

The Town of Darien Connecticut SMART Waste Management



Issued by:
Green Waste Solutions
For the Connecticut Department of Environmental Protection

**Darien Connecticut
SMART Guidebook to Unit Based Pricing Solid Waste Management**

Town of Darien Connecticut '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 Town of Darien 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 Town recycling program, as well as with a mandatory curbside Town 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 Town 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 the cities' 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 Darien'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.

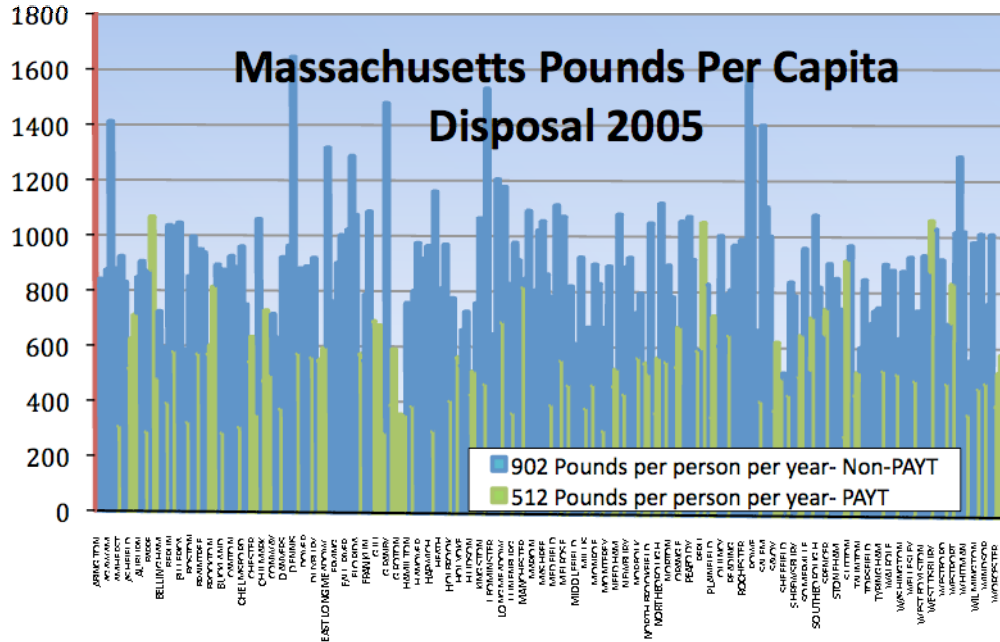
2. Rate Structure and Program Options

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 Town 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 Town 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 Town 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 about 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 CO₂. 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. Town of Darien Overview

4.1 Existing Waste Collection System

The Town of Darien has no municipal waste collection. Households contract with private haulers for removal of trash from the back door. There are officially 8 haulers collecting waste in Darien. The total waste generation was 6,600 tons of material. This is a combination of hauler collection and materials brought to the transfer station. The largest hauler A & D Carting has stopped bringing their material to the Town transfer station over the last two years. They now dispose of the material somewhere else. There was a significant decline in waste from 2006 to 2008 (approximately 50%). The majority of this decline is due to the hauler (A & D) not properly reporting waste generation to the Town of Darien. This makes determining Darien's real recycling rate and per capita disposal rate difficult. For the purpose of the SMART guidebook the average of the two per capita disposal numbers will be used: one based on the 2006 generation and; one based on the 2008 generation number.

There are a total of approximately 6,500 households with a population of about 19,000 in Darien. Based on the 2008 numbers the per capita disposal for Darien is 766 pounds per person annually. The per capita disposal is much higher, if the 2006 (13,228) waste generation number is used, the per capita number is 1476. This number is extremely high. The missing material makes it difficult to get an accurate per capita disposal number, so this guidebook will use a per capita number of 1,100 pounds per year. This is a reasonable number based on the current commodity recycling and the surrounding Connecticut towns per capita disposal.

The Town also collects approximately 600 tons of bulky waste

The following is a breakdown of the Town's per capita disposal over the past 4 years. The Town contracted with CRRA and brought their waste to the Bridgeport facility for the past decade. The new contract began in January of 2009 with City Carting. The current tip fee is \$94 per ton. The haulers pay the \$98 per ton to the transfer station for residential waste.

