Seattle Solid Waste Recycling, Waste Reduction, and Facilities Opportunities

VOLUME 2

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Prepared for

Seattle City Council
and
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Volume 2

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“A” Strategies

Mandatory Commercial Recycling Container (#108)

Description

Expand commercial recycling program by implementing a mandatory recycling container requirement. This requirement would be implemented contractually for all businesses producing more than 10 cubic yards of waste disposal weekly. This option could be implemented as a component of a commercial recyclables disposal ban (see option # 349).

Background

Mandatory commercial recycling bins have been considered and recommended as a strategy to increase diversion in other municipalities. This strategy was considered in a City of Fort Collins, CO study and was projected to result in a very high level of diversion of traditional recyclables from the commercial sector waste stream, as high as 33% from the participating 15% of businesses subject to the requirement. Diversion levels this high are not likely attainable for commercial businesses in Seattle, as existing recyclables diversion generally already exceed 50% for most recyclable material categories. However, for the purpose of this analysis it is assumed that the projected levels of effectiveness demonstrated in Fort Collins when translated to Seattle will result in recovery of an additional 1/3 of the recyclable materials currently being disposed.

Materials Involved

Traditional Recyclables: All paper (accept other), container and beverage glass, food cans, other ferrous metals, and aluminum cans.

Implementation Timeframe

Implementation Year: 2010 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
Traditional Curbside Recyclables	90%	33%

Diversion Potential

30% recovery rate, up to 20,943 tons by 2038 (1.75% of total waste stream)

Cost

Projected costs are assumed to be strictly programmatic. Capital and variable costs will be on the contractors.

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$65,150*	$65,150*	$65,150*	$65,150*	$65,150*
Capital 10 Yr.	$0					
Capital 25 Yr.						

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

* Escalates annually at 80% of CPI

Environmental Benefits

- Reducing the volume of waste sent to landfills and incinerators, which results in fewer methane emissions from landfills, and reduced carbon dioxide and nitrous oxide emissions from combustion.

- Minimizing the demand for virgin materials, thereby reducing energy consumption to extract, process, and manufacture the products from those virgin materials. The reduction in energy use minimizes fossil fuel consumption, thus resulting in fewer emissions of carbon dioxide and nitrous oxide.

- Slowing the logging of trees and hence maintaining the carbon dioxide storage capacity provided by forests.

Action Feasibility

Implementation of contractual requirements is easily achievable. The contractual requirement should be structured to accommodate special case businesses facing logistical problems with implementing this collection strategy (e.g., insufficient space or access for the container requirement.

Risk of Not Achieving Results within Timeframe

This option is highly sensitive to the assumption that 33% additional recovery of currently disposed recycled materials can be achieved. Inherent in this assumption is the supposition that businesses subject to this proposed requirement are currently disposing of a large amount of recyclable materials. Should this assumption prove to be inaccurate, this option may fail to achieve the diversion levels anticipated. However, even if only low levels of diversion were realized this option would still prove cost effective because the costs to SPU for administration are low.

Pros:

- Low cost approach for achieving potentially significant diversion rates
- Option likely to prove cost effective even at lower than projected diversion rates

Cons:

- Option would increase SPU compliance monitoring and enforcement requirements
- Some commercial sites may not have suitable enclosure space or collection access necessary to meet requirement
- May encounter resistance from the commercial business community
- Would require changes in collection strategy, and in some cases possibly capital costs for new collection bins

Assumptions

- Materials recovered include all paper categories accept "Other" which are assumed to include non-recyclable food soiled materials
- Implementation and ramp up time frame are based on timeframes required for regulatory bans (e.g., option #349), which are assumed to be similar to those necessary to implement contractual requirements
- Participation and efficiency rates are assumed based on ratepayer acceptance surveys conducted for this and other strategies in Fort Collins, CO (SERA 2006), which found that a high (50% to 85%)

to very high (>85%) proportion of businesses would accept increased requirements and a modest increase in rates to increase recycling

- Total diversion rates assume recovery of an additional 1/3 (33% of commercial sector recyclable materials that are currently being disposed, for a total of 15,543 tons based on SPU 2003 60% projections (SPU 2003)

- Costs to SPU are estimated to be very low (<$50,000/year), based on the estimated implementation cost for this strategy in Fort Collins ($1/ton) (SERA 2006) and the total anticipated diversion tonnage (see above)

- Ratepayer costs are expected to be very low (up to $25/ton) based on projected costs for implementation of similar option (SERA 2006)

References

Skumatz Economic Research Associates, Inc (SERA). 2006. Fort Collins Solid Waste 5-year Plan: Strategies to Reach 50% Diversion from Landfill Disposal (Draft Report). Prepared for City of Fort Collins. February 8, 2006.

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Rate Structure Review for Commercial Organics Collection (#118)

Description

Review the rate structure for commercial organics collection. Increase participation in organics collection by raising the variable rates for garbage can sizes through a two-tiered or multi-tiered system. With a two-tiered or multi-tiered system customers pay a flat fee for a base level of service, and then pay a "second-tier" fee based on how much waste they set out. Second-tier fees can be either a proportional or variable rate. The rate structure proposed by this option would allow commercial customers to pay a lower unit rate for higher quantities of organics.

Establishing a rate system in which an increasing quantity of garbage raises the per-unit rate of garbage disposal is supplemented by decreases in the per-unit rate with an increasing quantity of organics, creates an incentive for commercial customers to divert waste from the garbage disposal stream into the organics disposal stream. By diverting the organics that were previously in the waste stream into the organics container, the customer can pay for collection and processing at a lower rate. This lower rate equates to a cost savings for the customer and an increase in the production of high quality compost material.

Materials Involved

Commercial Organics (food waste, yard waste, and other compostable materials such as soiled paper and cardboard)

Implementation Timeframe

Implementation Year: 2011 Ramp Period: 10 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
Organics	20%	50%

Diversion Potential

10% recovery rate, up to 8,681 tons by 2038 (0.72% of total waste stream)

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M	$0	$246,200	$246,200*	$82,067*	$82,067*	$82,067*
Capital 10 Yr.	$0	$0	$0	$0	$0	$0
Capital 25 Yr.	$0	$0	$0	$0	$0	$0

* O&M costs escalate at 80% of CPI.

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton	$0	$0	$0	$0	$0	$0

Action Feasibility

Proposed action is feasible and has a reasonable probability of success. Rate payers' incentive to save money by reducing waste has been successfully proven through economic and statistical techniques used to measure source reduction (SERA, 2000).

Risk of Not Achieving Results within Timeframe

Proposed action is considered to be low risk given success in other jurisdictions and can be implemented immediately.

Pros:

- Increased participation in commercial waste reduction
- Increased landfill life by reducing disposal quantities
- By staying with a volume-based unit rate system, the City would not be required to invest much money to implement this option.
- Generation of high quality compost material that can be used for agricultural production.

Cons:

- A static waste disposal bill may not deter businesses with higher incomes, who most likely are the higher waste generators. Businesses will need to make room for and encourage the use of organic disposal bins. This will be and additional upfront cost to the business.

- Potential loss of revenue to the City (and their contractors), due to the diversion of more organics away from the garbage stream.

- Potential for inadvertent or intentional improper diversion of materials into the organics dumpsters and drop boxes by businesses that want to take advantage of the lower organics collection rates.

- Designing transfer stations to handle the additional volume of organics may result in upfront costs.

Assumptions

- Both theory and empirical evidence indicate that people tend to recycle more as garbage rates increase (SPU, 2004). The tendency to recycle more as garbage rates increase is driven by the behavior of the rate payer to save money. By reducing the total volume of garbage rate payers will pay a lower disposal fee.

- The City would use a volume-based unit pricing (based on dumpster or drop box size).

- The City would use the same size commercial compost dumpsters and drop boxes currenlty offered.

- Labor demand on City will will be reduced by two-thirds starting in Year 3 of the program. The initial 2 years of the program will demand more City time for planning and evaluating the program.

References

Canterbury, 1999. Designing a Rate Structure for Pay-As-You-Throw. Public Works Magazine. Canterbury, Janice. May 1999.

SPU. 1998 revised 2004. Seattle's Solid Waste Plan: On the Path to Sustainability. City of Seattle's Recycling Potential Assessment/System Analysis Model (RPA).

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EPA. Pay As You Throw:
http://www.epa.gov/payt/top15.htm
http://www.epa.gov/payt/tools/bulletin/bullet.htm#1

Multifamily Residential Organics Program (#123)

Description

Make source separated organics collection available to the multifamily residential sector. Program may be voluntary, incentive based, or could include a regulatory ban (see option #182). The Halifax Regional Municipality in Nova Scotia, the Nanaimo Regional District in British Columbia, the City of San Francisco and several other municipalities have successfully implemented multifamily organics programs. In the case of Halifax and Nanaimo, regulatory bans were used to increase participation. In the case of San Francisco, a modified garbage fee structure was used to incentivise increased participation.

The Canadian models place responsibility on multifamily dwelling owners and managers to provide facilities and information necessary to increase compliance. Regulatory mechanisms are in place to penalize offending occupants as well. The San Francisco model relies on a fee structure that encourages reductions in garbage waste and increased source separation of organics and compostable paper. All systems use a source separated three stream collection strategy.

Materials Involved

Organics: Food Waste, Compostable/Soiled Paper

Implementation Timeframe

Implementation Year: 2008 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Residential		
Organics, including food waste, misc. organics, non-distinct fines, compostable/soild paper, leaves and grass, and prunings	20%	50%

Diversion Potential

10% recovery rate, up to 3,331 tons by 2038 (0.28% of total waste stream)

Cost

O&M costs required for program advertising and education, monitoring, and enforcement actions as necessary. Capital costs required for distribution of new bins to some residential users. Increase in variable costs per ton anticipated due to change in collection strategy (weekly collection of organics and garbage stream.

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$312,070*	$312,070*	$312,070*	$312,070*	$312,070*
Capital 10 Yr.**	$191,250**					

* O&M costs escalate at 80% of CPI

** Total Capital cost to be amortized over 10 years at 7% interest.

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$10*	$10*	$10*	$10*	$10*

* Variable costs per ton escalate at 80% of CPI

Action Feasibility

Proposed option is feasible based on experience in other jurisdictions, with high likelihood of success (i.e., low risk).

Risk of Not Achieving Results within Timeframe

Highly variable receptacle enclosure configuration in multifamily residential buildings may make collection strategy design a challenge. Considerable work with haulers and the multifamily sector, including pilot studies, may be required to develop an ideal strategy.

Pros:

- Multifamily residential organics programs have achieved high levels of participation and efficiency in other jurisdictions
- Moderately high participation and efficiency rates could achieve diversion of up to 10% of the waste stream

Cons:

- High initial capital costs for bin purchase and distribution

- Waste receptacle enclosure configuration will be highly variable, creating potential problems with bin selection and distribution

- Requires alteration of collection strategy to allow for weekly pickup of organics

- Higher rates of contamination with non-compostable or non-suitable materials are likely to occur

Assumptions

- Program assumes a voluntary or incentive based program with all source separated organics collected weekly with garbage (i.e., does not consider possible bi-weekly collection of garbage to encourage increased organics participation).

- Participation rates based on observed change in single family residential organics management participation for people not composting at home (FBK 2006):

  - Number of households using the trash for food waste fell from 75% to 38% between 1995 and 2005 (remainder used home composting assumed not to be available in multifamily dwellings)

  - Assume an increase of 20+% would result from implementation of a non-mandatory multifamily program.

  - Assume an additional percentage would separate organics at least some of the time.

  - Note that higher participation rates (up to 90%) have been achieved in other municipalities through regulatory bans (Tools of Change 2000, Stanley 2007).

- Efficiency rates of ~50% based on experience in San Francisco with voluntary incentive based program (Haley 2006) and general assumption.

- Total targeted multifamily compostable waste stream estimate of ~25,670 tons (in 2012 at full ramp up) based on:

  - Current food waste disposal of 15,878 tons (SPU 2004)

  - Current yard waste disposal of 1,758 tons (SPU 2004)

    - Compostable soiled paper disposal of 3,075 tons (SPU 2003)

- Total diversion estimate of ~2,567 tons (in 2012 at full ramp up) based on estimated potential waste stream 20% participation 50% efficiency

- O&M costs based on RPA Program #5 expanded apartment recycling (SPU 1998) escalated to 2006 USD at 80% of CPI, assuming that program advertising, educational materials and staff coordination costs would be similar for an expanded organics program

- Year 1 O&M costs include estimate costs for pilot studies to determine the best configuration for multifamily residential organics service.

- Capital costs for distribution of new bin systems to the multifamily residential sector based on:

    - The estimated 139,000 multifamily residential units in Seattle (OFM 2000), 18 units per building (DPD, 2006), and 20% participation.

    - Capital costs of $25 for each multifamily 32 gallon toter

    - Total purchase costs of $191,250 amortized over 10 years at 7%.

- Variable costs based on RPA program #63/#64/#65 options 398/399 (SPU 1998), weekly co-collection of source separated garbage and commingled yard and food waste, escalated to 2006 USD at 80% of CPI.

References

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HRM. 2006. Halifax Regional Municipality, commercial and residential waste management information. Website viewed on November 30, 2006. Last updated January 15, 2007. Http://www.halifax.ca/wrms/index.html.

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O.I.C. 2002. Nova Scotia Solid Waste-Resource Management Regulations. S.N.S. 1994-95, c. 1 O.I.C. 96-79 (February 6, 1996), N.S. Reg. 25/96 as amended up to O.I.C. 2002-94 (March 1, 2002), N.S. Reg. 24/2002. Website viewed on January 9, 2007. http://www.gov.ns.ca/JUST/regulations/regs/envsolid.htm

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Stanley, Allen. 2007. Director of Solid Waste Management Organics Program, Regional District of Nanaimo, British Columbia, Canada. Telephone conversation with Eric Doyle, Herrera Environmental Consultants, January 16, 2007.

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Commercial Weight-Based Garbage Rates (#124)

Description

The implementation of a commercial weight-based garbage rate structure includes the billing of a commercial customer for the actual waste set out for collection on a weight basis. This collection-billing method would be implemented with the aim of changing customer behavior in increasing their waste reduction and recycling activities in order to save money.

Background

Research conducted for this option analysis did not identify any commercial weight-based garbage rate programs, but it did yield residential programs. The principles and components required to implement a weight-based program is the same for a residential program as it would be for a commercial program.

From February 1990 through March 1991, a pilot program was conducted to study the weight-based garbage billing for select residential collection routes in the City of Seattle (City). The program was designed to identify technical, labor, time, legal, and cost barriers to a weight-based system. The program was considered a success, because it met the following objectives:

- The project showed general feasibility and promise, and found that the obstacles were small.
- Other cities became interested in the concept.
- Truck, scale and identification manufacturers became interested in the concept and in developing appropriate technology.
- Customers did not react negatively to the concept.

The City selected routes within their normal collection routes and notified customers that they were to be part of the pilot program. Residential customers received bi-weekly mock garbage collection bills. These bills provided customers with information about the number of pounds of waste in their garbage cans for the previous two weeks. In addition, a comparison was given between the amount they were paying for their variable can garbage subscription service level and the amount that they would have paid had the weight-based rates from the experiment been in effect.

Garbage collected on the selected routes were weighed via a static weighing system, initially, and then a dynamic weighing system toward the end of the project. The customer was identified with bar codes on their waste containers and the weight information was fed into the database system using a bar code scanner. The static weighing configuration slowed the collection process down by about 10 percent additional time. Once the dynamic weighing system was used, the collection process was performed quicker. The program used crude weighing systems, but since the program several manufacturers have been driven to improve prototypes to meet the demands of a fully functioning system.

The customer was charged in the mock bills using a rate structure similar to that of other traditionally metered utilities (electricity and water). The rate structure comprised of a fixed customer charge and a two-tiered "block rate" system. Customers were charged a weekly minimum customer charge and were assessed a lower rate per pound for their first 25 pounds of waste and a higher per-pound rate for levels above 25 pounds. Structuring the rates in this manner ensured a stronger recycling incentive was provided for high waste generators.

Tonnage and revenue results of the program are summarized in Table 1. Besides the increase of waste reduction, customer feedback was also very positive. Customer feedback is summarized in Table 2.

Table 1. Tonnage and Revenue Results of Seattle Pilot Program

Tonnage Results	Tonnage on a per-household basis decreased over the period of the experiment for pilot project customers, with a decrease of 0.3 pounds or 1.4 percent per week. This represents a 15 percent drop in the average number of pounds per household over the course of the experiment.
	Mini-can (19-gallon) customers decreased their weekly weight from 15 pounds to approximately 11.5 pounds.
	One-can (30-gallon) customers decreased their weekly weight from 25 pounds to 21.1 pounds.
	Two-can (30-gallons per can) customers decrease was not found to be significant.
Revenue Results	Customer revenues to the City would have been about 3 percent lower than the existing variable can rates.
	Customer bills would have been reduced by about 1 percent per week over the course of the experiment.

Table 2. Customer Feedback Regarding Seattle Pilot Program

Customer Feedback	
Satisfaction Level	Almost 40 percent were very satisfied with the experiment.
	19 percent were moderately satisfied.
	8 percent were dissatisfied.
	33 percent were neither satisfied, dissatisfied, nor declined to respond.
Preferred Rate System	54 percent preferred the weight-based system over the variable can system.
Cost to Implement System	About 66 percent felt that if it were more expensive to operate such a rate system, additional City funds should not be spent.
Incentive to Reduce/Recycle	Almost 48 percent of the customers felt the pilot program provided them with an incentive to reduce waste and recycle.
Popular Features of Pilot Program	Paying for only the amount of waste in the can.
	Saving money on the garbage bill.
	Seeing clearly what is being paid for.
	Providing a reminder to reduce waste.
	Not paying the same as someone who overstuffs his or her garbage can.
Unpopular Features of Pilot Program	Costs might increase.
	Garbage might be weighed incorrectly.
	Other people might put waste in the can for which the customer would have to pay.
	It is complex, cans might be moved, or it is too much work for garbage collectors.

Pilot programs, outside of Seattle, have also been performed. The programs are listed below (Skumatz, 1995).

Columbia, South Carolina

The pilot program began in the spring of 1994 with 500 households located throughout the city. Data for bills were collected for about 165 households. The system uses a modified semi-automated rear-loader with a 25 cubic-yard body. An RFID tag attached to the roll-cart dumper reads the RF tags just below the upper lip of the roll cart. A computer located in the cab of the truck maintains the data. Production (stops collected per hour) during the pilot has kept pace with pre-pilot rates, and the equipment is submitted for certification.

Durham, North Carolina

Durham began a pilot, weight-based system with 2,800 households in 1992. The system used a semi-automated scale with a poly coder and bar-code scanner. In a six-month field test, the system performed well and proved durable in all sorts of weather extremes. It was then demonstrated in the lab and field for state and federal weights-and-measures officials. In the first set of tests, the scale produced consistent accuracies of 0.1 to 0.3 pounds in level conditions (within the required 0.5 pounds), but the scale did not produce sufficient accuracy at the required 2 to 3 degrees off-level. The manufacturer of this system has since solved this problem. As of spring of 1994, the scale has been certified, but given the time involved, the staff have currently given up trying to get the Council to accept a variable-rate system.

Victoria, Capital Regional District, British Columbia

One of the most extensive pilot tests for weighing residential waste took place in 1995 in the Capital Regional District (CRD) of Victoria, B.C. In the CRD municipality of Oak Bay, the collection staff tested prototype equipment to simultaneously weigh and collect three different residential waste streams. In the comprehensive pilot program, the CRD staff worked with a new truck capable of collecting and weighing refuse, nonglass recyclables, and organics in one stop. The truck is an innovative new triple-packer truck with three packing bins and three tipping arms, each of which is modified with load-cell weighing technology and RFID technology. The pilot customers received special carts with RF tags. The system recorded the weight of the contents, the type of material, and the generator and address; this information was then downloaded to computer. This automated system also downloads the weights remotely through a radio system to a computer downtown at headquarters.

The pilot test was made available to all citizens of Oak Bay on a volunteer basis, and 65 percent of the residents opted to participate. Weight-based billing is one of the many diversion incentives that the CRD is examining to push residents toward diversion goals of 50 percent for 1995. Expenses for the pilot test were $325,000, including $100,000 for the new truck. The truck manufacturer provided substantial technical assistance and test carts for below cost. The pilot ended the same year and the equipment was removed. The District hoped to implement the system throughout the Capital Regional District in a three- to five-year horizon from 1995.

Mendham Township, New Jersey

In 1992, Mendham Township implemented a weight-based variable rate system. Rather than charging customers based on the number of pounds, Mendham incorporated a variation that charges customers in 15-pound increments. Customers buy stickers at $1 per 15 pounds and attach the number of stickers needed to "cover" the waste in the container. Although customers need to estimate the number of pounds in a container, the system provides an innovative way around the problems associated with billing and revenue collection (stickers are prepaid). The sticker cost covers the disposal cost of the waste. This system, along with a switch from twice to once-per-week service and a recycling program, is credited with reducing annual, tax-funded costs per household by about half, increasing recycling by 83 percent, and decreasing disposal tonnage by 55 percent.

Milwaukee, Wisconsin

Milwaukee's system includes retrofitted semi-automated tippers. Instead of identifying the carts via RFID, Milwaukee is using a computerized routing system in which the routes are read, in order, into the computer, and the computer scrolls the address to the next house at each stop.

Farmington, Minnesota

Farmington wanted to become the first municipality to implement weight-based rates, but because of technological setbacks and ultimately unsuccessful redesigns, the city has ceased working on the system. The city attempted to develop a fully automated collection system, and over the last few years worked with several different companies toward that goal. Occasional field tests were conducted on various combinations of system components with Farmington's modified, fully automated rapid rail collection truck. At least one test operated fairly successfully, except for the electrical problems produced by the abusiveness of field conditions. The static weighing mechanism that Farmington was working on required a two-second pause in tipping cycle. They tested two types of identification and data storage: 1) radio frequency cart identification; and 2) fixed bar-code scanner reading an onboard route sheet. Farmington has experienced retraining difficulties and opposition from collection personnel. At various points, the city has estimated that a fully developed system could cost between $10,000 and $12,000 per truck with an additional $7,000 to $9,000 for office equipment.

Minneapolis, Minnesota

Minneapolis ran a small pilot test of a weight-based system in the spring/summer of 1993. They installed load cells on two semi-automated lifters, and used RFID for can identification, read by an antenna. The system weighed before and after dumping, and the information was stored in an onboard computer that was downloaded in the evenings. They found the system showed good reliability and accuracy, but they did not feel their trial was long enough to determine how well the system would ultimately work. They were concerned that performance would be affected by a wide range of factors, including continuous movement, angle of collection, wind speed, speed of dumping, and relative amounts of refuse. The city, which simultaneously examined alternative, volume-based (variable can) options, is not planning to implement the system at this time. They decided that customers might not like the new system and might complain.

Denmark

A fully automated system (with carts similar to 90-gallon) was used in a community in Denmark, charging 2 kroner (35¢) plus tax per kilogram for garbage collection, and recycling collection at no charge. The name and address are attached to the container, and the garbage weighed and recorded by the electronic database in the truck. The community found that people were content with the system. The weighing and recycling programs were reported to have cut by half the amount of garbage having to be burned in the community.

Australia

In 1994, a city in Australia conducted a small trial system for residents. Single-family dwelling waste was weighed. The system used computerized identification tags fitted to residents' rubbish bins. The weight of cans and the address of the stop were read as they were emptied into the garbage truck. Residents received regular statements throughout the year informing them of the quantity of their waste, how much they could be expected to charge for that quantity, and how it compared with other set-outs in the community ("mock bills"). Residents also received waste reduction educational materials. The weighing technology developed for the trial was proven not to be accurate over the course of the project and the boundaries of the city changed during the experiment, placing the households outside the confines of the city. For these reasons, they decided not to proceed with implementation of a weight-based program.

Although the pilot programs have been conducted for residential customers, the same principles and components of implementing a weight-based commercial rate structure would still apply. The feasibility of implementing this system is dependent on the weighing system technology available for City collection trucks and the legal issues associated with certifying the weighing equipment for the purpose of billing.

Commercial customers typically are interested in turning a profit. If this rate structure is implemented, commercial businesses will perceivably be open to waste reduction and recycling if it results in cost-cutting in their operational practices.

Materials Involved

Commercial MSW

Implementation Timeframe

Implementation Year: 2020 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
MSW	4%	50%

Diversion Potential

2% recovery rate, up to 2,946 tons by 2038 (0.25% of total waste stream)

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M	$0	$269,350	$269,350*	$269,350*	$89,783*	$89,783*
Capital 10 Yr.	$0	$0	$0	$0	$0	$0
Capital 25 Yr.	$0	$0	$0	$0	$0	$0

* O&M costs escalate at 80% of CPI.

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton	$0	$0	$0	$0	$0	$0

Action Feasibility

Proposed action is feasible and has a high probability of success, but it is very dependent on the available weighing system technology, which would have to be outfitted on collection trucks, and the ability to certify weighing equipment. Rate payers' incentive to save money by reducing waste has been successfully proven through economic and statistical techniques used to measure source reduction (SERA, 2000).

Risk of Not Achieving Results within Timeframe

Proposed action is considered to be medium risk for the commercial sector given its success in the residential sector. It will also take a long period of time to implement, from present year.

Pros:

- Increased participation in commercial waste reduction
- Increased participation in commercial recycling

- Increased landfill life by reducing disposal quantities

- Weight-based system can evolve with the customers and provide a waste disposal system for the longer term. With time, customers become more educated about recycling and waste reduction and use waste reduction and recycling programs and alternatives with increasing frequency. The built-in flexibility of the weight-based system can provide incentives down to very small increments of waste amounts, allowing for the ability to progressively reward the customer.

Cons:

- Medium risk due to capital costs and the fact that customers and collectors may not support the program.

- Significant capital costs to implement program.

- Requires significant programmatic accounting changes.

- Heavily dependent on existing weighing systems required for collection trucks.

- Potential legal issues in certifying weighing systems.

- Slower collection times compared with the existing rate system. This may be remedied by breakthrough technology (dynamic weighing systems).

- Potential for increased illegal dumping by businesses that have no interest in waste reduction or recycling.

- Potential for increased billing disputes, due to claims by customers that wastes are incorrectly weighed.

- Because Seattle pilot program was conducted 16 years ago, there is a potential that commercial customers will not be open to change the current system.

Assumptions

- Using research on weight-based rate structure is a good resource to determine how customers will respond to changes in their garbage rates.

- Both theory and empirical evidence indicate that people tend to recycle more as garbage rates increase (SPU, 2004). The tendency to recycle more as garbage rates increase is driven by the behavior of the rate payer to save money. By reducing the total volume of garbage rate payers will pay a lower monthly disposal cost.

- Capital costs are only incurred by contractor, not the City, including but not limited to collection vehicles with scales.

- Labor demand on City will be reduced by two-thirds starting in Year 4 of the program. The initial 3 years of the program will demand more City time for planning and evaluating the program.

References

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Skumatz, 1995. Garbage by the Pound: On the Streets. Study No. 184. Skumatz, Lisa A. February 1995.

SPU. 1998 revised 2004. Seattle's Solid Waste Plan: On the Path to Sustainability. City of Seattle's Recycling Potential Assessment/System Analysis Model (RPA).

Other Disposal Bans (#152)

Description

The city of Seattle could expand the existing disposal ban by including additional items. The enactment of a disposal ban is one of several cost-effective methods used by local governments to divert material from landfills. Disposal bans forbid disposal of certain materials and/or of loads containing a given percentage of those materials.

The existing ban targets a waste stream already being diverted to an established, local market. A substantial percentage of the community voluntarily diverted the banned items well before the ban was enacted (since 1989), with a diversion rate of 57% residential and 37% commercial (2003). The success of the program has been favorable with an existing market, education outreach program, and a history of community participation. The act of education is the primary means of enforcement rather than the use fines or penalties. Banning items that historically have not been recycled on a large scale would likely require increased public education, coordination and input from stakeholders and market infrastructure development. Unlike the current disposal ban, it is likely that any new bans will be a lengthier process and will result in higher initial costs.

Background

Seattle's main enforcement mechanism is through education. This method is considered the most effective tool in lieu of other enforcement programs. To reach a goal of zero waste, both homeowners and business owners need information to allow them to fully understand local recycling ordinances and to learn of additional ways to influence the outcome of the program. Educational materials typically include sector specific brochures that explain recycling preparation and opportunities.

To promote the recycling ban for residential (traditionals and yard debris) and businesses (paper, cardboard and yard debris) that went into effect on January 1, 2005, Seattle Public Utilities implemented an educational outreach program through direct mail to residents and businesses in 2004. A new, automated (206) RECYCLE phone number was established to help answer basic questions about the recycling requirements for single-family residents, apartment dwellers, businesses and self-haul customers to the City's Recycling and Disposal Stations.

As of January 1, 2006, under City of Seattle Ordinance #121372 (Administrative Rule SPU-DR-01-04), banned items recycling enforcement went into effect. Single-family residents are denied services through the contracted haulers if their garbage contains significant amounts of recyclables. The contractor tags the noncompliant canister instructing the customer to separate out the recyclables and place the container out at the curb for collection the following week. If apartment owners, property managers, business owners, and property managers are non-compliant, city inspectors mail the garbage account holder two warning notices before a $50 surcharge is added to the building's garbage bill. Warnings, denied services and tagging have occurred since recycling enforcement went into effect. No surcharges have been issued.

Residents (both single-family and multi-family)- All residents are prohibited from putting significant amounts of paper, cardboard, glass and plastic bottles and jars as well as aluminum and tin cans in their garbage containers as of January 1, 2005. Yard debris has been prohibited from residential garbage since 1989**.** There is the exception of contaminated and food soiled paper.

Commercial – All businesses are prohibited from disposing of significant amounts of paper, cardboard and yard debris in the garbage as of January 1, 2005 with exceptions based on adequate space for recycling as determined by SPU inspection, Garbage dumpsters that receive waste from the public, and contaminated and food soiled paper.

