bags to be purchased for all disposal of trash. Thus a fee is paid at the time of service through the cost of the bag. Fairness is assured. Revenues can be uncertain until the program is established and its history can be used to project future costs and revenues. Funding for the entire program is dependent on bag sales. The cost of the program is reduced because billing and opting out is eliminated. However, this system carries the highest financial risk. Success actually reduces revenue and program costs may not be met. It is important to price the bags correctly from the start. Leaving a financial cushion is important, especially during the first year.

**Image 3. Proportional Rate Bag System**

Benefits/Advantages	Risks/Disadvantages
Easiest system to understand and comply with because the bag causes the volume and weight limits to be more apparent.	Revenue uncertainty and cash flow when program first begins.
The size of the official bag will clarify the volume limit. The strength of the bag will clarify the weight limit by bursting when the weight limit is grossly exceeded.	The more the community decreases the waste the less revenue is generated from bags sales.
Customers purchase only bags, which are needed for disposal anyway.	
Increased flexibility by offering more than one bag size. A smaller size bag could be offered to customers who generate small amounts of rubbish.	
Any future changes to unit weight or volume can be easily implemented by changing the size of the bag(s).	
Fastest and most efficient means of collection. Official bags are easily identified and conform to size and weight limits.	
Official bags are more difficult to counterfeit than stickers or tags.	
Illegal waste containers are more easily identified.	
Details of the entire MSW program could be printed on each bag, or bag packaging for customers to easily reference.	

A proportional program can also be achieved with a container system. Containers would be priced based on the unit cost (per gallon). Each gallon would be priced proportional to the next. Therefore, a 64 gallon container would be double the cost of a 32 gallon container. Container systems are billed to the households monthly or quarterly based on chosen container size. A container system requires an accounting and fee collection function and can be difficult to administer in areas of high household turnover. The container system also requires an

inventory of multiple container sizes in order to meet changing residential needs. Revenue stream can be risky and difficult to manage because of non-paying households.

**Image 4. Proportional Rate Container System**

Benefits/Advantages	Risks/Disadvantages
Likely to maximize reduction of waste, so not to purchase additional overflow bag.	Potentially higher costs for collection because overflow bags would require manual collection.
Automated and semi automated collection.	Communities must offer residents a choice of subscription levels, provide them with containers in varying sizes, and bill accordingly. System requires billing and inventory.
Potential for decreased labor and workers compensation.	These systems might be more expensive to implement and administer.
Collection system is clean and organized on the curbside.	Revenue Stream can be slightly risky due to non-pay households.

**Two-Tiered Proportional** — Two-tiered systems help communities achieve revenue stability. Residents receive a base level of service, for which they pay a flat fee. The ‘first-tier’ fee can be assessed through the tax base or through a base monthly fee. The base charge can be used to cover specific costs of the solid waste program (e.g. personnel, transportation, executive oversight, etc.). Residents then pay a ‘second-tier’ based on the amount of waste they put out for collection. The second-tier is unit based and generally covers disposal costs. The two-tiered program is also widely used throughout the United States. The base fee assures funding of all fixed costs. In some cases one bag of trash per week is also included in the base fee. In this case the base fee is higher in order to cover part of the disposal.

**Image 5. Two-Tiered Proportional**

Benefits/Advantages	Risks/Disadvantages
Revenue will cover fixed costs.	The requirement of paying an additional fee for second (or multi) tier may be difficult to understand.
Revenue stability is ensured. Program funding is not entirely dependent on bag sales. Success of program does not under fund program.	Collection of fees may require administration expense.
Waste reduction, reuse and recycling are encouraged. Residents use the goal of reducing trash to one bag to avoid buying additional bags, thus reducing waste.	
Can be implemented more quickly and inexpensively than other types.	
Allows for maximum flexibility to implement changes.	

**Variable Rate** — Variable rate pricing means charging different amounts per unit of garbage, in different container sizes. Several container sizes are offered generally from 10 to 96 gallons. The community bills residents based on their container size or subscription level. The program is flexible because the community can charge a higher than subscription level price for additional containers if their goal is to create a strong incentive to decrease waste.

### Image 6. Variable Rate System

Benefits/Advantages	Risks/Disadvantages
Automated and semi automated collection.	More complicated.
Rate is based on the amount of rubbish generated by each customer.	Too many variables in a program cause it to be more difficult to implement and operate.
Potential for decreased labor and workers compensation.	Potentially higher costs because collection is slower.
Authorities can charge a price for additional containers that are higher or lower than subscription level depending on the community.	Communities must offer residents a choice of subscription levels, provide them with containers in varying sizes, and bill accordingly.
Collection system is clean and organized on the curbside.	These systems are more expensive to implement and administer.

## 3. The Climate and Waste Connection

The Earth's surface temperature has risen by approximately 1 degree Fahrenheit in the past century, with an accelerated rate of warming during the past two decades. Current evidence strongly suggests it is likely that human activities have contributed to this warming. Human activities have altered the chemical composition of the atmosphere by increasing emissions of greenhouse gases (GHG) - primarily carbon dioxide, methane, and nitrous oxide.

Every stage of a product's life cycle—extraction, manufacturing, distribution, use, and disposal—indirectly or directly contributes to the concentration of GHGs in the atmosphere and potentially affects the global climate. For instance, product manufacturing releases GHGs both directly, from the manufacturing process, and indirectly, from the energy produced to run the plant. Extraction and distribution require gasoline-powered vehicles that release CO<sub>2</sub>. Discarded products typically end up in a landfill, which releases methane as products decompose.

Waste prevention and recycling—jointly referred to as waste reduction—offer significant potential for decreasing GHG emissions. *Source* <http://www.epa.gov/wastewise/climate/change.htm>. A formal analysis of a data set including 305 municipalities from the state of Massachusetts indicates that a per capita reduction of (.17) MTCE is expected in SMART UBP residential waste reduction programs. *Source* ICF International, June 2008. This factor represents the latest available methodology for estimating the potential effect of implementing a SMART waste management strategy on climate change. This Guidebook will use this factor to determine potential waste reduction benefits.

## 4. City of Atlanta Overview

### 4.1 Existing Waste Collection System

The City of Atlanta disposed of approximately 100,000 tons of residential garbage in calendar year 2008. The City offers municipal service for curbside waste collection through [union] public works employees. Waste is collected weekly from approximately 95,000 homes. Homes are considered attached homes with 6 units and under. Waste is brought to private transfer stations and then to private landfills. The current tip fee is \$33 per ton. The transfer stations move waste to and landfills that are approximately 50 miles away



The City has automated, and semi automated collection. Currently trash is collected once per week from all residences and there is no limit to the amount of trash placed out at each location. The City provides bulky pick up by appointment, and averages 500 – 600 bulky pick ups per month. Fiscal 2008 produced a total of 11,000 tons of bulk material, 2009 is estimated to be 14,000 tons. The tremendous jump is attributed to the economy and high renter turnover. The average household produces 915 pounds of trash per person each year including bulky items. This number is approximately the same as most peer cities with similar income demographics and current recycling rates.

The Department mission is to enhance Atlanta's quality of life by working collaboratively with its citizens. The vision of the Public Works department is to provide a user friendly container system that will encourage recycling and composting through some incentives.

## **4.2 Existing Recycling Collection System**

Curbside recycling in the City of Atlanta is performed by city [union] employees. The City is currently working with Recycle Bank to provide an incentive for residents in 10,000 homes. This started November 16<sup>th</sup>. The Recycle Bank program is funded through the public works budget. Each household is assessed a fee for the incentive program. Recycle bank also owns the recycled material. If the Pilot is successful, all terms are negotiable. Recycling is collected every week and is collected in a single stream. Currently, commingled materials such as plastics 1 and 2, plastic 3-7, glass bottles, metal cans, metal, aluminum, as well as paper (newspaper and office paper) and corrugated are collected weekly. The recycling collection method is not standardized throughout the city. It is the goal of the Atlanta Public Works Department to have 96 gallon containers distributed to every household in 2010.

The materials are brought to SP Recycling, the current Materials Recovery Facility. The current contract is through 2010. Currently, there is no tip cost for recycling. The city is compensated \$1 per ton of material collected.

The overall tonnage of residential waste (garbage and bulky) collected in 2008 was 100,000 tons. The total tonnage of commodity (and other non-yard waste) residential recycling collected was 9,000 tons. The total tonnage of yard trimmings generated by the city was 30,000 tons. Atlanta's total overall generation of materials was 139,000 tons yielding a 28% overall recycling rate, and 6.5% recycling rate for commodity materials. The percentages are only estimates based on data and should not be compared with other strictly residential percentages.

Yard trimmings are collected curbside weekly and include grass clippings, brush and leaves. Citizens can place yard waste in paper bags, in a container, or loose - but not in plastic bags. The city composts its yard waste. Yard debris is banned from landfills in Georgia. Yard waste diversion is considered recycling by the EPA. The current yard waste diversion rate is 22%.