Image 7. Per Capita Residential Waste Trend

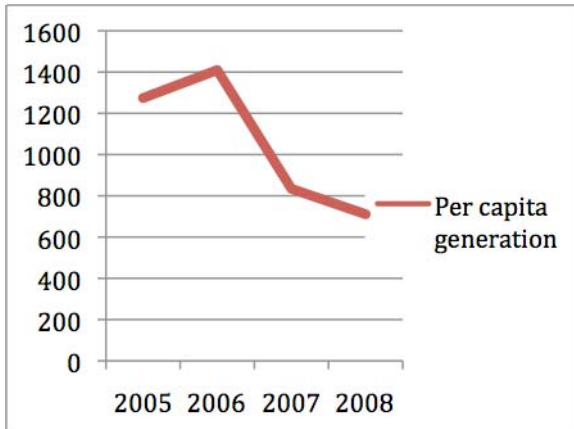
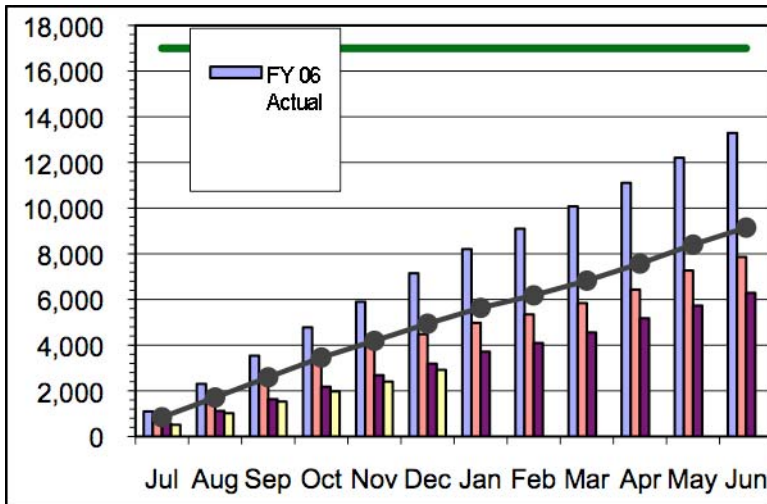


Image 8. CRRA Residential Disposal Tonnage



4.2 Existing Recycling Collection System

Backyard recycling in the Town of Darien is paid for by the residents through private haulers. Currently the recycling is brought to CRRA. This changed on July 1, 2009 to City Carting. The total tonnage of commodity recycling was 1,515 in 2008. As mentioned in section 4.1, the total waste generation is not accurate therefore the commodity recycling rate will be measured using an average of 2006 and 2008. The 2006 Commodity rate was 6.2% and the 2008 rate is 8.5%. The recycling rate based on per capita disposal of 1,100 pounds is 7%.

To put this into perspective the RI state law mandates residential commodity recycling rates of 35% by the year 2012. Despite the fact that the waste generation number is estimated the commodity recycling is far below the national average and the Connecticut average.

Commodity materials (plastic, paper, cardboard and glass) are currently picked up by the private haulers and although recycling is mandatory there is no way to be sure that each resident has actually contracted for recycling services.

Yard waste is collected and composted by the Town. The program collects 9,177 tons of leaves, brush and wood chips annually. This material is a combination of residential and non-residential. Yielding a yard waste recycling rate for 2006 of 37% and for 2008 of 52%. Both percentages are amazingly high for both the region and the county. The Yard Waste recycling rate based on per capita disposal of 1,100 pounds is 43%. The Town composts its yard waste on site. Relative to the US waste characterization study it is virtually impossible to have this much yard waste. It is possible that some of this material is coming from landscapers from other towns and could also be associated with the fact that Darien is a beautiful town with very large yards.

Image 9. Recycling Numbers based on per capita disposal of 1,100 pounds

| Recycling Rates | 2008 | 2006 | Average |
|-----------------------------|-------|-------|---------|
| Waste Total / tons | 7227 | 13288 | 10377 |
| Commodity Recycling / tons | 1515 | 1515 | 1515 |
| Metal / tons | | | |
| Yard Waste / tons | 9177 | 9177 | 9177 |
| Total Generation | 17919 | 23980 | 21069 |
| Recycling Commodity Percent | 8.5% | 6.3% | 7.2% |
| Yard Waste percent | 51.2% | 38.3% | 43.6% |
| Total Recycling / tons | 10692 | 10692 | 10692 |
| Total percent | 59.7% | 44.6% | 50.7% |