Self-Haul Customers at the City's Recycling and Disposal Station - All self-haul customers are prohibited from disposing of significant amounts of recyclable paper, cardboard and yard debris in the garbage pit. Ash, Tires and Carpet?

Other Considerations

- **Tolerance Level:** Zero tolerance is politically difficult to enact though it is easier to prove noncompliance. Typically, a specified amount remaining in the disposal stream is allowed. Seattle's current disposal ban allows up to 10% of the prohibited waste stream to remain in garbage canisters.

- **Point of Compliance/ Inspection:** Compliance can be determined by visual inspection or by weight, for example. The enforcers of disposal bans are usually the collector or disposal facility. In Seattle, it is a combination of the two. Residential and business waste streams are enforced at the point of generation while materials brought to transfer stations are inspected at the point of disposal. In addition, developers are required to consult with SPU or DPD staff to confirm that planned waste/recycling facilities can physically comply with current and expected recyclables/waste handling regulations.

- **Penalties:** Penalties and violations typically vary depending on the generator and the type of material that is being banned. The most common method is to double, triple and/or quadruple the tipping fee. Almost all penalties increase for multiple violations. In Seattle, the non-compliant customer is provided with an informative tag; denied service until compliance is met; and there is a potential $50 fine for apartment owners, property managers, business owners, and property managers after two warning notices.

- **Grace Period:** The time that elapses between adoption of the ordinance and the date it takes effect must have sufficient time for educating the public and for the parties affected to find alternative means of managing the materials. In Seattle, the education began in 2004 with the official enactment occurring in 2006.

Source**:** NC Division of Pollution Prevention and Environmental Assistance. 2002

Effectiveness

Once the collection program is in place, enforcement becomes the main driving force. The creation of additional bans could be implemented in the same fashion as the current ban which included a year-long public outreach campaign followed by the official ban, a program maintenance effort through education with minimal inspection and enforcement. However, as discussed, the current ban targets items that the community is accustomed to recycling. If a ban targets an item that is not part of the current recycling practice or if the targeted sector historically has low recycling diversion, it may take more time and effort to effectively implement and maintain. In addition, in a growing region, audiences tend to change over time and education tools need to be updated to reach new target audiences.

The following are directions that could be taken:

1. A ban fashioned similarly to the current ban.

2. A ban with the same start-up as the current ban with a combination of education and a higher level of inspection and enforcement.

Philadelphia. A study was performed to develop an education and advertising plan to reeducate the residents to increase recycling rates. They interviewed non-recyclers to better understand the rational behind non-recycling. Overall, the non-recyclers generally felt that the threat of a fine would motivate them to recycle. A marketing plan was developed reflecting the results of the study. A fictitious character named “Officer Daniels” was created to represent a Streets and Walkways Education and Enforcement Program (SWEEP) to target the materials in their mandatory recycling ordinance. The SWEEP program was a friendly but firm reminder that residents must recycle with a fine as the underlying deterrent.

- Tactics: brochures, billboards, TV and radio commercials, bus billboards, bill stuffers and press events. Materials were also created in Spanish, Russian and Korean to target on-English speaking communities.
- Targets: Neighborhoods with low recycling rates.
- Cost: The City invested $3 million in this public education program.
- In May 2002, Sweep officers issued warnings and $25 tickets to residents who violated city recycling code along with educational materials.
- Results: Beginning in May, requests for recycling bins, phone calls to the Recycling Office and visits to the Recycling Office website all substantially increased.

According to Streets Department data, diversion rates rose each month of the ticketing campaign and continued for five months after ticketing ended. In all, between May of 2002 and December of 2002, the diversion rate rose from 5.47% to 7.12%, a 30% increase. This data shows a strong correlation between enforcement of the law and participation in the recycling program

- Yielding to the pressure from a few non-recyclers, the mayor banned the issuance of recycling tickets four months into what was intended to be a three year campaign
- Recycling diversion rates (at the time of the report) slumped to rates lower than at the start of the campaign.

Source: Recycling Alliance of Philadelphia 2004

Materials Involved

Other Materials: Ash and Tires (Residential and Self-haul); Ash, Tires, and Carpet (Commercial)

Implementation Timeframe

Implementation Year: 2015 (Residential and Self-haul) 2012 (Commercial) Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
Ash, Tires, Carpet	50%	100%
Residential		
(SF) Ash, Tires	90%	100%
(MF) Ash, Tires	90%	89%
Self-Haul		
Ash, Tires	50%	100%

Diversion Potential

Commercial: 50% recovery rate, up to 2,477 tons by 2038

SF Residental: 90% recovery rate, up to 199 tons by 2038

MF Residential: 80% recovery rate, up to 25 tons by 2038

Self-haul: 50% recovery rate, up to 19 tons by 2038

Total: Up to 2,720 tons by 2038 (0.23% of total waste stream)

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$287,450	$287,450	$257,450	$257,450	$257,450
Capital 10 Yr.	$0					
Capital 25 Yr.						

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

* Escalates annually at 80% of CPI

Action Feasibility

Risk of Not Achieving Results within Timeframe

Pros:

City	Private Sector
Increases diversion	Provides for increased recognition as "environmentally responsible"
Easy to implement contractually.	Increases revenue from additional hauling needed.
Easy to implement practically	Increases material flow through a variety of recyclers
May require multiple policy actions to account for diversity of targeted sectors	Achieves goals at a minimum cost or service increase
Requires significant political groundwork	
Leverages existing recycling programs	
Addresses key waste stream concerns	
Achieves high diversion with relatively low costs to the city and users	

Cons:

City	Private Sector
Requires additional site or facility monitoring	May raise costs for haulers
Hard to enforce	May raise costs for generators
May promote illegal dumping	May raise cost for processors
May sour relationships with contracted haulers	May create an uneven playing field
May provoke lawsuits	Relies on mandates

Assumptions

The expected participation and efficiency for additional bans is highly contingent on the amount of potential material targeted for diversion, market infrastructure, and the development of a solid framework consisting of education and input from effected sectors.

It is anticipated that future bans targeting the business and C & D sector would have the most substantial reduction in tonnage in the short term. The volume of tonnage (divertible/recyclable/ reusable) and the existing market infrastructure are the primary drivers for successful waste diversion of these targeted sectors. Education enforcement is the recommended effort to increase the tonnage captured through existing and future bans. Education and marketing costs would decrease to 50% after 5 years.

Ban of Tires, Ash and Carpet would go to private facilities therefore no variable cost to SPU.

References

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Expand Inspection & Enforcement Program, Commercial/Institutional Waste Audits (#160, #330)

Description

Increase recycling efforts through the expansion of the inspection and enforcement and business waste audits. This can be done through a combination of goals, incentives and penalties that seek to improve the performance of waste reduction and recycling programs to reduce the amount of waste that is directed to waste disposal facilities.

Expansion of Inspection & Enforcement

Case Study: Program Development for C&D Ban

In 2006, the Massachusetts Department of Environmental Protection (DEP) amended a bill (310 CMR 19.017) to add (asphalt, pavement, brick, concrete, metal and wood) to the list of items prohibited from disposal, and transfer or contracting for disposal. The impetus for the ban was a goal of 88% waste diversion by 2010 as cited in the Massachusetts *Beyond 2000 Solid Waste Master Plan* which recommended a ban on unprocessed C&D as a tool to accomplish this goal, assuming an adequate market (Allison et al. 2002).

From the outset, the C&D ban was not entirely favored by stakeholders. Realizing the success of the program was reliant on stakeholder input and support, DEP actively worked with groups involved in the generation and management of C&D debris for several years to develop strategies to reduce C&D from going to disposal (landfills) and with the goal of diversion to higher end uses through new developments in policy and the market (Allison et al. 2002). The workgroup recommended what items to ban (based on market infrastructure); identified the sector (commercial versus residential) the ordinance should target; determined restriction levels; and the appropriate type of enforcement (Allison et al. 2002).

Conclusion

The goal of an enforcement program should not be viewed as punishment but as a mechanism to gain compliance with solid waste ordinances. Enforcement can be met with resistance from all sectors. During the development of a program or ordinance, consideration should be given to the all parties involved. The act of enforcement is unlikely to be met with resistance if those affected by the ordinance are involved in the development of the program.

Waste Study: Conducted by Collier County, Florida

Collier County, Florida performed a survey of a number of cities and counties across the country to understand the various approaches to recycling compliance and enforcement. The following were some of their findings:

- There is a trend in lax enforcement of commercial recycling. Some places do not enforce business compliance at all while other municipalities have enforcement officers but their numbers are limited, making routine inspections of businesses almost impossible.

- Inexpensive fines do not impose a significant financial burden on businesses cited for violations. Some ordinances contain fines that range between $25 and $100 per incident (In Seattle it is $50). Inexpensive fines may not provide enough incentive for a business to comply. It may be more profitable for the business not to invest the time and money in a recycling plan than to pay the fine. The study noted that education remains an important tool in all cases to bring businesses into compliance.

- One approach may be enforcement starting at the licensing stage for both businesses and the haulers. This does not guarantee that recycling is actually taking place in each establishment, but it does guarantee that all businesses are officially contacted and educated on how to handle their recyclables.

- In Chicago, as a contingency to renewal or receipt of a business license, businesses are required to provide evidence of their recycling. This includes proof that there is use of proper recycling containers, what types of materials are recycled, and evidence of their contract with authorized haulers. Haulers must provide evidence of their recycling activities to obtain a license. Chicago also requires businesses to either recycle three items or recycle two including two source reduction methods.

- The imposition of fines or reduction of payment by city to contracted haulers when their loads have a significant amount of recyclables. This could be done through the inspection of trucks at landfill locations.

- All the cities and counties surveyed did not share revenues on the sale of commercial recyclables and the businesses must privately contract with haulers. Therefore, the cities and counties only serve as facilitators of information and enforcement, but do not receive any revenue from the sale of recyclables. In Seattle, through the contracted haulers, rates are based on the market. The city may benefit or they may owe additional money to the contracted hauler depending on the market value of the recyclables.

Conclusion

SPU's inspection and enforcement program currently employs one inspector for the residential waste stream, and one inspector for the C&D waste stream. Warnings, denied services and tagging have occurred since recycling enforcement (January 1 2006 – Recycling Ban) went into effect but no surcharges (citations) have been issued since the programs inception.

In Seattle, contracted haulers have the highest likelihood of encountering recycling non-compliance. If the contracted hauler is unable to successfully provide the inspection service as specified in the contract, it could be considered a breach of service: Section 750 Liquidated Damages—existing commercial contract and Section 960 Liquidated Damages – existing residential contract. This essentially enables the city to deduct from the monthly payment to the hauler if inspection and enforcement are not implemented per the contractual agreement. The city could implement a monthly audit by assessing the percent of remaining recyclable material left in the waste stream. If it exceeds 10%, as with the requirements of the residential and commercial sector, then the payment to the contracted hauler would be reduced. The city may also want to consider a quota system.

Currently in Seattle, developers are required to consult with SPU or DPD staff to confirm that planned waste/recycling facilities can physically comply with current and expected recyclables/waste handling regulations. This could be expanded to the licensing stage for both businesses and the haulers. As with Chicago, to receive renewal or receipt of a business license, businesses would be required to provide evidence of their recycling. This includes proof that there is use of proper recycling containers, what types of materials are recycled, and evidence of their contract with authorized haulers. Haulers must provide evidence of their recycling activities to obtain a license.

Penalties should be high enough to be an effective deterrent. This will encourage compliance and lessen the possibility of Seattle becoming too dependent on this revenue stream. As concluded in Collier County Florida Waste Study, smaller penalties will not make it worthwhile for the generator to incur the cost and effort to separate the recyclable materials. In the Canadian Kootenay Boundary Regional District (RDKB), landfill gate personnel are provided with digital cameras to document offenses. Enforcing fines is more difficult at privately owned facilities (Product Policy Institute 2006).

Participation and Efficiency

The baseline level of enforcement for the existing OCC ban is 5% of commercial customers are inspected per year (using 1 FTE). Increased enforcement /inspection would likely attempt up to 20% inspection per year.

Commercial/Institutional Waste Audits

The most important aspect of a waste reduction and waste audit program is that it enables a jurisdiction to plan and implement new programs. The city of Seattle has already created an in-depth characterization of the local waste stream (with special attention to large volumes) to determine materials that have the greatest diversion potential. With an emphasis on markets or outlets for the banned materials, additional enforcement efforts could include a contract with a private firm to conduct mandatory waste audits to characterize individual medium and large commercial waste streams. The program could require an action plan to address banned materials and encourage the business to develop a voluntary action plan to divert other recyclables. Once the audit program is in place and the opportunities to divert additional recyclables are realized, the city could work towards implementing a new ban that targets the commercial sector. Based on the existing volume of waste generated from the commercial sector and the market potential, the waste ban would likely target organics and remaining traditionals recyclables (there is already a ban on cardboard, paper, and yard debris).

The California Integrated Waste Management Board (CIWMB) contracted a consultant to characterize the waste diversion rates of selected industry groups. Concepts, methodology and background information from the study could be used to fashion a similar audit program in Seattle. The study found that food stores have the highest diversion rate (71% which consists primarily of cardboard) followed by retail big-box stores (64% again, mostly cardboard). The non-durable goods wholesale distributor diversion rate is about 59 % (primarily through cardboard recycling and reuse of wood pallets) and the group with the fourth-highest diversion rate is other retail stores (54%--mostly cardboard recycling). The sectors with less successful diversion rates included other building material and garden (24 %), large hotels (23 %), public venues and events (11 %) and large office buildings (7 %). Note: the percentages are all estimates and the estimate for large office buildings does not take into account any diversion that might be accomplished through tenants of the office buildings independently of the buildings' services.

Materials Involved

Traditional Curbside Recyclables, including Aluminum Beverage, Brown Beverage, Clear Beverage, Office Paper, Computer Paper, Container Glass, OCC/Kraft unwaxed, OCC/Kraft waxed, Tin Food Cans, Mixed Lowe Grade Paper, Phonebooks, Polycoated Paper, Newspaper, Other Aluminum, Other Ferrous, Other Glass, Other Paper, Paper/Other Materials, #1 PET Bottles, #2 HDPE Bottles (natural and colored), Grocery Bags and Bread Bags, Jars and Tubs. Other Clean PE Bags, Other Film, Other HDPE Bottles, Other PET Bottles, Other Plastic Bottles

Other Materials including Ash, Tires, and Carpet

Implementation Timeframe

Implementation Year: 2010 (Traditionals) Ramp Period: 5 years (Traditionals)

2012-2015 (Other Materials) 3 Years (Other)

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
Traditionals	10%	50%
Other Materials	5%	60%
SF Residential		
Traditionals	50%	10%
Other Materials	50%	10%
MF Residential		
Traditionals	50%	10%
Other Materials	30%	10%
Self-Haul		
Traditionals	10%	50%
Other Materials	10%	50%

Diversion Potential

Traditionals

Commercial: 5% recovery rate, up to 2,341 tons by 2038

SF Residental: 5% recovery rate, up to 852 tons by 2038

MF Residential: 5% recovery rate, up to 671 tons by 2038

Self-haul: 5% recovery rate, up to 1,323 tons by 2038

Other Materials

Commercial: 5% recovery rate, up to 227 tons by 2038

SF Residental: 5% recovery rate, up to 11 tons by 2038

MF Residential: 3% recovery rate, up to 1 ton by 2038

Self-haul: 5% recovery rate, up to 2 tons by 2038

Total: Up to 5,428 tons by 2038 (0.45% of total waste stream)

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$361,050*	$331,050*	$331,050*	$331,050*	$331,050*
Capital 10 Yr.	$0					
Capital 25 Yr.						

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

* Escalates annually at 80% of CPI and Year 2 decreases $30,000 due to reduction in educational costs

Action Feasibility

SPU currently has a contract with Business Industry Resource Venture (BIRV), a consulting firm that provides free, technical assistance to all Seattle businesses on waste prevention and recycling through a dedicated website, phone assistance, email and on-site consultation

Even though BIRV receives limited funding, a 2000 survey performed by the City of Seattle demonstrated that a program like BIRV has strong name recognition and utilization without extensive promotion. The survey characterized the business community's awareness and utilization of five "city programs" for businesses: crime prevention, energy conservation, water conservation, recycling (BIRV), and hazardous waste management. One in three (37%) Seattle businesses were familiar with BIRV while 43% of those familiar with the program (15% of all businesses) have actually used the service. The results for Resource Venture were a higher percentage than any of the other four programs surveyed.

The existing BIRV program has also shown significant success. According to a program review of Resource Venture, the commercial recycling rate went from 38 percent to 49 percent between 1989 and 1999 (estimated diversion 60,000 tons). Construction-debris recycling increased by 50 percent over a ten year period (1991-2001) and commercial cardboard disposal dropped by 5,000 tons between 1992 and 1996. Both these waste streams were actively targeted by Resource Venture during that period. According to a survey conducted by Resource Venture in 2003, of the businesses working with the program, 28 percent reported saving money. About 79 percent said they saved less than $5,000; 14 percent saved $5,000 to $25,000; and 7 percent saved $25,000 or more.

In addition, SPU could establish a City fund to train representatives (through an organization like BIRV) from local businesses on the Environmental Management

System / ISO 14001 standard. Companies must pledge goal of achieving Zero Waste by 2020 (New Zealand example) and must provide matching funds to show commitment. Training is sponsored by the Zero Waste Alliance or other groups ($1,695 for 1 week per person). Training should address 1) what ISO 14001 is, and 2) should focus on training Lead Auditors and other key personnel so that each company has an on-staff expert. See Option #138 from matrix.

Risk of Not Achieving Results within Timeframe

Expansion of Inspection & Enforcement

Pros:

City	Private Sector
Increases diversion	Provides for increased recognition as "environmentally responsible"
Complements proposed CIP options	Increases revenue from additional hauling needed.
Easy to implement contractually.	Increases material flow through a variety of recyclers
May require multiple policy actions to account for diversity of targeted sectors	Helps align public and private sector goals
Leverages existing recycling programs	Achieves goals at a minimum cost or service increase
Addresses key waste stream concerns	

Cons:

City	Private Sector
Requires additional site or facility monitoring	May raise costs for haulers
Hard to enforce	May raise costs for generators

City	Private Sector
May promote illegal dumping	May create an uneven playing field
May sour relationships with contracted haulers	Relies on mandates
May provoke lawsuits	

Commercial/Institutional Waste Audits

Pros:

City	Private Sector
Increases diversion	Reduces costs for waste handling at generation point
Addresses source reduction and waste prevention/ minimization as well as recycling	Provides for increased recognition as “environmentally responsible”
Easy to implement contractually.	Enhances cost effectiveness of onsite reuse options
Easy to implement practically.	Increases material flow through a variety of recyclers
Leverages existing recycling programs	Creates economic incentives, not mandates
Helps align public and private sector goals	Helps align public and private sector goals
Addresses key waste stream concerns	Achieves goals at a minimum cost
Addresses a perceived weakness in program diversity	

Cons:

City	Private Sector
Cost to City to administer	May create an uneven playing field
May negatives affect City revenue	May depress material prices
May sour relationships with contracted haulers	Relies on mandates
May provoke lawsuits (due to mandatory nature)	

Assumptions

The cost of the program could potentially be lessened or eliminated if businesses had a fee added to their licensing. The fee could be administered to businesses that meet a specific annual gross income or if they have a certain number of employees.

References

CIWMB. 2006. Targeted Statewide Waste Characterization Study: Waste Disposal and Diversion Findings for Selected Industry Groups produced by Cascadia Consulting Group Incorporated, Publication #341-06-006, CA.

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Product Policy Institute. 2006. Transitioning to Zero Waste -What can local governments do NOW? Within a Zero Waste / EPR planning framework, local governments will get out of the business of managing product wastes, by Helen Spegielman, Portland, OR.

On-Demand Annual or Biannual Bulky Item Recycling Collection (#170)

Description

Allow residents to schedule one to two free bulky item collections each year. A limit on number of collected items would be set and accepted items would include appliances; furniture; electronic equipment including TVs, computers and stereos; yard items; mattresses; scrap metal and used oil.

Background

San Francisco
In San Francisco, garbage bill payers who live in buildings with five units or less are eligible for two free bulky item collections each year. A maximum of 5 items among the categories of items above are accepted for collection. Apartment building owners and managers of buildings with six or more units can also participate in the program.

City of Alameda, CA
The City of Alameda has a successful program involving the recycling of white goods (washing machines, dryers, refrigerators, freezers, air conditioners and water heaters) and furniture. Total Recycling Systems is one of the main companies that collects furniture (mostly mattresses and couches) for recycling. Total Recycling charges rates based on the number of units they collect curbside on a specific agreed-upon date. Their rate is about $20 per yard, or roughly $10 per mattress and $20 per couch. On a cubic yard basis, they are about the same as local landfill tipping fees. On a per-ton basis, they are about twice as expensive. Total Recycling also has an on-call service during the rest of the year. The company charges $20 for a house call and then a small amount depending on the items collected.

Total Recycling diverts about 90 percent of the materials from the dismantled products. About 60 percent is recycled (into steel, urethane, some wood, cotton batting, and fiberfill stuffing). For example, cotton batting is recycled into body punching bags, and urethane foam is made into carpet underpadding.

Some of the material received (about 25 to 30 percent) is composted (for example, sisal pad, some of the wood, some of the cotton). Shoddy pad, some cover cloth materials (although they are exploring new markets for rags and drop cloth materials) and miscellaneous trash go to the landfill. Total Recycling has the world's largest collection of used couch parts.

California Integrated Waste Management Board (CIWMB)
CIWMB programs that focus solely on reuse and recycling of materials generally are able to divert 90 percent or more of their materials from landfill. Programs combined with

trash cleanups are able to divert 50 to 60 percent of their materials from landfills if well-designed and operated.

Community cleanups have proven to be an effective way to divert bulky items from landfills. Through community cleanups, local governments have the potential to reuse and recycle most of the bulky goods in their communities. Typically, cleanup programs address the following bulky goods, depending on the materials routinely collected by local recycling programs:

- White goods (e.g., refrigerators, stoves)
- Brown goods (e.g., computers, TVs, telephones)
- Wood (e.g., chairs, tables)
- Used building materials (e.g., lumber, bricks, doors, windows)
- Upholstered furniture; mattresses and frames
- Carpets and padding
- Hardware and housewares
- Toys & sporting goods
- Garden equipment and supplies
- Auto parts
- Paper (e.g., large boxes, magazines and books)
- Textiles

Most communities provide some type of cleanup service as part of their regular garbage and recycling collection system. Usually these include curbside collection services or one-to-four-times-per-year special events (either collected curbside and/or dropped off to a central location). Increasingly, communities are seeking to reduce, reuse, and recycle as much of the material collected by these programs as possible.

Curbside Collection Programs

There are generally two types of curbside collection services:

- On-call service
- Special events

On Call Service

Communities may collect bulky goods on an on-call basis. Some communities provide this service free for the first two or three items and charge a fee for additional items or additional collections. In the past, thrift stores and charities such as Goodwill Industries and Salvation Army also provided such service. However, in many communities, these organizations cannot afford to collect bulky goods. Some communities are now contracting with these charities (either directly or via their waste hauler) to help pay for this service.

Special Event Cleanups

Communities collect one to four times each year, often as part of a spring and/or fall cleanup. Sometimes these events coincide with other recycling campaigns and community events.

Unfortunately, curbside collection events have the potential of mixing materials together so they cannot be reused or recycled. Special efforts could be made to target different materials on different days to address this concern (e.g., one day for electronics pickups, another day for furniture).

Urban Ore has partnered with the City of Berkeley for years to provide curbside pickup of bulky goods. Emeryville uses East Bay Depot to collect all reusables during their Bulky Waste Cleanup Days. Grant funding (e.g., Alameda County Waste Management Authority.) generally pays for East Bay Depot services.

Solid Waste Facilities

Transfer Stations, material recovery facilities (MRFs), and landfills provide opportunities for bulky goods to be recovered instead of landfilled. The public is particularly supportive of these programs if they can avoid paying tipping fees when they donate bulky goods for reuse or recycling. A good example of this is the Last Chance Mercantile in Marina, California. This facility processes materials for resale, and it has indoor display space for books, clothing, sporting goods, household items, and furniture. Outdoor display areas contain building materials, plumbing fixtures (e.g., tubs and sinks), and patio furniture. Materials are available at a deep discount, giving them a last chance before the landfill.

Wisconsin – DNR

Results of several bulky waste studies conducted by Wisconsin DNR indicate that the overall diversion rate for bulky items is approximately 95%.

Based on landfill inspection reports by Department personnel, landfill protocols and practices, coupled with the development of an extensive infrastructure of dealer takeback policies for used appliances and tires, DNR programs have effectively eliminated these banned items from the landfilling waste stream over the last decade.

Materials Involved

White Goods / Bulky Items / Furniture including mattresses, tires, miscellaneous furniture, other ferrous metals, other non-ferrous metals, and other aluminum.

Implementation Timeframe

Implementation Year: 2008 Ramp Period: 3 years

Expected Participation and Efficiency

Participation and efficiency rates were not given among the several programs researched. However, based on the qualitative data, the following participation and efficiency rates appear to be achievable:

Sector / Material	Participation	Efficiency
Residential		
White Goods / Bulky Items / Furniture	20%	50%
Self-Haul		
White Goods / Bulky Items / Furniture	20%	50%

Diversion Potential

10% recovery rate, up to 914 tons by 2038 (0.08% of total waste stream)

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$103,550*	$103,550*	$103,550*	$103,550*	$103,550*
Capital 10 Yr.	$0					
Capital 25 Yr.						

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$181.82*	$181.82*	$181.82*	$181.82*	$181.82*

* Escalates annually at 80% of CPI

Environmental Benefits

Environmental benefits would rate medium. Examples of benefits include:

- Recovery rates for this type of program are moderate. Landfill capacity would be higher due to diversion of these large, bulky items.

- Illegal and landfill dumping of these items would decrease, thus reducing pollution

Action Feasibility

Based on successful bulky item programs in other states, implementation of this type of program should be highly feasible.

Risk of Not Achieving Results within Timeframe

Several jurisdictions are experiencing success with this type of program. In addition, associated costs to implement this type of program are relatively low. Therefore, risks associated with implementing this type of program locally are low to medium.

Pros:

- Recovery rates for this type of program are high. Landfill capacity would be much higher due to diversion of these large, bulky items.

- Convenience of pick-ups for customers would foster high participation and efficiency rates.

- Illegal dumping of these items would decrease

Cons:

- Ratepayer costs would increase

- Costs to SPU would increase

Assumptions

- Bulky items included in this analyses include white goods (refrigerators, stoves, dishwashers, etc.), furniture (mattresses, couches, carpets, tables, chairs, sporting goods, etc.), and to a lesser extent bulky metal itens (doors, windows, fencing, etc.)

- Participation and efficiency rates were gleaned from qualitative data provided among programs researched (no quantitative data was provided).

- Diversion rate is based on average numbers obtained from similar programs researched on the web

- Charities and thrift stores such as Goodwill and St. Vincent DePaul are often used for collection of these items. In some communities where these organizations cannot afford to provide this service, communities' contract with these charities either directly or via their waste hauler to help pay for these services.

- Variable cost estimated from existing contractor's average fee for pick up of bulky items at $25 per item. Assume average pick up of bulky item is 275 pounds.

References

City of San Franciso -
http://www.sfenvironment.com/aboutus/recycling/resident/bulky_collect.htm

Wisconsin Dept. of Natural Resources -
http://dnr.wi.gov/org/aw/wm/publications/recycle/2003finalstatusofrecycling.pdf

CA Integrated Waste Management Board -
http://www.ciwmb.ca.gov/LGlibrary/Innovations/CleanUps/Examples.htm

CA Integrated Waste Management Board -
http://www.ciwmb.ca.gov/lglibrary/innovations/CleanUps/Summary.htm

C&D Disposal Ban for all C&D Waste (#173)

Description

Through a new ordinance, the City would ban C&D recyclables from City transfer stations. This would likely be the last option pursued by the City after other efforts to divert C&D waste have been implemented.

Background

In 2005, the Massachusetts Department of Environmental Protection (MassDEP) amended 310 CMR 19.017 to add certain construction and demolition materials (asphalt pavement, brick, concrete, metal and wood) to the list of items prohibited from disposal, transfer for disposal, or contracting for disposal (MDEP 2007). Since the ban took effect some Massachusetts area contractors have reported acheiving a C&D debris recycling rates as high as 82 percent (Resource Recycling 2002).

In 2001 Sedgwick County, Kansas, banned all commercially-generated C & D from transfer stations in the county. From 2001 to 2002 the amount of C&D waste reported received at private C&D recycling facilities rose from 43,315 tons to 123,986 tons (Sedgwick County 2003). The ban created strong market support for private C&D facilities.

King County, Washington does not allow C&D wastes to be disposed of at any of its 10 transfer stations with the exception of de minimis amounts of C&D mixed in with loads of garbage (King County 2007).

Materials Involved

C&D Wastes: Dimensional lumber, crates and pallets, other untreated wood, new gypsum, roofing, ceramics and porcelain, fiberglass insulation, carpet, asphalt, bricks, and concrete

Implementation Timeframe

Implementation Year: 2015 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
C&D Materials	50%	100%
Self-Haul		
C&D Materials	50%	100%

Diversion Potential

50% recovery rate, up to 8.908 tons by 2038 (0.74% of total waste stream)

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M (annual)		$333,888*	$288,888*	$288,888*	$288,888*	$288,888*
Capital 10 Yr.	$0					

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

* Escalates annually at 80% of CPI

Environmental Benefit

Environmental benefits would rate medium. Examples of benefits include:

- Landfill dumping of these items would decrease, thus reducing the potential for ground- and surface-water pollution

Action Feasibility

Based on successful C&D ban programs in other states, implementation of this type of program should be highly feasible.

Risk of Not Achieving Results within Timeframe

Several jurisdictions are experiencing success with this type of program. In addition, associated costs to implement this type of program result in a cost effective program given the tonnage diverted. Therefore, risks associated with implementing this type of program locally are low to medium.