**Image 7. Recycling Numbers**

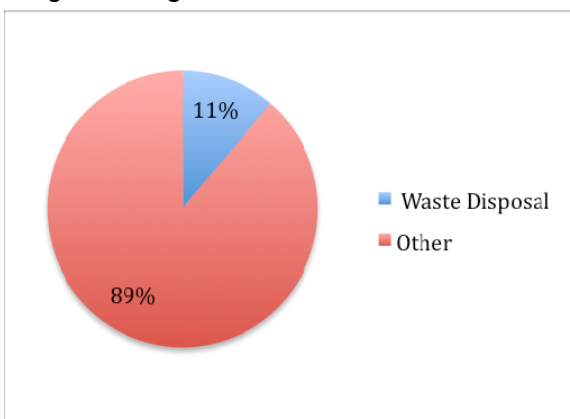
Waste Total / tons	100,000
Commodity Recycling / tons	9,000
Metal / tons	
Yard Waste / tons	30,000
Total Generation	139,000
Recycling Commodity Percent	6.5%
Yard Waste Percent	2.6%
Total Recycling / tons	39,000
Total Percent	28%

**4.3 Overall Solid Waste Budget**

The City of Atlanta’s Public Works waste and recycling collection services are paid through an enterprise fund which is funded by an annually fee. The 2009 budget for services is approximately \$30,000,000. The budget covers all collection, transport, and management of garbage, recycling, and yard trimmings. The total cost for each participating household is \$307.19 per household. The homes are charged an additional fee based on frontage [paved and unpaved]. The total Fulton County tax collection for the Atlanta Public Works Enterprise fund includes the frontage fee which varies by household, the trash fee and a recycling fee of \$30 per household. The Enterprise fund covers all costs associated with the department. The last few years the department had run within the budget. Department officials believe that the cost associated with trash pick up, tipping and management are covered in the \$307 annual fee. They also feel the cost associated with yard trimmings, tip, street sweeping are covered through the frontage fee and that they recycling collection is covered within the recycling fee. In order to determine specific rate structures for a SMART program and more detailed analysis would have to be completed. The Public Works staff is currently working on such an analysis. This guidebook will make the assumption that the \$307 fee is in fact specifically related to trash, administration, tipping and collection. Based on the estimated households participating in service through the City of Atlanta the base fee brings in approximately 30 million dollars.

The total revenue generated from the enterprise fund covers all services including bulky pickup. The current tip cost is \$33 per ton or a total of \$3,300,000 annually for. The overall cost to residents can be broken down as follows \$274 per household, or 11% of the current overall public works budget.

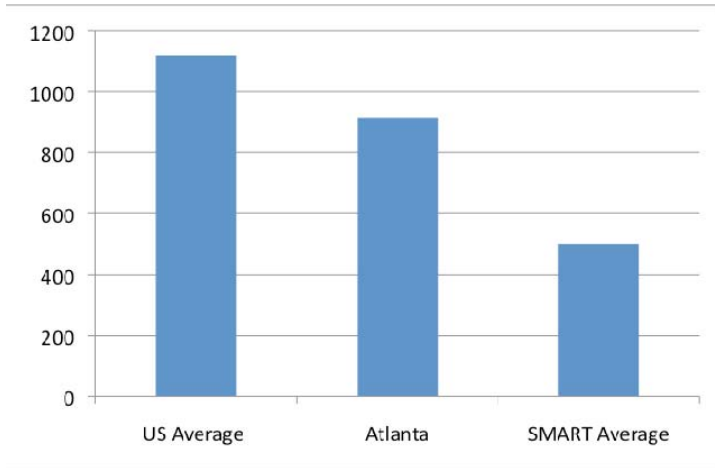
**Image 8. Budget Overview: Overall Solid Waste Budget/Costs Excluding Frontage Fee**



## 4.4 Waste Minimization Goals for the City of Atlanta and the State of Georgia

The City of Atlanta has a goal for increasing recycling in hopes of becoming a model city inspiring other cities to expand their green efforts. Atlanta's Climate and Sustainability Action Plan calls for Zero Waste within 50 years. The RMM has suggested an aggressive approach toward waste reduction beginning in 2010. Pay As You Throw is one of the key strategies. The state of GA has a complementary recycling marketing campaign 'I don't recycle', to increase awareness though out the state.

**Image 9. National Compared with Atlanta and the Average SMART Communities**



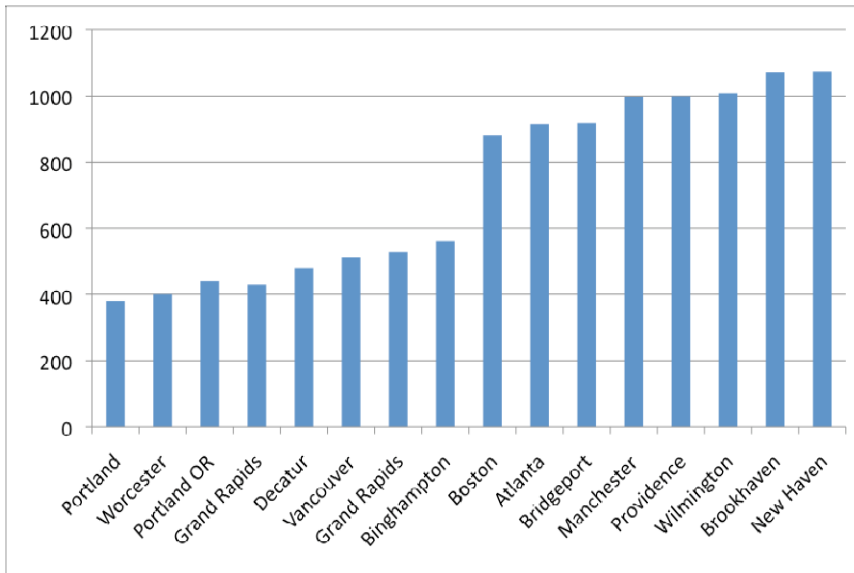
## 5. SMART Unit Based Pricing (UBP) Program Projections and Design

### 5.1 Projected per Capita Disposal Change

The City of Atlanta 2008 residential waste tonnage was 100,000 tons, which equals 915 pounds of trash per capita. Unit Based Pricing could decrease the disposal to approximately 500 pounds per person per year. Based on the population of residents in household units of 6 and under a decrease in disposal of 415 pounds per person per year would yield a total reduction of over 45% of the current waste stream. For the purpose of the SMART guidebook the EPA SMART BET (Benefit Evaluation Tool) was used. This tool assumes a unit based pricing structure where one unit has a consistent value. Unit based pricing provides maximum motivation to reduce waste. Massachusetts average per capita of 500 pounds per person per year will be used as a benchmark. Based on this number the total expected diversion of waste for the City is approximately 45,000 tons annually.

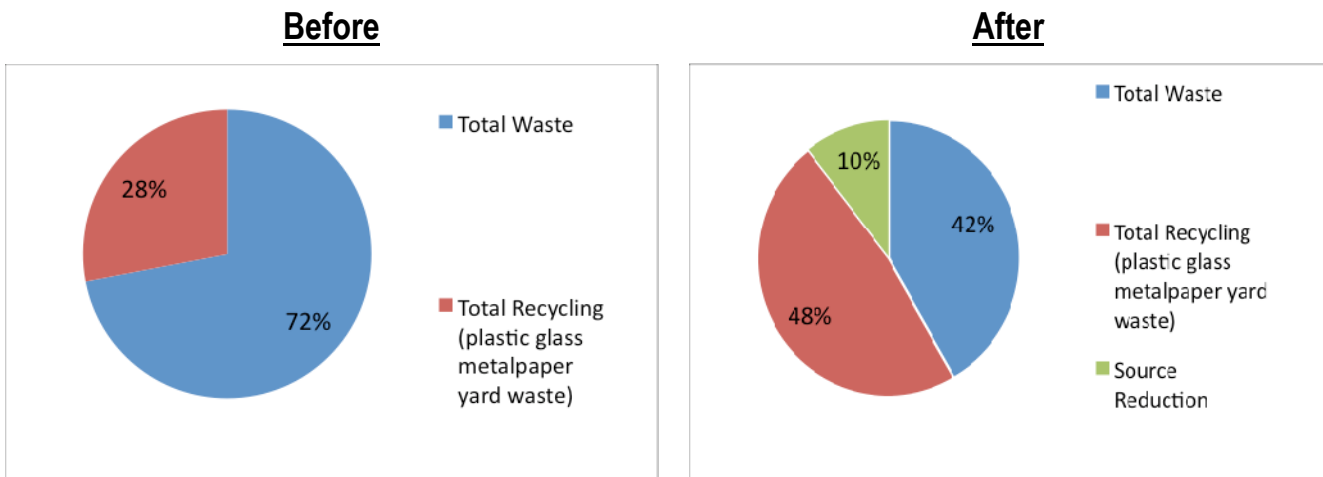
The following chart is a look at other cities with similar characteristics populations or demographics. All of the municipalities have curbside recycling collection, but only half have UBP SMART programs. This comparison demonstrates the waste reduction that Atlanta may achieve through UBP. The cities on the left all have UBP with weekly curbside recycling. The cities on the right just offer weekly curbside recycling.

**Image 10. Projected City of Atlanta Per Capita Waste Compared with Peer Communities**



The following before and after charts demonstrate the potential change in the residential waste stream, after the implementation of a SMART unit based pricing waste plan.

**Image 11. Waste Stream Before and After SMART**



Trash represents 72% of Atlanta’s total 2008 residential stream (before UBP) but reduces to 42% after the implementation of a SMART program. This is a decrease of approximately 45% or 45,000 tons of material brought to the landfill facility and a savings of approximately 1.5 million dollars in avoided disposal costs annually for the City residents (depending on the structure of the program). The disposal savings is based on an average of \$33 per ton tip cost, the savings does not include associated logistical savings per ton to the city. The disposal fee decrease is equal to approximately 5% of the overall residential waste management budget.