4.3 Overall Solid Waste Budget

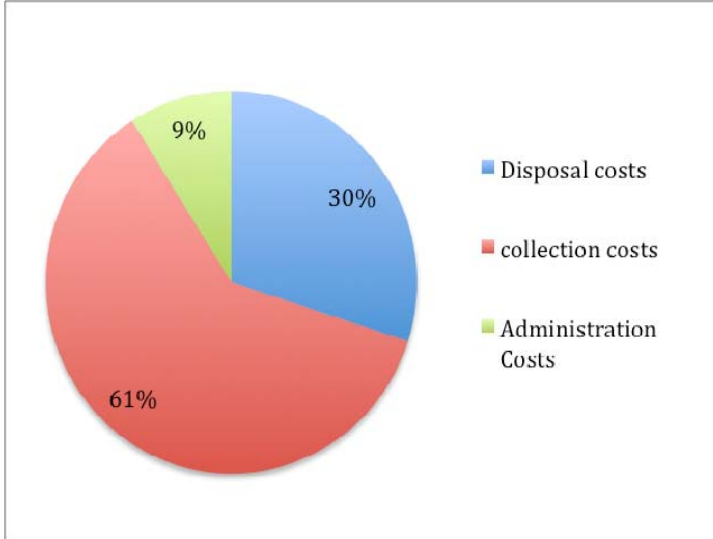
The Town of Darien Public Works services are paid through the general fund. This includes no costs for collection, only administration. The 2009 budget for services is approximately \$320,000. The total cost for each participating household \$ 49 per household.

The current solid waste tip cost is \$94-98 per ton. The current contract is through City Carting. Based on the total tonnage disposed the average household is paying approximately \$157.00 to tip their trash. The private collectors charge various rates that range between \$30.00 and \$50.000 monthly averaging \$40.00 monthly. The hauler charge contains the cost of tipping.

Residents that do not retain a private hauler pay a fee at the transfer station of 110.00 per household. Residents that do have a hauler may purchase a sticker for \$35 per year for the occasional use of the transfer station.

Overall Solid Waste Budget/Costs

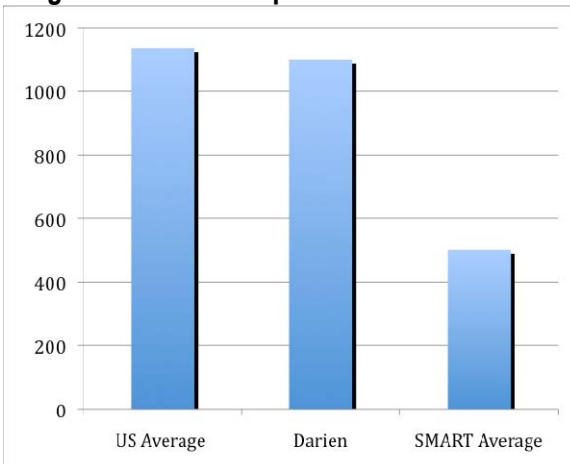
Image 10. Resident Cost Overview (Average Household cost)



4.4 Waste Minimization Goals for the Town of Darien CT and the State of Connecticut

The Town of Darien has a goal for increasing recycling. Darien's Climate Sustainability Plan Executive Order 2008-04 indicates the town's commitment to reducing the carbon footprint by 20% from current levels by 2010. Part of this commitment includes recycling and waste reduction. The State of Connecticut has a goal of 58% waste diversion.