Pros:

- Achieves high diversion with relatively low costs to the City and users
- Reduces processing costs due to economies of scale
- Levels the playing field
- Provides a strong boost to the private C&D material recovery facility market.

Cons:

- May raise contractor costs for labor, hauling, equipment during recovery
- Cost to the City to administer and enforce
- Requires additional site or facility monitoring
- May promote illegal dumping
- Limits revenue potential for solid waste facility (landfill) operators
- May negatively affect City revenue
- May depress material prices
- Has potential cost impacts on contractors
- May require multiple policy actions to account for diversity of targeted sectors

Assumptions

- Materials covered under this option include dimensional lumber, crates and pallets, other untreated wood, new gypsum, roofing, ceramics and porcelain, fiberglass insulation, carpet, asphalt, bricks, and concrete.
- 50% of diverted C&D materials would be brought to a City-owned facility where a targeted sort line for building materials is proposed; 50% would be brought to a

private recycling facility.

- This option would be implemented in 2015 and it would take 5 years to ramp up.
- The participation rate is expected to be up to 50 percent.
- The expected efficiency rate is expected to be up to 100 percent.
- The expected recovery rate is 50 percent.
- Program management costs include 0.5 FTE (Manager II) to oversee the program.
- Educational costs include 0.5 FTE (Manager II), and $60,000 in marketing materials during the first year; this cost drops to $15,000 per year during years 2 through 5.
- Fixed O&M costs include 0.25 FTE (crew chief I) and 2 FTEs (inspectors/analyst) to oversee implementation and inspections at the NRDS and SRDS.

References:

King County. 2007. Construction, Demolition & Landclearing Recycling and Disposal Stations. Information viewed February 15, 2007 on agency website: <http://www.metrokc.gov/dnrp/swd/facilities/C&D-stations.asp>.

MDEP. 2007. Waste Disposal Ban Regulation 310 CMR 19.017 regulating the disposal and transfer of certain C&D wastes. Regulation viewed January 22, 2007, at the Massachusetts Department of Environmental Protection agency website: <http://www.mass.gov/dep/recycle/laws/bansreg.htm>.

Resource Recycling. 2002. Diverting C&D Debris – The Interplay of Policies and Markets. Resource Recycling Magazine, December 2002.

Sedgewick County. 2003. Sedgwick County, Kansas, Solid Waste Management Plan Five-Year Review and Update.

Residential Food Waste Disposal Ban (#182)

Description

Ban residential sector disposal of food waste by developing new regulations. Food waste must be source separated for curbside collection, composted on site or self-hauled to RDS. Combine with new organics collection strategies as appropriate. Materials include all food waste and other compostable materials such as soiled paper and cardboard.

The regional municipality of Halifax, NS (HRM) instituted an organics disposal ban across all sectors, including residential, and implemented universal organics composting in compliance with provincial law passed in 1997 (see Schedule "B" in Solid Waste-Resource Management Regulations under Section 102 of the Environment Act [O.I.C. 2002]). All compostable organic materials are banned from disposal in landfills. Halifax instituted an organics collection strategy similar to the three bin source separated system used by San Francisco.

See record # 253 for additional discussion of collection strategies, education and support programs used by Halifax to increase particiaption and efficiency.

Materials Involved

Organics: Food Waste, Compostable/Soiled Paper

Implementation Timeframe

Implementation Year: 2015 Ramp Period: 3 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Residential		
Food Waste	80%	63%

Diversion Potential

50% recovery rate, up to 15,971 tons by 2038 (1.33% of total waste stream)

Cost

O&M costs required for program management, advertising and education, and monitoring and enforcement. Capital costs incurred for SPU purchase of specialty bins for in-home storage of compostables prior to disposal in combined organics bin, distributed to all single family homes.

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$449,669*	$449,669*	$330,000*	$330,000*	$330,000*
Capital 10 Yr.	$1,390,000**					
Capital 25 Yr.						

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$156.49*	$156.49*	$156.49*	$156.49*	$156.49*

* Escalates annually at 80% of CPI
** Total Capital to be amortized at 7%

Action Feasibility

Regulatory bans are easily achievable. The City could work with haulers to tailor source separation and collection to meet both customer and hauler needs, and is likely to produce high compliance and would incur minimal capital and O&M costs.

Risk of Not Achieving Results within Timeframe

Pros:

- High probability of achieving significant diversion rate
- Should ultimately result in reduced ratepayer costs as more of the commercial waste stream is shifted to organics for composting (which incurs lower tip fees)
- Could be combined with changes in rate structure to incentivise increased participation

Cons:

- Increases compliance monitoring and enforcement requirements

- Would require changes in collection strategy, and related capital costs for new collection bins

Assumptions

- Bans result in very high participation and efficiency rates, as observed in existing examples (Halifax, NS).

- Ban would be implemented with other incentives, including limits on garbage collection by volume, changes in rate structure favoring increased source separation, etc.

- Program elements that include up front information and educational services and materials (e.g., refrigerator magnets or mailers with instructions, neighborhood waste management stewards, etc.) can achieve high levels of participation (HRM 2006)

- High participation and efficiency rates based on RPA program #5 for ban on grass disposal (SPU 1998).

- Very high diversion rate based on 44% diversion rate achieved by HRM in first year of their program (Biocycle 2000). Given that organics and compostable paper constitute a large percentage of typical waste streams, these constituents are assumed to account for at least 5% of the 44% realized.

- If a regulatory ban achieved a net 50% diversion of residential organics, this would translate to a net diversion of 1.3%, of Seattle's total waste stream, or approximately 15,000 tons, based on SPU 2003 60% projections (SPU 2003).

- O&M costs based on RPA costs for bans on grass disposal (Program #5) covering increased education and promotion of the regulatory ban (SPU 1998). Program administrative costs are estimated using Program #5 O&M costs inflated to 2006 USD, using the following assumptions for staff requirements:

    - Education costs of approximately $125,000 will be incurred in program years 1 and 2

    - Program will require one full time (1 FTE) manager at the Manager II level

    - Program staff will include 2 full time inspector/analysts and one full time laborer

- Capital costs are estimated based on the following assumptions:

    - Program implementation will require the distribution of 3-gallon collection bins for in-home storage of compostables prior to disposal in combined organics bin

    - Bins for all 139,000 single family homes in Seattle will be purchased at the start of the program, at an estimated cost of $ 10/each

    - Total capital costs of $ 1,390,000 will be amortized over 10 years at 7% interest ($ 238,500/year)

- Variable costs are based on calculated collection costs for weekly pickup of commingled materials. These costs were calculated as follows:

    - Contract prices for transfer and haul, and organics processing derived from the 2003 Facilities Master Plan (SPU 2003)

    - The calculated increase in truck requirements for weekly pickup (see Truck Trip Calculator Assumptions for details)

- Variable costs reflect the total cost/ton for weekly collection of commingled materials, not the incremental cost of moving to weekly service from the existing bi-weekly pickup of yard waste and selected organics

- Variable costs do not account for the cost savings gained through increased diversion

References

Biocycle. 2000. Landfill Bans Stimulate Composting Programs in Nova Scotia. http://www.jgpress.com/BCArticles/2000/030053.html.

HRM. 2006. Halifax Regional Municipality, commercial and residential waste management information. Website viewed on November 30, 2006. Last updated January 15, 2007. Http://www.halifax.ca/wrms/index.html.

O.I.C. 2002. Nova Scotia Solid Waste-Resource Management Regulations. S.N.S. 1994-95, c. 1 O.I.C. 96-79 (February 6, 1996), N.S. Reg. 25/96 as amended up to O.I.C. 2002-94 (March 1, 2002), N.S. Reg. 24/2002. Website viewed on January 9, 2007. http://www.gov.ns.ca/JUST/regulations/regs/envsolid.htm

SPU. 1998. Seattle's Solid Waste Plan: On the Path to Sustainability. City of Seattle's Recycling Potential Assessment/System Analysis Model (RPA).

SPU. 2003. Revised 60% projections. Microsoft Excel spreadsheet provided by Seattle Public Utilities.

Tools of Change. 2000. Case Study, Halifax Waste Resource Management Strategy. Case study developed by Tools of Change. Website Viewed on November 30, 2006. http://www.toolsofchange.com/English/CaseStudies/default.asp?ID=133

Pet Waste Composting (Integrates #192 and #335)

Description

This program option is integrates two previously considered options: #192, development of a pet waste program for residential sector and commercial businesses that produce or collect pet waste, and; #335, develop a home pet waste composting program. Option #192 cannot be practically implemented with currently available or likely to emerge technologies in the immediate future. In contrast, option #335 presents an attractive alternative that could divert as much as 65 tons from the existing waste stream.

Under option #192, waste material would be composted for use as a biosolid or processed through an anaerobic digestion reactor to produce methane for energy production. Anaerobic digestion is an efficient process for processing animal waste that sterilizes the material, and produces biosolids and methane gas useful for fertilizer and energy production. Several internet sources referencing an ongoing San Francisco pilot study of home based technologies do not have a basis in fact. San Francisco investigated this option and rejected it due to numerous technical challenges. Current technology is impractical for distributed power generation at residential sector scale for several reasons. First, individual households do not produce enough animal or combined organic waste for efficient biogas production. Second, anaerobic digestion is a complex process requiring regular monitoring which could adversely affect participation. Finally, the process produces odorless, explosive and potentially toxic gasses that have to be stored onsite until use. This creates potentially unacceptable safety hazards.

In contrast, large scale anaerobic digestion of pet waste commingled with other organics is an attractive option (see option #350, development of a large scale anaerobic digestion reactor for processing all of Seattle's organic waste). Conversion of animal waste and other organics into biogas for power generation is already being used in European and developing countries. In the U.S. some dairy farms are currently using similar technology for on-site power generation. Currently available technology is sufficient for development of a centralized anaerobic digestion facility supplied by source separated pet waste. This would require either: 1) developing a new collection strategy for source separated pet waste, or; 2) commingling pet waste with the existing organic waste stream and subjecting all materials to anaerobic digestion.

Option #335, developing a home pet waste composting program, is an attractive alternative to option #192. The program would purchase and distribute pet waste composters to interested residents (several models are commercially available). Diversion potential for this program is estimated at 2% of Other Organics. On this basis home pet waste composting could divert over 65 tons from the waste stream.

A 2001 American Veterinary Medical Association survey found that there are approximately 125,000 dogs and 250,000 cats in Seattle.

Materials Involved

Other Organics: Pet waste.

Implementation Timeframe

Implementation Year: 2011 Ramp Period: 3 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Residential		
Other Organics	4%	50%

Diversion Potential

4% recovery rate, up to 65 tons by 2038 (0.01% of total waste stream)

Cost

Cost estimates are presented for option #335 only. No cost information is available on residential scale anaerobic digestion reactors because the technology is not commercially available.

Capital and O&M costs are estimated based on the costs required to implement the current residential backyard waste composting program in 1989, extrapolated to 2006 USD. Under this program, composting bins were purchased and distributed to 35,503 Seattle households by 1996. O&M costs are expected to include staffing LOEs, and the program advertising and educational budget.

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$108,400*	$83,400*	$83,400*	$83,400*	$83,400*
Capital 10 Yr.	$1,400,000**					
Capital 25 Yr.						

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

* Escalates annually at 80% of CPI
** Total Capital to be amortized at 7%

Action Feasibility

This option is viewed to be low feasibility. The obstacles to home implementation of this technology are numerous.

Risk of Not Achieving Results within Timeframe

Option #192: The ultimate effectiveness of this option is dependent on several high risk assumptions. There is a high probability that this option would not achieve the desired results within the next 10 to 15 years.

Pros:

- Provides an efficient process for diverting the pet waste stream, which comprises between 1-2% of the total current waste stream
- Removes pet waste from the environment and sterilizes pathogens, providing environmental benefits
- Converts nuisance waste into a renewable energy resource

Cons:

- Currently impractical for distributed power generation, technology for household scale development is not available
- Untested technologies could create new household hazards (e.g., toxic and explosive gasses)
- Power production from all of Seattle's pet waste would be modest at current pet waste tonnage (~91 to 182 kW continuous energy production)

Option #335: The ultimate effectiveness of this option is dependent on lower risk assumptions and supported by data on existing residential composting behavior. There is a high probability that this option would achieve the desired results within the next five years.

Assumptions

Conditions necessary for viability of option #192:

- Suitable anaerobic digestion reactor technologies for safe and efficient use at the household scale become available (high risk assumption)
- Participation and efficiency by pet owners is high (this is a high risk assumption)
- Operators of distributed anaerobic reactors would be uniformly vigilant about operational and safety requirements
- Users would be willing to direct sufficient quantities of other organic waste through the process to achieve sufficient volume for efficient processing

Option #335 is currently viable.

- Participation, efficiency and diversion rate assumptions for this option include the following
  - The pet waste component of the waste stream is approximately 7,500 tons (based on SPU 2003 60% projections)
  - There is at least one dog or cat per household (a 2001 American Veterinary Medical Association survey found that there are approximately 125,000 dogs and 250,000 cats in Seattle, which far surpasses the number of households).
  - The 40% of Seattle households currently compost some or all of their food waste (based on the 2005 home organics survey);
  - 100% of these individuals have pets and would participate in home pet waste composting at 70% efficiency.
  - On this basis home pet waste composting could divert approximately 2,100 tons from the waste stream.
- Program costs are estimated using the following assumptions
  - Pet waste composting will be implemented as part of the existing residential composting program

- O&M costs include the costs for staffing, advertising and education as follows:
  - Advertising and education will cost $ 50,000/year in program years 1 and 2 and $ 25,000/year from years 3 to 20, escalating at 80% of CPI per year
  - Program staffing will require1.5 administrative FTEs for years 1 to 20, with costs escalating at 100% of CPI per year
- Capital costs include costs to purchase pet waste composting bins for the current 35,500 households that have received yard waste composting bins from the city program, purchased at the beginning of the program
- Bins cost $40/each, for a total principal of $ 1,400,000 amortized over 10 years at 7%/year ($ 240,200/year)
- There are no variable costs associated with this program as materials will be diverted by the residential producer

References

FBK. 2006. City of Seattle, 2005 Home Organics Waste Management Survey. Prepared by FBK Research in association with Seattle Public Utilities.

SPU. 1998. Seattle's Solid Waste Plan: On the Path to Sustainability. City of Seattle's Recycling Potential Assessment/System Analysis Model (RPA).

SPU. 2003. Revised 60% projections. Microsoft Excel spreadsheet provided by Seattle Public Utilities.

Http://www.composters.com/docs/bins_p5.html.

Http://www.metrokc.gov/dnrp/swd/composting/petwaste.asp.

Http://www.uaf.edu/coop-ext/compost/dogs.html.

Building & Demolition Permit C&D Reuse and Recycling Fee Deposit (#204)

Description

Deposit system for construction, demolition, and remodeling projects when the project permit is issued. This option should likely be one of the first options that the City implements to increase recovery of C&D wastes. Upon demonstration of recovery of a pre-established percentage of the C&D debris, the full deposit or appropriate portion would be refunded. The City would advertise the program for one year in advance of implementation. The required percentage recovery would start low at 30% and ramp up over five years to reach 60% required recovery.

Background

City of Atherton, California

In July 1999 the City of Atherton passed Ordinance No. 506 adding Chapter 15.52 to the City's municipal code (City of Atherton 1999). Permit applicants on any construction project that will create solid waste destined to be delivered to a landfill are required to post a cash deposit of $50 per ton of estimated construction and/or demolition debris, but not less than $5,000. The City returns the deposit without interest, in total or in proportion, upon proof that the minimum required tons of C&D waste were diverted. Applicants must also complete a Recycling and Waste Reduction Form prior to issuance of a building or demoliton permit and must make all structures "available for deconstruction, salvage, and recovery prior to demolition."

"Designated recyclable and reuseable materials" covered by the ordinance include landclearing debris, concrete, rocks, and asphalt.   The following percentages of diversion are required:

- Demolition: 50 percent of waste tonnage including concrete and asphalt, and 15 percent of waste tonnage excluding concrete and asphalt.
- Reroofing of homes with shingles or shakes as a separate project: 50 percent of waste tonnage.
- Construction and Remodeling: 50 percent of waste tonnage

The Atheron building department evaluates and monitors each project to gauge the percentage of materials recycled, salvaged, and disposed from each project. The required diversion of materials is measured separately during the project's demolition and construction phases.

City of San Jose, California

In October 2000, the City of San José passed an ordinance establishing a Construction & Demolition Diversion Deposit (CDDD) program that provides an incentive to encourage the diversion of C&D debris from landfill burial (City of San Jose 2000). The City requires applicants to complete a Recycling and Waste Reduction Form, and collects a deposit for each construction or demolition project and fully refunds it if at least 50 percent of the C&D debris generated by the project is diverted. To obtain a refund, the permit applicant must provide documentation proving that the required minimum of C&D waste was diverted to a certified C&D recycling facility. The City does exempt several types of projects from the program including:

- Work for which a building permit is not required
- New residential construction projects less than $115,000 in value
- New non-residential construction projects less than $135,000 in value
- Residential alterations less than $2,000 in value
- Non-residential alterations less than $5,000 in value
- Roofing projects that do not include the tear-off of the existing roof
- Work for which only plumbing, electrical, or mechanical permits are required.

City of Glendale, California

In 2005, the City of Glendale passed ordinance No. 5478 creating Chapter 8.58 (Construction and Demolition Debris Diversion Program) of the Glendale Municipal Code (City of Glendale 2005). Applicants for demolition or construction permits are required to provide a diversion security deposit and complete a construction and demolition waste reduction and recycling plan application prior to permits being issued. Upon completion of a project the applicant is required to submit a waste reduction and recycling compliance report to document how and where C&D wastes were diverted. C&D materials covered by the ordinance include waste generated during construction, deconstruction, demolition, excavation, land clearing, landscaping, reconstruction, remodeling, renovation, repair and site clean-up.

Materials Involved

C&D Materials

Implementation Timeframe

Implementation Year: 2008 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
C&D Materials	100%	10%

Diversion Potential

10% recovery rate, up to 2,331 tons by 2038 (0.19% of total waste stream)

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M (annual)		$239,300*	$234,300*	$234,300*	$234,300*	$234,300*
Capital	$0					

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

* Escalates annually at 80% of CPI

Environmental Benefit

The environmental benefit is expected to be moderate due mostly to the reduced demand for virgin recources from materials entering the recovery cycle.

Action Feasibility

Risk of Not Achieving Results within Timeframe

Pros:

- A deposit system for construction, demolition, and remodeling projects can provide sufficient incentive to encourage businesses to recycle.
- Applies to both residential and commercial sectors
- Encourages recycling through economic burden

- Economic burden is specifically carried by only those that apply for demolition and construction permits
- Provides money to subsidize and stimulate markets and recycling
- Discourages illegal dumping
- Addresses source reduction and waste prevention / minimization as well as recycling
- Achieves high diversion with relatively low costs to the City and users.
- Provides the City with a method to track the amount of C&D waste diverted.

Cons:

- Will require substantial City effort and cost to administer.
- Would likely require additional facilities to be built to accept the increased quantity of C&D waste
- Will require jobsite and facility monitoring
- Administration of the transaction and refund process can be slow and managing the financial components of the program requires additional resources and time.

Assumptions

- The materials included under this option include all C&D wastes.
- This option would be implemented as soon as 2008 and would ramp up in 5 years.
- The participation rate is expected to be up to 100 percent.
- The efficiency rate is expected to be up to 10 percent.
- The diversion potential would increase as this option ramps up over 5 years. The required percent recovered under the deposit requirement would initially be set very low at 30 percent to allow time for market development, and would increase to 45 percent by the third year, and would plateau at 60 percent required recovery by the fifth year.

- The environmental benefit is expected to be medium due to the reduced demand for virgin recources.

- If combined with reduced tipping fees then source-separated recycling of C&D may be favored.

- If combined with private C&D facility development the commingled C&D recycling may be favored.

- Programmatic costs include 0.5 FTE (Manager II), 0.5 FTE (Analyst), and 2.5 FTE (Administrative) to oversee the program, process permit deposits and refunds, and to implement the permit program.

- Educational costs include $10,000 in marketing materials during the first year; the cost would drop to $5,000 per year during years 2 through 5.

- The medium consumer cost is based on the permit fee only ($50) with the assumption that the entire deposit ($5,000 security deposit for residential, or a percentage of total project value with a maximum of $100,000 for large commercial projects) is returned based on satisfaction of the permit requirements.

References:

Atherton, City of. 1999. Ordinance No. 506 adding Chapter 15.52 to the Atherton Municipal Code relating to the recycling and diversion of construction and demolition debris. Ordinance viewed January 22, 2007, at California Integrated Waste Management Board website: <http://www.ciwmb.ca.gov/ConDemo/SampleDocs/Atherton.htm#15.52.060>.

Glendale, City of. 2005. Ordinance No. 5478 amending Chapter 8.58 of the Glendale Municipal Code related to recycling of construction and demolition debris. Ordinance viewed January 23, 2007 at City website: <http://www.ci.glendale.ca.us/gmc/8.asp>.

San Jose, City of. 2000. Ordinance No. 26219 amending Chapter 9.10 of Title 9 of the San Jose Municipal Code to establish the Construction and Demolition Diversion Deposit Program. Ordinance viewed January 22, 2007 at City website: <http://www.sjrecycles.org/business/pdf/cddd_finalord.pdf>.

SPU. 2005. Commercial and Self-Haul Waste Streams Composition Study, Final Report. Prepared by Cascadia Consulting Group, Inc. and Sky Valley Associates in cooperation with Seattle Public Utilities Staff.

Incentivize Development of Private Mixed C&D Debris Recycling Facility (#209)

Description

The City could promote/incentivize development of a private C&D recycling facility for commingled loads of C&D debris. The City could offer tax-exempt bonds to finance projects, and grants to support design and permitting, as well as feasibility research and evaluation. If grants are awarded, the City should require matching funds to ensure the commitment of the grant applicant.

Background

Some U.S. municipalities have issued tax-exempt bonds or awarded grant money to stimulate private development of C&D recycling facilities. Tax-exempt bonds provide very low interest rate financing for capital projects: eligible projects to finance the purchase, rehabilitation or construction of solid waste disposal facilities as well as new equipment purchases may be exempt from both federal and/or state taxes. Grants can offset costs associated with engineering design, feasibility analysis, and permitting.

The Massachusetts Development Finance Agency, also known as MassDevelopment, is a state agency that works with Massachusetts businesses, financial institutions and local officials to stimulate economic growth across the Commonwealth. In 2005 MassDevelopment issued a $5 million tax-exempt bond to help ABC&D Recycling build a C&D recycling facility in Ware, MA. In 2006 MassDevelopment sold land to Devens Recycling Center, LLC and issued a $12 million tax-exempt bond issue to help the developer build and operate a C&D recycling facility. Due to the associated cost savings these projects were each financed and built in as little as one year (MDFA 2007).

In 2004 Chittenden Solid Waste District awarded two $10,000 grants to support development of private C&D recycling facilities in Chittenden County, Vermont. One of the grants was awarded to Myers Container of Winooski, VT to reimburse engineering costs associated with the design and permitting of a facility on Rathe Road in Colchester. The second grant was awarded to Green Seal Environmental of Sandwich, MA to research and evaluate the feasibility of a mixed C&D facility in Chittenden County (CSWD 2007).

Materials Involved

C&D Materials: Recyclable wood, composition roofing, new gypsum, metals, OCC/paper, carpet, and mineral aggregates.

Implementation Timeframe

Implementation Year: 2010 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
Recyclable Wood	50%	100%
Composition Roofing	50%	100%
New Gypsum Scrap	50%	100%
Metals	50%	100%
OCC / Paper Packaging	50%	100%
Carpet	50%	100%
Mineral Aggregates	50%	100%
Self-Haul		
Recyclable Wood	75%	100%
Composition Roofing	75%	100%
New Gypsum Scrap	75%	100%
Metals	75%	100%
OCC / Paper Packaging	75%	100%
Carpet	75%	100%
Mineral Aggregates	75%	100%

Diversion Potential

Commercial: 50% recovery rate, up to 10,488 tons by 2038

Self-haul: 75% recovery rate, up to 46,631 tons by 2038

Total: Up to 58,121 tons by 2038 (4.85% of total waste stream)

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M (annual)		$103,500*	$103,500*	$103,500*	$53,500	$53,500
Capital	$0					

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

* Escalates annually at 80% of CPI

Environmental Benefit

The environmental benefit is expected to be moderate due mostly to the reduced demand for virgin recources from materials entering the recovery cycle.

Action Feasibility

Risk of Not Achieving Results within Timeframe

Pros:

- Encourages recycling through market incentive by significantly reducing the cost to private developers of C&D recycling facilities.
- Helps improve recycling infrastructure for all C&D materials.
- Supporting facility development can logically be timed to coincide with or occur just prior to a landfill ban on C&D wastes as in the Massachusetts example.

Cons:

- May raise costs for processors.
- Disincentivizes Source-Separation.
- Requires high volume to justify capital costs.
- Does not address space limitations.
- May create a perceived uneven "playing field".
- May provoke legal challenges.
- Requires extensive political groundwork.
- Creates perceived "flow control" inequities

Assumptions

- The materials covered under this option include recyclable wood, composition roofing, new gypsum, metals, OCC/paper, carpet, and mineral aggregates.

- This option would be implemented in 2010 and would have a 5 year ramp up time.
- The participation rate is expected to be up to 50 percent.
- The efficiency rate is expected to be up to 100 percent.
- The recovery rate is expected to be 10 percent.
- The environmental benefit of this option is expected to be medium due to the reduced demand for virgin resources.
- Programmatic costs include 0.5 FTE (Manager II) to oversee program implementation.
- Fixed O&M costs include incentives totalling $100,000 split equally between year 1 ($50,000) and year 2 ($50,000).
- Funding in other jurisdictions ranges from $10,000 grants to $12 million bond issues.
- RPA program #25 transfer station material recovery center: 80,000 tons per year, 50,000 square-foot facility staffed by 40 people, customers pay full tip fee. O&M costs $2,797,000 1 -20 years; capital over 7 years costs $342,000.

References:

CSWD. 2007. Information regarding grants awarded by the Chittenden Solid Waste District to private companies to support development of private C&D recycling facilities; viewed January 19, 2007 at agency website: <http://www.cswd.net/cd/mixed_C&D.shtml.>

Herrera. 2006. Current Management Practices for Construction and Demolition Debris and Recommendations for Increased Recovery. Prepared by Herrera Environmental Consultants, Inc. for Seattle Public Utilities, Seattle, Washington.

MDFA. 2007. Article regarding $12 million tax-exempt bond issued by the Massachusetts Development Finance Agency to support development of the Deven Recycling Center, LLC; viewed January 19, 2007 at agency website: <http://www.massdevelopment.com/press/11152006-01.aspx>.

Self – Haul computer Parts (#217)

Description

Incorporate collection of self-hauled computer parts into City-owned facilities. Collection occurs regularly with available containers. Either flat fees for each type of equipment can be collected regardless of quantity, or fees can be collected for each item after a limit (i.e., the first two items may be free, but fees will be collected for any remaining items).

Background

There has been a tremendous increase in the creation of electronics collection programs, and an associated impact on costs and cost effectiveness. Program expense has dropped significantly and ongoing collections have become the most cost effective strategy. There has been a tripling of the household participation rate, but only a slight increase in the amount of material being brought in by each participant. Significantly more programs now charge end-of-life fees than was the case a year ago, and those fees have generally increased (NERC 2007).

Snohomish County
Self-Haul customers are charged for recycling computer parts at the County facilities, or they can go through the private sector to dispose of these items. Haulers can bring up to three items at a time. The County maintains Hauler Tracking Forms to document the number of units dumped by each hauler, where the material originated, etc. Self-haul customers found disposing electronics as garbage are charged the same fee charged for recycling. While some components of the local policy provide no charge for electronics incidentally disposed with mixed garbage, it is the intent of the policy that NO banned electronics be disposed as garbage.

The total volume of residential electronics equipment collected in Snohomish County every year is approximately 530 tons. Snohomish County has a population of 606,000 people and 225,000 households. The e-waste generation rate is assumed to be 1.75 lb/ per person/per year.

Units found in paper truck or front-end loaded truck loads are removed from the garbage as practical and are recycled. In this situation, haulers are not charged for the units. Units found in drop box loads are removed and recycled, and haulers are charged regular e-waste recycling rates. These rates cover costs that the County pays to vendors to recycle these materials.

Santa Barbara County. CA
Since April 2001, the County of Santa Barbara Public Works Department has collected electronic equipment of all types from households and businesses. Self-haulers can take

electronic items to one of the County's facilities so that it can either be recycled or donated for reuse. Some facilities accept all electronic items from households and businesses free of charge, while other facilities may charge small fees based on the quantity of items. Most of the cost to recycle electronics is collected during purchasing of electronic equipment. On January 1, 2005, an electronic waste recycling fee was imposed at the point of sale of CEDs such as computer monitors, televisions, and laptop computers. This fee is collected from California consumers at the time of all retail sales,

The Electronic Waste Recycling Act of 2003 (aka Senate Bill 20) made California the first state in the country to enact a law to fund the collection of certain types of electronic devices to be recycled. Among its major provisions, Senate Bill (SB) 20 requires the following:

- The collection of an electronic waste recycling fee at the point of sale by retailers for covered electronic devices (CEDs) such as computer monitors, televisions, and laptop computers;
- The issuance of payments to approved entities for the collection and recycling of CEDs;
- A reduction in the amount of hazardous materials used in making CEDs sold in California

A study conducted for the National Safety Council projects that more than 10,000 computers and televisions become obsolete in California every day. Further, the study also projects that three fourths of all computers purchased in the United States remain stockpiled in storerooms, attics, garages, or basements. Finally, only an estimated 20 percent of obsolete computers and televisions are collected for recycling. About 70 percent of the heavy metals found in landfills emanate from electronic equipment discards.