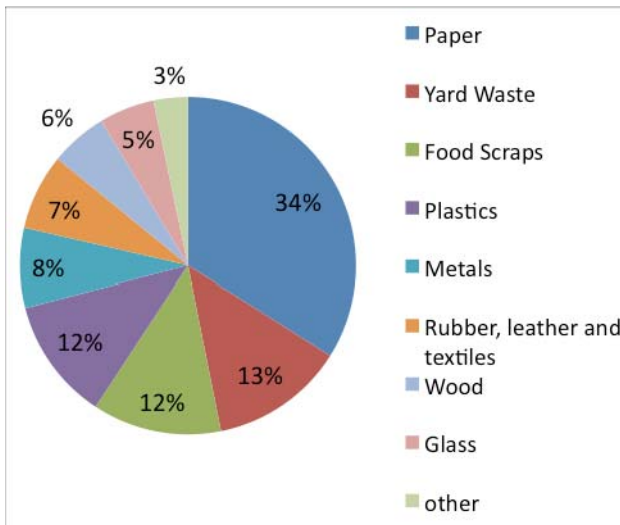
The overall residential recycling rate (including commodities and yard waste) could increase from 28% to 48%. Recycling is considered by the EPA and the state of Georgia to be both commodities materials and yard waste. EPA studies show that approximately 66% of diversion in PAYT programs is recycled or composted, but 33% can be categorized as source reduction. Approximately 27,000 tons of the diverted material will go toward increased

commodity recycling and increased yard waste or backyard composting. The commodity tonnage has the potential to create significant revenue based on the average price per ton in local markets. The city has a great yard trimming program and will most likely see most of the increase in commodity recycling which is currently very low.

The remaining diversion of 14,000 tons comes from waste reduction (i.e., through reducing and reusing). This is an added environmental benefit. When faced with financial incentives, consumers actually make better purchasing decisions at the source or retail level. Therefore, products that are packaged better, smaller or with recyclable materials are chosen over those that do not fit the new environmentally inspired criteria. Residents also utilize local organizations like Goodwill or Habitat for Humanity, or national outlets such as E-bay, or Freecycle.

The City of Atlanta does not have an official waste characterization study. The *Franklin Associates* waste characterization study used in the 2005 EPA report *Solid Waste in the United States Facts and Figures* and will be used as a benchmark. There are some differences in regional waste. Georgia has a more current characterization, but the percentages of individual materials do not vary much from the national average. The SMART Guidebook will use the national average to extrapolate an estimate of the Atlanta residential waste stream. This information is not exact but is used to show that there are many items in the waste stream that can be recycled.

**Image 12. Waste Characterizations US and Atlanta**



Atlanta	Per Capita
Paper	310
Yard Waste	118
Food Scraps	114
Plastics	107
Metals	70
Rubber, leather and textiles	67
Wood	50
Glass	49
Other	30
	914

## 5.2 SMART Rate Structure and Logistical Design for Atlanta

A SMART design plan for the City of Atlanta would utilize the current garbage and recycling collection vehicles and logistical structure in order to meet the needs of the City and its residents. The City of Atlanta has a low homeownership rate and a high poverty rate. These factors are important in developing a sustainable rate structure that will financially incentivize residents without imposing hard ship.

The City uses a fee structure to cover the costs for the hauling and disposal of garbage and recycling to the two transfer stations and ultimately landfill. The actual cost of tipping trash is currently only \$33 per ton, which equates to around \$35 per household annually. A SMART (Save Money and Reduce Trash) program would create

transparency and allow residents to control all or part of their trash bill. However, there is a minimal potential for savings based on avoided disposal alone. Currently, the residents have no control over how much they pay. The goal of this program would be to shift some control of waste costs to the residents.

The following rate structure options use 500 pounds per capita as a benchmark. This equals a 45% reduction in waste for the City of Atlanta. This analysis also makes assumptions on three other benchmarks: a waste reduction to 400 pounds, 600 pounds, and 700 pounds per capita, representing: 56%, 34%, and 24% waste diversion respectively. Several cities throughout the US have achieved per capita disposal of 400 pounds and under. The projected decrease in residential waste due to PAYT is of critical importance since an overly optimistic projection will result in underestimating the costs. Conversely, an overly conservative waste reduction projection will result in lower revenues than necessary to fund the program cost. All design options would allow semi automated collection throughout the city. All options would allow for the addition of an organics or other program at a later date.

There are traditionally two basic options for structuring the rate:

Proportional: Traditionally all costs of collection and disposal of recycling and waste are divided into a unit-based cost or a variable cost. This can be achieved through cart service and billing or through bags. Currently only 45% of residents own their own homes. Therefore, a fee reduction would only benefit homeowners and it would impose a new fee on the renters (or the other 50% of the population). Shifting the burden of trash related costs from a fee that the property owner paid in the past to a new expense for the property occupant is a big change. With a 45% homeownership rate, this might be a tough sell to constituents. The idea that the property owner be responsible for a rebate to the renter would be difficult to control and not practical. A proportional rate would require a strong belief from the city officials that the cost of trash ultimately lies with the producer/consumer.

The proportional model can be divided many ways. As a starting point this Guidebook will assume that the cost of collection for both trash and recycling as well as the tipping fees are included in the proportional rate structure. This can be adjusted to more or less than this amount.

Two-Tiered: This rate maintains a portion of the costs, generally the fixed costs, in a base fee and the variable costs are placed in an additional unit based cost either through a container or a bag. This rate structure would allow part of the cost burden to fall on the homeowner and part on the property occupant. This may be an easier option, but the variable tip cost is minimal at each household and it is difficult to assign unit based costs to collection. The argument being that the collector must stop at the house whether they are picking up a 32 gallon container or a 96 gallon container. There are some collection economies because of an overall waste generation decrease. In order for the two-tiered system to work there must be enough incentive to create behavior change.

Many cities decide on a variable rate structure because the logistical portion of the rate does not increase equally per unit of garbage collected. Atlanta wants to decrease residential waste significantly in order to meet a Zero Waste Goal. The City should develop a rate structure that is linear [each unit has the same value], or a variable rate that has significant tiers. The aggressive nature of Atlanta's Zero Waste goal coupled with the low disposal cost makes the rate structure challenging. The low tip cost means that relative savings per household is only about \$17 per year. A SMART program puts future value on the cost of trash and factors this into the rate structure.

The City of Vancouver, WA is used as a comparison city for several reasons: The City uses a near linear/proportional rate structure; multiple semi-automated trash container options; large single stream recycling containers; and city yard waste collection. The City also recently completed a “garbage by the pound study” in order to verify price structure and investigate the future possibility of weight-based billing. The City chose the rate structure based on the future value of trash and not based on the current costs. This structure gave a clear incentive to the individual households to save money and therefore reduce their trash. Their current rates are as follows:

**Image 13. Vancouver Chart 1**

	<b>Monthly Cost</b>
32-gallon	\$9.80
20-gallon	\$12.16
20-gallon	\$14.53
32-gallon	\$14.53
32-gallon	\$18.46
64-gallon	\$18.46
64-gallon	\$34.20
96-gallon	\$49.94

Vancouver is just a sample. Atlanta has different logistical costs and tip costs, however the cities recycling rate is approximately 50% and the overall waste generation and the cities per capita disposal is 50% less than that of the City of Atlanta. Vancouver collects with automated containers. The following is a breakdown of the number of households and the level of service.

**Image 14. Vancouver Chart 2**

<b>WASTE CONNECTIONS INC. VANCOUVER FACILITY 2008 CENSUS</b>		
<b>AUTOMATED CART SERVICES</b>	<b>2008</b>	<b>% TOTAL</b>
Automated 1-20 Gallon Cart Weekly	1521	4%
Automated 2-20 Gallon Cart Weekly	11	
Automated 3-20 Gallon Cart Weekly	3	
Automated 1-20 Gallon Cart Every Other Week	392	
Automated 2-20 Gallon Cart Every Other Week	2	
Automated 1-32 Gallon Cart Weekly	24499	63%
Automated 2-32 Gallon Carts Weekly	456	1%
Automated 3-32 Gallon Carts Weekly	46	0%
Automated 4-32 Gallon Carts Weekly	88	0%
Automated 5-32 Gallon Carts Weekly	0	
Automated 6-32 Gallon Carts Weekly	1	
Automated 8-32 Gallon Carts Weekly	2	
Automated 9-32 Gallon Carts Weekly	2	
Automated 11-32 Gallon Carts Weekly	0	
Automated 12-32 Gallon Carts Weekly	1	
Automated 15-32 Gallon Carts Weekly	0	
Automated 17-32 Gallon Carts Weekly	0	
Automated 22-32 Gallon Carts Weekly	1	
Automated 25-32 Gallon Carts Weekly	0	

**WASTE CONNECTIONS INC.  
VANCOUVER FACILITY  
2008 CENSUS**

<b>AUTOMATED CART SERVICES</b>	<b>2008</b>	<b>% TOTAL</b>
Automated 33-32 Gallon Carts Weekly	0	
Automated 34-32 Gallon Carts Weekly	1	
Automated 1-32 Gallon Cart Every Other Week	3391	9%
Automated 2-32 Gallon Carts Every Other Week	9	
Automated 3-32 Gallon Carts Every Other Week	1	
Automated 4-32 Gallon Carts Every Other Week	2	
Automated 32 Gallon Cart Monthly	1402	4%
Automated 2-32 Gallon Carts Monthly	4	
Automated 1-64 Gallon Cart Weekly	5931	15%
Automated 2-64 Gallon Carts Weekly	34	
Automated 3-64 Gallon Carts Weekly	2	
Automated 4-64 Gallon Carts Weekly	0	
Automated 64 Gallon Cart Every Other Week	481	1%
Automated 64 Gallon Cart Monthly	81	
Automated 96 Gallon Cart Weekly	551	1%
Automated 2-96 Gallon Carts Weekly	27	
Automated 96 Gallon Cart Monthly	5	
Special City 32 Gallon Cart On-Call	3	

Vancouver recently studied the weight per household in order to better understand how a weight based program might work within the city. The following is a breakdown of the weight based study. See appendix A for more details)

**Image 15. Vancouver Chart 3**

	Per HH per year		Per person	
	Vancouver	Atlanta	Vancouver	Atlanta
Garbage	1188	2104.5	517	915
Recycling	672	188.6	292	82
Yard Debris	504	632.5	219	275
Diversion rate	49%	28%	49%	28%
Person per HH	2.3	2.3	2.3	2.3

### 5.3 Design Overviews

#### Option 1 – Multiple Containers

A system with Unit Based Pricing could be created with multiple container sizes like the City of Vancouver, WA. A multiple container program would work well with a proportional or two tiered program.