Image 11. Darien compared to the National average and with the SMART average



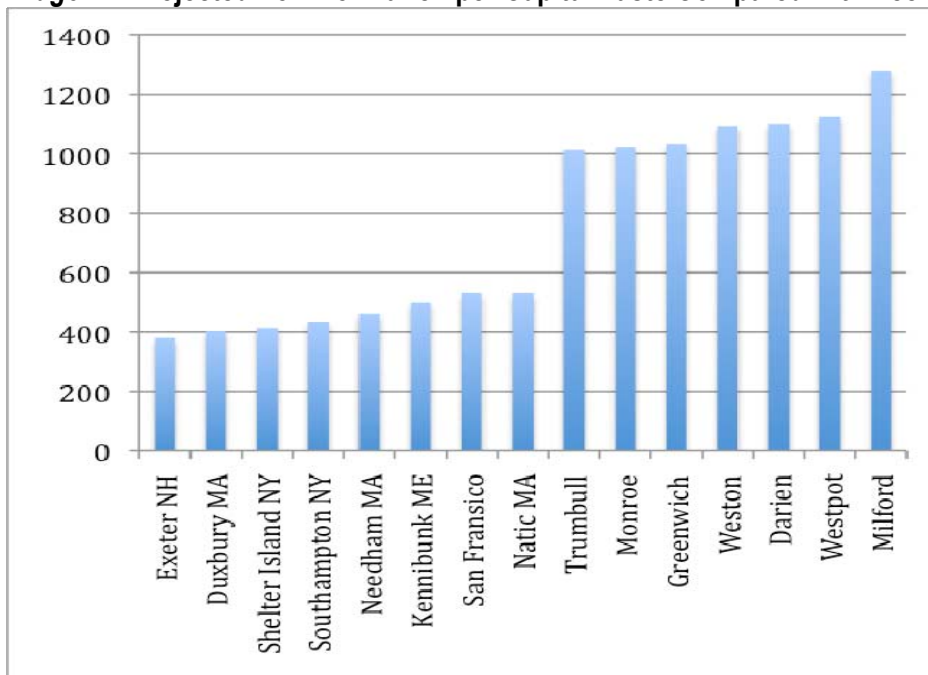
5. SMART Unit Based Pricing (UBP) Program Projections and Design

5.1 Projected per capita disposal change

The Town of Darien 2008 residential waste tonnage is estimated at 10,377 tons, which equals 1,100 pounds of trash per capita (see section 4.1). Unit Based Pricing (UBP) could decrease the disposal to approximately 530 pounds per person per year. Based on the population of residents in single family household units a decrease in disposal of 570 pounds per person per year would yield a total reduction of over 52% of the (estimated) 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 530 pounds per person per year will be used as a benchmark. Based on this number the total expected diversion of waste for the Town is approximately 5,300 tons annually. This includes a reduction from the material currently being picked up in Darien but not being recorded as Darien waste.

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

Image 12. Projected Town of Darien per Capita Waste Compared with Peer Communities

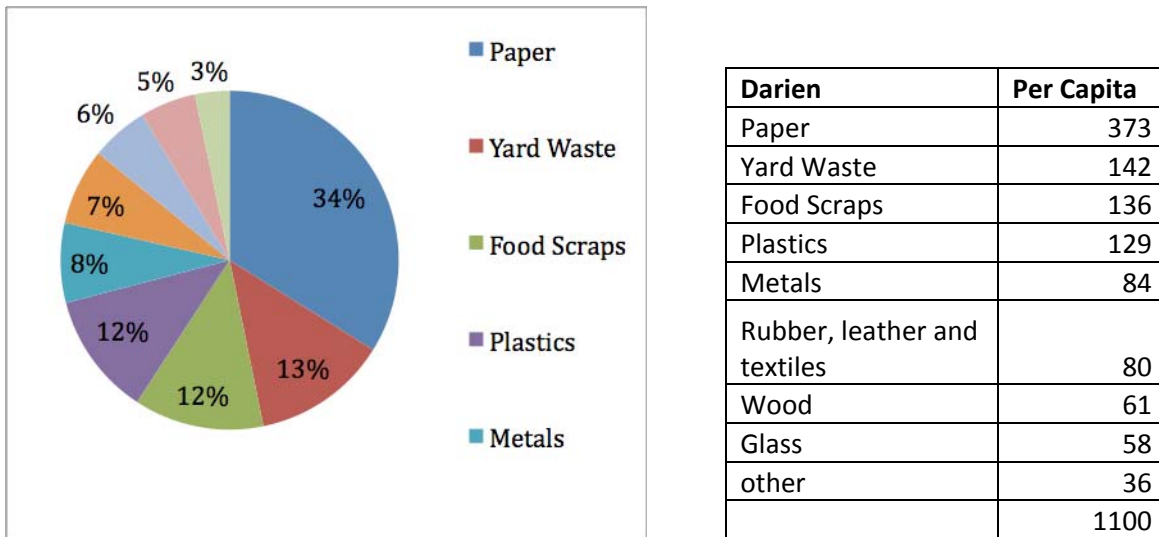


The overall residential recycling rate (including commodities and yard waste) would increase. Recycling is considered by the EPA and the state of Connecticut to be both commodities materials and yard waste. EPA studies show that approximately 66% of diversion in PAYT programs is recycled or composted, but 33% can be categorized as source reduction. The commodity tonnage has the potential to create significant revenue based on the average price per ton in local markets.