Materials Involved

Electronic Waste, including computer monitors, other computer components

Implementation Timeframe

Implementation Year: 2008 Ramp Period: 3 years

Implementation Period: Short - 1-3 years **Ramp Period:** Medium - 3-5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
Electronics/Computers	5%	100%
SF Residential		
Electronics/Computers	10%	100%
MF Residential		
Electronics/Computers	5%	100%
Self-Haul		
Electronics/Computers	5%	100%

Diversion Potential

Commercial: 5% recovery rate, up to 204 tons by 2038

SF Residential: 10% recovery rate, up to 35 tons by 2038

MF Residential: 5% recovery rate, up to 37 tons by 2038

Self-haul: 5% recovery rate, up to 83tons by 2038

Total: Up to 359 tons by 2038 (0.03% of total waste stream)

Cost

Set-up costs consist primarily of staff time for designing and implementing the program, advertising, and supply purchases. The average cost to set-up a program has declined dramatically for many municipalities, with the increase in peer examples, trainings, and general support for establishing programs. Operating costs have also declined. Operating costs include staff, ongoing publicity, transportation, processing fees, any other ongoing program expenses.

Snohomish County – Seattle-Tacoma Case Study

Recycler Processing Cost. The cost associated with processing the collected equipment is based upon data from a recent survey of electronics recyclers. The following costs are assumed:

• Personal Computers: No Charge
• TVs and Monitors: $0.12 per lb
• Other Electronic Peripherals: $0.13 per lb

The cost to recycle computers and their peripherals, including monitors, averages about $330/ton nationally. In Georgia, the average processing cost for the pilot program was about $11 per unit. For the most expensive equipment (TV and monitors), a processing fee of approximately $805/ton was charged. Nationally, collection programs have ranged from vendors paying local governments for materials collected to charging them up to $1,100/ton.

For Seattle:

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$77,748*	$57,748*	$57,748*	$57,748*	$57,748*
Capital 10 Yr.	$0					
Capital 25 Yr.						

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

* Escalates annually at 80% of CPI

Environmental Benefits

A significant amount of toxic chemicals from electronic waste would be diverted from landfills, which would decrease potential for groundwater pollution and other pollution in general.

Action Feasibility

Given the success of electronics recycling programs in other jurisdictions, in addition to relatively low costs associated with implementation of these programs, implementing this type of program locally should be very feasible.

Risk of Not Achieving Results within Timeframe

As several jurisdictions have similar existing programs that have proven to be successful, the risk is projected to be low.

Pros:

- Materials recovered through these programs are typically of higher quality/utility than those recovered through commingled recycling (better sorting, less breakage, less contamination).

- Recovery rates have the potential to be high.

- Litter reduction can be significant. Seven states reported 30 to 47% total litter reductions after program implementation (used as the basis for a High environmental benefit rating).

Cons:

- Moderate ramp up times are likely to be required before full participation and efficiency are achieved

Assumptions

- NERC cost data above reflects 2001 data from programs in cities with populations generally less than a million. At the end of 2002, there were a significant number of programs in multi-million population cities. As a result, the average populations have increased dramatically (NRC, 2007).

- Participation, efficiency and diversion rates and costs listed above are average numbers based on data from multiple programs researched

- Participation, efficiency and diversion rates and costs would significantly increase with implementation of an outreach and education component

- Recycling fees for computers and TVs ranged from $5 - $30/unit. This range was derived from several programs researched on the web

- Cost to recycle and dispose will be similar to California's program rate of 28 cents per pound.

References

Snohomish County Solid Waste – Electronics Recycling
http://www.productstewardship.net/PDFs/libraryElectronicsElectronicsRecyclingStaffInfo.pdf

Snohomish County – Seattle-Tacoma Case Study - Electronics Collection & Recycling
http://www.productstewardship.net/PDFs/libraryElectronicsSeattleTacomaIEEE.pdf

Santa Barbara County - http://www.lessismore.org/Programs/electronics.html

Northeast Recycling Council - http://www.nerc.org/documents/ntlelctrcylprgm02-03.html

Georgia Dept. of Community Affairs – Pilot Project Final Report – April 2003
http://www.dca.state.ga.us/development/EnvironmentalManagement/programs/downloads/DCA_E-Scrap_Pilot_Report_3_13_03.pdf

Mid-Atlantic States Electronics Recycling Pilot Project
http://www.epa.gov/reg3wcmd/pdf/eCyclingReportonly.pdf

A Review of California's and Maine's electronics and recycling programs
http://www.informinc.org/FS_SWP_ME&CA_FINAL.pdf

Residential On-Demand Collection Of C&D Waste (#221)

Description

The City would provide on-demand residential collection for small quantities of source separated C&D waste from household projects. The main benefit is the elimination of many self-haul trips to City transfer stations. Other residential on-demand programs utilizing the same type of collection service include Option # 376 (for small appliances and electronics) and Option #170 (for white goods, bulky items, and furniture).

All on-demand programs will be implemented progressively, first by offering the service, then incentivizing increased participation by first changing the self-haul rate structure and finally by implementing a self-haul ban (option #323). Each step will realize a progressive increase in diversion rates.

To coordinate this program the City would purchase a small existing commercial building to serve as a call center. Residents would contact the call center and request either of two types of collection services:

- Strategy A would include curbside pick up of bagged or bundled C&D weighing less than 360 pounds total (the approximate weight of a typical car load of C&D). Residents would place C&D at the curbside for pickup by a truck with a grapple; C&D would be placed in bags or in bundles.

- Strategy B would include containerized collection of C&D weighing more than 360 pounds. Residents would call to request containers ranging in size from 96-gallon totes on wheels, to 5 cubic yard stab dumpsters, to 20 cubic yard roll-off boxes; residents would place a second call to request pick up when the containers are full.

- Under Strategy A residents would be limited to up to 6 bags at 60 pounds each or 1 bundle of C&D up to 8 feet long by 3 feet in diameter. A flat fee would be charged for collection.

- Under Strategy B residents would be charged a flat fee for containers that are 96-gallons up to 4 yards; all larger containers would be weighed and charged based on weight.

Background

The City of Madison, Wisconsin offers curbside collection of building materials (i.e., C&D waste) such as dry wall, plywood, insulation, roofing shingles, dimensional lumber and wood paneling, siding, and plaster. The materials are placed at the curbside for pick up on the same day as regularly household trash pick up. The quantity is limited to 6 bags and/or containers or their equivalent of building material per week and includes boards or lumber placed for large item collection.

Residents can also call for separate pickup of large items such as cabinets, doors, windows, plumbing fixtures (sinks, toilets, etc.), furnaces, and white goods (i.e., appliances). Debris from major remodeling or construction projects and work done by contractors, as well as bricks, concrete, and concrete blocks are prohibited from curbside collection.

Materials Involved

C&D Materials: All C&D wastes and carpet

Implementation Timeframe

Implementation Year: 2008 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Self-Haul		
C&D Materials	6%	66%
Carpet	6%	66%

Diversion Potential

4% recovery rate, up to 2,541 tons by 2014 (0.28% of total waste stream). After 2015, it is assumed in Scenario 4 that the ban of C&D materials from disposal incentivizes private haulers to capture C&D materials and diverts these materials through other programs.

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M (annual)		$309,650*	$309,650*	$309,650*	$309,650*	$309,650*
Capital	$250,000					

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$63.12*	$63.12*	$63.12*	$63.12*	$63.12*

* Escalates annually at 80% of CPI, Drops to $264,650 in Year 10 (2007 dollars)

Environmental Benefit

The environmental benefit is expected to be moderate due mostly to the reduced demand for virgin recources with materials entering the recovery cycle.

Action Feasibility

Proposed option is feasible based on experience in other jurisdictions, but carries a moderate likelihood of success (i.e., moderate risk).

Risk of Not Achieving Results within Timeframe

Pros:

- Eliminates many self-haul trips to the City transfer stations
- Provides a convenient way for homeowners to get rid of small amounts of C&D waste
- Allows more opportunities for materials to be diverted for reuse

Cons:

- Will require a great deal of effort to educate the public
- May raise costs for the City (program management and education)

Assumptions

- The materials covered under this option include all C&D wastes and carpet
- This option would be implemented in 2008 and take 5 years to ramp up.
- The participation rate is expected to be up to 6 percent.
- The efficiency rate is expected to be up to 66 percent.
- The recovery rate under this option would be approximately 4 percent.
- This option would recover 450 tons in year 1, 2,435 tons by year 5. After 2015, it is assumed in Scenario 4 that the ban of C&D materials from disposal incentivizes

private haulers to capture C&D materials and diverts these materials through other programs.

- On-demand service would be available 355 days per year.
- Truck service would include 1 collection truck and ½ truck to deliver and move containers from site to site.
- The average weight of a self-haul trip is 0.35 tons (700 pounds). When applied to 2,400 tons, this generates 6,802 calls per year/ 19 calls per day by residents requesting pickup. One FTE can field approximately 12 calls per hour or 84 calls per day.
- Facility capital costs include purchasing an existing small commercial building to serve as a City call center. The center would provide 500 square feet of office space per FTE and a total site size 3 times larger than the office to accommodate parking.
- Program management costs include 1 FTE (Manager II) to oversee the program.
- Educational costs include 0.5 FTE (analyst), and marketing materials of $60,000 in year 1; this cost drops to $15,000 per year for years 2 through 5.
- Fixed facility O&M costs include 2 FTEs (1 crew chief and 1 administrative)

References:

Madison, City of. 2007. Information on City of Madison's Streets and Recycling Department curbside collection program for building materials viewed on January 23, 2007, at City website: <http://www.cityofmadison.com/streets/collectionBuilding.cfm>.

Performance-Based Contracting for Solid Waste Service Contracts (Resource Management) (#240)

Description

Structure solid waste service contract to compensate waste contractors based on performance in achieving the City's waste reduction goals rather than the volume of waste disposed. Waste contractor incentives are aligned with the City's waste reduction goals to create a mutually beneficial partnership to explore innovative approaches that foster cost-effective resource efficiency through prevention, recycling, and recovery.

Background

Resource Management (RM) is a strategic alternative to disposal contracting that emphasizes cost-effective resource efficiency through prevention, recycling, and recovery while limiting hauling and disposal. RM is premised on the idea that contractors will pursue resource efficiency when provided the correct financial incentives. RM contracts align waste generator and contractor incentives by constraining disposal compensation and providing opportunities for both the contractor and the generator to profit from resource efficiency innovations (Table 1). Thus, if a contractor identifies cost-effective recycling markets for disposed materials, or techniques for preventing waste altogether, they receive a portion of the savings resulting from the innovation (Tellus Institute 2001).

The practices summarized in Table 2 are essential elements of any RM contract because they align customer-supplier incentives for resource efficiency by establishing a compensation mechanism based on supplier performance and continuous improvement. Furthermore, the practices provide an information rich environment in which to evaluate resource efficiency opportunities (Tellus Institute 2001).

The city currently has four separate contracts for collection and processing of residential and commercial waste (Table 3). All of the contracts are set to expire on March 31, 2008. Current bonuses and penalties are tied to the accuracy of reporting the collection of garbage and yard waste in excess of the base service level (Section 128). Reward targets exist for centralized apartment recycling and are tied to the participation percentage of accounts with detachable container service. The reward target is set at 70% with rewards for higher participation and penalties for lower participation. The reward rate doubles for participation rates exceeding %80.

Table 1. Comparison of Resource Management and traditional hauling and disposal contract features.

Features	Traditional Hauling & Disposal Contracts	RM Contracts
Contractor Compensation	Unit price based on waste volume or number of pick-ups.	Capped fee for waste hauling/disposal service. Performance bonuses (or liquidated damages) based on value of resource efficiency savings.
Incentive Structure	Contractor has a profit incentive to maximize waste service and volume.	Contractor seeks profitable resource efficiency innovation.
Waste Generator-Contractor Relationship	Minimal generator-contractor interface.	Waste generator and contractor work together to derive value from resource efficiency.
Scope of Service	Container rental and maintenance, hauling, and disposal or processing. Contractor responsibilities begin at the Dumpster and end at landfill or processing site.	Services addressed in hauling and disposal contracts plus services that influence waste generation (i.e., product/process design, material purchase, internal storage, material use, material handling, reporting).

Table 2. Descriptions and Examples of Resource Management Standard Practices.

Resource Management Standard Practice	Description/Examples
1. Establish Baseline Cost, Performance, and Service Levels	■ Define scope and service levels. ■ Identify existing contract and compensation methods. ■ Establish cost and performance benchmarks. ■ Establish goals.
2. Seek Strategic Input from Contractors	■ Convene pre-bid meetings with contractors to articulate goals and address questions. ■ Allow or require bidders to submit operations plans for achieving specified improvements in existing operations.
3. Align Waste and Resource Efficiency Services	■ Coordinate, integrate, and formalize all contracts and services included in the baseline scope identified in Practice 1. ■ Ensure that contractor has access to "internal" stakeholders that influence waste management and generation.
4. Establish Transparent Pricing for Services	■ Delineate pricing information for specific services such as container maintenance, container rental, hauling, disposal, etc. ■ Allow variable price savings, such as "avoided hauling and disposal," to flow back to generator and/or be used as means for financing performance bonuses.

5. Provide Direct Financial Incentives for Resource Efficiency	■ Establish compensation that allows contractor to realize financial benefits for service improvements and innovations. ■ Assess liquidated damages for failing to achieve minimum performance benchmarks or standards.
6. Cap Compensation for Garbage Service	■ Establish a cap on waste hauling/disposal service compensation that decreases gradually over time. ■ Decouple contractor profitability from waste generation and/or service levels. ■ Base compensation initially on reasonable estimates of current hauling and disposal service and costs as per Practice 1.

Table 3. Details of existing City of Seattle Collection Contracts.

Collection Contract With	Collection Contract Area	Contract For	Contract Expiration
Rabanco, LTD.	North Seattle[1]	Commercial Collection	March 31, 2008
Waste Hauling and Recycling, Inc.	North Seattle[1]	Residential Collection	March 31, 2008
Waste Management of Washington, Inc.	South Seattle[1]	Commercial Collection	March 31, 2008
U.S. Disposal II	South Seattle[1]	Residential Collection and Material Processing	March 31, 2008

[1] – North Seattle collection area is defined as follows: The north boundary is the north city limits of the City of Seattle. The south boundary is, from west to east, Salmon Bay, the Lake Washington Ship Canal, Lake Union, Portage Bay, the Portage Cut (Montlake Cut), and Union Bay.

[2] – South Seattle collection area is defined as follows: The north boundary is, from west to east, Salmon Bay, the Lake Washington Ship Canal, Lake Union, Portage Bay, the Portage Cut (Montlake Cut), and Union Bay. The south boundary is the south city limits of the City of Seattle.

Materials Involved

Traditional Curbside Recyclables, including Aluminum Beverage, Brown Beverage, Clear Beverage, Office Paper, Computer Paper, Container Glass, OCC/Kraft unwaxed, OCC/Kraft waxed, Tin Food Cans, Mixed Lowe Grade Paper, Phonebooks, Polycoated Paper, Newspaper, Other Aluminum, Other Ferrous, Other Glass, Other Paper, Paper/Other Materials, #1 PET Bottles, #2 HDPE Bottles (natural and colored), Grocery Bags and Bread Bags, Jars and Tubs. Other Clean PE Bags, Other Film, Other HDPE Bottles, Other PET Bottles, Other Plastic Bottles

Implementation Timeframe

Implementation Year: 2016 Ramp Period: 3 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
Traditional Recyclables	4%	50%
SF Residential		
Traditional Recyclables	8%	50%
MF Residential		
Traditional Recyclables	4%	50%
Self-Haul		
Traditional Recyclables	4%	50%

Diversion Potential

Commercial: 2% recovery rate, up to 765 tons by 2038

SF Residential: 4% recovery rate, up to 589 tons by 2038

MF Residential: 2% recovery rate, up to 237 tons by 2038

Self-haul: 2% recovery rate, up to 452 by 2038

Total: Up to 2,043 tons by 2038 (0.17% of total waste stream)

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$457,000*	$457,000*	$457,000*	$457,000*	$457,000*
Capital 10 Yr.	$0					
Capital 25 Yr.						

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

* Escalates annually at 80% of CPI

Incentives for waste contractor performance are a function of the specific structure of the contract established with the waste generator as developed using Resource Management Standard Practices (see Table 2). Principal strategies of the Resource Management contract structure include establishing a cap for hauling and disposal of waste and that decreases over time and defining specific waste reduction goals and benchmarks. Compensation or penalties in the form of performance bonuses and liquidated damages are assessed based on the contractor's performance in relation to the established goals and benchmarks.

Environmental Benefits

Level of benefit: Low

Benefits provided:

- Reducing the volume of waste sent to landfills and incinerators, which results in fewer methane emissions from landfills, and reduced carbon dioxide and nitrous oxide emissions from combustion.

- Minimizing the demand for virgin materials, thereby reducing energy consumption to extract, process, and manufacture the products from those virgin materials. The reduction in energy use minimizes fossil fuel consumption, thus resulting in fewer emissions of carbon dioxide and nitrous oxide.

- Slowing the logging of trees and hence maintaining the carbon dioxide storage capacity provided by forests.

Action Feasibility

- City of Seattle collections contracts are set to expire in 2008 providing a near-term option for restructuring the existing collection contract system towards one inspired by resource management contracting.

- It may be politically infeasible for the City to move towards a single hauler.

- Separate RM contracts be considered for the commercial and residential sectors or based on geography (north/south Seattle)

Risk of Not Achieving Results within Timeframe

Pros:

- Strong incentive for waste contractor to achieve diversion goals especially if decreasing cap is placed on total refuse tonnage that will be reimbursed.

Cons:

- Material diversion rates may already be sufficiently high that potential resource management waste contractors will have low confidence in being able to significantly impact diversion streams.

Assumptions

- All existing waste contracts expire at the end of March, 2008.

- Financial incentives and the possible assessment of liquidated damages related to agreed upon waste diversion benchmarks will spur innovation on the part of the waste contractor to achieve higher diversion rates.

References:

U.S. Environmental Protection Agency (EPA). 2007. Information on resource management features, standard practices, and case studies. Information viewed February 7, 2007 on agency website: <http://www.epa.gov/wastewise/wrr/rm.htm>.

U.S. Environmental Protection Agency (EPA). 2002. Waste Wise - Resource Management: Innovative Solid Waste Contracting Methods.

Tellus Institute. 2002. Assessing the Potential for Resource Management in Clark County, Nevada. Prepared for U.S.EPA Region IX. Report viewed online February 7, 2007: <http://www.epa.gov/wastewise/wrr/rm.htm>.

Tellus Institute. 2001. Advancing Resource Management in Nebraska: A demonstration Project Sponsored by the Nebraska Environmental Trust. Report viewed online February 7, 2007: <http://www.epa.gov/wastewise/pubs/ne_rm.pdf>.

City of Seattle. 1999. Solid Waste Collection Contract between the City of Seattle and Washington Waste Hauling & Recycling, Inc.

City of Seattle. 1999. Solid Waste Collection and Processing Contract between the City of Seattle and U.S. Disposal II.

City of Seattle. 1999. Contract between the City of Seattle and Waste Management of Washington, Inc. for the Collection of Commercial Waste.

City of Seattle. 1999. Contract between the City of Seattle and Rabanco, LTD. for the Collection of Commercial Waste.

Expand Residential Curbside Organics Collection to Include All-Food Waste (#253)

Description

Expand organics program to allow for collection of commingled yard waste and food waste of all types, including meat, dairy, and fats, as well as compostable paper. This system has been successfully implemented in several jurisdictions, including San Francisco, CA, Alameda County, CA, Halifax, NS, and several other Canadian regional districts. Would require weekly year-round collection of organics, as opposed to the current bi-weekly/monthly seasonal system. May also require purchase and distribution of new bins to limit odor and pest problems, and for in-kitchen source separation (San Francisco provides green cart and mini-bin to suit these purposes).

Materials Involved

Organics, including Food Waste, and Compostable soiled paper

Implementation Timeframe

Implementation Year: 2011 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
SF Residential		
Material	13%	80%
MF Residential		
Material	10%	50%

Diversion Potential

SF Residential: 10% recovery rate, up to 2,218tons by 2038

MF Residential: 5% recovery rate, up to 1,120tons by 2038

Total: Up to 3,338 tons by 2038 (0.28% of total waste stream)

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$449,670*	$449,670*	$449,670*	$330,000*	$330,000*
Capital 10 Yr.	$208,500**					
Capital 25 Yr.	-					

* O&M Costs escalate annually at 80% of CPI
** Total Capital to be amortized at 7%
Capital costs assumed to include purchase of new bins (see assumptions)

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$10.00*	$10.00*	$10.00*	$10.00*	$10.00*

* Variable costs escalate annually at 65% of the CPI

Action Feasibility

Proposed action is feasible and has a high probability of success. Similar programs have been successfully implemented in several other jurisdictions.

Risk of Not Achieving Results within Timeframe

Proposed action is considered to be low risk given success in other jurisdictions.

Pros:

- Should achieve a high diversion rate (>5%)
- Consistent with "Highest and Best Use" goals for organic waste
- High likelihood of success
- Low program costs after 10 year capital costs have been retired

Cons:

- Requires initial capital costs for investment in new collection carts and bins, as well as education costs and other possible subsidies (e.g., paper liners for kitchen bins)
- Increases collection frequency will result in increased variable costs (potentially offset by reduced landfill tip fees)

- Process requirements for meats, fats and oils are more stringent, potentially increasing composting costs

Assumptions

- Diversion potential based on estimate of 3,338 tons calculated using current residential food waste and compostable soiled paper production (48,750 tons/year) (SPU 2004), and assumed 10%-15% participation and 50%-80% efficiency rates.

- Very High participation and efficiency rates (i.e., >85%) can be achieved by modifying rate structures and collection strategies for garbage and organics collection to incentivise source separation (San Francisco, CA), or through organics disposal bans combined with these measures (Halifax, NS)

- O&M costs based on 1 FTE program Manager, Education Marketing materials at $124,000 which decrease after year 2 by 75%, 2 Inspector/Analyst FTEs and 1 Laborer FTE.

- 10 year capital costs based on estimated costs to supply new carts and mini-bins to each participating household (15% of 139,000 households, ~$ 10/household), totaling $208,500amortized at 7% interest over 10 years (SPU 1998). Note that these additional costs may not be necessary if existing bins are suitable for all organics collection.

- Variable costs are assumed to include the marginal cost of weekly organics collection only.

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Take-Back Program for Carpet (#265)

Description

Create a mandatory carpet take-back program that requires manufacturers and retailers to take back carpet for recycling. This would apply to all carpet sold in Seattle or Washington State. Pertains to carpet design, labeling of content, consumer information, and could include carpet leasing.

Enable industry to establish a carpet recovery market in Seattle by providing tax or other business development incentives (subsidized land, resource recovery parks). Recycling/processing facilities are capital intensive and are often started by large corporations. Small business carpet recycling consists mainly of material collection, sorting and consolidation. Create efficiency and success by concurrently working with small businesses and larger corporations for a means of collection, consolidation, recycling and processing. Incentivise market creation through subsidies to keep consumer/ratepayer costs low.

Recovered waste carpet can be managed through direct reuse, refurbishment, recycling fiber into other plastic products, recycling carpet backing into new carpet backing, and carpet-to-carpet recycling.

Background

All carpet generally contains a composite of carpet face and carpet backing. The carpet face is made from yarn or fiber with several types of fiber used, including nylon 6, nylon 6,6, wool, cotton, olefin, acrylic, rayon, and polyester. Of these fibers, only nylon fiber (type 6 and type 6,6) is currently recycled. The California Integrated Waste Management Board (CWMB) estimates that nylon fiber represents 70 percent of all carpet sold in the United States (CWMB 2001). The independent research agency, INFORM Incorporated estimates that nylon 6 and nylon 6,6 account for 45 – 55 percent of the nylon carpet market. Other major carpet materials include polyester and polypropylene which are not economical to recycle due to the low cost of virgin materials (INFORM 2000).

Several private carpet recycling companies exist around the country, with more in development (the majority located in the East and Southeast). Eighty percent of the U.S. Carpet market is supplied by mills located within a 65 mile radius of Dalton, Georgia.

In January 2002, members of the carpet industry, governmental agencies, and non-governmental organizations voluntarily signed a Memorandum of Understanding (MOU) for management of waste carpet. This MOU is the result of a two-year negotiation process in which participants joined together to implement a product stewardship plan to change how post-consumer carpet is managed in the United States. Carpet America Recovery Effort (CARE) is responsible for achieving a 40% diversion goal of post-consumer carpet within 10 years. The functions to enhance collection infrastructure for post-consumer carpet by creating demand in the marketplace for products that contain post-consumer recycled content from carpet; serve as a resource for technical assistance; and measure and report on progress toward fulfilling the MOU goals. The program is funded by a tiered sponsorship system. Current sponsors include carpet manufacturers, equipment and material suppliers, a professional trade association, and the US EPA. (CARE 2006)

Example of CARE's initiative:

The CARE organization is in the process of lobbying "big box" stores such as Lowes and Home Depot to institute a reclamation fee but the process has been non productive and CARE is under the impression that is will be a slow process. So far, they have established dialogue with Home Depot and GCA Global (CARE 2006a).

Summary of the national goals for carpet recovery:

Figures rounded to millions of pounds. Data on carpet discards provided by the Carpet and Rug Institute.

	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Total Discards	4,678	4,828	4,537	5,038	5,261	5,590	5,642	5,887	6,020	6,605	6,772
Reuse	0			25			113		211		203-339
Recycling	180			353			620		903		1,354-1,693
Waste-to-Energy (WTE)	-	48	45	50	53	56	56	59	60	66	68
Cement Kilns	-			100			300		200		200
Landfill	4,498			4,510			4,552		4,646		4,812
Recycling Rate	3.8%			7%			11%		15%		20-25%
Landfill Diversion Rate	3.8%			10%			19%		23%		27-34%

Source: CARE 2006

The voluntarily initiation of carpet take-back is driven by the following factors:

- **Profit driven.** Take-back-recycling programs have the potential for profitability. For example, virgin materials (oil) and energy costs (amount of Btus used in manufacturing) and the cost of the recycled product versus the newly manufactured product can be reduced with lower-cost recycled nylon.

- **Marketing.** Take-back recycling programs are viewed as a competitive strategy to satisfy market demand. For example, a carpet take-back program would be supported by professionals involved in Seattle's LEED program and Construction Work's program. Increasingly, architects, designers, government entities and developers are demanding higher recycled content and recyclability.

- **Demand for Recycled-Content Parts.** Auto manufactures are setting higher standards for recycled-content for auto parts. For example, the downcycling of Nylon 6 (DuPont, etc…) is currently being used in a variety of auto parts including air-cleaner housings, engine covers, and other vehicle components.

- **Preempting Legislation.** As EPR programs are becoming more popular, the carpet industry is preparing itself for potential take-back legislation. Currently, the electronic take-back program in WA (official start-up - 2009), is completely producer funded. **(**Inform 2000)

Existing Carpet Procurement Programs

Procurement programs are becoming increasingly popular at the Federal, state and local levels of government. In fact, if an agency at any level of government is using appropriated federal funds for procurement, they are required to purchase products with the highest recovered material content level practicable. The inclusion of recycled carpet under procurement guidelines reduces the amount of waste generated, closes the recycling loop and more importantly, incentivises the industry and demonstrates government leadership. The following are examples of existing procurement programs at the federal, state (WA) and county (King) levels of government:

Federal Government

Under the Comprehensive Procurement Guideline, Federal agencies are required to purchase items containing recovered materials (pursuant to EO 13101 and Section 6002 of The Resources Conservation and Recovery Act). Sixty-one items are currently listed, including P.E.T. carpet face fiber and carpet cushion.

Washington State

Washington has joined many other states and signed the nationwide MOU for management of waste carpet under CARE. Using procurement guidelines from other states across the nation, the Department of Ecology worked with the WA state purchasing office to develop a carpet procurement contract. The contract includes provisions for recycled content carpet and the recycling of the old carpet. It also includes a stipulation that installers must use adhesives with low levels of Volatile Organic Compounds (VOCs). The contract is set up so that it may be used by all state agencies, political subdivisions of WA or OR, qualified organizations, materials management centers, and participating institutions of higher education. Vendor contracts have been established with DuPont and Rubenstein's Contract Carpet and several manufacturers including: Lee's, Collin's and Aikman, Bigelow, Milliken, and Mohawk.

In a pilot take-back program conducted between 1997 and 2000, the state of Washington was able to prevent the land filling of over 2 million pounds of carpet (Inform 2007).

King County. The King County Environmental Purchasing Program assists County agencies in implementation of King County Executive Policy CON-7-1-2, which requires agencies to use recycled and other environmentally preferable products wherever practicable.

In a King County procurement bulletin report (1998), King County's main contractor for flooring (DuPont Flooring Systems) estimated that 13,000 lbs of carpet was recycled for King County through their DuPont Carpet Reclamation program. In addition, King County Records and Elections purchased 635 square yards of Collins & Aikman carpet with recycled-content backing (Purchased through the State flooring contract from DuPont Flooring Systems).

Carpet Recycling and Collection Market in WA

The following represent carpet recycling and collection based on accessible data, this list is not all-inclusive.

The closest carpet recycler is in Vernon, California—Los Angeles Fiber Company: Carpet and Textile Recycling Plant (LA Carpet). They receive waste carpet from eleven states including WA (Seattle) and convert the material into synthetic carpet cushion. The recycling service is free while the customer pays freight.

A local market does exist for residential carpet polyurethane foam, Pacific Urethene Recycling (253-852-9080) in Kent. Pacific Urethane Recycling pays customers .08 cents per pound but it must be dropped off. Many Seattle carpet stores recycle old foam carpet pads but it is typically geared towards their customers.