*Multiple Containers:* Containers would be available in three to four sizes (20,32,64,96/gallon). *How does a container system work?*

The resident chooses the size container that they feel best meets their weekly needs. The pricing should be structured in a proportional manner so that each unit of measurement carries the same cost. For example, the 32 gallon container is priced at \$50 per quarter, the 64 gallon is \$100 per quarter and the 96 gallon is \$150 per



quarter. This example is priced so that the total revenue minus the expected decrease in disposal cost will equal the target budget number. This is also based on everyone choosing the smallest container option. There are variations on using different size containers, however, since the goal is waste reduction it is best to assume maximum reduction to make sure all costs are covered. In this projection there would be excess revenue, which could be used to cover the cost of containers at first. Once costs are recovered the additional revenue could be used to offset the general fund supplement, or for other programs.

### *Pricing*

Pricing for containers would be based on the assumption that 100% of the population would choose the 32 gallon container and that waste would be reduced to approximately 45,000 tons annually. The revenue generated from the container fee would be placed in an enterprise fund and used by the City to pay the tip fee and other related services. Additional trash overflowing the container, or bulky items would be paid for through the purchase of official 'City trash bag' or 'City tag' (revenue also placed in the enterprise fund). The additional trash would be placed next to the container on trash day. Since the cities collection is semi-automated additional trash can easily be picked up. An additional disposal method is necessary because residents may have houseguests or events, which would generate extra waste. The pricing structure could be proportional - covering all costs [fixed and variable] collected annually/quarterly or two-tiered, allowing the City to retain all of the collection and administrative costs in the tax base. A unit based cost would be assessed to the containers proportionally and collected annually.

### *How to handle fee collection for containers*

Containers would be billed to individual households on a quarterly basis along with another utility bill (water or electric), or annually in the tax bill, or on their own. Low-income residents would be assessed as to qualification for reduced rates. Households exceeding the chosen container size would be required to purchase special bags or tags for additional trash. City sanitation workers would be responsible for compliance of container and only containers with closed lids would be collected. Overflowing containers (snow coning) would be rejected and/or tagged. The option of changing container size should be annual. The City should make it clear that once a container is chosen it then remains either for one year or until the residence changes hands.

### **Option 2 - Bags**

The City could use a special colored trash bag to collect the unit-based charge. Bags will work in a proportional rate structure or a two tiered rate structure. Bags would be priced to cover all costs or just the variable portion of the costs. Budgeted costs would be collected through the sale of special trash bags through participating retailers.

Residents would have the advantage of only paying for what they use. Smaller bags would allow elderly households, low-income individuals, or part time residents to save more. Enforcement would occur at curbside by an attendant. The attendant would make sure the load is in the proper bags as it is being dumped, and if not the container would be stickered and the household resident would be fined. Low-income residents could qualify for reduced price or free bags. The qualification of residents would be done through social services, but would allow equity to all participants. One option to help the renter population with bags would be to encourage or require landlords to provide one free bag per week to their tenants. This could be difficult to enforce. The bag program would have less initial investment and no capital expenses for containers, but there would be an annual ongoing bag expense.

### *How Does a Bag System Work?*

Official City bags would be purchased by the City and then made available at local retailers (there are companies that handle this for the City so it requires minimal effort). The City should identify and contact the retailers that they would like to participate and create a standard letter to be sent out before the program begins. This may include all major grocery retailers, drug stores, and larger convenience stores as well as any local mom and pop stores. The City will want to make sure to include local retailers so they feel part of the process. At the same time you want the number of stores to be manageable. Stores should carry the official City trash bags at no additional cost. They should think of the item as a lost leader like milk or bread. The bags will bring customers into the stores. The city should create a trash bag specification for the manufacture, storage and distribution of bags. The bid should be sent out 4-6 months in advance so that bags can be on the store shelf about 2-4 weeks before the program begins (see Appendix B, City Southampton NY, trash bag bid).

The City may be required to create an ordinance stating that residential trash must be placed in Official City Trash Bags. The city should also create a fine for non-compliance.

### *Cash Flow of the Bag System*

Once you are up and running a bag system creates great cash flow. At the start of the program, don't count on bag revenue. Prepare for a 2 to 3 month lead-time. Generally, retailers initially take 30 to 60 days to pay, especially the larger chains. Their maze of paperwork takes a while, but once you get through the system they tend to be steady payers. Some of the smaller stores may need to be monitored carefully. It helps to create specific terms from the start and keep them consistent.

### **Option 3 – Basic Service System One 32 Gallon Standard Container + Additional Overflow Bags or Containers**

One 32 gallon container would be provided as part of the current base fee to each household. Residents could opt for a larger container at an additional annual cost, or a smaller container to receive a rebate. Or, they would be required to purchase 'City overflow bags' or 'City tags' if they exceed the allotted container. The average household will use an additional  $\frac{1}{4}$  to  $\frac{1}{2}$  bags or containers per week. The current base fee would still cover all Public Works costs. The overflow bags or containers would be priced to cover all the additional cost of contents. The City would realize a 1.5 million dollar annual savings. The additional revenue generated by the sale of overflow bags or containers and bulky stickers would be used by the City to pay for the original container investment or for other programs like incentivized recycling, or yard waste containers. Traditionally, in these programs there is not much overflow revenue because most families reduce their trash in order to fit in the allotted container. The State of Connecticut calls this the measuring cup effect. When the cup is full you get creative with your trash in order to avoid paying more.

Using a basic service program will encourage residents to fit their trash into the provided container. Providing a container with no additional charge addresses the fact that 45% of the households are renter occupied. The homeowner and renter would start with the same base; all residents would still be allowed one 32 gallons of trash before incurring costs. This would eliminate an additional expense of quarterly billing and collection in the majority of households. It would also eliminate logistical challenges due to home sales or renter turnover. Each location would have a standard 32 gallon container as a base.

In addition, the basic service program provides a way for the City to gain a stream of revenue for future waste minimization projects from residents that opt for larger containers or buy occasional overflow trash bags. The cost of the new standard 32 gallon container would be paid from the avoided disposal savings and the additional revenue. After which point there is a surplus of revenue.

## 5.4 Rate Structure Options

There are three basic ways to create a rate structure for containers, bags and a combination of the two. (All rate options assume no logistical savings due to decreased waste generation). This potential savings could be factored in later for a more concise structure.

### A. Proportional Container Fee

- A. Eliminate the current base fee associated specifically with the waste costs. The property owner will now save 307.00 annually. This cost will now be turned into a unit based [linear cost]. Containers would be billed quarterly or annually. Quarterly billing could be done through utility or on its own annual billing could go through Fulton County. Quarterly billing would be easier for renters due to low income demographic and high renter turnover. Quarterly fees would be approximately \$75 / \$150 / \$225 for 32 gallon, 64 gallon, and 96 gallon respectively.
- B. The following model assumes that the average household will choose the 32 gallon container for trash. The 32 gallon size is based on the experience in other proportional rate cities, as well as the recent weight test in Vancouver, WA and Portland, OR. The majority of the residents opt for the 32 gallon container. There may be a small percentage that chooses a larger or smaller container, however based on detailed studies the average is 32. If residents overflow the 32 gallon container, they would be required to either save their trash for the next week or purchase a special bag or sticker for the overflow material.
- C. Based on the 32 gallon container, this structure would save the average household only a minimal amount rate reduces to \$304; however the city would gain revenue due to avoided disposal, increased productivity due to source reduction and the potential for commodity recycling revenue.
- D. Billing could be done through the property owner or the occupant. There are advantages and disadvantages to both.