The remaining diversion 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 like E-bay, or Freecycle.

The Town of Darien does not have an official waste characterization study. The *Franklin Associates* waste characterization study from 1999 was 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. And the percentages of individual materials can vary from the national average. The SMART guidebook will use the national average to extrapolate an estimate of the Darien 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 13. Waste Characterizations US and Darien



5.2 SMART Rate Structure and Design for Darien

A SMART design plan for the Town of Darien would utilize the current garbage and recycling collection vehicles and structure in order to meet the needs of the Town, its residents, and the State. With the implementation of unit based pricing it is best to keep the same collection system in place to avoid too much change at one time. The Town of Darien has a high homeownership rate and no poverty rate. These factors are important in developing a sustainable rate structure that will financially incentivize residents to make the long term behavioral changes needed to meet the state goals.

Design Structure Options

The Town of Darien residents contract private haulers for both trash and recycling. In order to for the town to sustainably reduce waste residents must understand that waste has a value. Some level of unit based pricing must be implemented. There are two options for the Town:

1. The Town can eliminate the tip cost to the haulers and create a unit-based bag cost for residential waste generation. This would be mandatory for all haulers that pick up residential material. The Hauler would in turn be responsible for a rate reduction to the homeowners reflecting the tip fee. The town can control this through its permitting process. As haulers renew annual permits the town would be responsible for reviewing their rate structure. This is not uncommon as it is seen in Cities like Portland Oregon and Seattle Washington. The hauler rate structure must follow town standards and will only reflect decreases related to tip costs. This can be determined easily, by the town, through the current tonnage records per registered hauler. This is actually a simple solution to waste reduction within the Town. A SMART program will not affect the haulers because they will continue to be contracted separately by residences, and continue to charge for collection and service. The Town could achieve this through a required Town bag which covers the cost of tipping.

2. The town can create an ordinance requiring haulers to use unit base pricing. The hauler would continue to pay the tip fee. In order to be registered in the town the hauler must submit to the Town a unit based pricing program. This is common in Colorado. This pricing must include the cost of recycling, collection service for trash and recycling, and tipping. Recycling service by the hauler would be free and the costs would be embedded into their unit based trash fee. This could be achieved through a hauler bag, sticker or billing system by the can. The hauler would be responsible for disclosing to the town all households that are utilizing its service in order to show that their system is achieving a benchmark per capita disposal.

A SMART (Save Money and Reduce Trash) program would create transparency and allow residents to control part of their trash bill. The town of Darien would benefit because they would have the ability to monitor the haulers' performance, and they would be able to meet the Connecticut recycling mandates. The goal of a SMART program is to demonstrate to the residents that there is a cost for disposal. 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. In order for a SMART (Save Money and Reduce Trash) program to be widely accepted residents must understand that they are paying too much overall for trash.

5.2 [A] Design Option 1: Official Town Bags

The Town would use a special colored trash bag to collect the unit-based charge that covers the cost of tipping.

How would this work for Haulers? The haulers would no longer pay a tip fee, and would be required by town ordinance to reduce average charges per household based on an average household tip cost. This cost could be determined through dialogue with the haulers. The Town can provide a questionnaire to haulers to help them determine how to reduce the tip cost. The Town would have to suggest a fair reduction in order not to adversely affect the haulers. Bags would be priced to cover the total tip cost for the Town. This option would still allow the use of current collection system. (private back door service).

How will the Town collect its tip cost? The tip cost would be collected through the sale of special trash bags. Haulers would no longer receive a disposal bill from the town.

Who is responsible for compliance?

- Haulers would be responsible for monitoring the compliance at a household level. It should be easy for the hauler to monitor since they pick up from the backdoor. If resident trash is not contained in appropriate official Town trash bag then the attendant will be responsible for tagging the trash with a

Darien Tag that explains the ordinance and warrents the homeowner. Two part tickets will be used and after the first offence the residence would be reported to the Town and the town would be responsible for enforcement with the homeowner. For residents that do not wish to go to the store to purchase bags, the hauler could place the residents trash in the appropriate bag and the cost would be added to their quarterly trash bill.

- The Town would be responsible for monitoring and enforcing compliance by the hauler. When the hauler brings the load to the transfer station they will be spot checked for compliance and a fine would be imposed for noncompliance. If the hauler delivers non-compliant trash to the transfer station, it will be easy to identify because it will be in special colored trash bags. There will be a system set up for some incorrect bags in the beginning. However, after a 4-week period hauler and resident will be expected to comply.