A local carpet dealer, Collins & Aikman Floorcoverings (Tandus, Inc.), accepts any vinyl backed carpet or carpet replaced by their product exclusively through the commercial sector. The company began their recycling program ten years ago and has recovered 110 million pounds of carpet nationwide since the program's inception. Historically, customers were required to pay for the shipping costs; however, now that the recycling efforts have proven to be profitable, they no longer charge for shipping.

Through the Collins & Aikman Floorcoverings program, contractors bid on a commercial remodel recovery (Waste Management or Demicon, for example) then transport the vinyl backed carpet to Recovery One located in Tacoma, WA for consolidation/ bailing for shipping. The cost to recover the carpet through Recovery One is half the cost of landfilling ($56/ton). A freight company ships the carpet by train to Georgia for processing. Collins & Aikman Floorcoverings (Tandus, Inc.) covers the cost of shipping at no cost to the consumer. The carpet is reclaimed, recycled and reused. The entire composite is recycled to a high tech product that is the same or better than the original. Collins & Aikman Floorcoverings (Tandus, Inc.) typically markets their environmental services departments of Fortune 500 or Fortune 1000 companies with "green missions" (conversation with Collins & Aikman Floorcoverings representative, Dennis Turnbull).

Environmental Benefits

"Carpet is produced from petroleum, a non-renewable resource. Petrochemical processes for synthetic fiber production require high inputs of energy and water and produce harmful air emissions (hazardous air pollutants and volatile organic compounds (VOCs) that contribute to smog). Carpet production itself is energy and water intensive, and toxic dyes have been used to produce the attractive colors we demand, which sometimes end up in streams. Carpet has also been identified as a contributor to indoor air pollution, particularly from adhesives used for installation. Finally, old carpet has been typically disposed of in landfills, taking up valuable landfill space and wasting resources that could be reused or recycled. The carpet industry continues to address each of these major environmental impacts with different approaches depending on the company and the type of carpet being manufactured." (Green Seal 2001)

The environmental impacts of carpet recovery impacts both Seattle and the broader landscape. Using the comprehensive Antron Reclamation Program[sm] the following assumptions for the environmental benefits of reclaimed carpet are as follows:

	Base Year	**Year 2030**
Equivilant Pounds (Lbs) Reclaimed	7,264,000	8,930,000
Cubic Yards of Landfill Saved	13,588	16,740
Average Equivilant BTUs Saved	79,860,480,000	98,384,367,900
Average U.S. home could love off saved BTUs for this many months	5,327	6,563
Climate Change Potential Averted (Co2 Equivilant Lbs)	12,000,000	14,783,438
Number of trees it would have taken to absorb that much CO2 in 1 year	750,000	923,965
Gallons of Water Saved	7,296,000	8,988,330

Source: Antron Reclamation Program[sm] Carpet Reclamation Calculator (Envista 2007). The model is based on internal life cycle analysis of carpet reclamation developed through experience. The following are the assumptions:

1. The nylon is recovered from broadloom carpet and is used as feedstock in making

new engineered resins.
2. An average used commercial carpet is 32 oz face fiber, 32 oz backing and 8 oz dirt.
3. The average US home used about 14,991,083 BTUs of energy per month.
4. An average mature tree absorbs 16 pounds of CO_2 per year.

Data

In the United States, there is an estimated 4.7 billion pounds of old carpet going to the landfill today.

Local. In 2005, more than 24 million pounds of waste carpet were buried in King County's Cedar Hills Landfill in Maple Valley.

National. Estimated total U.S. discards of carpet in 2002 were 4.7 billion pounds. Even though most components of carpet can be recycled or reused, only 4% is recovered while 96% is disposed of in landfills (Care 2006).

In 2001, approximately 53% of carpet sales were residential and 47% for commercial applications. Commercial installation is broken down into six (6) categories: Corporate (30%); Retail (18%); Educational (15%); Health Care (15%); Hospitality (13%); and Government/other (9%) (Floor Covering News 2002).

According to the National Association of Home Builders (NAHB), the national supply of carpet was 1,750,000 tons in 1998 which represents nearly one percent by weight and nearly 2 percent by volume of municipal waste (NAHB 1998). Because carpet is categorized as a durable good, the amount recycled is based on the estimated amount ready for disposal, not the amount of product sold. With this said, the North Carolina Department of Environment and Natural Resources (DNR) estimated the per capita supply, based on national population (267,636,061 (U.S Census 1997)) and the national supply of carpet (1,750,000 tons) to be 0.00654 tons of waste generated per capita or 13.8 pounds per capita. The North Carolina DNR characterized North Carolina's waste carpet generated per person based on their existing and projected population as follows:

	1997	1998	1999	2000	2001	2002
NC Estimated Population	7,436,690	7,542,996	7,641,684	7,733,097	7,811,951	7,891,238
Supply of Carpet Waste in NC	48,627	49,322	49,967	50,565	51,080	51,599

Source: North Carolina (NC) Office of State Planning

The total residential waste tonnages based on figures for combined commercial and residential waste in New York City is 25,464 tons of carpet and rugs annually (SAIC 2000). The New York City Department of Sanitation reports that residential waste accounts for 38% of New York City's total municipal waste stream (NYCDS 2002).

Third-Party Organization: In its 2003 annual report, the Carpet Industry third-party organization, CARE lists 15 sponsoring members. Based on the published membership schedule for CARE, these 15 organizations contribute approximately $300,000 per year. For 2003, they reported 43,300 tons of carpet recycled for a per ton cost of $6.92 for the TPO (City of Tacoma 2005).

Action Feasibility

- Carpet backing would be labeled so that the content would be known and it would be easier to recycle.
- Voluntary carpet take-back programs are motivated by fear of legislation.
- At this time, carpet take-back is mostly market driven; if take-back legislation were developed, there could be more coordination and integration within the program.
- A carpet reclamation program is already supported by big players in the carpet industry, state and federal governments.
- The technology to improve and increase the recyclability of products is continually driven by profitability.

Risk of Not Achieving Results within Timeframe

- Would be slow to implement and would require legislation (potentially leading to lawsuits). Carpet installed/manufactured before 2007 could be more difficult to recycle.
- There are currently no carpet recycling facilities in Seattle or the State of WA, which makes transportation costs for recycling (not in all instances) a large factor.

Materials Involved

Carpet/ Upholstery

Implementation Timeframe

Implementation Year: (Commercial)	2010 (Commercial)	Ramp Period: 10 years
	2015 (Self-haul)	7 years (Self-haul)

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		

Carpet	50%	80%
Self-haul		
Carpet	25%	80%

Diversion Potential

Commercial: 40% recovery rate, up to 1,333 tons by 2038

Self-haul: 20% recovery rate, up to 1,469by 2038

Total: Up to 2,802 tons by 2038 (0.23% of total waste stream)

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$77,400*	$77,400*	$77,400*	$77,400*	$77,400*
Capital 10 Yr.	$0					
Capital 25 Yr.						

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

* Escalates annually at 80% of CPI; Drops to $72,400 in year 6.

Assumptions

Tonnage Diversion. The estimated diversion potential from removing carpet from the waste stream is expected to be low. Carpet represents approximately 15% of the miscellaneous waste category in the SPU 2004 60% projections (or an estimated 5,250 tons/year). Using tonnages based on North Carolina's DNR per capita estimate and New York Cities Department of Sanitation tonnage of carpet waste, estimated pounds of carpet waste are 13.8 pounds per capita in NC and 12.75 pounds per capita for NYC.

Using Seattle's Census 2000 population of 563,374 and use North Carolina's estimated waste generated per capita of 13.8 pounds of carpet per person, an estimated 3,684 tons/ carpet/ year would be generated and if projected out to 2030, based on Puget Sound Regional Council's (PSRC's) population projection of 672,441, it would increase to 4,398 tons/carpet/ year (PSRC 2006). New York City's estimate of total residential waste tonnages based on figures for combined commercial and residential waste of 25,464 tons of carpet and rugs annually (SAIC 2000) equates to 12.75 pounds per capita based on New York Cities population of 8,00,278 (NYCDS 2002). Using Seattle's Census 2000 population it would equate to 3,591 tons/carpet/ year and if projected out to 2030 based on PSRC's population projection, it would be 4,297 tons/carpet/year (PSRC 2006). The NYC Department of Sanitation reports that residential waste accounts for

38% of New York City's total municipal waste stream. If you were to divide the tonnage of carpet waste a year into residential and commercial, based on Seattle's 2000 Census Population, it would be 1,365 tons/carpet/year and 2,226 tons/carpet/year respectively. If projected out to 2030, residential waste would be 1,629 tons/carpet/year and commercial waste would be 2,658 tons/carpet/year.

The average tonnage or waste carpet in Seattle, based on NYC and NC is 3,637 tons/carpet/year using year 2000 population Census data for Seattle and 4,348 tons/carpet/year in 2030 based on PSRC's projections (PSRC 2006). With a 40% diversion goal through CARE by 2019, with a base year of 3.8% diversion (based on CARE figures), one can expect approximately 138 tons to be diverted in the base year. The following table shows the estimated total population projection, total discards, and diversion rate projected out every ten years to 2030 based on PSRC's population projections and the goal of 40% diversion by 2019. Once there is an established market infrastructure and increased participation rates, it can be expected that the diversion may go higher by 2038.

Years	2010	2020	2030
Population Projection	586,365	631,724	672,441
Total Discards (tons)	3,893	4,195	4,465
Landfill Diversion Rate (percent)	4%	40%	40%
Net Diversion (tons) after processing residual *	94	1,060	1,204

* Processing efficiency assumed to be 60%

Capital Costs. The take-back program would be managed by a third-party organization (TPO) on a voluntary level through the private, not-for-profit organization CARE or another similar organization. Capital costs will be very low, if non-existent because functioning program already exists. Administrative and management costs would be absorbed by the industry. The TPO's responsibilities would include collecting fees and managing program funding; establishing and managing a product collection system; monitoring, evaluating and reporting program results; and program promotion. In its 2003 annual report, the Carpet Industry third-party organization, CARE lists 15 sponsoring members. Based on the published membership schedule for CARE, these 15 organizations contribute approximately $300,000 per year. For 2003, they reported 43,300 tons of carpet recycled for a per ton cost of $6.92 for the TPO (City of Tacoma 2005). The chart on the following page shows the Green Seal ® recommended carpet brands based on resin type, recyclability, recycled content, and toxicity, by manufacturer.

Recommended Carpet Brands

MANUFACTURER *BRAND*	FIBER TYPE	RECYCLED CONTENT	DYEING METHOD	VOLATILE ORGANIC EMISSIONS	RECYCLABLITY
Beaulieu *Caladium*	Polyester	100% recycled PET recovered from bottles	Beck	CRI standard	No current programs for polyester carpet
Brintons U.S. Axminster *Custom Woven*	80/20 Wool/ Nylon	None	Yarn	CRI standard	Into other applications
Colin Campbell *Nature' s Carpet*	Wool from organically-raised sheep	None	Carpet is sold un-dyed, or the yarn dyed using vegetable dyes or non-acid dyes	Negligible VOCs detected by lab tests	Biodegradable; puts nitrogen back into the soil
Collins and Aikman *Powerbond E3*	Nylon 6,6	Vinyl backing contains 100% recycled content (mix of PC and PI materials); 31% to 50% overall recycled content	Solution/ Yarn	CRI standard	All vinyl-backed products are 100% recyclable into carpet backing
Interface *"Sabi" and "Prairie School Collection"*	Nylon 6,6	100% recycled content GlasBac RE vinyl backing + high recycled content nylon 6,6 face fiber; 51% overall (22% PC + 29% PI) for Sabi and 55% overall (22% PC + 33% PI) for Prairie School	Solution/ Yarn	CRI standard	Recyclable Evergreen leasing program recycles used carpet tiles.
J&J *Encore SD Ultima*	Nylon 6	25% of face fiber (7% PC + 18% PI content)	Solution/ Yarn	CRI standard	J&J' s Carpet Reclamation Program
Lees *Unibond, Lees6, Lees Squared*	Nylon 6,6	4%-60% of face fiber	Solution/ Yarn	CRI standard	DuPont Carpet Reclamation Program
Mannington *Infinity Backing Series*	Nylon 6,6	25%-40% in the backing + recycled content face fiber by DuPont	Solution/ Yarn	CRI standard	DuPont Carpet Reclamation Program
Milliken *Earth Square (Attitudes, Movements)*	Nylon 6,6	Renewed and refurbished product has 100% PC content	Solution, Injection	CRI standard	Renewable
Mohawk *ColorStrand Infinity*	Nylon 6	50% of face fiber (25% PC + 25% PI content)	Solution	CRI standard	Nylon 6 closed-loop; other materials downcycled
Image (light duty)	Polyester	100% PC face fiber from PET bottles	Piece	CRI standard	No current programs for polyester carpet
Shaw *EcoSolution Q fiber + Ecoworx olefin backing*	Nylon 6	Face fiber has 25% PC and PI recycled content	Solution	CRI standard	Yarn into yarn; backing into backing
Talisman *Envirelon*	Polyester	100% face fiber from PC soft drink bottles	Skein	CRI standard	No current programs for polyester carpet

Notes:

1. Most manufacturers offer leasing options, if desired by the customer. However, the customer should make sure that the manufacturer commits not to landfill or incinerate the carpet taken back, but instead to refurbish or recycle it.
2. *Beck dyeing* is a wet process in which carpet sewn into a loop is continuously rotated and immersed in a heated dye vat for several hours (commonly used for cut-pile carpet). *Beck dyeing* is a *piece dye* method.
3. *Yarn dyeing* is another wet process in which the finished yarn is dyed prior to carpet assembly.
4. *Skein (or "package" dyeing)* is a wet process that involves reeling the yarn into "skeins" or winding it onto a "package" (on a perforated tube), and dyeing in vats.
5. *Injection dyeing* involves the use of micro jets to inject dye into the face of the finished carpet.
6. PC = Post-consumer
7. PI = Post-industrial

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Tiered Commercial Garbage Rates (#270)

Description

The implementation of a tiered commercial garbage rate structure includes a system in which customers pay an increased unit rate for higher waste disposal quantities. This tiered rate structure is commonly used by the water industry to promote water conservation. The water industry uses a progressive rate structure in which high water users pay more for a unit of water than those who conserve and keep their water use down. The water industry charges a flat rate for water usage up to a fixed volume, when the usage goes beyond that fixed volume the customer has to pay at the next rate tier, which has a higher cost per gallon. The flat rate guarantees a steady cash flow to cover the fixed costs. Multiple tiers can be used to set-up different volume range usage.

This tiered commercial garbage rate structure would be implemented with the same principles as the water industry and would aim at changing commercial customer behavior in increasing their waste reduction and recycling activities in order to save money (avoiding the higher tiered unit rate for waste disposal). Structuring the rates in this manner ensures stronger reduction and recycling incentives are provided for high waste generators. By implementing this rate structure on the commercial customers, dense-waste industry sectors, such as grocery stores and restaurants, can be targeted and encouraged to reduce, reuse, and recycle.

Background

Seattle commercial customers have two options for garbage collection:

- Commercial garbage containers – 60 gallons to 8 cubic yards (CY); and
- Commercial drop boxes – 4 CY to 40 CY.

For each of the two options above, the cost for an additional pickup is equal to the cost for the first pickup. The existing City of Seattle (City) rate structure does not penalize commercial customers who generate more waste with an increased cost per additional pickup of a container or drop box.

The tiered rate structure should include higher cost per container/drop box pickup as compared with the weekly (or one-time) pickup rates. A tiered commercial garbage rate structure can be developed to have a fee schedule that is similar to what is shown in Table 1.

Table 1. Example of a Tiered Commercial Garbage Rate Structure

Type	Size[1]	Weekly Pickup Rate[1]	Tier I Pickup Rate (up to X additional weekly pickups)	Tier II Pickup Rate (from Y to Z additional weekly pickups)
Container	60-gal	$ 7.00	$ 7.00 + TBD	$ 7.00 + TBD + TBD
	90-gal	$ 8.30	$ 8.30 + TBD	$ 8.30 + TBD + TBD
	1 CY	$ 18.40	$ 18.40 + TBD	$ 18.40 + TBD + TBD
	2 CY	$ 26.20	$ 26.20 + TBD	$ 26.20 + TBD + TBD
	3 CY	$ 31.95	$ 31.95 + TBD	$ 31.95 + TBD + TBD
	4 CY	$ 44.80	$ 44.80 + TBD	$ 44.80 + TBD + TBD
	5 CY	$ 57.80	$ 57.80 + TBD	$ 57.80 + TBD + TBD
	6 CY	$ 70.95	$ 70.95 + TBD	$ 70.95 + TBD + TBD
	7 CY	$ 79.05	$ 79.05 + TBD	$ 79.05 + TBD + TBD
	8 CY	$ 100.20	$ 100.20 + TBD	$ 100.20 + TBD + TBD
Drop Box[2]	3-4 CY	$ 72.65	$ 72.65 + TBD	$ 72.65 + TBD + TBD
	6 CY	$ 72.65	$ 72.65 + TBD	$ 72.65 + TBD + TBD
	8 CY	$ 72.65	$ 72.65 + TBD	$ 72.65 + TBD + TBD
	10 CY	$ 97.50	$ 97.50 + TBD	$ 97.50 + TBD + TBD
	12 CY	$ 97.50	$ 97.50 + TBD	$ 97.50 + TBD + TBD
	15 CY	$ 97.50	$ 97.50 + TBD	$ 97.50 + TBD + TBD
	16 CY	$ 97.50	$ 97.50 + TBD	$ 97.50 + TBD + TBD
	20 CY	$ 97.50	$ 97.50 + TBD	$ 97.50 + TBD + TBD
	25 CY	$ 97.50	$ 97.50 + TBD	$ 97.50 + TBD + TBD
	30 CY	$ 97.50	$ 97.50 + TBD	$ 97.50 + TBD + TBD
	40 CY	$ 97.50	$ 97.50 + TBD	$ 97.50 + TBD + TBD

1 Source of container/drop box sizes and pickup rates is SPU website.
2 Drop box rates shown are for noncompacted waste and permanent accounts.
3 TBD – To be determined as part of the tiered rate structure development.

Designing a tiered rate structure begins with analyzing the ways to organize a tiered unit pricing program. After determining whether the program should measure collected waste by weight or volume, the City needs to consider the types and sizes of containers to use and the most appropriate service options. For the purpose of this option analysis, it is assumed that the City will continue using the existing commercial containers and drop boxes for a newly implemented tiered rate structure.

Under unit pricing, customers are charged either by the weight or volume disposed. The two systems have very different design and equipment requirements.

In volume-based systems, customers are charged for each container they generate using a specific size container or drop box (or several container or drop box sizes). The price typically includes the waste collection services. Volume-based programs encourage customers to compact the waste to fit into their containers and typically do not require specialized collection vehicles.

In weight-based systems, collection crews weigh the waste each customer sets out. The municipality or hauler then bills each customer per pound produced. Weight-based systems provide a more direct link between waste reduction and savings, since every pound of waste prevented, recycled or composted yields savings. These systems tend to be more expensive to implement and operate since they require special equipment and more labor to manage the billing system. Due to its complexity, only a few communities have implemented a weight-based system (Shapiro, 1994). It is assumed that for this option, the City would use a volume-based system.

Two important issues must be considered in setting up a tiered rate structure (Canterbury, 1999):

- As a minimum, the rate structure should cover the actual cost of providing the service (collection and disposal); and
- The public's input should be obtained to ensure that the rates are not too high. Rates that are too high can create problems with illegal dumping.

To guide the commercial customers to behave in the manner expected, by implementing this tiered rate structure, the City would have to educate the public before the program is implemented. The public should also be educated in the existing recycling, composting, and waste reduction programs.

Commercial customers typically are interested in turning a profit. If this rate structure is implemented, commercial businesses will perceivably be open to waste reduction and recycling if it results in cost-cutting in their operational practices.

The specific sector of the commercial industry that is targeted by this option is the dense waste generator, such as restaurants and grocery stores. A large portion of these businesses' waste stream is food waste. Food waste also happens to represent a large percentage of the overall waste stream in the City (16 percent). The tiered rate structure can encourage these businesses to be proactive in composting their food waste as opposed to being penalized with the higher tiered unit rates.

When collected in a source-separated manner, food waste can be processed into a high quality compost material. Collection and processing of food waste is relatively new compared to the "well-established" field of curbside collection of traditional recyclables (containers and paper). Commercial businesses tend to have relatively well-structured waste generation systems. Overall, the commercial sector is a logical place to phase in food waste collection programs with subsequent extension to the residential community (Newell, Markstahler, & Snyder, 1993).

Other guidance documents exist that can be used by restaurants and grocery stores to help them reduce, reuse, and recycle. One such document is the Restaurant Guide to Waste Reduction and Recycling (IWMB, 1992), which focuses on proactive tips in the categories of: purchasing; product handling and storage; food preparation; and production and service areas.

The overall intent of implementing a tiered commercial garbage rate structure is summarized best by a quote from Gary Liss & Associates (GLA, 2007), where they stated:

"*Incentive programs are designed to use economic and policy tools to harness the forces of the marketplace to accomplish adopted public policy goals. Many of these economic tools are designed to reward those who decrease the amount of waste they produce, or those who reuse, recycle, or compost it. Conversely, for those who continue to waste, these tools are designed to increase their costs. People can reduce-reuse-recycle, or they can pay for the privilege of wasting.*"

Materials Involved

Commercial MSW

Implementation Timeframe

Implementation Year: 2008 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
MSW	10%	50%

Diversion Potential

5% recovery rate, up to 267 tons by 2038 (0.02% of total waste stream)

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M	$0	$139,200	$139,200*	$139,200*	$69,600*	$69,600*
Capital 10 Yr.	$0	$0	$0	$0	$0	$0
Capital 25 Yr.	$0	$0	$0	$0	$0	$0

* O&M costs escalate at 80% of CPI.

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton	$0	$0	$0	$0	$0	$0

Action Feasibility

Proposed action is feasible, but has the significant obstacle of having to implement a rate structure that would increase disposal costs for several businesses (compared with the existing rate structure). A tiered rate structure has been successfully implemented (as part of pay-as-you-throw programs) for residential customers, but not necessarily for commercial customers.

Risk of Not Achieving Results within Timeframe

Proposed action is considered to be low risk given its success in the residential sector.

Pros:

- Increased participation in commercial waste reduction
- Increased participation in commercial recycling
- Increased landfill life by reducing disposal quantities
- High likelihood of success and low risk
- By staying with a volume-based unit rate system, the City would not be required to invest much money to implement this option.

Cons:

- A more expensive waste disposal bill may not deter businesses with higher incomes, who most likely are the higher waste generators.

- Requires significant programmatic accounting changes.

- Potential for increased illegal dumping by businesses that have no interest in waste reduction or recycling, but want to avoid increased costs.

Assumptions

- The City would use the same size commercial containers and drop boxes currenlty offered.

- The City would use a volume-based unit pricing (container size).

- A detailed analysis by the group responsible for developing the waste rate structure would have to be performed prior to implementing a tiered commercial garbage rate structure.

- Both theory and empirical evidence indicate that people tend to recycle more as garbage rates increase (SPU, 2004). The tendency to recycle more as garbage rates increase is driven by the behavior of the rate payer to save money. By reducing the total volume of garbage rate payers will pay a lower disposal fee.

- Labor and marketing demand on City will be reduced by one-half starting in Year 4 of the program. The initial 3 years of the program will demand more City time for planning, implementing, and evaluating the program.

References

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Shapiro, 1994. Balancing Costs and Revenues for Strong Unit Pricing Programs. WasteAge magazine. Shapiro, Michael. October 1, 1994.

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Residential Diaper Composting/Recycling (#273)

Description

Program would include collection of residential sector disposable diapers for composting at a centralized facility. Research on this subject has shown that diaper composting presents a number of technical challenges that limit the utility of this option.

In contrast, emerging diaper recycling technologies may make diaper recycling a viable alternative to composting. Pilot diaper recycling studies have been implemented in California, Canada, and Australia, and commercial scale programs are operating in Europe and Canada. However, these efforts have produced mixed results due to numerous technical problems, higher than anticipated costs and less market acceptance for recycled products than anticipated.

The analysis results, assumptions and estimates presented below focus only on diaper recycling. Pros and cons consider composting as well as recycling to demonstrate the challenges facing composting methods.

Materials Involved

Organics: Disposable diapers

Implementation Timeframe

Implementation Year: 2015 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
SF Residential		
Disposable diapers	5%	50%
MF Residential		
Disposable diapers	5%	50%

Diversion Potential

2.5% recovery rate, up to 103 tons by 2038 (0.009% of total waste stream) (when combined with strategy #400)

Cost

Cost estimates presented below are for diaper recycling only.

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5-10
O&M	-	$250,700	$250,700	$250,700	$250,700	$250,700
Capital 10 Yr.	$3,750,000					

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton	-	$70	$70	$70	$70	$70

Action Feasibility

Implementation of diaper recycling is feasible with capital facilities investment and changes in collection strategy (i.e., development of a fourth stream for source separated diaper waste). However, capital costs and related O&M costs will be high.

Risk of Not Achieving Results within Timeframe

This option presents a high risk of not achieving desired results within a reasonable timeframe without modification. Diaper composting poses technical challenges and potential environmental impacts that could limit end uses of compost products. Diaper recycling technology is available and potentially feasible for broad scale implementation, however capital and O&M costs for this technology are high. Moreover, where this technology has been implemented it has generally failed to perform at expected levels, resulting in diversion of significant amounts of post-process wastes to landfills.

Pros:

Diaper Composting:

- Diaper waste processing can be processed through anaerobic digestion to create biogas for power generation and compost feedstock
- Diaper waste can be aerobically composted directly, removing the anaerobic step if desired
- Presuming suitable collection strategies and processing technologies are in place, diaper waste could be commingled with other organics

- Biodegradable waste is separated from other materials, diverting a significant component of the waste stream
- Processed human waste provides a nutrient rich resource for aerobic composting

Diaper Recycling:

- Suitable technology is available and has been operated in United States, Europe, Australia and Canada
- Non-biodegradable waste (plastic liners, absorbent materials) is separated for recycling
- Human waste is separated from recyclable materials and can be directed into existing wastewater treatment systems

Cons:

Diaper Composting:

- Zinc oxide contamination from diaper rash creams and related medications can cause significant increases in compost zinc concentrations to levels approaching or exceeding regulatory thresholds, limiting potential end uses (Brinton 2000)
- Organic components of conventional disposable diaper waste can be efficiently processed through an anaerobic digestion reactor, however the non degradable plastics and absorbents must be physically separated and disposed or recycled
- Film and fiber components of biodegradable diapers do not compost efficiently in the absence of sunlight (typical in compost piles)
- Diaper waste is a potential vector for a number of potential pathogens not killed by standard aerobic composting, presenting potentially unacceptable risks to human health

Diaper Recycling:

- Implemented diaper recycling programs have generally failed to meet economic and diversion objectives

- Existing recycling technology is expensive leading to increased overall costs, may require separate funding mechanism (see option #400)

- Requires new collection strategies for source separated diaper waste

- Current facilities are not adequate, considerable capital investment will be required

- Current collection strategies are not adequate, would require a fourth source separation/collection stream

Assumptions

Diaper Composting:

- No assumptions applied because this option is not currently considered viable.

Diaper Recycling:

- Total annual costs to SPU are assumed to be Very High (>$750,000) based on the estimated capital costs and the likelihood that O&M costs, while currently unknown, are anticipated to be higher than $250,000/year

- Capital costs of $3.75 million are estimated based on scaling of capital costs for Santa Clarita CA project for Seattle based on population (Santa Clarita population is ~150,000 or approximately 1/3 of Seattle's population of 550,000)

- Annual capital costs are amortized over 10 years at 7%

- O&M costs $250,700

- Variable costs are ~$70/ton (Knowaste 2007), escalating at 80% of CPI/year, not including the market value of recovered materials

- Diversion potential is expected to be low (~1%) based on the actual rates achieved in the Barrie pilot study (Santa Clarita 2001) (this recovery rate suggests that approximately 2/3 of the diaper material, ~16,000 tons, still ends up being landfilled)

- Variable cost assumes high levels of recovery and market acceptance of recyclable materials, failure in either area results in landfilling of materials

- General ratepayers will not be asked to bear the variable cost of the program

- Consumer costs assume that disposable diaper surcharge will be used to cover variable costs per/ton (see option #400), with estimates based on the following additional assumptions:

  - Seattle produces approximately 43,333,300 disposable diapers/year given that: 1) there are approximately 26,000 children under 5 years old living in Seattle, and; 2) and each of these children will use 5,000 disposable diapers by the time they are toilet trained at age three (or ~1,667 diapers per child per year)

  - If each loaded diaper weighs approximately 1 pound, this equates to approximately 21,600 tons of diaper waste/year (this estimate comports with SPU estimates of 24,600 tons/year, which also include adult incontinence products)

  - On this basis, a surcharge of $0.04/diaper would be necessary to recover year 1 variable costs of $1.73 million

  - Each diaper consumer has 1.2 babies in diapers at any given time, equating to purchases of 2,000 diapers/year

References

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Rate Structure Review for Garbage Collection (#283)

Description

Review the rate structure for garbage collection. A rate structure can be used to support key goals such as waste prevention, greater equity, extended landfill capacity, and revenue stability. The goal of a rate structure review is to determine the price that solid waste planners will charge residents for each container of garbage they set out for collection and increase participation in garbage collection by raising the variable rates for garbage can sizes. The rate structure proposed by this option would encourage customers to source separate materials and increase recycling rates.

Establishing a system in which an increasing quantity of garbage increases the per-unit rate of disposal creates an incentive for customers to divert recyclables from the garbage disposal stream. By diverting the recyclables that were previously in the waste stream into the recycling containers, the customer can pay for its collection and processing at a lower rate. This lower rate equates to cost savings for the customer and increased diversion and recycling rates.