*Occupant Billing - A fee reduction to the property owner means the occupant will now have to sign up and receive service and a bill for service. This could be done along with another utility. It also creates some risk for the City. Because renter turnover is high there could be a bill collection issue. The City may have difficulty putting a lien on the property if the occupant left without paying the bill.*

*Property Owner Billing - The process of collecting money from the property owner would be easier than the renter, but it would put the burden on the property owner to choose a container size for the renter. One option could be an ordinance that requires the property owner to provide the 32 gallon container in the cost of the rent and a request for a different size would go through the property owner. This way the owner and renter can work out the details of additional costs. Atlanta has a high poverty rate and therefore high renter turnover, which might make this difficult to handle for the property owner. This may cause the owners to provide the 96 gallon container option automatically just so they avoid a hassle with the renter. The 96 gallon container would eliminate the incentive to the renter.*

Image 16. Proportional Structure with Multiple Containers No Fee

Container Proportional												
Projected Per Capita Disposal	500	500	500	400	400	400	600	600	600	700	700	700
weekly container cost	5.75	5.85	5.95	5.75	5.85	5.95	5.75	5.85	5.95	5.75	5.85	5.85
Annual Container cost	299.00	304.20	309.40	299.00	304.20	309.40	299.00	304.20	309.40	299.00	304.20	309.40
Additional container Revenue/ \$							5.25	5.35	5.45	5.25	5.35	5.45
Trash Fee / base												
Total fee container	28,405,000	28,899,000	29,393,000	28,405,000	28,899,000	29,393,000	28,405,000	28,899,000	29,393,000	28,405,000	28,899,000	29,393,000
Additional Revenue							3,921,522	3,996,217	4,070,913	8,897,609	9,067,087	9,236,565
Increased Recycling Revenue	15,015	15,015	15,015	18,612	18,612	18,612	11,418	11,418	11,418	7,821	7,821	7,821
Total Revenue	28,420,015	28,914,015	29,408,015	28,423,612	28,917,612	29,411,612	32,337,940	32,906,635	33,475,331	37,310,430	37,973,908	38,637,366
Cost Reductions												
Avoided Disposal Cost	1,501,500	1,501,500	1,501,500	1,861,200	1,861,200	1,861,200	1,141,800	1,141,800	1,141,800	782,100	782,100	782,100
Reduction Labor	-	-	-	-	-	-	-	-	-	-	-	-
Total Cost Reductions	1,501,500	1,501,500	1,501,500	1,861,200	1,861,200	1,861,200	1,141,800	1,141,800	1,141,800	782,100	782,100	782,100
Total Source of Funding	29,921,515	30,415,515	30,909,515	30,284,812	30,778,812	31,272,812	33,479,740	34,048,435	34,617,131	38,092,530	38,756,008	39,419,466
Cost of / \$PAYT												
Trash Bag Cost	-	-	-	-	-	-	-	-	-	-	-	-
Cost of additional containers	760,000	760,000	760,000	760,000	760,000	760,000	760,000	760,000	760,000	760,000	760,000	760,000
Cost of additional vehicles	-	-	-	-	-	-	-	-	-	-	-	-
Total cost of program	760,000	760,000	760,000	760,000	760,000	760,000	760,000	760,000	760,000	760,000	760,000	760,000
NET	29,161,515	29,655,515	30,149,515	29,524,812	30,018,812	30,512,812	32,719,740	33,288,435	33,857,131	37,332,530	37,996,008	38,659,466
Budget	29,165,000	29,165,000	29,165,000	29,165,000	29,165,000	29,165,000	29,165,000	29,165,000	29,165,000	29,165,000	29,165,000	29,165,000
Difference	(3,485)	490,515	984,515	359,812	853,812	1,347,812	3,554,740	4,123,435	4,692,131	8,167,530	8,831,008	9,494,466
Ave HH Cost/YR	299.16	304.36	309.56	299.20	304.40	309.60	340.40	346.39	352.37	392.74	399.73	406.71

## Benefits

1. The City would be able to tell the homeowners they have reduced the base fees.
2. Every household would have the opportunity to choose their level of service through an incentivized rate.
3. The system is clean and neat.
4. The City would cover its expenses and possibly have some extra revenue from overflow bag or bulky sticker sales.

## Challenges

There are a few challenges with the multiple container options:

1. Billing – the City would now be responsible for collection of quarterly fees. There are administrative costs to this as well as potential for revenue shortfall. The city has a large amount of turnover so a billing system may be difficult to manage.
2. Renter vs. Owner – who chooses the container and who pays the bill and who is responsible for non-payment. This detail would have to be worked out at the start since 45% of the homes in Atlanta are renter occupied. In this structure, the renter is paying much more.
3. Start up expense and on hand inventory of multiple containers. The container system would require purchases of new 32 gallon containers and possibly some 20 gallon and/or 64 gallon. The approximate cost to the City would be an average of \$40 per household or a one-time total of about \$3,200,000. The City would have to bid the containers out about 9 months in advance to ensure delivery and distribution by target start date. Once the initial containers were purchased the City would have to keep an inventory of all sizes for residents that are moving to a new home. This causes a small logistical challenge.
4. Proportional rates do not account for the vacant homes. Currently, these homes are also assessed a fee since they the vacant homes would not be generating trash they would have to continue to pay at fee for the fixed city costs.
5. Enforcement of snow coned containers
6. Potential for illegal dumping because of the new burden on the renter.

### **B. Proportional Bag Fee (very similar to proportional container fee)**

- A. Eliminate the current base fee associated specifically with the waste costs. The property owner will now save \$307 annually. This cost will now be turned into a unit based [linear cost] covered through the sale of a special colored trash bag. The bags could be placed in the current 96 gallon container and there would be no reason to purchase new containers. Field employees could monitor compliance as containers are dumped into truck.
- B. As in *Rate Structure A*, this option reduces the cost to the property owner and places more burden on the renter. The renter would now be responsible for purchasing a trash bag at a cost of approximately \$5.50 each in order to cover all the costs associated with the previous fee. This cost could be prohibitive to the program and cause hard ship for many families considering Atlanta's demographics.
- C. In a bag system, the typical household a little over 1 bag per week thus spending an average of \$315 per household per year. Although the total estimated expense per household approximately the same the

responsibility shift from owner to occupant might be hard to sell to constituents. It would be difficult to require / monitor or enforce the property owner to help offset this cost, by providing free bags. The city of Binghamton, NY, reduced the tax to the homeowner and encouraged landlords to offset their tenants new 'trash expense' by providing some free bags.

Image 17. Proportional Structure Cost is Paid through Bags No Fee

Bag Program Proportional												
Projected Per Capita	500	500	500	400	400	400	600	600	600	700	700	700
Disposal	500	500	500	400	400	400	600	600	600	700	700	700
Bag price	5.25	5.50	5.75	5.25	5.50	5.75	5.25	5.50	5.75	5.25	5.50	5.75
Revenue/\$												
Trash Fee /base												
Sale of Trash Bags	28,612,500	29,975,000	31,337,500	22,890,000	23,980,000	25,070,000	34,335,000	35,970,000	37,605,000	40,057,500	41,965,000	43,872,500
Increased Recycling Revenue	15,015	15,015	15,015	18,612	18,612	18,612	11,418	11,418	11,418	7,821	7,821	7,821
Total Revenue	28,627,515	29,990,015	31,352,515	22,908,612	23,998,612	25,088,612	34,346,418	35,981,418	37,616,418	40,065,321	41,972,821	43,880,321
Cost Reductions												
Avoided Disposal Cost	1,501,500	1,501,500	1,501,500	1,861,200	1,861,200	1,861,200	1,141,800	1,141,800	1,141,800	782,100	782,100	782,100
Reduction Labor	-	-	-	-	-	-	-	-	-	-	-	-
Total Cost Reductions	1,501,500	1,501,500	1,501,500	1,861,200	1,861,200	1,861,200	1,141,800	1,141,800	1,141,800	782,100	782,100	782,100
Total Source of Funding	30,129,015	31,491,515	32,854,015	24,769,812	25,859,812	26,949,812	35,488,218	37,123,218	38,758,218	40,847,421	42,754,921	44,662,421
Cost of / \$ PAVT												
Trash Bag Cost	1,362,500	1,362,500	1,362,500	1,090,000	1,090,000	1,090,000	1,635,000	1,635,000	1,635,000	1,907,500	1,907,500	1,907,500
Cost of additional containers	-	-	-	-	-	-	-	-	-	-	-	-
Cost of additional vehicles	-	-	-	-	-	-	-	-	-	-	-	-
Total cost of program	1,362,500	1,362,500	1,362,500	1,090,000	1,090,000	1,090,000	1,635,000	1,635,000	1,635,000	1,907,500	1,907,500	1,907,500
NET	28,766,515	30,129,015	31,491,515	23,679,812	24,769,812	25,859,812	33,853,218	35,488,218	37,123,218	38,939,921	40,847,421	42,754,921
Budget	29,165,000	29,165,000	29,165,000	29,165,000	29,165,000	29,165,000	29,165,000	29,165,000	29,165,000	29,165,000	29,165,000	29,165,000
Difference	(398,489)	964,015	2,326,515	(5,485,189)	(4,395,189)	(3,305,189)	4,688,218	6,323,218	7,958,218	9,774,921	11,682,421	13,589,921
Ave HH Cost/VR	301.34	315.68	330.03	241.14	252.62	264.09	361.54	378.75	395.96	421.74	441.82	461.90

### *Benefits of the Bag System*

1. The City will be able to tell homeowners that they have eliminated the fee related to waste.
2. Less up front investment for the city, no need to purchase containers.
3. Residents get a bag as part of the fee (they save on regular trash bags).
4. Single and elderly residents can save more (fairest option).
5. Low-income residents could qualify for discounted or free bags.

### *Challenges of the Proportional Bag System*

1. Although the homeowner will benefit from a decreased fee, the renter will be paying much more.
2. Ongoing expense of trash bags, approximately \$1,370,000 annually.
3. Vacant homes will not be covering their share of the fixed department costs.
4. Non compliance and illegal dumping because of the new burden on the renter
5. The field employees will be responsible for enforcement. Households not using proper bags and hiding the trash within the container will have to be fined and accounted for.

### **C. Two-Tiered Containers**

- A. Reduce the base fee to the property owner by the tip cost only. This is approximately \$35 of savings per household per year for property owner. The potential for saving is minimal but if the City required property occupants to sign up for garbage service (covering the tip portion) like other utilities, there would be some cost transparency and accountability. Leave all of the fixed costs (including all or most of collection) in the base fee structure in order to guarantee revenue to the City and to retain the majority of responsibility on the property owner.
- B. Create a unit based cost for the fee portion. The difficulty with Atlanta is the low tip fee. As the proportional option (above) the overall waste generation would decrease, so the City could include some of the collection savings in this rate structure.
- C. The suggested rate structure can be adjusted, and are used only as examples. The example looks at a fixed base fee of \$272 per household and an additional container cost of \$35 / \$70 / \$105 annually for respective sizes 32 gallon 64 gallon and 96 gallon. The pricing could be slightly higher to create an additional revenue stream. This additional revenue could be used to offset any billing or collection issues from renters. The revenue could also be used for the incentive based recycling program.