How would this benefit residents? Residents would have the advantage of only paying for what they throw. Smaller bags would allow elderly households or fixed-income individuals to save more. Part time residents would save. Residents that use the transfer station will no longer pay a fee. And instead will pay a bag cost for disposal. This is a change for the residents, however those that reduce well will save.

The bag program would have minimal initial investment and minimal capital expenses for bags The bags pay for themselves after the program begins and cash flow is established.

The following model assumes that all households participate. The *Town Ordinance* will require that all residential trash picked up in Darien must pass through the Darien Transfer Station, in order to have an accurate diversion rate for the state. This will allow the town to measure its progression.

Rate Structure Reduce the tip cost to haulers. Currently haulers pay \$98 per ton for tipping. This equates to approximately \$13 per month per household. Haulers would be required to lower monthly rates by approximately the (\$9-13) amount to the individual households. The official Darien Trash bags would cover the cost of tipping and therefore eliminate the need to collect tip fees from haulers. The haulers will continue to charge for special backdoor collection and for recycling but not include the trash tip cost. The town transfer station will also require that residents dispose of waste only in the proper colored trash bags. The Town will have a small surplus revenue from the bags which can be used for continuing recycling education as well as Town recycling projects. In order to price the bag correctly it is imperative to get accurate information from the haulers.

Image 14. Price structure tip cost is paid through bags

| Bag Program Two Tiered | | | | | | | | | | | | |
|-------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Projected Per Capita Disposal | 500 | 500 | 500 | 400 | 400 | 400 | 600 | 600 | 600 | 700 | 700 | 700 |
| Bag price | 1.00 | 1.50 | 2.00 | 1.00 | 1.50 | 2.00 | 1.00 | 1.50 | 2.00 | 1.00 | 1.50 | 2.00 |
| Revenue/ \$ | | | | | | | | | | | | |
| Trash Fee / base | - | - | - | - | - | - | - | - | - | - | - | - |
| Per household fee | - | - | - | - | - | - | - | - | - | - | - | - |
| Sale of Trash Bags | 426,087 | 639,130 | 852,174 | 340,870 | 511,304 | 681,739 | 511,304 | 766,957 | 1,022,609 | 596,522 | 894,783 | 1,193,000 |
| Increased Recycling Revenue | - | - | - | - | - | - | - | - | - | - | - | - |
| Total Revenue | 426,087 | 639,130 | 852,174 | 340,870 | 511,304 | 681,739 | 511,304 | 766,957 | 1,022,609 | 596,522 | 894,783 | 1,193,000 |
| Cost Reductions | | | | | | | | | | | | |
| Avoided Disposal Cost | 536,746 | 536,746 | 536,746 | 632,786 | 632,786 | 632,786 | 440,706 | 440,706 | 440,706 | 344,666 | 344,666 | 344,666 |
| Reduction Labor | - | - | - | - | - | - | - | - | - | - | - | - |
| Total Cost Reductions | 536,746 | 536,746 | 536,746 | 632,786 | 632,786 | 632,786 | 440,706 | 440,706 | 440,706 | 344,666 | 344,666 | 344,666 |
| Total Source of Funding | 962,833 | 1,175,876 | 1,388,920 | 973,656 | 1,144,090 | 1,314,525 | 952,010 | 1,207,663 | 1,463,315 | 941,188 | 1,239,449 | 1,537,666 |
| Cost of / \$ PAYT | | | | | | | | | | | | |
| Trash Bag Cost | 106,522 | 106,522 | 106,522 | 85,217 | 85,217 | 85,217 | 127,826 | 127,826 | 127,826 | 149,130 | 149,130 | 149,130 |
| Cost of additional containers | - | - | - | - | - | - | - | - | - | - | - | - |
| Cost of additional vehicles | - | - | - | - | - | - | - | - | - | - | - | - |
| Total cost program | 106,522 | 106,522 | 106,522 | 85,217 | 85,217 | 85,217 | 127,826 | 127,826 | 127,826 | 149,130 | 149,130 | 149,130 |
| NET | 856,311 | 1,069,355 | 1,282,398 | 888,438 | 1,058,873 | 1,229,308 | 824,184 | 1,079,836 | 1,335,489 | 792,057 | 1,090,318 | 1,388,536 |
| Budget | 1,016,946 | 1,016,946 | 1,016,946 | 1,016,946 | 1,016,946 | 1,016,946 | 1,016,946 | 1,016,946 | 1,016,946 | 1,016,946 | 1,016,946 | 1,016,946 |
| Difference | (160,635) | 52,409 | 265,452 | (128,508) | 41,927 | 212,362 | (192,762) | 62,890 | 318,543 | (224,889) | 73,372 | 371,630 |

How Does a Bag System Work?