The following are the current garbage collection rates:

	Seattle, WA	**King County, WA**	**City of Renton, WA**	**San Francisco, CA**
Residential				
Garbage can Service	32 gal container $16.55 per month	32 gal container $18.05 per month	32 gal container $ 13.44	32 gal container $22.29 per month
Extra Garbage	$ 5.60 per bag	Additional Cost	Additional Cost	Additional Cost
Commercial				
Commercial Dumpster	60 gal container $ 7.00 per 1 pickup			
Commercial Drop Box	$ 81.25 per ton			

Background

San Francisco, Ca

The Department of Public Works increased the residential garbage rates from $19.08 per month to $22.29 in 2006 and it is expected to increase gradually to $24.33 by 2011. The rate hike for a once-a-week residential collection of a single 32-gallon black can reflects a 27 percent increase over the next five years.

An annual cost of living adjustment formula was also approved that will adjust rates based on inflation over that same time period. Under the 1932 Refuse Collection and Disposal Initiative Ordinance, the City and County of San Francisco approves and sets residential garbage rates every five years.

Materials Involved

MSW

Implementation Timeframe

Implementation Year:	2015	Ramp Period:	3 years
	2010 (Self-haul)		3 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial *		
MSW	2%	50%
SF Residential **		
MSW	4%	50%
MF Residential **		
MSW	2%	50%
Self-Haul ***		
MSW	2%	50%

* When # 283 implemented with #378
** When # 283 implemented with #402
*** When # 283 implemented alone

Diversion Potential

Commercial: 1% recovery rate, up to 386tons by 2038 *

SF Residential: 2% recovery rate, up to 301tons by 2038 **

MF Residential: 1% recovery rate, up to 120 tons by 2038 **

Self-haul: 1% recovery rate, up to 255 by 2038 ***

Total: Up to 1,062 tons by 2038 (0.089% of total waste stream)

* When # 283 implemented with #378
** When # 283 implemented with #402
*** When # 283 implemented alone

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M	$0	$246,200	$246,200*	$82,067*	$82,067*	$82,067*
Capital 10 Yr.	$0	$0	$0	$0	$0	$0
Capital 25 Yr.	$0	$0	$0	$0	$0	$0

* O&M costs escalate at 80% of CPI.

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton	$0	$0	$0	$0	$0	$0

Action Feasibility

Proposed action is feasible, but has the obstacle of having to implement a rate structure that could potentially decrease City (more accurately, their contractors') revenue from residential and commercial customers (compared with the existing rate structure).

Risk of Not Achieving Results within Timeframe

Proposed action is considered to be a low risk, although it has the potential to lower the revenue of the City's collection contractors.

Pros:

- Increased landfill life by reducing disposal quantities.
- Determine cost tier-system that will encourage customers to increase their use of recycling and yard waste containers over more expensive waste containers.

- By staying with a volume-based unit rate system, the City would not be required to invest much money to implement this option.

Cons:

- No changes in waste disposal bills may allow businesses with higher incomes to continue their current status quo practice of not performing source separation.

- Potential loss of revenue to the City (and their contractors), due to the diversion of materials from the garbage stream.

- Requires significant programmatic accounting changes.

Assumptions

- Both theory and empirical evidence indicate that people tend to recycle more as garbage rates increase (SPU, 2004). The tendency to recycle more as garbage rates increase is driven by the behavior of the rate payer to save money. By reducing the total volume of garbage, rate payers will pay a lower disposal fee.

- The City would use a volume-based unit pricing.

- Program implmentation and educational labor demands on the City will be reduced by two-thirds starting in Year 3 of the program. The initial 2 years of the program will demand more City time for planning and evaluating the program.

References

Canterbury, 1999. Designing a Rate Structure for Pay-As-You-Throw. Public Works Magazine. Canterbury, Janice. May 1999.

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Commercial Organic Waste Disposal Ban (#285)

Description

Ban commercial sector disposal of food waste and other compostable organics by developing new regulations. Food waste must be sorted for curbside collection, composted on site or self-hauled to RDS. Combine with new organics collection strategies as appropriate. Materials include all food waste, yard waste, and other compostable materials such as soiled paper and cardboard.

The Regional District of Nanaimo (RDN) BC, implemented a commercial organics disposal ban into law in 2005 and is currently ramping up. Since the RDN waste program is funded completely by ratepayers (i.e., no taxpayer subsidy), the costs of the program are borne by the commercial sector. The RDN has found that allowing commercial users the flexibility to work with their haulers to tailor source separation and collection to their specific needs has provided the greatest cost effectiveness and produced very high participation and efficiency rates.

Because this program is regulatory in nature, participation and efficiency are expected to be very high once suitable collection mechanisms are in place. Diversion potential is also expected to be high, given the fact that organics currently account for 23% of Nanaimo's waste stream, and commercial organics account for 40% of the commercial and institutional waste stream.

Materials Involved

Organics: Food Waste.

Implementation Timeframe

Implementation Year: 2020 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
Food Waste	90%	33%

Diversion Potential

30% recovery rate, up to 21,321 tons by 2038 (1.78% of total waste stream)

Cost

Capital costs for this option would be negligible since no new facilities would be required to modify the collection system to accept additional organics. Ratepayers will initially incur nominal costs to develop suitable source separation and collection systems. Experience in Canada has demonstrated that over time ratepayer costs actually decline because the tip fees for trash are higher than for compostables, and organics and compostable paper account for the majority of the waste stream from a significant portion of the commercial sector.

O&M costs required for program advertising and education, monitoring, and enforcement actions as necessary.

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$ 401,050*	$300,000*	$300,000*	$300,000*	$300,000*
Capital 10 Yr.	$0					
Capital 25 Yr.						

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

* O&M costs continue to escalate annually at 80% of the CPI

Action Feasibility

Regulatory bans are easily achievable. Allowing commercial sector to work with haulers to tailor source separation and collection to meet their needs is likely to produce high compliance and would incur minimal capital and O&M costs.

Risk of Not Achieving Results within Timeframe

Pros:

- High probability of achieving significant diversion rate

- Costs to SPU, ratepayers and consumers are expected to be nominal

- Should ultimately result in reduced ratepayer costs as more of the commercial waste stream is shifted to organics for composting (which incurs lower tip fees)

Cons:

- Increases compliance monitoring and enforcement requirements

- Requires contractors to work with commercial sector to design individual collection systems

Assumptions

- Bans result in very high participation and efficiency rates, as observed in existing examples (Halifax, NS; Nanaimo, BC).

- Assume that contractors will cooperate by reporting violators, reducing FTE requirements for enforcement (Stanley 2007)

- High diversion rates based on assumed recovery of the following proportion of Seattle's commercial waste stream: Diversion of 30% of commercial organics alone (i.e., not including compostable paper) would achieve 1.78% diversion of the total waste stream by 2038, or approximately 21,321 tons, based on revised 60% projections (SPU 2003).

- If compostable soiled paper can be recovered as well, ban would achieve a higher diversion.

- Program is assumed to incur only O&M costs for administration, advertising and education, and inspection and enforcement. There are no capital costs associated with the proposed project, under the assumption that all bins and other related collection infrastructure will be incorporated in the contractual variable costs consistent with the currently offered service.

- O&M costs for the program estimated using the following assumptions

    - The program will be managed by one Manager II level staff person at 0.75 FTE

        - Program staff will include 3 Analyst level staff (1 in administration, two in inspection and enforcement) at 1 FTE each

        - O&M costs includes $100,000 for advertising and education costs in Year 1 only

        - Staff FTE rates are derived from the SPU 2004 Facilities Master Plan (SPU FMP, 2004)

    - A minimal component of commercial sector regulatory compliance costs will be passed to consumers (resulting in a Very Low cost finding)

References

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Beverage Container Deposit System (#298)

Description

Work with Northwest Product Stewardship Council and other jurisdictions to lobby state lawmakers to establish a statewide beverage container deposit system.

Covers single use beverage containers (glass, plastic, aluminum). Washington currently recycles 37% of beverage containers statewide. Based on SPU 2003 60% projections, Seattle is currently recovering only about 50% of the glass and aluminum beverage containers (SPU 2003). The City of Tacoma funded a 2005 study evaluating the effect of a $0.10/container deposit requirement for all beverage containers for the Northwest Product Stewardship Council (Morris et al. 2005). Similar programs have been found to increase recycling rates for these types of containers to over 90% (Michigan achieved 95% recovery with a $0.10/container deposit).

Recommend working with NWPSC and other interested jurisdictions to lobby state lawmakers to pass this proposed regulation. Alternatively, a federal senate bill (sponsored by Jim Jeffords - (I) Vermont) may result in a nationwide regulatory requirement. Approach involves risk, because the results are outside SPU control.

In BC, Canada, the Recycling Regulation (B.C. Reg. 449/2004) introduced in October 2004, includes beverage containers that may hold, holds or has held a beverage; is offered for sale or sold in BC; is not a refillable container have a capacity >10 liters. The deposit for containers that hold 1 liter or less and are non-alcoholic are $0.05/container; for containers that hold 1 liter or less and are alcoholic are $0.10, and; for containers that hold 1 liter or more of any beverage, $0.20/container.

Materials Involved

Traditionals: Beverage glass, aluminum cans, PET bottles, other HDPE bottles, other plastic bottles

Implementation Timeframe

Implementation Year: 2020 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
Beverage glass, aluminum cans, PET bottles, other HDPE bottles, other plastic bottles	95%	95%
SF Residential		
Beverage glass, aluminum cans, PET bottles, other HDPE bottles, other plastic bottles	95%	95%
MF Residential		
Beverage glass, aluminum cans, PET bottles, other HDPE bottles, other plastic bottles	95%	95%
Self-Haul		
Beverage glass, aluminum cans, PET bottles, other HDPE bottles, other plastic bottles	95%	95%

Diversion Potential

Commercial: 90% recovery rate, up to 6,288 tons by 2038

SF Residential: 90% recovery rate, up to 1,526 tons by 2038

MF Residential: 90% recovery rate, up to 899tons by 2038

Self-haul: 90% recovery rate, up to 968by 2038

Total: Up to 9,681 tons by 2038 (0.81% of total waste stream)

Cost

O&M costs required for initial program advertising and education, monitoring, and enforcement actions as necessary.

Fixed Cost	Year (10) - 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M	$26,750	$51,750*	$51,750*	$26,750	$26,750	$26,750
Capital 10 Yr.	$0					
Capital 25 Yr.						

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

* Escalates annually at 80% of CPI

Consumer Cost: Very High – over $ 100/household (assuming non-participation in redemption program)

Action Feasibility

Action is feasible based on experience in other states. However, statewide implementation is necessary to achieve program efficiency.

Risk of Not Achieving Results within Timeframe

There is a moderate risk of not achieving objectives within a set timeframe because the proposed program would require statewide legislation. The success of statewide legislation is ultimately out of the control of SPU.

Pros:

- Materials recovered through deposit programs are typically of higher quality/utility than those recovered through comingled recycling (better sorting, less breakage, lower contamination).
- Recovery rates are extremely high, generally exceeding 90%
- Litter reduction can be significant. Seven states reported 30 to 47% total litter reductions after deposit system implementation (Morris et al. 2005) (used as the basis for a High environmental benefit rating).

Cons:

- Places cost and compliance burden on consumers
- Places compliance and storage burden on retailers
- Legislation will likely take longer than 5 years for passage and implementation and ultimately will be outside of SPU control
- Modest ramp up period is likely to be required before full participation and efficiency are achieved

Assumptions

- Very high participation and efficiency rates assumed based on the aggregate 90% or higher total recovery rates observed in states with deposit systems (Morris et al. 2005)

- Calculated diversion rate of 0.81% of the waste stream based on the following assumptions:

    - All PET and HDPE plastic bottles, aluminum cans and beverage glass would be subject to the requirement, making a total of 13,226 tons of currently disposed waste eligible for diversion (SPU 2003)

    - Implementation of a deposit system would increase recovery (i.e. total diversion) of these materials to 90% as per experience in Michigan (Morris et al. 2005), for a total of ~10,713 tons of new net diversion (a 90% processing efficiency is assumed; the actual 2038 tonnage of 9,681 is net of other programs targeting the same materials).

    - Disposal of currently recycled materials would not increase as a result of the program

- SPU fixed O&M costs would be limited, based on the following assumptions:

    - One Manager II level staff person would work at 0.25 FTE for year -10 to implementation year 0 to lobby the state legislature to create a deposit system, develop the container return system, and work with commercial distributors and retailers.

    - Labor costs will escalate at 100% of CPI

    - Education costs of $25,000 per year will be incurred throughout the life of the program

    - Education costs will escalate at 80% of CPI

- No capital costs are expected, however variable costs could be affected by a net loss of revenue from currently recycled materials diverted through deposit system, offset by lower collection costs.

- Consumer costs will vary depending on willingness to participate in deposit system returns. The maximum cost/household could reach as high as $108 per theoretical household per year, assuming that:

- The average consumer accounts for 490 containers per year (Morris et al. 2005)
- The average deposit would be $0.10/container
- There are an average of 2.2 consumers/household (OFM 2000), for a total of 1,078 containers/household/hear
- This household does not participation in the redemption program

References

Morris, J., B. Smith and R. Hlavka. 2005. Economic and Environmental Benefits of a Beverage Container Deposit System in the State of Washington. Prepared by the Sound Resource Management Group for the City of Tacoma Solid Waste Management Division.

OFM. 2000. Census 2000 Summary File 3, City of Seattle. Washington State Office of Financial Management. Website viewed on February 2, 2007: http://www.ofm.wa.gov/census2000/dp58/pl/63000.pdf

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SPU. 2003. Revised 60% projections. Microsoft Excel spreadsheet provided by Seattle Public Utilities.

Tiered Commercial Organics Rates (#307)

Description

The implementation of a tiered commercial organics rate structure would be similar to the implementation of a tiered commercial garbage rate structure (Option #270), except that instead of an increasing unit rate with an increasing garbage quantity, the unit rate for organics would decrease with an increase in organics quantity.

This tiered rate structure is the inverse of what is commonly used by the water industry to promote water conservation. The water industry uses a progressive rate structure in which high water users pay more for a unit of water than those who conserve and keep their water use down. The water industry charges a flat rate for water usage up to a fixed volume, when the usage goes beyond that fixed volume the customer has to pay at the next rate tier, which has a higher cost per gallon. The flat rate guarantees a steady cash flow to cover the fixed costs. Multiple tiers can be used to set-up different volume range usage.

The rate structure proposed by this option would allow commercial customers to pay a lower unit rate for higher quantities of organics. The decreasing unit rate with increasing organics offers an incentive for commercial customers to source-separate the organics from their waste stream. By diverting the organics that were previously in the waste stream into the organics container, the customer can pay for its collection and processing at a lower rate. This lower rate equates to cost savings for the customer and an increased production of high quality compost material.

The rate structure would aim at changing commercial customer behavior in increasing their waste reduction (by source-separation of organics) in order to save money (achieving the lower tiered unit rate for organics processing). Structuring the rates in this manner ensures stronger reduction incentives are provided for high organics generators. By implementing this rate structure on the commercial customers, dense-waste industry sectors, such as grocery stores and restaurants, can be targeted and encouraged to compost their organics.

Background

Seattle commercial customers are offered an existing optional service, the Commercial Compost Collection, to handle compostable material. The service accepts:

- all food scraps (including meat, fish, dairy and produce);
- food soiled paper;
- waxed cardboard; and
- yard debris.

A complete, detailed list of accepted materials for composting can be found on the Seattle Public Utilities (SPU) website. The compostable materials collected as part of this program is processed by Cedar Grove Composting at their Maple Valley, WA facility. SPU's website states, "Service prices are 20% below garbage prices, plus there are no utility taxes, reducing total prices to approximately 30% below garbage prices." An approximate 30 percent savings is a big incentive for commercial businesses to source-separate their organics.

Seattle commercial customers have two options for organics collection:

- Commercial compost dumpsters – 60 gallons to 8 cubic yards (CY); and
- Commercial compost drop boxes – 4 CY to 40 CY.

For each of the two options above, the cost for special pickup (presumably for additional organics) is higher than the cost for the weekly pickup. The existing City of Seattle (City) rate structure does not award commercial customers who generate more organics (by doing more source-separation) with a lower cost per additional pickup, instead they are penalized.

The tiered rate structure should include lower cost per additional compost dumpster/drop box pickup compared with the weekly (or one-time) pickup rates. A tiered commercial organics rate structure can be developed to have a fee schedule that is similar to what is shown in Table 1.

Table 1. Example of a Tiered Commercial Compost Rate Structure

Type	Size[1]	Weekly Pickup Rate[1]	Tier I Pickup Rate (up to X additional weekly pickups)	Tier II Pickup Rate (from Y to Z additional weekly pickups)
Dumpster[2]	60-gal	$ 5.60	$ 5.60 – TBD[4]	$ 5.60 - TBD - TBD
	90-gal	$ 6.64	$ 6.64 - TBD	$ 6.64 - TBD - TBD
	1 CY	$ 14.72	$ 14.72 - TBD	$ 14.72 - TBD - TBD
	1.5 CY	$ 20.96	$ 20.96 - TBD	$ 20.96 - TBD - TBD
	2 CY	$ 25.56	$ 25.56 - TBD	$ 25.56 - TBD - TBD
	3 CY	$ 35.84	$ 35.84 - TBD	$ 35.84 - TBD - TBD
	4 CY	$ 46.24	$ 46.24 - TBD	$ 46.24 - TBD - TBD
	5 CY	$ 56.76	$ 56.76 - TBD	$ 56.76 - TBD - TBD
	6 CY	$ 63.24	$ 63.24 - TBD	$ 63.24 - TBD - TBD
	8 CY	$ 80.16	$ 80.16 - TBD	$ 80.16 - TBD - TBD
Drop Box[2,3]	3-4 CY	$ 58.12	$ 58.12 - TBD	$ 58.12 - TBD - TBD
	6 CY	$ 58.12	$ 58.12 - TBD	$ 58.12 - TBD - TBD
	8 CY	$ 58.12	$ 58.12 - TBD	$ 58.12 - TBD - TBD
	10 CY	$ 78.00	$ 78.00 - TBD	$ 78.00 - TBD - TBD

Type	Size[1]	Weekly Pickup Rate[1]	Tier I Pickup Rate (up to X additional weekly pickups)	Tier II Pickup Rate (from Y to Z additional weekly pickups)
	12 CY	$ 78.00	$ 78.00 - TBD	$ 78.00 - TBD - TBD
	15 CY	$ 78.00	$ 78.00 - TBD	$ 78.00 - TBD - TBD
	16 CY	$ 78.00	$ 78.00 - TBD	$ 78.00 - TBD - TBD
	20 CY	$ 78.00	$ 78.00 - TBD	$ 78.00 - TBD - TBD
	25 CY	$ 78.00	$ 78.00 - TBD	$ 78.00 - TBD - TBD
	30 CY	$ 78.00	$ 78.00 - TBD	$ 78.00 - TBD - TBD
	40 CY	$ 78.00	$ 78.00 - TBD	$ 78.00 - TBD - TBD

1 Source of dumpster/drop box sizes and pickup rates is SPU website.
2 Dumpster/Drop box rates shown are for noncompacted waste and permanent accounts.
3. A charge of $50.00 per ton is also added to the drop box pickup fee.
4. TBD – To be determined as part of the tiered rate structure development.

Designing a tiered rate structure begins with analyzing the ways to organize a tiered unit pricing program. After determining whether the program should measure collected organics by weight or volume, the City needs to consider the types and sizes of containers to use and the most appropriate service options. For the purpose of this options analysis, it is assumed that the City will continue using the existing commercial compost dumpsters and drop boxes for a newly implemented tiered rate structure.

Under unit pricing, customers are charged either by the weight or volume disposed. The two systems have very different design and equipment requirements.

In volume-based systems, customers are charged for each container they generate using a specific size dumpster or drop box (or several dumpster or drop box sizes). Volume-based programs encourage customers to compact the waste to fit into their containers and typically do not require specialized collection vehicles.

In weight-based systems, collection crews weigh the organics each customer sets out. The municipality or hauler then bills each customer per pound produced. Weight-based systems provide a more direct link between waste reduction and savings, since every pound of waste recycled or composted yields savings. These systems tend to be more expensive to implement and operate since they require special equipment and more labor to manage the billing system. Due to its complexity, only a few communities have implemented a weight-based system (Shapiro, 1994). It is assumed that for this option, the City would use a volume-based system.

An important issue to consider in setting up a tiered rate structure is that at a minimum, the rate structure should cover the actual cost of providing the service (collection and processing). The organics processing contractor may have a tiered processing fee schedule, in which he may charge higher processing rates due to potentially higher contamination levels within the organics collected. The contamination levels could potentially rise as part of this option implementation. The unit rates set as part of the tiered commercial organics rate structure need to cover the highest tier in the processing fee schedule.

The Franchise Agreement between the County of San Mateo and BFI Waste Systems of North America, Inc. for Solid Waste, Recyclable Materials and Plant Materials Collection Services serves as an example of a composting contractor having a tiered processing fee schedule (BFI, 2003).

To guide the commercial customers to behave in the manner expected, by implementing this tiered rate structure, the City would have to educate the public before the program is implemented. The public should also be educated in the existing composting program.

Commercial customers typically are interested in turning a profit. If this rate structure is implemented, commercial businesses will perceivably be open to source-separation of their organics if it results in cost-cutting in their operational practices.

The specific sector of the commercial industry that stands to gain the most by this option is the dense waste generator, such as restaurants and grocery stores. A large portion of these businesses' waste stream is food waste. Food waste also happens to represent a large percentage of the overall waste stream in the City (16 percent). The tiered organics rate structure can encourage these businesses to be proactive in composting their food waste as opposed to being penalized with the higher rates for garbage disposal.

Collection and processing of food waste is relatively new compared to the "well-established" field of curbside collection of traditional recyclables (containers and paper). Commercial businesses tend to have relatively well-structured waste generation systems. Overall, the commercial sector is a logical place to phase in food waste collection programs with subsequent extension to the residential community (Newell, Markstahler, & Snyder, 1993).

The overall intent of implementing a tiered commercial organics rate structure is summarized best by a quote from Gary Liss & Associates (GLA, 2007), where they stated:

"*Incentive programs are designed to use economic and policy tools to harness the forces of the marketplace to accomplish adopted public policy goals. Many of these economic tools are designed to reward those who decrease the amount of waste they produce, or those who reuse, recycle, or compost it. Conversely, for those who continue to waste, these tools are designed to increase their costs. People can reduce-reuse-recycle, or they can pay for the privilege of wasting.*"

Materials Involved

Commercial Organics (food waste, yard waste, and other compostable materials such as soiled paper and cardboard)

Implementation Timeframe

Implementation Year: 2011 Ramp Period: 10 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
Organics	20%	50%

Diversion Potential

10% recovery rate, up to 7,855 tons by 2038 (0.66% of total waste stream)

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M	$0	$139,200	$139,200*	$139,200*	$69,600*	$69,600*
Capital 10 Yr.	$0	$0	$0	$0	$0	$0
Capital 25 Yr.	$0	$0	$0	$0	$0	$0

* O&M costs escalate at 80% of CPI.

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton	$0	$0	$0	$0	$0	$0

Action Feasibility

Proposed action is feasible, but has the obstacle of having to implement a rate structure that could potentially decrease City (more accurately, their contractors') revenue from commercial customers (compared with the existing rate structure).

Risk of Not Achieving Results within Timeframe

Proposed action is considered to be high risk given its potential to lower the revenue of the City's collection contractors and the fact that it remains a voluntary program.

Pros:

- Increased participation in commercial waste reduction.
- Increased landfill life by reducing disposal quantities.
- Low likelihood of success due to high risk and the program being voluntary.
- By staying with a volume-based unit rate system, the City would not be required to invest much money to implement this option.

Cons:

- An unchanging waste disposal bill may not deter businesses with higher incomes, who most likely are the higher waste generators.
- Potential loss of revenue to the City (and their contractors), due to the diversion of more organics away from the garbage stream.
- Requires significant programmatic accounting changes.
- Potential for inadvertent or intentional improper diversion of materials into the organics dumpsters and drop boxes by businesses that want to take advantage of the lower organics collection rates.

Assumptions

- The City would use the same size commercial compost dumpsters and drop boxes currenlty offered.
- The City would use a volume-based unit pricing (based on dumpster or drop box size).
- A detailed analysis by the group responsible for developing the organics rate structure would have to be performed prior to implementing a tiered commercial organics rate structure.

- Labor and marketing demand on City will be reduced by one-half starting in Year 4 of the program. The initial 3 years of the program will demand more City time for planning, implementing, and evaluating the program.

References

BFI, 2003. Franchise Agreement Between the County of San Mateo and BFI Waste Systems of North America, Inc. 2003.

GLA, 2007. Incentive Programs for Local Government Recycling and Waste Reduction. California Integrated Waste Management Board. Gary Liss & Associates. January 2007.

Shapiro, 1994. Balancing Costs and Revenues for Strong Unit Pricing Programs. WasteAge magazine. Shapiro, Michael. October 1, 1994.

Rate Structure Review for Residential Organics Collection (#312)

Description

This option includes a review of the rate structure for residential organics collection. Raising the variable rates for garbage cans would increase the participation in organics collection. In a variable-rate system, the unit price varies. Increasing the unit price for garbage cans and limiting or not charging for organics disposal provides a strong incentive to for residential customers to divert allowable organic waste into the organic waste container for composting. Reducing the total volume of garbage disposed will save the consumer money by being able to use a smaller garbage can.

Materials Involved

Residential Organics (food waste, yard waste, and other compost able materials such as soiled paper and cardboard)

Implementation Timeframe

Implementation Year: 2008 Ramp Period: 3 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
SF Residential		
Organics	6%	80%
MF Residential		
Organics	2%	50%

Diversion Potential

SF Residential: 5% recovery rate, up to 1,868 tons by 2038

MF Residential: 1% recovery rate, up to 306 tons by 2038

Total: Up to 2,174 tons by 2038 (0.18% of total waste stream)

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M	$0	$246,200	$246,200*	$82,067*	$82,067*	$82,067*
Capital 10 Yr.	$0	$0	$0	$0	$0	$0
Capital 25 Yr.	$0	$0	$0	$0	$0	$0

* O&M costs escalate at 80% of CPI.

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton	$0	$0	$0	$0	$0	$0

Action Feasibility

Proposed action is feasible and has a high probability of success. Rate payers' incentive to save money by reducing waste has been successfully proven through economic and statistical techniques used to measure source reduction (SERA, 2000).

Risk of Not Achieving Results within Timeframe

Proposed action is considered to be medium risk given its success in other jurisdictions and its relatively short implementation period.

Pros:

- Increases participation in residential organics collection.
- Increased landfill life by reducing disposal quantities through the diversion of organics from the waste stream.
- High likelihood of success and medium risk
- Generation of high quality compost material that can be used for agricultural production.

Cons:

- Potential for inadvertent or intentional improper diversion of materials into the organics containers by residents that want to take advantage of the lower organics collection rates.

Assumptions

- Both theory and empirical evidence indicate that people tend to recycle more as garbage rates increase (SPU 2004). The tendency to recycle more as garbage rates increase is driven by the behavior of the rate payer to save money. By reducing the total volume of garbage rate payers will pay a lower monthly disposal cost. This behavior of avoiding higher disposal costs by diverting waste from the garbage and into recycling is likely to create the same incentive by increasing residential organics collection.

- Restructuring rates to encourage organic collection and recycling would not, by itself increase participation (SPU 2004). To increase participation, rate changes need to be complemented with convenient service options, such as weekly curbside organics pick up.

- The City of Seattle (City) would use the same size residential organic waste can sizes currenlty offered.

- Program management and educational labor demands on the City will be reduced by two-thirds starting in year 3 of the program. The initial 2 years of the program will demand more City time for planning and evaluating the program.

References

SPU. 1998 revised 2004. Seattle's Solid Waste Plan: On the Path to Sustainability. City of Seattle's Recycling Potential Assessment/System Analysis Model (RPA).

Skumatz Economic Research Associates (SERA). 2000. Measuring Source Reduction: Pay As You Throw/Variable Rates As An Example.

EPA. Pay As You Throw:
http://www.epa.gov/payt/top15.htm
http://www.epa.gov/payt/tools/bulletin/bullet.htm#1

Ban Self-Haul at City Owned Transfer Stations (#323)

Description

The intent of this option is to: minimize the self-haul traffic to the City owned transfer stations; minimize delays in tipping activities; and increase safety at the transfer stations. If successful, this ban could result in positive residual effects that include: eliminating the need to resize the tipping floor and eliminating the need to add more tipping stalls at the transfer stations.

This option is not a complete ban on self-haulers, instead it is a ban on self-haulers who do not meet at least one of the following criteria:

- Self-haul vehicle has a semi-automatic or automatic mechanism for unloading waste loads;
- Self-haul vehicle has a 1-ton or greater load capacity (a one-ton vehicle's springs, chassis, and bed are designed to safely carry a maximum of 2,000 pounds (lbs)); or
- Self-hauler's load comprises of only organics.

The ban on self-haulers at the City owned transfer stations can be achieved by developing a new City ordinance. The City can support this ban by enhancing existing programs that offer services for collecting extra garbage with curbside pickups, collecting extra and bulky wastes (on-demand basis), and providing containers available for rental and pickups (on-demand basis).

Background

Self-haul includes all non-City contracted vehicles and public vehicles, such as large flatbed or end-dump trucks, smaller cars, sport utility vehicles (SUVs), vans, and pick-up trucks. According to 2002 data provide by the City (SPU, 2006), 16 percent of self-haulers are classified as "cars" and the remaining 84 percent are classified as "trucks". "Cars" are defined as sedans, station wagons, and SUVs and are charged a flat rate. "Trucks" are defined as all other vehicles and are charged on a weight basis.

There are some self-haul customers who regularly haul their waste to City transfer stations, because of personal preference. There are other self-haul customers who occasionally haul their waste to City transfer stations. The most common reasons these customers give for self-hauling are that they have a large amount of garbage or items that are too big for curbside pickup. This intermittent self-hauling of extra or bulky wastes often results from a household move or a major cleaning, remodeling, or landscaping project.