Image 18. Two-Tiered Structure Tip Cost is Paid through Container (reduction in current fee)

Container Two Tiered												
Projector Per Vehicle	500	500	500	400	400	400	400	600	600	600	700	700
Disposal	500	500	500	400	400	400	400	600	600	600	700	700
Heavy Container Cost	0.60	0.70	0.80	0.60	0.70	0.80	0.80	0.60	0.70	0.80	0.60	0.70
Annual container cost 32 gallon additional container	31.20	36.40	41.60	31.20	36.40	41.60	41.60	31.20	36.40	41.60	31.20	36.40
Revenue / \$	-	-	-	-	-	-	-	31.20	36.40	41.60	31.20	36.40
Trash Fee base	25,840,000	25,840,000	25,840,000	25,840,000	25,840,000	25,840,000	25,840,000	25,840,000	25,840,000	25,840,000	25,840,000	25,840,000
Total fee container	2,964,000	3,458,000	3,952,000	2,964,000	3,458,000	3,952,000	3,952,000	2,964,000	3,458,000	3,952,000	2,964,000	3,458,000
Additional Revenue through Recycling Revenue	-	-	-	-	-	-	-	31,370,182	36,398,349	41,826,909	62,286,345	72,867,636
Revenue	15,015	15,015	15,015	18,612	18,612	18,612	18,612	11,418	11,418	11,418	7,821	7,821
Total Revenue	28,819,015	29,313,015	29,807,015	28,822,612	29,316,612	29,810,612	29,810,612	60,185,600	65,907,963	71,630,327	91,098,366	101,973,457
Cost Reductions	-	-	-	-	-	-	-	-	-	-	-	-
Avoided Disposal Cost	1,501,500	1,501,500	1,501,500	1,861,200	1,861,200	1,861,200	1,861,200	1,141,800	1,141,800	1,141,800	782,100	782,100
Reduction Labor	-	-	-	-	-	-	-	-	-	-	-	-
Total Reductions	1,501,500	1,501,500	1,501,500	1,861,200	1,861,200	1,861,200	1,861,200	1,141,800	1,141,800	1,141,800	782,100	782,100
Total source of Funding	30,320,515	30,814,515	31,308,515	30,683,812	31,177,812	31,671,812	31,671,812	61,327,400	67,049,763	72,772,127	91,880,466	102,755,557
Cost of PAY	-	-	-	-	-	-	-	-	-	-	-	-
Trash Bag Cost	-	-	-	-	-	-	-	-	-	-	-	-
Cost of additional containers	760,000	760,000	760,000	760,000	760,000	760,000	760,000	760,000	760,000	760,000	760,000	760,000
vehicles	-	-	-	-	-	-	-	-	-	-	-	-
Total cost of program	760,000	760,000	760,000	760,000	760,000	760,000	760,000	760,000	760,000	760,000	760,000	760,000
NET	29,560,515	30,054,515	30,548,515	29,923,812	30,417,812	30,911,812	30,911,812	60,567,400	66,289,763	72,012,127	91,120,466	101,995,557
Budget	29,165,000	29,165,000	29,165,000	29,165,000	29,165,000	29,165,000	29,165,000	29,165,000	29,165,000	29,165,000	29,165,000	29,165,000
Difference	395,515	889,515	1,383,515	758,812	1,252,812	1,746,812	1,746,812	31,402,400	37,124,763	42,847,127	61,955,466	72,830,557
Ave HH Cost/YR	303.36	308.56	313.76	303.40	308.60	313.80	313.80	633.53	693.77	754.00	958.93	1,073.40
												1,187.88

### *Benefits Two-Tiered Container*

1. The City will be able to tell the homeowners they have reduced fees.
2. Every household would have some level of service as currently provided and would be incentivized to save.
3. The city would cover its expenses and possibly have some extra revenue from overflow bag or bulky sticker sales.
4. Vacant homes would not be as much as an issue because their fee would be contributing to the overall fixed city costs.

### *Challenges of Two-Tiered Container*

There are a few challenges with the multiple container options:

1. Billing – the City would now be responsible for collection of quarterly fees. There are administrative costs to this as well as potential for revenue shortfall. The City has a large amount of turnover so a billing system may be difficult to manage.
2. Renter vs. Owner – who chooses the container and who is responsible for the bill and non-payment. This detail would have to be worked out at the start since 45% of the homes in Atlanta are renter occupied.
3. Start up expense and on-hand inventory of multiple containers. The container system would require purchases of new 32 gallon containers and possibly some 20 gallon and/or 64 gallon. The approximate cost to the City would be an average of \$40 per household or a one-time total of about \$3,200,000. The City would have to bid the containers out about 9 months in advance to ensure delivery and distribution by target start date. Once the initial containers were purchased, the City would have to keep an inventory of all sizes for residents that are moving to a new home. This causes a small logistical challenge.

### **D. Two-Tiered Rate Structure Bags**

- A. The two tiered structure could be achieved by reducing the annual fee associated with tip cost by approximately \$35 to \$272 per household. The revenue to cover the tip cost would then come from the sale of official City trash bags. This provides a direct savings to property owners annually.
- B. Create a unit bag cost that represents the tip value for an amount greater than the tip value, thus covering tipping and creating additional revenue source for the city. This revenue could be used to offset potential non-payment due to renter turnover it could also be used to cover the cost of incentive based recycling. The cost of \$1 for the 32 gallon trash bag would shift some of the cost to the garbage producer and create some transparency without a huge burden. Social Services could issue trash bag credits for some families in need.
- C. Bags would be placed by residents in containers, thus eliminating the need for new containers. The City benefits from avoided disposal and new revenue totaling about \$2,000,000.

Image 19. Two-Tiered Structure Tip Cost is Paid through Bags (reduction in current fee)

Bag Program Two Tiered												
Projected Per Capita Disposal	500	500	500	400	400	400	600	600	600	700	700	700
Bag price	0.60	0.70	0.80	0.60	0.70	0.80	0.60	0.70	0.80	0.60	0.70	0.80
Revenue/ \$												
Trash Fee / base	25,840,000	29,840,000	25,840,000	29,840,000	25,840,000	29,840,000	25,840,000	29,840,000	25,840,000	29,840,000	25,840,000	29,840,000
Per household fee	272	272	272	272	272	272	272	272	272	272	272	272
Sale of Trash Bags	3,270,000	3,815,000	4,360,000	2,616,000	3,052,000	3,488,000	3,924,000	4,578,000	5,232,000	4,578,000	5,341,000	6,104,000
Increased Recycling Revenue	15,015	15,015	15,015	18,612	18,612	18,612	11,418	11,418	11,418	7,821	7,821	7,821
<b>Total Revenue</b>	<b>29,125,287</b>	<b>29,670,287</b>	<b>30,215,287</b>	<b>28,474,884</b>	<b>28,910,884</b>	<b>29,346,884</b>	<b>29,775,690</b>	<b>30,429,690</b>	<b>31,083,690</b>	<b>30,426,093</b>	<b>31,189,093</b>	<b>31,952,093</b>
<b>Cost Reductions</b>												
Avoided Disposal Cost	1,501,500	1,501,500	1,501,500	1,861,200	1,861,200	1,861,200	1,141,800	1,141,800	1,141,800	782,100	782,100	782,100
Reduction Labor	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total Cost Reductions</b>	<b>1,501,500</b>	<b>1,501,500</b>	<b>1,501,500</b>	<b>1,861,200</b>	<b>1,861,200</b>	<b>1,861,200</b>	<b>1,141,800</b>	<b>1,141,800</b>	<b>1,141,800</b>	<b>782,100</b>	<b>782,100</b>	<b>782,100</b>
<b>Total Source of Funding</b>	<b>30,626,787</b>	<b>31,171,787</b>	<b>31,716,787</b>	<b>30,336,084</b>	<b>30,772,084</b>	<b>31,208,084</b>	<b>30,917,490</b>	<b>31,571,490</b>	<b>32,225,490</b>	<b>31,208,193</b>	<b>31,971,193</b>	<b>32,734,193</b>
<b>Cost of / \$ PAYT</b>												
Trash Bag Cost	1,362,500	1,362,500	1,362,500	1,090,000	1,090,000	1,090,000	1,635,000	1,635,000	1,635,000	1,907,500	1,907,500	1,907,500
Cost of additional containers	-	-	-	-	-	-	-	-	-	-	-	-
Cost of additional vehicles	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total cost of program</b>	<b>1,362,500</b>	<b>1,362,500</b>	<b>1,362,500</b>	<b>1,090,000</b>	<b>1,090,000</b>	<b>1,090,000</b>	<b>1,635,000</b>	<b>1,635,000</b>	<b>1,635,000</b>	<b>1,907,500</b>	<b>1,907,500</b>	<b>1,907,500</b>
<b>NET</b>	<b>29,264,287</b>	<b>29,809,287</b>	<b>30,354,287</b>	<b>29,246,084</b>	<b>29,682,084</b>	<b>30,118,084</b>	<b>29,282,490</b>	<b>29,936,490</b>	<b>30,590,490</b>	<b>29,300,693</b>	<b>30,063,693</b>	<b>30,826,693</b>
<b>Budget</b>	<b>29,165,000</b>	<b>29,165,000</b>	<b>29,165,000</b>	<b>29,165,000</b>	<b>29,165,000</b>	<b>29,165,000</b>	<b>29,165,000</b>	<b>29,165,000</b>	<b>29,165,000</b>	<b>29,165,000</b>	<b>29,165,000</b>	<b>29,165,000</b>
<b>Difference</b>	<b>99,287</b>	<b>644,287</b>	<b>1,189,287</b>	<b>81,084</b>	<b>517,084</b>	<b>953,084</b>	<b>117,490</b>	<b>771,490</b>	<b>1,425,490</b>	<b>135,693</b>	<b>898,693</b>	<b>1,661,693</b>
<b>Ave HH Cost /YR</b>	<b>306.58</b>	<b>312.32</b>	<b>318.06</b>	<b>299.74</b>	<b>304.33</b>	<b>308.91</b>	<b>313.43</b>	<b>320.31</b>	<b>327.20</b>	<b>320.27</b>	<b>328.31</b>	<b>336.34</b>