Official Town bags would be purchased by the Town and then made available at local retailers (there are companies that handle this for the Town so it requires minimal effort). The Town should identify and contact the retailers that they would like to participate and create a standard letter to be sent out before 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 Town will want to make sure no local retailers feel left out. At the same time you want the number of stores to be manageable. Stores should carry the official Town 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 in the stores. The Town 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 A, Town Southampton NY, trash bag bid). There is also list of bag suppliers available on the Massachusetts state website.

The Town may be required to create an ordinance stating that residential trash must be placed in Official Town Trash Bags. The Town 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 are steady payers. Some of the smaller stores may need to be monitored carefully. It helps to create specific terms from the start and stick to them.

Summary Design Option 1

Benefits of the Bag System

1. The Town will be able to tell homeowners that they have helped reduced overall hauler cost, and therefore directly reduced their cost.
2. Residents can then pay as they go for what they use. Every household will have the same level of service through haulers, but all would have the opportunity to reduce and save.
3. The Town will not have to bill haulers for tipping at the transfer station and therefore will not have to worry about delinquent accounts
4. The Town will be able to control the residential waste movement by the hauler and comply with Connecticut regulations.
5. Town would benefit from access revenue from bag sales
6. Minimal up front investment, bags will pay for themselves within a few months.
7. Residents get a bag as part of the fee (they save on regular trash bags).
8. Single and elderly residents can save more (fairest option).
9. Fix-income residents could qualify for discounted or free bags.

Challenges

There are a few challenges with the bag system:

1. Initial expense for trash bags
2. The Town will have to work with haulers to estimate cost reductions.

5.2 [B] Design Option 2: Create an Ordinance that requires each hauler to set up their own SMART structure

Each Hauler can create their own SMART Unit Based Pricing Structure:

How would a hauler program work? The haulers in Darien pick up from the back door from each household. This level of service lends itself to a hauler program. The hauler would create a unit program using a bag or sticker similar to the above option. It would be their bag or sticker and would be purchased directly by the residents through the hauler. For instance in Holland, Michigan a hauler uses a paper door hanger as a form that residents leave out when they are out of bags or stickers. The hauler drops off extra bags and then bills the customer accordingly. The program could also be managed through a container billing system, since service is back door the hauler could charge a base fee and then bill by the container for each container placed out for pick up. This option leaves all the responsibility on the hauler. Hauler performance would be evaluated annually during waste audit. Haulers would be required to meet a benchmark waste reduction or they will not receive a permit in the Town for the following year. Or they would have the option to re-design their unit-based program. The new program would then have to be approved by the Town.

How would the rate structures work for the hauler? Haulers have the flexibility to design their unit-based program around their customers service needs. The hauler has the option of including all or part of their cost in a bag, or a sticker, or a container, keeping the remaining cost in a standard monthly fee. The Hauler should design a structure proportional unit pricing to incentivize residents to reduce the trash volume and increase recycling, reuse, and source reduction. The haulers would be subject to a rate structure review board annually before they are permitted. The review board can be appointed by the town to assess the hauler rate structure. The haulers would also be subject to waste audits and be required to provide the town with a list of customers.

Is there a simple inexpensive option for the hauler? . A two-part sticker or ticket for a standard size bag or container could be used. The attendant could assess the trash by bag or container and leave a receipt for total usage. There would have to be some set rules in order for the hauler not to exceed the per capita limit.

Rate Structure would be determined case by case. Similar structure to Image 14 could be used for 32 gallon bags, containers, or stickers. A base fee + a variable cost for the total volume disposed.

Benefits

1. Every household would receive the same base level of service, but all would have the opportunity to save by reducing.
2. The hauler would be able to control the program design.
3. Residents would not have to purchase bags at stores (possibly more convenient for residents)

Challenges

There are a few challenges with the overflow:

1. More cumbersome and costly for hauler due to a complicated billing system and possible purchasing of bags.
2. Town would have to work closely with haulers during implementation and annual reviews.