Sixteen percent (122,834 tons) of the waste received at the City's transfer stations is from self-haulers, but they are responsible for a large percentage of the number of trips made. The high number of trips for a relatively smaller amount of waste can cause longer queues at transfer stations and traffic backups onto adjacent City streets. Private self-haulers typically require more time to unload their vehicles, because the vehicles are usually emptied manually. The contractor vehicles, who share the transfer stations with the self-haulers, unload much quicker than self-haulers. When behind a self-hauler in the queue, a contractor vehicle may lose money via time spent waiting in line to unload. Negative impacts attributed to self-haulers at transfer stations are:

- Limitations on site access;
- Stress on the facilities' capacity;
- Decreased level of service to self-haulers and city contracted haulers;
- Increased site traffic;
- Increased off-site traffic, due to overflow of transfer station traffic into adjacent streets;
- Increased operational costs;
- Increased liability and safety concerns; and
- Litter in nearby neighborhoods caused by the transport of loose waste loads.

Research for this option analysis yielded no examples of a municipality successfully banning self-haulers from transfer stations. It is anticipated that a complete ban on self-haulers would be difficult to gain public support, which could prevent such an ordinance from being adopted. An alternative would be to impose a qualified ban that is designed toward meeting the intent of the ban option.

The ban would allow self-haulers at the transfer stations, if they meet one of the following criteria:

- Self-haul vehicle has a semi-automatic or automatic mechanism for unloading waste loads;

- Self-haul vehicle has a 1-ton or greater load capacity (a one-ton vehicle's springs, chassis, and bed are designed to safely carry a maximum of 2000 lbs); or

- Self-hauler's load comprises of only organics.

The exclusion of self-haul vehicles that do not meet at least one of the requirements will minimize traffic flow to the transfer stations.

In order to successfully implement a ban on self-haulers, the City must offer alternatives for managing the waste stream currently transported by these self-haulers. The City has three existing programs that can be used for the collection of the waste stream re-routed due to the ban on self-haulers. The three existing programs are described below:

- Extra garbage pickup with regularly scheduled curbside collection
    - Customers are charged an additional $5.60 per bag, bundle, or can (maximum 32 gallons with a 60-lb weight limit per bag or can).

- On-demand collection of extra and bulky wastes
    - Customers call SPU customer service for special garbage pickups ($24.00 for the first container plus $2.50 for each additional container; maximum 32-gallon container with a 60-lb weight limit per container).
    - Customers call SPU customer service for bulky item or white good collection ($20.00 per item plus an additional $6 per item if the item contains chlorofluorocarbons (CFCs)). Electronics, such as televisions and computers, are excluded from pickup. In addition, there is a size limit of 8-feet length and 4-feet diameter and a weight limit of 300 lbs per item.

- On-demand container/drop box rental and pickup
    - Handled by City contracted waste management companies.
    - Customers call SPU for container service (for noncompacted material and a temporary account). The fee schedule is included as Table 1.
    - Customers call SPU for drop box service (for noncompacted material and a temporary account). The fee schedule is included as Table 2.

Table 1. Container Rental and Pickup Rates for Noncompacted Material (Temporary Accounts)

Service Type	60 Gallon	90 Gallon	1 CY	1.5 CY	2 CY	3 CY	4 CY	5 CY	6 CY	8 CY
Initial Delivery	---	---	$ 13.20	$ 13.20	$ 13.20	$ 13.20	$ 13.20	$ 13.20	$ 13.20	$ 13.20
Pickup Rate	---	---	$ 27.85	$ 34.90	$ 41.45	$ 54.75	$ 68.05	$ 79.05	$ 89.95	$112.20
Rent Per Calendar Day	---	---	$ 3.25	$ 3.25	$ 3.25	$ 3.25	$ 3.25	$ 3.25	$ 3.25	$ 3.25

Source:
http://www.seattle.gov/util/stellent/groups/public/@spu/@fab/documents/webcontent/spu01_002365.pdf

Table 2. Drop Box Rental and Pickup Rates for Noncompacted Material (Temporary Accounts)

Drop Box Size	Pickup Rate	Rent per Calendar Day
3 - 4 CY	---	---
6 CY	---	---
8 CY	$ 84.25	$ 3.45
10 CY	$ 107.50	$ 3.45
12 CY	$ 107.50	$ 3.45
15 CY	$ 107.50	$ 3.45
16 CY	$ 107.50	$ 4.60
20 CY	$ 107.50	$ 4.60
25 CY	$ 107.50	$ 4.60
30 CY	$ 107.50	$ 5.80
40 CY	$ 107.50	$ 5.80

Source: http://www.seattle.gov/util/Services/Garbage/Rates/COS_002864.asp

Commodities, transported by banned self-haulers that will be re-routed to other modes of transport are:

- Municipal solid waste (MSW) in excess of 360 lbs (six 32-gallon bags or 32-gallon cans with a maximum weight limit of 60-lbs per bag or container);
- Appliances;
- Electronics;
- Furniture;
- Mattresses;
- Carpet/upholstery;
- Construction and demolition debris (C&D) in excess of 360 lbs;
- Tires;
- Mixed metals and materials; and
- Wood.

The transport/disposal fate of the ban-affected commodities along with assumptions used to determine their fates are summarized in Table 3 and the Assumptions section of this report.

Table 3. Transport/Disposal Fate of Ban-Affected Commodities

Commodity	Quantity	Transport Fate	Disposal Fate
MSW	< 360 lbs	Extra garbage pickup with regular curbside collection.	Transfer station then on to Columbia Ridge Landfill.
	360 lbs < x < 1,500 lbs	On-demand special garbage pickup	Transfer station then on to Columbia Ridge Landfill.
	> 1,500 lbs	On-demand container/drop box rental and pickup	Transfer station then on to Columbia Ridge Landfill.
Appliances	500 lbs or greater	On-demand special garbage pickup	Recycler/landfill
Electronics	500 lbs or greater	Electronics waste contractor	Recycler/landfill
Furniture	300 lbs or greater	On-demand bulky item or white goods collection	Recycler/landfill
Mattresses	200 lbs or greater	On-demand bulky item or white goods collection	Recycler/landfill
Carpet/Upholstery	700 lbs or greater	On-demand bulky item or white goods collection	Recycler/landfill
Construction and Demolition (C&D) debris	< 360 lbs	Extra garbage pickup with regular curbside collection.	Recycler/landfill
	360 lbs < x < 1,500 lbs	On-demand special garbage pickup	Recycler/landfill
	> 1,500 lbs	On-demand container/drop box rental and pickup	Recycler/landfill
Tires	500 lbs or greater	On-demand special garbage pickup	Recycler
Mixed metals/Materials	1,000 lbs or greater	On-demand container/drop box rental and pickup	Recycler
Wood	2,000 lbs or greater	On-demand container/drop box rental and pickup	Recycler/landfill

To help obtain success and general public support, the City could perform certain activities, such as:

Financial Incentives

- Dollars off a new subscription for curbside collection, to attract those self-haulers that regularly haul their wastes to City transfer stations.

- A payment voucher to be used toward a one-time curbside collection of bulky or extra waste, to attract those occasional self-haulers.

- Increased minimum fees for self-haul could be used to reduce self-haul trips.

- Discounted tipping fee at a transfer station during off-peak hours.

Supporting Programs

- Staging more community collection events. These events can be scheduled to coincide with spring and fall cleanup, and can be performed on different days for different materials (i.e., one day for furniture, another day for electronic waste).

- Providing monthly pickup of bulky waste and extra garbage or enhancing existing programs to handle the expected demand increase for on-demand pickups.

SPU currently accepts all self-haul customers at transfer stations operating between 8:00 AM and 5:30 PM, seven days a week. Commercial garbage trucks have priority between 3:30 PM and 5:00 PM, Monday through Friday. Instead of a ban on self-haulers, other municipalities have changed the hours for self-haulers to disallow self-haulers at the times when commercial garbage truck traffic is at their peak.

The following are examples of municipalities that limit when self-haulers may use the transfer stations:

Boulder County, Colorado:
Monday, Wednesday and Friday - 9:30 AM - 2:30 PM
Saturday and Sunday - 10:00 AM - 4:00 PM

Bristol, Connecticut:
Monday through Friday - 7:15 AM – 2:45 PM
Saturday - 7:30 AM – 1:00 PM

Simsbury, Connecticut:
Wednesday - 8:00 AM – 3:00 PM
Saturday - 8:00 AM – 3:00 PM

Norwich, Connecticut:
Monday through Friday - 8:00 AM – 11:00 AM and 12:00 PM – 2:30 PM
Saturday - 8:00 AM – 12:00 PM

Wethersfield, Connecticut:
Monday through Friday 9:00 AM – 2:45 PM
Saturday - 8:00 AM – 3:45 PM

Materials Involved

Materials subject to On-Demand Collection for recycling: All Organics; Other Materials including ash, carpet/upholstery, ceramics/porcelain, misc. inorganics, rubber products, tires; Small Appliances and Electronics including small appliances, TVs, electronic waste; White Goods/Bulky Items/Furniture including furniture, and mixed metals/materials; and all C&D materials.

Materials subject to On-Demand Collection for disposal: Remaining Traditionals (after additional enforcement associated with existing ban), and Remaining material categories in Other Materials; Small Appliances and Electronics, and White Goods/bulky Items/Furniture.

Implementation Timeframe

Implementation Year: 2015 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Self-Haul		
Organics	90%	100%
Other Materials	90%	100%
Small Appliances and Electronics	90%	100%
White Goods/bulky Items/Furniture	90%	100%
C&D Materials	90%	55%

Diversion Potential

26% recovery rate, up to 37,670 tons by 2038 (3.14% of total waste stream)

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M*	$808,300	$0	$0	$0	$0	$0
Capital 10 Yr.	$500,000	$0	$0	$0	$0	$0
Capital 25 Yr.	$0	$0	$0	$0	$0	$0

* O&M cost escalation at 80% of CPI.

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton	$0	$86.70	$86.70*	$86.70*	$86.70*	$86.70*

Ratepayer Cost: $25 per bulky item

Risk of Not Achieving Results within Timeframe

Pros:

- Implementation of this program would result in improved safety at the transfer stations, because self-haul traffic will be decreased.
- Decreased traffic congestion on nearby streets.
- Decreased queue lengths, due to a decrease in the amount of self-haul trips.
- Faster vehicle throughput due to automatic and semi-automatic unloaded vehicles or manually unloaded commercial loads.
- Potential decrease in litter in nearby neighborhoods due to less self-haulers, who usually transport loose waste loads.
- Eliminating self-haulers could save money needed to improve existing transfer stations.

Cons:

- Moderate ramp up times are likely to be required before full participation and efficiency are achieved.
- Implementation of a ban is generally not received well by the public.
- Requires a strong public campaign to get the word out of a ban on self-haulers or a limit on their acceptable hours at the transfer stations.
- Capital costs required to enhance the existing on-demand or monthly pickup of bulky waste and extra garbage programs.
- Several self-haulers may resort to some form of illegal dumping to dispose of their waste or to haul their loads to facilities that accept them.

- Banning self-haulers at the transfer stations, may force several of these haulers to go straight to landfill sites. When loads are hauled to landfill sites, the recyclables and reusable materials may not be separated and may be landfilled instead.

Assumptions

Assumptions for Allowed Self-Haulers Under the Ban

- Semi-automatic and automatic mechanisms for unloading waste loads include:
  - Pick-up truck bed conveyor;
  - Truck tip bed;
  - Boom;
  - Grapple crane; or
  - Lift gate.
- One-ton or greater capacity vehicle
  - A one-ton vehicle's springs, chassis, and bed are designed to safely carry a maximum of 2,000 lbs.
  - Although a one-ton vehicle has a load capacity of 2,000 lbs, for the purpose of trip diversion calculations it is assumed that these vehicles are carrying 1,500-lb loads. Setting 1,500 lbs as the minimum load, will exclude cars, smaller pick-up trucks, vans, and most sport utility vehicles (SUVs).
- Organics include:
  - Yard waste; and
  - Food waste.

Service Assumptions

- The program will provide for collection of banned self-hauled loads as follows:
  - Collection Strategy A: White goods and electronics, furniture, mattresses, carpet and upholstery, tires, mixed metals, and source separated and bagged C&D waste greater than 360 lbs and less than 1,500 lbs.
  - Collection Strategy B: C&D waste weighing more than 1,500 lbs will be collected separately by on-demand container or drop box rental and pickup.

- Currently self-hauled MSW in amounts weighing less than or equal to 360 lbs (including food waste, paper, plastics, organics, etc.) will be collected by the existing 'extra garbage pickup' service offered by SPU.

<u>Implementation Assumptions</u>

- Program implementation will require the development and staffing of a call center for ordering and tracking of service delivery, which will incur O&M costs

- All on-demand collection services will be contracted by SPU. Contractors will be responsible for supplying trucks and collection bins, and separating materials for recycling and disposal. The City will be responsible for the development and staffing of the call center.

- Program implementation will take place in the following sequence:
  - On-demand service implementation (Option #221): 2008, with a 3 to 5 year ramp period depending on material type
  - Self-haul rate structure adjustments to incentivize use of on-demand services (Option #379): 2010, with a 3 year ramp period
  - Self-haul ban implementation (Option #323): 2015, with a 5 year ramp period

<u>Generation Tonnage Assumptions</u>

- Self-haul tonnages by material class are derived from the SPU revised 60% projections, all self-haul tonnage of the listed material types are eligible for collection through this program

- The ratio of passenger car and truck trips to total self-haul trips are used to calculate the materials tonnages that will be collected under strategy A and strategy B above, respectively, applied equally across all material types

<u>Collection Vehicle and Trip Requirement Assumptions</u>

- Strategy A: On-demand pickup of white goods, electronics, C&D greater than 360 lbs and less than 1,500 lbs, tires, and mixed metals:

  a. 100% of selected materials are eligible

b. Tonnage is represented by the fraction of self-haul trips conducted by passenger car and includes revised 60% projections for self-haul trip tonnages for the materials listed

c. Appliances and Electronics = 500 lbs; Furniture = 300 lbs; mattresses = 200 lbs; Carpet/upholstery = 700 lbs; Tires = 500 lbs; Mixed metals = 1000 lbs; Wood = 2000 lbs

d. Total self-haul trips and passenger car trips and tonnage based on 2002 numbers from Table 3-7 of Solid Waste Plan "On the Path to Sustainability"

e. One self-haul passenger car trip equals one on-demand pickup

f. Materials will be picked up by: 2.75-ton, 21-foot flatbed truck with a tommy lift; 7-ton packer truck with forks; or a 7-ton packer with bucket.

g. Operations are 7 days a week

h. Amount of time spent per pickup is 15 minutes (time to pick up and travel to next pick up)

i. 8 hours of collection in a day

j. Travel time for full truck to arrive at transfer station is 45 minutes

- Strategy B: On-demand pickup of C&D waste in excess of 1,500 lbs and/or MSW in excess of 360 lbs

a. 100% of selected materials are eligible

a. Tonnage is represented by the fraction of self-haul trips conducted by light truck and includes revised 60% projections applied to the volume of C&D materials delivered to facilities by the self-haul sector

b. Self-haul trips of each commodity and C&D figured by average tons per commodity per self-haul trip

c. Collection containers will be dropped off on an on-demand basis. A 3 cubic yard container is assumed for the self-haul trip diversion calculations.

d. Dedicated trucks with loading arms and front tipping dumpsters will be used to collect toters, contracted specialized trucks will be used for roll off containers

e. Operations are 7 days a week

f. Amount of time spent per pickup is 15 minutes (time to pick up and travel to next pick up)

g. 8 hours of collection in a day

h. Travel time for full truck to arrive at transfer station is 45 minutes

<u>Cost Assumptions</u>

- Capital costs reflect the initial cost of program implementation to be incurred by the City, which includes call center land acquisition and call center facility purchase. Capital costs required to meet the expected increase in collection requests will be borne by City contractors. The capital cost breakdown and assumptions made are as follows:
    - 4,800 square feet of land at a rate of $50/square foot or $240,000.
    - 1,600 square feet of office space at a rate of $100/square foot or $160,000.
    - The expected number of trips made by self-haulers that will be affected by this ban is 182,751 trips. These trips would be handled by the on-demand service and each trip equates to one call to the call center.
    - Call center and on-demand service will operate 7 days a week, 355 days a year.
    - The average number of calls per day is 515 calls. A call center operator can handle 84 calls per day, therefore, it'll take 7 operators to handle the influx of calls. There will also be a crew chief to supervise the operators. This puts the total number of people in the call center at 8 personnel.
    - The call center size is based on a 200 square-foot per person minimum or 1,600 square feet of office space.
    - The property (land) is based on triple the call center size or 4,800 square feet of property.

- O&M costs reflect the costs of program implementation to be incurred by the City, such as: program management, advertising; education; contractor auditing; call center staffing; and call center facility operations and maintenance. The O&M cost breakdown is as follows:

- Program manager for the equivalent of a quarter of a year at a wage rate of $107,000/year.
- Analyst for the equivalent of half a year at a wage rate of $73,600/year.
- Marketing materials at an annual cost of $60,000.
- Call center crew chief for the year at a wage rate of $78,750/year.
- Seven call center operators for the year at a wage rate of $55,600/operator/year.
- Building maintenance:
  - Structure maintenance miscellaneous at $40,000/year.

- Variable costs reflect the costs that the City's contractor will charge the City for performing on-demand pickup. The variable cost is estimated to be $86.70 per ton and the assumptions are as follows:
  - City contractor to perform on-demand pick up of waste.
  - Collection will be performed using a 7-ton packer truck and a 2.75-ton flatbed truck.
  - One operator per packer truck and one operator and one laborer per flatbed truck.
  - Standardized 3-CY containers assumed for on-demand service.

- Costs associated with this option are independent of the costs formulated for Options 221 and 379, which precede this option in the implementation schedule.

Simultaneous Increase for Self-Haul Tipping Fees and Illegal Dumping Fines (#332) &

Adjust Rate Structure for Self-Haul Disposal at City Owned Transfer Stations (#367)

Description

Increasing tipping fees for self-haulers at local transfer stations may serve as a method to encourage residents to rely on hiring waste management contractors to pick up their items that cannot be addressed with regular weekly waste pickup. The decrease in frequency of self-haulers at local transfer stations will increase the efficiency of the transfer station operations, and ultimately decrease the cost of waste management for the City of Seattle (City). Increasing tipping fees could potentially cause an increase in illegal dumping; therefore raising tipping fees should be simultaneously implemented with an increase in the fines for illegal dumping. The City can support increasing self-haul tipping fees by improving advertisements for on-demand pickups of extra and bulky wastes to discourage self-haul.

Background

Self-haul includes all non-City contracted vehicles and public vehicles, such as large flatbed or end-dump trucks, smaller cars, sport utility vehicles (SUVs), vans, and pick-up trucks. According to 2002 data provide by the City (SPU, 2006), 16 percent of self-haulers are classified as "cars" and the remaining 84 percent are classified as "trucks". "Cars" are defined as sedans, station wagons, and SUVs and are charged a flat rate. "Trucks" are defined as all other vehicles and are charged on a weight basis.

Some of the self-haul customers haul their waste regularly to City transfer stations, because of personal preference while other self-haul customers haul their waste only occasionally to City transfer stations. The most common reasons for self-haul customers are that they have a large amount of garbage or items that are too big for curbside pickup. This intermittent self-hauling of extra or bulky wastes often results from a household move or a major cleaning, remodeling, or landscaping project.

Sixteen percent (122,834 tons) of the waste received at the City's transfer stations is from self-haulers, but they are responsible for a larger percentage of the number of trips made. This high number of trips for a relatively smaller amount of waste can be the cause of longer queues at transfer stations and traffic backups onto adjacent City streets. Private self-haulers typically require more time to unload their vehicles, because the vehicles are usually emptied manually. The contractor vehicles, who share the transfer stations with the self-haulers, unload much quicker than self-haulers. When behind a self-hauler in the queue, a contractor vehicle may lose money via time spent waiting in line to unload.

SPU currently accepts self-haul customers at transfer stations during all operation hours; between 8:00 AM and 5:30 PM, seven days a week. The 2007 recycling and disposal tipping fees are as follows:

Table 1: Transfer Station Rates

Material	Flat Rate Vehicle	Per Ton Rate Vehicles
Recyclables Only	$0.00	$0.00
Garbage*	$20.00	$110.00
Clean Yard Waste**	$13.00	$80.00
Clean Wood Waste***	$13.00	$55.00
Vehicle Tires Only (limit 4 per load)	$10.00	$10.00
Large Appliances****	$20.00	$6 per appliance + tonnage rate for other materials
Unsecured Loads	$3.00	$5.00, less than 1 ton $10.00, greater than 1 ton
Sharps (limit one gallon per trip)	$0.00	Not accepted

* Per ton rate has a $20.00 minimum charge for loads up to 363 lbs.
** Per ton rate has a $13.00 minimum charge for loads up to 325 lbs.
*** Per ton rate has a $13.00 minimum charge for loads up to 473 lbs.
**** Flat rate fee of $20.00 is per appliance with limit of 2 per load.

Table 2 summarizes the rates of some other randomly selected communities that charger per ton, rather than per cubic yard. The cost for self-haul customers to drop-off general municipal solids waste ranges from $14.35 to $110 per ton, with Seattle having the highest rate of the communities selected. Generally, communities with high disposal rates also have long haul programs for disposal of their wastes.

Table 2: Transfer Station Rates

Community	Recycle	Garbage (Ton)	Yard Waste	Wood Waste (ton)	Car Tires	Appliances (each)
Berkley, CA	$0.00	$96.00	$54.00 / ton	$54.00	$6.00 each	$38.00
Cecil County, MD	$0.00	$52.00	$0.00		$2.00 each	$0.00
Glendale, AZ	$0.00	$14.35	-	-	$3.00 each	$8.00
King County, WA	$0.00	$89.10	$75.00 / ton	$75.00	-	$24.00
Onondaga County (Syracuse), NY	$0.00	$80.00	-	$35.00	$4.00 each	$15.00
Portland, OR	$0.00	$94.86	$64.86 / ton	$64.86	$2.00 each	$20.00
San Francisco, CA	$0.00	$107.76	-	-	$5.00 each	$40.00
Seattle, WA	$0.00	$110.00	$80.00 / ton	$55.00	$10 flat rate, up to 4 tires	$20.00
St. Paul, MN	$0.00	$86.00	$9.50 / CY	-	$5.00 ea	$23.00

The City already offers curbside collection service for bulky items. The City charges $20 per item, or $25 for items containing CFCs such as refrigerators. Customers need to call the City to request a bulky item pickup and place their item outside on private property for pickup. Typical bulky items include appliances, beds, building materials, and furniture. The City will not pick up items that are greater than 8-feet in length or 4-feet in diameter, and limits the items to 300-lbs or less.

Illegal dumping is the action of dropping off wastes onto or under the ground surface or into waters, except at a solid waste disposal facility for which there is a valid permit. Illegal dumping is currently a problem that exists within Seattle, with approximately 4,000 illegal dumping cases every year. The illegally dumped wastes include a wide range of items from household garbage, appliances, mattresses, and yard waste to construction debris. Almost all of the illegal dumping is committed during the night time. Generally, illegal dumpers are not captured or prosecuted since it is difficult to gather sufficient evidence and witnesses to establish a prosecutable case against violators. The current fine for illegal dumping is $150.

To promote the success of increasing tipping fees and raising illegal dumping fines, the City could improve upon their advertising of the existing economical pickup services for collecting extra and bulky wastes; and expand recycling and reuse pickup opportunities in the community. The success of increasing tipping fees and illegal dumping fines can be supported by positive financial incentives and supporting programs such as those listed below:

Financial Incentives

- Decrease subscription cost for curbside collection, to attract those self-haulers that regularly haul their wastes to City transfer stations.

- Implement a voucher system to be used toward a free one-time or multiple-time curbside collection of bulky or extra waste, to attract the occasional self-haulers.

Supporting Programs

- Stage more community collection events. These events can be scheduled to coincide with spring and fall cleanup, and can be performed on different days for different materials (i.e., one day for furniture, another day for electronic waste).

- Provide scheduled monthly pick-up of bulky waste and extra garbage without requiring residents to phone in the request.

- Enhance existing bulk item pickup program to handle the expected demand increase for call-to-haul, following the increase in tipping fees.

Materials Involved

All Self-haul Waste (i.e. MSW, yard wastes, wood wastes, vehicle tires, appliances, etc.).

Implementation Timeframe

Implementation Year: 2015 Ramp Period: 3 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Self-Haul		
All Self-haul Waste	20%	50%

Diversion Potential

10% recovery rate, up to 4,273 tons by 2038 (0.36% of total waste stream)

Cost

O&M costs required for program advertising and education, monitoring, and enforcement actions as necessary.

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M	$0	$139,200	$139,200*	$139,200*	$69,600*	$69,600*
Capital 10 Yr.	$0	$0	$0	$0	$0	$0
Capital 25 Yr.	$0	$0	$0	$0	$0	$0

* O&M costs escalate at 80% of CPI.

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton	$0	$0	$0	$0	$0	$0

Action Feasibility

Increasing tipping fees and illegal dumping fines is easily achievable.

Pros:

- Reduced quantity of vehicles entering transfer stations and less traffic congestion on nearby streets.

- Implementation of this program would result in increased safety and efficiency at the transfer stations due to less traffic congestion.

- Faster vehicle circulation due to less manually unloaded vehicles.

Cons:

- Regular self-haulers will be financially impacted negatively and may resent the tipping fee increase.

- Potential, temporary increase in illegal dumping.

Risk of Not Achieving Results within Timeframe

Low

Assumptions

- The rate increase will discourage self-haulers and reduce the quantity of non-City contracted vehicles.

- Self-haulers learn about SPU's additional pick up services and choose to utilize those services rather than continue to dropping off at City owned transfers stations or illegally dump their waste.

- Increasing the illegal dumping fine will reduce the number of illegal dumping occurrences.

- Labor and marketing demand on City will be reduced by one-half starting in Year 4 of the program. The initial 3 years of the program will demand more City time for planning, implementing, and evaluating the program.

Disposal Ban for Recyclables in Commercial Waste (#349)

Description

Implement a disposal ban on commercial sector disposal of recyclable materials. Program would involve increased capacity to support collection of recycled materials, and ongoing education and enforcement requirements to achieve full compliance. A ban of this type might also include mandatory commercial sector recycling container requirements as a component of waste collection contracts (see option # 108).

Background

Similar regulatory bans have been enacted at the municipal level in Canada. For example the entire province of Nova Scotia has banned disposal or incineration of several categories of recyclable materials, and collection strategies and compliance (O.I.C. 2002) and the Halifax Regional Municipality (HRM) implemented the ban throughout its waste management system. The Regional District of Nanaimo (RDN) has implemented a ban on commercial sector organic waste disposal (Stanley 2007). Where implemented with concurrent enforcement and penalties, bans are capable of achieving high levels of participation and efficiency. However, experience demonstrates that participation and efficiency can lag when enforcement and educational support is lacking. The RDN organics disposal ban, accompanied by education, enforcement and coordination with haulers, has effectively increased diversion of commercial sector organics to the point that system capacity is the only factor limiting additional gains. In contrast, the HRM recyclables disposal ban has achieved relatively limited diversion of commercial sector organics and recyclables due to the need for more enforcement.

Materials Involved

Traditionals: Beverage glass, aluminum cans, PET bottles, other HDPE bottles, other plastic bottles, plastic containers; paper, various types including newsprint; metals.

Implementation Timeframe

Implementation Year: 2015 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
Traditional Recyclables not currently covered by paper ban	50%	20%

Diversion Potential

10% recovery rate, up to 5,135 tons by 2038 (0.43% of total waste stream)

Cost

O&M costs required for initial program advertising and education, monitoring, and enforcement actions as necessary.

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$ 401,050*	$300,000*	$300,000*	$300,000*	$300,000*
Capital 10 Yr.	$0					
Capital 25 Yr.						

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

* O&M costs continue to escalate annually at 80% of the CPI

Action Feasibility

Regulatory bans are easily achievable. Allowing commercial sector to work with haulers to tailor source separation and collection to meet their needs is likely to produce high compliance and would incur minimal capital and O&M costs.

Risk of Not Achieving Results within Timeframe

Regulatory ban effectiveness is contingent on enforcement. If sufficient funding for education and enforcement is provided, there is a strong likelihood of achieving the projected diversion rates.

Pros:

- High probability of achieving significant additional diversion

- Should ultimately result in reduced ratepayer costs as more of the commercial waste stream is shifted away from disposal, which incurs higher end user costs

- Could be combined with changes in rate structure to incentivise increased participation

Cons:

- Increases compliance monitoring and enforcement requirements

- May require some changes in collection strategy, and perhaps new bin purchases

Assumptions

- Implementation and ramp period estimates based on HRM experience with implementation of Nova Scotia recyclables disposal ban (Tools of Change 2000)

- Diversion potential estimated based on observed total diversion rates resulting from the HRM commercial sector ban, or 1.3 percent total diversion (Wendt 2007).

- Program is assumed to incur only O&M costs for administration, advertising and education, and inspection and enforcement. There are no capital costs associated with the proposed project, under the assumption that all bins and other related collection infrastructure will be incorporated in the contractual variable costs consistent with the currently offered service.

- O&M costs for the program estimated using the following assumptions

- The program will be managed by one Manager II level staff person at 0.75 FTE

  - Program staff will include 3 Analyst level staff (1 in administration, two in inspection and enforcement) at 1 FTE each

  - O&M costs includes $100,000 for advertising and education costs in Year 0 only

  - Staff FTE rates are derived from (SPU FMP, 2004)

- Ratepayer costs are estimated to be very low (up to $25/ton) assuming that:

    - Variable costs for recyclables passed through to the ratepayer, which are currently ~$40/ton, are comparable to or lower than current variable costs/ton for disposal.

    - Based on HRM experience (Wendt 2007), commercial sector diversion would increase by a minimum of 6.5% (~11,800 tons), or approximately $8.50/ton.

    - Total program costs of $8.50/ton are insufficient to increase ratepayer costs by more than $25/ton.