### *Benefits of the Two-Tiered Bag System*

1. The City will be able to tell homeowners that they have eliminated part of the fee related to waste.
2. Renter is incentivized to change behavior without too big of a burden.
3. Less up front investment, no need to purchase containers.
4. Residents get a bag as part of the fee (they save on regular trash bags).
5. Single and elderly residents can save more (fairest option).
6. Low-income residents could qualify for discounted or free bags
7. No logistical issues with storage of multiple containers

### *Challenges of the Two-Tiered Bag System*

There are a few challenges with the bag system:

1. Ongoing expense of trash bags.
2. The field employees will be responsible for enforcement. Households not using proper bags and hiding the trash within the container will have to be fined and accounted for.

### **E. Basic Service Rate Structure with a 32 Gallon Container**

In this structure the property owner would pay the same and the occupant would continue to pay nothing unless they opt for a larger size. The city would benefit from avoided disposal of 1.4 million dollars plus any additional fee collection from larger containers. The savings and additional funds could be used to pay for the new containers and also eventually larger yard waste containers. It could also be used for the recycling incentive program or the larger recycling containers. Disposal exceeding the allotted container would require the purchase of an official bag or tag. The resident would also have the ability to request a smaller container and receive a rebate at the end of the year. Average cost per household would be unchanged unless they opt for a larger or smaller size.

**Image 20. Basic Service Program - Each Households Receives 32 Gallons of Base Disposal Weekly, Plus Additional Disposal Per Unit if Limit is Exceeded**

Overflow Program												
Projected Per Capita Disposal	500	500	500	400	400	400	600	600	600	700	700	700
Weekly Container Price	-	-	-	-	-	-	-	-	-	-	-	-
Overflow Bag price	1.00	1.50	1.75	1.00	1.50	1.75	1.00	1.50	1.75	1.00	1.50	1.75
Revenue/ \$												
Trash Fee /base	-	-	-	-	-	-	-	-	-	-	-	-
Sale of Trash Bags	250,476	375,714	438,333				1,288,571	1,932,857	2,255,000	2,326,667	3,490,000	4,071,667
Increased Recycling Revenue	15,015	15,015	15,015	18,612	18,612	18,612	11,418	11,418	11,418	7,821	7,821	7,821
Total Revenue	265,491	390,729	453,348	18,612	18,612	18,612	1,299,989	1,944,275	2,266,418	2,334,488	3,497,821	4,079,488
Cost Reductions / \$												
Avoided Disposal Cost	1,501,500	1,501,500	1,501,500	1,861,200	1,861,200	1,861,200	1,141,800	1,141,800	1,141,800	782,100	782,100	782,100
Reduction Labor	-	-	-	-	-	-	-	-	-	-	-	-
Total Cost Reductions	1,501,500	1,501,500	1,501,500	1,861,200	1,861,200	1,861,200	1,141,800	1,141,800	1,141,800	782,100	782,100	782,100
Total Source of Funding	1,766,991	1,892,229	1,954,848	1,879,812	1,879,812	1,879,812	2,441,799	3,086,075	3,408,218	3,116,588	4,279,921	4,861,588
Cost of / \$ PAVT												
Trash Bag Cost	62,619	62,619	62,619	-	-	-	322,143	322,143	322,143	581,667	581,667	581,667
Cost of additional containers	760,000	760,000	760,000	760,000	760,000	760,000	760,000	760,000	760,000	760,000	760,000	760,000
Cost of additional vehicles	-	-	-	-	-	-	-	-	-	-	-	-
Total cost of program	822,619	822,619	822,619	760,000	760,000	760,000	1,082,143	1,082,143	1,082,143	1,341,667	1,341,667	1,341,667
NET	944,372	1,069,610	1,132,229	1,119,812	1,119,812	1,119,812	1,359,647	2,003,932	2,326,075	1,774,921	2,938,254	3,519,921
Budget	-	-	-	-	-	-	-	-	-	-	-	-
Difference	944,372	1,069,610	1,132,229	1,119,812	1,119,812	1,119,812	1,359,647	2,003,932	2,326,075	1,774,921	2,938,254	3,519,921
Ave HH Cost/YR	2.79	4.11	4.77	0.20	0.20	0.20	13.68	20.47	23.86	24.57	36.82	42.94

### *Benefits Basic Service Program*

1. Every household would receive the same base level of service, but all would have the opportunity to save by reducing to a smaller size.
2. One 32 gallon container creates a subliminal measuring cup.
3. Residents feel they still get something free.
4. Residents can purchase additional bags/containers only if needed.
5. Most households will not go over so most will save.
6. Less change in the city tax structure (easier), addresses vacant homes.
7. Fairer for homeowners, less burden for renters, easier for low-income families.

### *Challenges Basic Service Program*

There are a few challenges with the overflow:

1. Investment in 32 gallon containers, approximately \$3,200,000.
2. Convincing constituents that they can fit into the 32 gallon container.

## **5.5 Secondary Effects of SMART**

*Logistical savings:* The City will most likely have to adjust routes due to the change in waste stream. It is estimated using data from the Massachusetts Department of Environmental Protection and the US EPA (Skumatz research) that approximately 30% of material will go to source reduction. This will mean an overall reduction in actual materials transported. This reduction will allow the City to make future logistical changes that should be favorable to their bottom line. The City will adjust routes and possibly trash and recycling days in order to adapt to the new material streams.

*Recycling containers:* Currently the City has plans to roll out 96 gallon containers for recycling to all households. Any of the above options would free up the 96 gallon container to be used for recycling. This would also make an investment in additional containers much lower as the majority of the containers would on be 32 gallon in size and less expensive

*Extended Landfill Life:* The state would gain tremendous long-term savings through increasing the landfill life. A SMART program in the City of Atlanta would reduce waste by 42% annually.

*Overall Reduction in Greenhouse Gases:* Waste reduction through recycling, reuse and source reduction conserves energy and natural resources. Diverting 000 tons from the waste stream will reduce GHG levels in the City by approximately ...500.tons of MTCO<sub>2</sub> per year. This is the equivalent of ....cars off the road annually.

*Illegal Dumping:* Some communities experience illegal dumping, however it is reported as minimal. Most communities feel that those that were dumping before will continue to dump, but those who are not currently dumpers do not become dumpers just because of PAYT. See

<http://www.epa.gov/waste/conserva/tools/payt/top8.htm>

[http://www.epa.gov/reg5rcra/wptdiv/illegal\\_dumping/downloads/il-dmpng.pdf](http://www.epa.gov/reg5rcra/wptdiv/illegal_dumping/downloads/il-dmpng.pdf)

## 5.6 Program Details

### *Compliance*

The sanitation employees would be asked to monitor compliance. Since it is the field employee's responsibility to collect waste from the household, it will ultimately fall on their shoulders to make sure residents are following the ordinance. Stickers for non-compliance should be provided by the City for the field employees to use. If household trash is not in proper containers with the lid closed, in Official City trash bags, or tagged with Official City tags it will be labeled and left behind. Employees will be accountable for compliance and there will have to be a penalty/fine set up for non-compliance by households.

### *Yard Waste*

The City has the potential for increased diversion of yard waste. Creating a unit based price for yard waste paper bags would bring in extra revenue. The City could go through the same exercise as with the trash bags. The costs associated with yard waste collection and disposal is less than trash so a nominal fee could be attached in this area as well. The City could create a yard waste paper bag bid and have yard waste bags available at a price less than the trash. The current frontage fee could be turned into a yard waste bag or container fee as well

### *Bulky Items and Large Loads at the Drop-Off Facility*

The City should decide how to handle bulky items. Prepaid stickers could be sold through grocery stores. Stickers would work as follows: there could be a unit base with an itemized list of items. For example, a mattress might equal two stickers and an oven might equal three stickers. The City should have some system in place upon implementation of program for the bulky items. This may be a place to just use a nominal fee. Bulky items tend to be the items that are illegally dumped so the City could just charge a small fee of \$5 for a refrigerator just to cover part of the handling expense. Loads of materials from someone cleaning out the garage should be bagged in official City bags and larger items charged a nominal fee. The City could offer 'free' clean up days twice per year as a bargaining tool. Regular bagged household waste should be in an official trash bag or stickered. Bulky items could be free the first year and the rate structure could be designed around the assumption that bulky pick up is included in the container / fee system. This could gradually be changed over time. A nominal fee encourages reuse through donation etc.

### *Demographics – Low Income Solutions*

It is important to take into consideration rental properties. Nearly 45% of households in Atlanta are owner occupied. Approximately 55% of households that are participating in the SMART program would be renters. There are ways to make SMART more equitable for renters. In a two-tiered container or bag system the landlord could be responsible for sharing the cost with renters. The City social services could develop a discount container rate for families in need. In a bag program, landlords could give a rent rebate, discount to tenants or purchase some bags for residents, similar to what was done in the City of Binghamton, NY. In the overflow system, the City Social Services department can provide free or discounted or containers.