3. Town would have to enforce the haulers if they are unable to reach the per capita diversion goals set by the town.

5.3 Secondary Effects of SMART

Logistical savings to the haulers: The Hauler 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 hauler to make future logistical changes that should be favorable to their bottom line. The hauler will adjust routes in order to adapt to the new material streams, because they are hauling less trash they will need to make less stops at the transfer station.

More control over garbage flow

Increased commodity recycling levels and revenue by the Town

Stable income for the town.

Overall Reduction in Greenhouse Gases: Waste reduction through recycling, reuse and source reduction conserves energy and natural resources. Diverting an additional 5,000 tons from the waste stream will reduce GHG levels in the Town by approximately 13,500 tons of MTCO₂ per year. This is the equivalent of 2,400 cars off the road annually

5.4 Program Details

Compliance of Bag Program

If household trash is not in the Official Town trash bags after first warning, it will be labeled with a town sticker and left behind. The Town will be responsible for visiting the home and inspecting the trash. Haulers will be accountable for compliance and there will have to be a penalty/fine set up for non-compliance by households and haulers.

Compliance of Hauler Program Annual review of per capita disposal would take place on a specified due date. The hauler would be required to meet an agreed upon benchmark. Non-compliance would be met with termination of permit for hauling in Darien. The town could then suggest a specific program for the hauler to follow in order to continue doing business in the Town.

Bulky Items and Large Loads at the Transfer Station

The Town 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 2 stickers and an oven might equal 3 stickers. The Town should have some system in place upon implementation of the 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 Town could just charge a small fee of \$5.00 for a refrigerator just to cover part of the handling expense. Similarly carloads of materials from someone cleaning out the garage should be weighed or assed a nominal fee. The Town 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.

Summary

The Town of Darien has two choices for implementation:

1. Create an ordinance that requires haulers to set up their own approved unit based pricing structure
2. Eliminate the tip cost to the haulers and reduce the sticker cost to residents. Create a unit based structure through an official bag.

SMART waste management is a clear solution to decreasing waste volume and residential disposal costs. Waste reduction and recycling are part of the State's long-term sustainability objectives. Waste reduction through SMART waste management will save taxpayers money through avoided disposal costs. 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 environmental difference to themselves and the region.

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 Town'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 Town of Darien 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 State's objective of creating a successful, sustainable, user-friendly, cost effective residential waste reduction program while working within the current collection infrastructure. SMART would also help Darien comply the state's trash flow reporting objectives.

Recommended Actions

1) Create an Official Advisory Committee to explore the two design options for the implementation of SMART. This Committee would be a communications link between the needs and concerns of both residents, haulers, and the Town officials. The members should be comprised of a combination of residents, Town officials, haulers, and employees, and haulers. Committee members should bring experience in areas like legal, PR, marketing, and education. The objective of the committee should be to choose one of the two recommended options in this guidebook or recommend an alternative option that will provide equivalent waste diversion. The committee should have a time limit of three months.

2) After the Committee has reached a decision to move forward with SMART, the committee can remain involved and create sub-committees to handle the implementation details.

A. Outreach phase: The Advisory 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, 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.

B) Implementation Phase: Advisory Committee would act as the 'go to' group, charged with keeping the Town 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 bags and or containers.
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.
 - Work with Salvation Army, Goodwill and local charities to create additional drop off locations or a bag system such as NJ.
 - 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."
 - Work with groups like Got Books, and electronics manufacturers to take back additional items that can be reused, or recycled.

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

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

4) Begin an enterprise fund for the collection of revenue from bags as the mechanism for funding the tip cost to the Disposal Facility (City Carting). The enterprise fund could also be used to capture additional recycling revenue from the increased stream of material (if commodity market prices increase this could be significant). The rate structure is based on estimates, if there is additional revenue in the fund it could be used for specific community projects. The surplus should be attributed to the residents waste reduction and recycling efforts, so they can see the benefits of their actions.

5) Address bulky items at transfer station drop off. The Town should decide weather to charge for bulky items and carloads from people cleaning out their garage etc.

6) Address Yard Waste. Consider if yard waste contained in an Official Bag could create additional revenue.

7) 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 Town of Darien 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 Town through the implementation process. Generally a four to six month period is ideal.

Phase 1 – Organization

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.

Phase 2 – Education

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

Phase 3 – Implementation

1. Mail fee and or 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.

Phase 4 – Follow up 2010

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

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