### *Would Recycle Bank work with SMART in Atlanta?*

Recycle Bank could be very helpful to the SMART program as long as the cost of the program was reviewed thoroughly. Recycle Bank in conjunction with any of the above suggestions would create a positive incentive for families that may need more space for trash than the average 32 gallon container. This incentive could financially

off set some of the additional burden, especially for the lower demographic with a large family. Recycle Bank could also help with education and outreach through their already established data base.

*Additional neighborhood collection programs*

The City should evaluate the collection programs such as hazardous waste, electronics, paint drives etc. These programs should be expanded upon. The city should build the additional cost of the extra program says into their rate structure. There are great opportunities to solicit business partners for these programs through sponsorship and advertising. It would also be a good idea to evaluate other program drives (for instance old toys or tennis shoe drives, or book drives. Or talk with groups like 'Got Books' to provide neighborhood drop off box locations.

**5.7 Summary**

SMART waste management is a clear solution to decreasing waste volume and disposal costs. Waste reduction and recycling are part of the City's long-term Zero Waste objective. Reducing Atlanta's residential waste stream by 45% through SMART waste management will save taxpayers 7.5 million dollars through avoided disposal over the next five years. The various container and bag recommendations all generate some additional revenue and also allow the city the flexibility to cover any implementation costs within a minimal time frame. Atlanta's current per capita disposal rate of 915 lbs annually is very high compared to other SMART communities within the State of Georgia and across the US.

**Image 21. Georgia SMART Program Success**

Community	HH Served	Type of Program	Per Capita Disposal
Duluth	10,000	Bag program	600
Athens Clarke	9800	Multi tiered container program	538
Decatur	6600	Bag program	453
Sugar Hill		Variable rate container program with overflow bags	690
Marietta		32 gallon container with the option of buying bags for overflow or requesting another 32 gallon container for an additional cost	542

Residents will benefit through the extended life of the landfill. The diversion of commodity materials will save natural resources, and also create local jobs. For every 13 jobs lost in waste management and materials extraction, over 100 new jobs are created in recycling. A SMART waste management approach will help stimulate the economy by saving tax payer money and creating jobs. It is vital that residents see the real cost of waste and understand that their behavior will make a financial and an environmental difference to themselves and the City.

Empowering residents to decide how much or how little they pay by how much or how little they waste will generate immediate sustainable behavior change. According to a statement by the Environmental Protection Agency in January 2009, "PAYT is long-proven to be the most cost effective environmentally sustainable MSW program that EPA can promote. While other initiatives may have positive benefits, PAYT is the single best way to prevent waste and reduce greenhouse gases while generating an equitable revenue stream for municipalities." Making residential SMART Waste Management a part of the City's long-range plan is a SMART solution to sustainable waste reduction and behavior change. Disposal costs continue to rise and there is no magic solution that makes everyone happy. However, a SMART cost structure is a great compromise.



## 6. Recommendations

The City of Atlanta is logistically a great candidate for a SMART waste management program. SMART can be achieved with very little change to the current collection system, and meets the City's objective of creating a successful, sustainable, user-friendly, cost effective residential waste reduction program while working within the current collection infrastructure.

Recommended Actions:

(1) Create an Official Advisory Committee to carry out three steps: the exploration, outreach and implementation of SMART. This Committee would be a communications link between the needs and concerns of both residents and the City officials. The members should be comprised of a combination of residents, City officials and employees. Committee members should bring experience in areas like legal, PR, marketing, and education.

During Step One – the exploration phase, the committee should review the options and choose a recommendation for council. There should be a deadline at which time the committee should provide a written recommendation to the Council that includes outreach and implementation suggestions.

During Step Two - the outreach phase, the committee should be charged with a grassroots outreach effort to inform residents throughout the community. The most important part of selling SMART is to create positive momentum within the community. The Committee should focus on three areas:

1. Craft a clear message to the press. The message should include cost structure, penalties for illegal dumping, penalties for non-compliance, penalties for renters or landlords, statement from the Mayor about cost reduction and environmental benefits; press workshop, create a PSA.
2. Conduct community outreach through civic organizations and community organizations such as AARP, Sierra Club, etc. Outreach should include a slide show of how SMART would work, as well as posters for libraries and community meeting places.
3. Create an informative website so that residents can read and see graphics about how the program works.

(2) After a decision has been made, during Step Two the Advisory Committee would act as the 'go-to' group, charged with keeping the city on task during the implementation of SMART program.

1. Decide on the public relations and education leading up to implementation. Design a tool kit to be distributed to all residents. Examples of items to include in each kit are:
  - Detailed overview and instructions of the new program.
  - Reference Guide - a small, easy to understand, "how-to" guide with graphics and short reminders.
  - Schedule of curbside pick up, and drop off information dates.
  - Other materials to provide for a smooth and simple start up.
2. Choose participating grocery stores and retailers that carry bags if necessary.
3. Create Bid Specifications, for different container sizes or bags.
4. Suggest additional items to be added for recycling collection. Investigate other state recycling lists.

5. Create up-stream producer responsibility by educating local restaurants, grocery, and convenience stores about 'one-way carry out packaging' that meets recycling regulations (especially foam containers). This helps residents reduce waste.
6. Encourage source reduction. Source reduction is a great benefit of unit based pricing. Residents are motivated to think before they act by pulling items out of the waste stream that used to be considered trash but actually have value to someone else.
7. Work with Salvation Army, Goodwill and local charities to create additional drop off locations or a bag system such as NJ.
8. Create a Swap Shop in town. A means for residents to exchange usable items. This can also be achieved through a website a "town EBay."
9. Work with groups like Got Books, and electronics manufacturers to take back additional items that can be reused, or recycled.

(3) The City may need a few new codes or ordinances for the following:

1. Require that residential trash must be contained in certain containers with lids closed or in an 'official' City Trash Bag. Determine weight limits for bags and rules for snow-coned containers (not closed).
2. Create enforcement guidelines and also stickers for use on non-compliance.
3. Review or create an ordinance to deal with renters/landlords to determine who is responsible for non-compliance.
4. Create multi-family enforcement suggestions and guidelines.

(4) Address bulky items at transfer station drop off. The City should decide weather to charge for bulky items and car loads from people cleaning out large household items.

(5) Address Yard Waste. Consider if yard waste contained in an Official Bag could create additional revenue for frontage fee.

(6) Convey a clear message to the public. Residents need to know that this is a program saving both money and natural resources. They need to understand that their efforts are worthwhile and are making a difference. If this message is well delivered residents will be very satisfied and happy to participate in a SMART program.

## **7. Timeline to Implementation**

Once the City of Atlanta has decided to move forward, the Advisory Committee can be utilized to keep the project on task and decide on details of program. The Advisory Committee can guide the City through the implementation process. Generally a six-month period is ideal.

### **1 – Organization Begin approximately 6 months prior to start date**

1. Create a clear message to sell the SMART program.
2. Create official timeline and outline goals for committee.
3. Plan meeting calendar with dates to speak with local civic groups.

4. Check into recycling containers. Do residents have enough containers to maximize recycling?
5. Create public education and relations strategy target dates and costs. Much of this will be free because this is big news, however some planned ads will be helpful.
6. Fine tune details of low income families.
7. Determine if ordinances, fines and/or penalties are needed.
8. Create bid specifications for containers or trash bags and related services.
9. Design and order stickers for bulky items, non-compliance and recycling containers.
10. Outreach to retailers for participation.

## **2 – Education begin approximately 3- 4 months prior to start date**

1. Public relations through local newspaper, advertorials, interviews, PSA, flyer for households, etc.
2. Possible school education program.
3. Address the issues listed in above section (illegal dumping, cardboard recycling, producer responsibility, etc.).
4. Develop materials for residential tool kit.
5. Continue to add to original website.
6. Other outreach strategies.

## **3 – Implementation**

1. Mail fee and bag information in tax bill and show discount or disclosure of disposal costs.
2. Prepare public relations information so residents understand where to purchase bags and what items can be recycled.
3. Mail out Starter Kit.
4. Distribute additional containers if necessary.
5. Determine a specific start date by working backwards to create a time line.
6. Conduct school education program or contest for website and bag art.

## **4 – Follow up**

1. Continue positive press during first year to reinforce the decision of the council.

## ***Suggested References for Information***

Rate Structure Design: Setting Rates for a Pay-As-You-throw Program, Handbook United States Environmental Protection Agency, January 1999

Pay-As-You-Throw: Lessons Learned About Unit Pricing, United States Environmental Protection Agency, April 1994

Pay-As-You-Throw Success Stories, United States Environmental Protection Agency, April 1997

Pay-As-You-Throw: Throw Away Less and Save., United States Environmental Protection Agency, April 1997

Pay-As-You-Throw: A Fact Sheet for Elected Officials, United States Environmental Protection Agency, April 1997

Pay-As-You-Throw: A Fact Sheet for MSW Planners, United States Environmental Protection Agency, April 1997

Pay-As-You-Throw: A Fact Sheet State Officials, United States Environmental Protection Agency, April 1997

Pay-As-You-Throw: An Implementation Guide for Solid Waste Unit-Based Pricing Programs, Commonwealth of Massachusetts, Department of Environmental Protection, January 2004

Municipalities with Pay-As-You Throw Programs, Commonwealth of Massachusetts, Department of Environmental Protection, Bureau of Waste Prevention, January 2005