- The assumed level of risk for achieving diversion objective is assumed to be low for the following reasons:

    - The diversion rate estimate is conservative, based on the relatively low level of existing recycling behavior in the existing HRM example (Seattle's existing commercial sector recycling rate is already high)

    - A regulatory ban with sufficient enforcement is likely to increase participation and efficiency sufficiently to achieve this conservative estimate

References

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Compostable Plastic Bags (#353)

Description

Implement an ordinance that mandates the use of compostable plastic bags. SPU would partner with local grocery chains to develop a program that provides for use of compostable grocery bags, garbage bags, lawn and leaf yard waste bags and pet waste bags sold at pet stores.

Background

Each year, Americans throw away approximately 100 billion polyethylene plastic bags and, in general, less than 2% of plastic bags get recycled. BioBag Inc. developed compostable bags to remedy this situation. Biobags are made from corn and other renewable resources and are 100% biodegradable/compostable, as well as recyclable and burnable. They can be reused several times, but also can degrade in 10 and 45 days. Studies have shown that the use of compostable bags reduces volumes of landfill items by as much as 30%. Though compostable plastic bags cost much more than traditional plastic bags, the reduced costs for disposal can offset this; plus, the environmental benefits are great.

Californians Against Waste – San Francisco
Californians use over 19 billion plastic grocery and merchandise bags a year (552 bags per person), creating 147,000 tons of unnecessary waste in our landfills. As Californians throw away more than 600 bags a second, they are creating enough waste to circle the planet over 250 times in one year. This cycle of one-time use and disposal wastes resources, manufacturing one ton of plastic bags requires 11 barrels of oil--more than one million barrels annually.

In 2005, City Hall and supermarkets agreed to attempt to reduce the number of plastic bags used by 10 million in 2006. San Francisco was contemplating the adoption of the nation's first plastic bag tax aimed at reducing plastic bag litter and waste in the city. San Francisco Mayor Gavin Newsom and Supervisor Ross Mirkarimi had blasted local grocery store chains for what they claim is a failure to live up to an agreement to cut plastic bag use in the city. Studies had found that plastic bags were a significant source of litter in the city, and serious threat to water quality and the marine environment.

In 2006, grocery chains cut a deal with the Mayor committing them to an effort to reduce plastic generation by 10 million bags in 2006. On Monday, the California Grocers Association announced that 32 supermarkets in San Francisco used 7.6 million fewer bags in 2006 than the year before. The announcement of the numbers comes after local SF officials became upset with grocery stores for failing to comply with the 2005 agreement to cut plastic bag use in the city The city also plans to continue with efforts to require that plastic bags be compostable to help in long term sustainable practices

Examples of Successful Plastic Bans and Transition to Use of Compostable Bags

- In January 2002, the South African government required manufacturers to make plastic bags more durable and more expensive to discourage their disposal—prompting a 90-percent reduction in use.
- Ireland instituted a 15 pence-per-bag tax in March 2002, which led to a 95-percent reduction in use.
- In the early 1990s, the Ladakh Women's Alliance and other citizens groups led a successful campaign to ban plastic bags in that Indian province, where the first of May is now celebrated as "Plastic Ban Day." Australia, Canada, New Zealand, the Philippines, Taiwan, and the United Kingdom also have plans to ban or tax plastic bags.
- Supermarkets around the world are voluntarily encouraging shoppers to forgo plastic bags—or to bring their own bags—by offering a small per-bag refund or charging extra for plastic.
- Some manufacturers have introduced biodegradable or compostable plastic bags made from starches, polymers or poly-lactic acid, and no polyethylene—though these remain prohibitively expensive and account for less than 1 percent of the market.
- The organizers of the 2000 Olympic Games in Sydney, Australia, were able to collect 76 percent of the food waste generated at the sports venues and athletes' village by using biodegradable utensils and plastic bags that composted as easily as the food and eliminated the need to separate the garbage.

Materials Involved

Traditionals: Grocery/Bread Bags

Implementation Timeframe

Implementation Year: 2010 Ramp Period: 10 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
SF Residential		
Grocery/Bread Bags	20%	50%
MF Residential		
Grocery/Bread Bags	10%	50%

Diversion Potential

SF Residential: 10% recovery rate, up to 88tons by 2038

MF Residential: 5% recovery rate, up to 22tons by 2038

Total: Up to 110 tons by 2038 (0.009% of total waste stream)

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$287,450*	$287,450*	$287,450*	$257,450*	$257,450*
Capital 10 Yr.	$0					
Capital 25 Yr.						

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

* Escalates annually at 80% of CPI

For manufacturers, cost is a stumbling block for synthetic biodegradable polyesters, whose densities are in the range of 1.22 to 1.35 g/cc and prices run $1.50 to $2.00/lb. That puts them at a disadvantage relative to paper, LDPE, PP, PS, and PET (Plastics Technology™, 2007).

Environmental Benefits

- Has the potential to divert a high percentage of plastic from landfills
- Compostable bags don't need to be separated from the waste stream and will decompose in environments with suitable temperature and moisture levels. Therefore, this provides a large environmental benefit

- Greenhouse effects associated with producing these bags are significantly lower than those from the production of traditional plastic bags

Action Feasibility

There has been much success with compostable plastic bag programs in Europe and Asia. Local implementation of this program is very feasible, especially if more research on program components, including costs, and research on bag degradability, is conducted.

Risk of Not Achieving Results within Timeframe

This type of program has recently been implanted by several jurisdictions. Since it's a relatively very new program, but implemented by several jurisdictions, the risk to implement a local compostable bag program is expected to be medium.

Pros:

- Has the potential to divert a high percentage of plastic from landfills
- Compostable bags don't need to be separated from the waste stream and will decompose in environments with suitable temperature and moisture levels.
- Costs to SPU and consumers would be low
- Existing infrastructure would be adequate and would not require much modification
- Risk to implement this type of program is low
- Greenhouse effects associated with producing these bags are significantly lower than those from the production of traditional plastic bags

Cons:

- Manufacturing and retail costs are much higher for compostable bags versus those of traditional plastic bags
- Current market demand is not high enough to bring down costs of compostable bags, which leads to reduced participation rates
- Degradability is questionable in some cases and more research is needed. Some studies have shown that compostable bags take several years to fully degrade.

Assumptions

- Plastic bags are one of the largest commodities among traditionals
- Each year, Americans throw away some 100 billion polyethylene plastic bags, of which only 0.6 percent are recycled
- Currently, compostable bags account for less than 1% of the market
- Most compostable bag programs are being implemented in Europe and Asia currently
- Research findings on degradability are generally accurate but more research is needed to test the degradability of compostable plastic bags
- North America and Europe account for nearly 80% of plastic bag use
- Costs to SPU are programmatic. Education and Marketing costs drop 50% after year 3

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On-Call Curbside Electronic Waste Recycling Including Appliances with Circuit Boards (#376)

Description

Implement a program to provide curbside recycling of small, non-CRT electronic waste through a "Call to Haul" recycling collection system. E-waste would be recovered at the recyclables sorting center and diverted to appropriate processing facilities.

Background

Sonoma County
White goods such as refrigerators, washers, dryers, air conditioners, and other bulky appliances are accepted at the solid waste facilities and baled as scrap metal. White goods that contain chlorofluorocarbons (CFCs) found in refrigeration and cooling systems are first processed to collect the CFCs before baling. Approximately 1,500 tons of white goods are diverted from County disposal sites as scrap metal each year.

Brown goods such as televisions, stereo equipment, musical instruments, computers, printers, copiers, VCRs, and compact disc players are being treated as characteristically hazardous. In 2002, televisions and computer monitors were banned from landfill disposal and are now collected for recycling the hazardous and non-hazardous components. Also in 2002, Sonoma County began a pilot program collecting small appliances and electronics in the single-stream curbside bins. The material reuse and recovery programs operating at the Central Disposal Site and the Healdsburg and Sonoma transfer stations accept working white and brown goods, as do many private businesses throughout Sonoma County, for resale to the general public. A fee of $20 fee is charged for units containing Freon, and a $10 fee is charged for units without Freon.

Plaistow, New Hampshire
Under this program, white goods are collected once/month, usually the first Saturday of the month. Residents need to call ahead and service is free. Computers and TVs may also be collected from the curb for $25 fee that must be paid directly to Waste Management. Residents need to call ahead for this service also.

In a Waste Management newsletter, all residents were encouraged to participate in the curbside recycling services available. Unfortunately, in 2005, Plaistow did not improve its recycling diversion rate, recycling only 8.3% of their total solid waste. The lack of participation in the recycling program becomes more expensive as the cost of solid waste disposal continues to increase. Waste Management reported that the Town would save over $20,000 per year if a reasonable goal of 15% diversion was reached.

Materials Involved

Small Appliances and Electronics

Implementation Timeframe

Implementation Year: 2012 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
Small Appliances and Electronics	20%	100%
SF Residential		
Small Appliances and Electronics	20%	100%
MF Residential		
Small Appliances and Electronics	40%	100%
Self-Haul		
Small Appliances and Electronics	20%	100%

Diversion Potential

Commercial: 20% recovery rate, up to 763tons by 2038

SF Residential: 20% recovery rate, up to 124 tons by 2038

MF Residential: 40% recovery rate, up to 406 tons by 2038

Self-haul: 20% recovery rate, up to 516 by 2038

Total: Up to 1,809 tons by 2038 (0.15% of total waste stream)

Cost

Average collection costs are strongly influenced by the population served and the cost to process and transport the collected materials. These are affected by:

1. Increased market competition among recyclers as programs and volumes of collected materials increase.
2. Greater geographic saturation of programs. More programs are concentrating in states and regions, adding to the ability of recyclers to offer services at competitive prices.

3. Predictable recycling streams. Electronics recyclers have long stated that part of the dynamic influence cost is the unpredictable nature of government collection programs: both in terms of frequency and material volume. As programs are held more regularly, some of this inconsistency is eliminated.
4. Changes in electronics recycling and processing technologies has resulted in decreased recycling costs in some regions.

Collection Rates
A study by the Northeast Recycling Council (NERC) experienced the following costs and cost trends during a pilot study of electronic waste collection:

Per Capita Collected	**2002**	**2001**	**Change**
Special Event	.11 lb	4.8 lb	-98%
Ongoing Collection	.33 lb	1.73 lb	-81%
Curbside	1.6 lb	0.56 lb	+186%

Cost Effectiveness
The NERC study also displayed the following cost effectiveness trends during the collection pilot program:

Program Type	**2001**		**2002**		**Change**	
	Average Tons/Year	Average Cost/Ton/ Year	Average Tons/Year	Average Cost/Ton/ Year	Average Tons/Year	Average Cost/Ton/ Year
Special Event	23	$491	22	$322	-4%	-34%
Ongoing	56	$483	58	$133	+4%	-72%
Curbside	71	$336	35	$298	-51%	-11%

In 2001, curbside collection was the most cost effective strategy – generating the most tonnage per year at the least cost per ton cost – with ongoing programs generating about 20% less material per year, at a greater cost, by approximately 45%, per ton. This had changed to show that ongoing collections are superior in cost effectiveness, with curbside taking second

Mid-Atlantic States Pilot Project

Collection Results
At its conclusion on December 31, 2002, the eCycling Pilot resulted in:

- 58 residential electronics collection events,
- 9 permanent collection programs
- Over 2,700 tons (5.5 million pounds) of end-of-life electronics diverted from the municipal waste stream, and

- More than 26,000 cathode ray tubes (CRTs) from televisions and computer monitors diverted from the municipal waste stream.

Collection Costs
The two largest recyclers for the eCycling Pilot were Envirocycle, Inc. of Hallstead, Pennsylvania and Elemental, Inc. of Philadelphia, Pennsylvania. The EPA-contracted electronics recycler was Envirocycle, Inc., while Elemental, Inc. provided recycling services for the Delaware drop-off program.

Envirocycle's Costs

- Average collection, transportation, and recycling costs were 6 cents per pound, 4 cents per pound, and 14 cents per pound, respectively;
- The contracted rate was 25 cents per pound
- The contracted rate included "turnkey" electronics collection and recycling services, ensured domestic dismantling, and ensured the use of safe environmental and human health management practices.

Overall Pilot Costs

- Approximately $1.1 million, and
- An average price of 20 cents per pound.

Transportation costs averaged about $1.42/mile among programs in Maryland, Virginia and Pennsylvannia and District of Columbia

Average processing costs for programs were about $200,000

For Seattle:

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$290,038*	$290,038*	$270,038*	$270,038*	$270,038*
Capital 10 Yr.	$0					
Capital 25 Yr.						

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$560*	$560*	$560*	$560*	$560*

* Escalates annually at 80% of CPI

Environmental Benefits

A significant amount of toxic chemicals from electronic waste would be diverted from landfills, which would decrease potential for groundwater pollution and other pollution in general.

Action Feasibility

Given the success of electronics recycling programs in other jurisdictions, implementing this type of program locally should be very feasible.

Risk of Not Achieving Results within Timeframe

As several jurisdictions have similar existing programs that have proven to be successful, the risk is projected to be low, especially when factoring in the convenience of this type of program to consumers.

Pros:

- Would capture heavy metals and other toxics in many modern appliances with computer chips and small circuit boards that area not covered by existing electronics take-back programs. Recovery rates have the potential to be high.

- Would have a high environmental benefit due to decreased amounts of toxic materials dumped into landfills

Cons:

- Will increase costs to SPU, ratepayers and consumers

- Would require significant outreach and education, which may incur high costs

Assumptions

- Participation, efficiency and diversion rates and costs listed above are average numbers based on data from multiple programs researched

- Recycling fees collected for computers and TVs ranged from \$5 - \$30/unit. This range was derived from several programs researched on the web

- Participation, efficiency and diversion rates and costs would significantly increase with implementation of an outreach and education component

- Local waste contractor will bare the responsibility of collection. This will be similar to California's program rate of 20 cents per pound. Cost to city will be once it hits the transfer station.

- Cost to recycle and dispose will be similar to California's program rate of 28 cents per pound.

References

Snohomish County - http://www.recyclenow.org/o_reports.html.

Plaistow, NH Waste Management - http://www.plaistow.com/vertical/Sites/%7B7A669649-1239-4F23-9E41-2FDC998217C3%7D/uploads/%7B365B6F69-2298-4D92-967C-64E203723F84%7D.PDF

Snohomish County Solid Waste – Electronics Recycling
http://www.productstewardship.net/PDFs/libraryElectronicsElectronicsRecyclingStaffInfo.pdf

Snohomish County – Seattle-Tacoma Case Study - Electronics Collection & Recycling
http://www.productstewardship.net/PDFs/libraryElectronicsSeattleTacomaIEEE.pdf

Santa Barbara County - http://www.lessismore.org/Programs/electronics.html

Northeast Recycling Council - http://www.nerc.org/documents/ntlelctrcylprgm02-03.html

Georgia Dept. of Community Affairs – Pilot Project Final Report – April 2003
http://www.dca.state.ga.us/development/EnvironmentalManagement/programs/downloads/DCA_E-Scrap_Pilot_Report_3_13_03.pdf

Mid-Atlantic States Electronics Recycling Pilot Project
http://www.epa.gov/reg3wcmd/pdf/eCyclingReportonly.pdf

A Review of California's and Maine's electronics and recycling programs
http://www.informinc.org/FS_SWP_ME&CA_FINAL.pdf

Take-Back Program for Used Building Materials at Home Product Centers (#363)

Description

The City would encourage home improvement chain stores and other stores that sell home remodeling products to collect source-separated used building materials dropped off by the public onsite. The City would facilitate coordination between the stores' distributors and manufacturers to take back materials for recycling or reuse, and also help coordinate with salvage retail stores to pick up salvaged materials from drop off centers for resale. The City would help establish a third party fund funded by manufacturers to pay for the retailers' costs to staff collection centers and to pay for hauling materials that are collected. Participants that voluntarily pay into the fund avoid having to pay under a mandatory take-back program and gain marketing benefits by advertising their company as a "green company" that takes back and recycles their products.

The materials could be collected either within the stores or in roll-off boxes in a corner of the store parking lot either for free or for a fee that is significantly lower than the tipping fees charged at City transfer stations.

This option is not intended to pursuade home improvement stores to resell used building materials themselves, but rather to provide a collection point for their customers. This would offer a great convenience to homeowners and contractors to "kill two birds with one stone" by unloading reusable materials from their vehicles while they are at the store to purchase new building products. The convenience offered by this option should elimnate many self-haul trips to City transfer stations.

Background

According to the Building Materials Reuse Association there are approximately 14 companies in the Seattle area that provide consulting or building material reuse services (BMRA 2007). A common complaint of self-haulers of C&D waste expressed during interviews conducted in 2006 at City of Seattle Recycling and Disposal Stations was that it is inconvenient to deliver recovered C&D waste including salvaged materials and white goods to salvage retailers due to the time and fuel costs involved in transporting materials, and varying acceptance criteria for salvaged materials (Herrera 2007).

Materials Involved

C&D wastes: wood, mixed metal materials, gypsum, roofing, carpet, insulation, and salvaged materials.

Implementation Timeframe

Implementation Year: 2012 Ramp Period: 7 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Self-Haul		
Material	20%	25%

Diversion Potential

5% recovery rate, up to 119 tons by 2038 (0.01% of total waste stream)

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M (annual)		$77,400*	$72,400*	$72,400*	$72,400*	$72,400*
Capital	$0					

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

* Escalates annually at 80% of CPI

Environmental Benefit

The environmental benefit is expected to be moderate due mostly to the reduced demand for virgin resources from materials entering the recovery cycle.

Action Feasibility

Proposed action is feasible, but has and has a low probability of success. Similar programs have not been successfully implemented in other jurisdictions, and a large infrastructure already exists, with substantial political support, for privately handling used and recyclable building products.

Risk of Not Achieving Results within Timeframe

Pros:

- The option is focused on self-haul and thus may eliminate many trips to City transfer stations; the nearest participating home improvement store may also be much closer than a City transfer station thus eliminating motor vehicle fuel consumption.

- Provides a convenience to customers to drop off recyclable or reusable materials when they visit the store to buy new building materials.

- Provides a service that draw customers to the home improvement store for potential impulse buying.

- Very low cost to the City

Cons:

- A large infrastructure already exists for recovery of C&D recyclables and used building materials; manufacturers and distributors would likely stress the desire to use this recovery channel rather than create a new one. However, there would still be a possibility for building material manufacturers to contribute money to offset municipal costs for handling EOL building products.

- Home improvement stores would have to provide staff to screen and sort incoming materials dropped off for take-back, and would need to prevent indiscriminant after-hours dumping.

- Traffic congestion could increase around some stores during peak shopping hours, especially on weekends.

- Lost City revenue from lost tipping fees at City transfer stations.

Assumptions

- The materials covered under this option C&D wastes such as wood, mixed metal materials, gypsum, roofing, carpet, insulation.

- This option would be implemented in 2012 and take 7 years to ramp up.

- The expected participation rate is 20 percent.

- The expected efficiency rate is 25 percent.
- The expected recovery rate is 5 percent.
- The City of Seattle would have to provide strong coordination between the public, home improvement stores, distributors, manufacturers, and salvage/retail stores to make this option effective.
- Program management costs include 0.5 FTE (Manager II) and 0.25 FTE (administrative) to handle outreach and coordination of the program as well as inspections of collection sites and dispute resolution.
- Educational costs include $10,000 in marketing materials during the first year; this cost drops to $5,000 during years 2 through 7.

References:

BMRA. 2007. List of reuse stores in Washington State viewed January 10, 2007, on organization's website: <http://www.buildingreuse.org/directory/washington>. Building Materials Reuse Association, State College, Pennsylvania.

Herrera. 2007. Technical Memorandum – Current Salvage and Deconstruction Practices, and Recommendations for Increased Activity for Residential and Small Commercial Buildings.

SPU. 2005. Commercial and Self-Haul Waste Streams Composition Study, Final Report. Prepared by Cascadia Consulting Group, Inc. and Sky Valley Associates in cooperation with Seattle Public Utilities Staff.

Maximum Commercial Recycling Container Rate (#378)

Description

Determine the maximum rate businesses will pay for recycling containers. This information can be obtained by determining businesses willingness to pay (WTP) for recycling and by reviewing information from other jurisdictions. Businesses will only have an incentive to recycle if there is a benefit in place such as a cost savings. If the rate for recycling is too high businesses will not have an incentive to recycle. The most efficient rate to charge businesses for recycling is the point at which their WTP equals the City of Seattle's (City's) proposed rate.

The following are the 2007 commercial garbage collection rates for two cities in western Washington:

Jurisdiction	Recyclables	Container Size	Rates by Collection Frequency		
			Bi-weekly	**Weekly**	**2 hauls/week**
Tacoma, WA	Mixed	30, 60, or 90 gallon	$5	$10	$20
	Glass	60 gallon (3 container per service)	$25	$45	$90
	Cardboard	2, 3, 4, 6 or 8 cubic yard box	$20	$40	$80
Vancouver, WA	Mixed (curb)	32 gallon	$11.90	$15.87	
	Mixed (curb)	64 gallon	$15.87	$31.74	
	Mixed (curb)	96 gallon		$47.61	

Materials Involved

Traditional Recyclables: All paper, container and beverage glass, food cans, other ferrous metals, and aluminum cans.

Implementation Timeframe

Implementation Year: 2015 Ramp Period: 3 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
Traditional Recyclables	2%	50%

Diversion Potential

1% recovery rate, up to 386 tons by 2038 (0.03% of total waste stream) (When implemented with Option # 283)

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M	$0	$246,200	$246,200*	$82,067*	$82,067*	$82,067*
Capital 10 Yr.	$0	$0	$0	$0	$0	$0
Capital 25 Yr.	$0	$0	$0	$0	$0	$0

* O&M costs escalate at 80% of CPI; When implemented with Option # 283

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton	$0	$0	$0	$0	$0	$0

Action Feasibility

Proposed action is feasible, but it is very dependent on determining the commercial businesses' WTP amount and to ensure that it is within range of the City's proposed amount.

Risk of Not Achieving Results within Timeframe

Proposed action is considered to be high risk, because the businesses' WTP may not be in line with the City's proposed amount. The most probable reason for any conflicts between the amounts would be that the commercial sector will want to pay as little as they can.

Pros:

- By implementing a desirable recycling rate businesses will participate in commercial waste reduction and recycling.

- Environmental benefits of recycling:

  - Reducing the volume of waste sent to landfills.

  - Minimizing the demand for virgin materials, thereby reducing energy consumption to extract, process, and manufacture the products from those virgin materials. The reduction in energy use minimizes fossil fuel consumption, thus resulting in fewer emissions of carbon dioxide and nitrous oxide.

  - Slowing the logging of trees and hence maintaining the carbon dioxide storage capacity provided by forests.

Cons:

- High risk in that commercial customers' may not support program rate changes.

- Low likelihood of success due to the program being voluntary.

- Potential for increased illegal dumping by businesses that have no interest in waste reduction or recycling.

Assumptions

- Program management and educational labor demands on the City will be reduced by two-thirds starting in year 3 of the program. The initial 2 years of the program will demand more City time for planning and evaluating the program.

References

City of Vancouver Washington. Garbage and Recycling: 2007 Commercial Rate Summary. http://www.cityofvancouver.us/solidwaste.asp?menuid=10465&submenuID=10531&itemID=26843

City of Tacoma. Commercial Recycling (Business/Multi-Family). http://www.cityoftacoma.org/Page.aspx?hid=1360

Create a Larger Difference Between Disposal Tip Fee and Fee to Dump Source Separated C&D Waste (#379)

Description

Create a larger difference between tipping fees for mixed C&D waste and the fee to dispose of source separated recyclables at City transfer stations. This option will have the greatest impact in the form of potential cost savings for people who self-haul C&D waste to City facilities. This option includes a penalty charged to people who fail to recycle items for which a reduced tip fee is offered. Revised tipping fees could coincide with a landfill ban on C&D waste and/or an ordinance requiring mandatory C&D waste recycling.

Background

Some jurisdictions in the U.S. including Orange County in North Carolina, the Oneida-Herkimer Solid Waste Authority in Utica, New York, and the South Bayside area near San Carlos, California, provide reduced tipping fees for C&D wastes at transfer stations and landfills to increase diversion. This rate structure may be accompanied by ordinances that require C&D debris recycling, licensing of haulers of C&D waste, certification of private C&D recycling facilities, and solid waste management plans as part of the building / demolition permit application process.

Orange County, North Carolina charges \$46/ton for mixed waste, \$41/ton for mixed C&D debris, and \$15/ton for clean wood. Loads of waste that contain clean wood, metal, cardboard, or other recyclables are subject to a penalty of double the tip fee. The revised tipping fee structure was enacted as part of the County's 2002 Regulated Recyclable Material Ordinance (RRMO) (Orange County, NC 2002). Under the RRMO, recycling cardboard, clean wood, and scrap metal is mandatory, and a solid waste management plan is required for all construction and demolition projects via the building/demolition permit process.

The Oneida-Herkimer Solid Waste Authority in Utica, New York also offers greatly reduced tip fees for source-separated loads of C&D debris and issues penalties for loads dumped as waste that are mixed with over 25 percent recyclable materials (OHSWA 2007).

The South Bayside Waste Management Association worked together with Allied Waste to encourage recycling of C&D waste by offering a reduced tipping fees for source-separated and mixed C&D loads containing clean wood, concrete, bricks, drywall, and other C&D debris (SBWMA 2007).

Materials Involved

C&D Wastes: Clean wood, pallets, crates, other untreated wood; new gypsum; asphalt roofing

Implementation Timeframe

Implementation Year: 2010 Ramp Period: 3 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
C&D Wastes	50%	20%
Self-Haul		
C&D Wastes	50%	20%

Diversion Potential

Commercial: 10% recovery rate, up to 553 tons by 2038

Self-haul: 10% recovery rate, up to 2,791 tons by 2014. After 2014, it is assumed that a more active e private collection and processing infrastructure would divert this tonnage away from City facilities and the recovery is captured by other programs.

Total: Up to 533 tons by 2038 (0.05% of total waste stream)

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M (annual)		$249,100*	$235,000*	$235,000*	$235,000*	$235,000*
Total capital	$0					

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

* Escalates annually at 80% of CPI

Environmental Benefit

The environmental benefit is expected to be moderate due mostly to the reduced demand for virgin resources from materials entering the recovery cycle.

Action Feasibility

Proposed action is feasible and has a high probability of success. Similar programs have been successfully implemented in Seattle (with wood), and in several other jurisdictions.

Risk of Not Achieving Results within Timeframe

Pros:

- Provides a strong incentive to recycle
- Increases diversion and makes waste disposal cost prohibitive
- Levels the playing field
- Provides a strong boost to the private C&D material recovery facility market.
- Would be a negative cost for ratepayers compared to the current cost of disposal.

Cons:

- May raise costs for processors.
- Creates lost revenue and flow control problems for transfer stations
- Must be coordinated with other jurisdictions to avoid shifting waste to other facilities with lower tipping fees (e.g., to King County transfer stations).
- Could result in an increase in illegal dumping.

Assumptions

- Materials covered under this option include clean wood, pallets, crates, other untreated wood; new gypsum; asphalt roofing. Metals and concrete are not included in the evaluation of this option since these materials are already recovered in high quantities via source separation.

- This option would be implemented in 2010 and take 3 years to ramp up.
- The expected participation and efficiency rates are 50 percent and 20 percent, respectively.
- The expected recovery rate is 10 percent.
- The environmental benefit of this option is expected to be medium due to a reduced demand for virgin resources.
- Programmatic costs for this option include 0.5 FTE (Manager II) and 0.25 FTE (Analyst). By comparison, Orange County, NC used 2.5 FTEs to handle licensing of C&D haulers, tracking C&D waste generated via solid waste management plans, educational outreach, and certifying private C&D facilities.
- Educational costs include $30,000 in marketing materials during the first; this cost drops to $15,000 per year during years 2 and 3.
- Fixed O&M costs include 2 FTEs (inspectors; 1 each at the NRDS and SRDS).

References:

OHWMA. 2007. Information regarding Oneida-Herkimer Solid Waste Authority's proposed 2007 tipping fee schedule for C&D waste viewed January 19, 2007 at agency website: <http://www.ohswa.org/docs/PROPOSED%202007%20BUDGET.pdf>.

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Pollock, Blair. 2007. Personal communication (telephone conversation on January 23, 2007, with George Iftner, Herrera Environmental Consultants, Inc., regarding recycling of C&D waste in Orange County, North Carolina. Orange County Solid Waste Planner.

SBWMA. 2007. Information on tipping fees charged by the South Bayside Waste Management Authority for construction and demolition debris delivered to transfer stations within San Mateo County, California. Information viewed january 19, 2007 on agency website: <http://rethinkwaste.org/news_archives.php?id=cndlowrates>.

Taylor, Rob. 2007. Personal communication (telephone conversation on January 18, 2007, with George Iftner, Herrera Environmental Consultants, Inc., regarding recycling

of C&D waste in Orange County, North Carolina. Recycling Manager at the Orange County Landfill.

Subsidize Reusable Diaper Services from Fee on Disposable Diaper Purchases (#400)

Description

Collect a 7% surcharge (~$0.03/diaper) on all disposable diaper sales in Seattle to subsidize increased use of reusable diaper services. This level of surcharge is comparable to the 6 to 7% disposable diaper tax charged in Canada. Fund would be collected at the retailer level. Coupons would be provided free of charge to interested participants and redeemable for service contracts with any reusable diaper business in the area.

The subsidy would cover the typical cost for 1 month of disposable diaper service. European experience has demonstrated that such subsidies can produce initial participation levels of 40%. Participation rate would be expected to remain relatively stable, given the cost advantages provided by disposable diaper services.

Currently, reusable diaper services are less expensive on an annual basis than use of disposables. By incentivizing consumers to "make the switch" with an initial subsidy, cost conscious users will be exposed to the benefits of reusable diaper services.

Materials Involved

Organics: Disposable diapers

Implementation Timeframe

Implementation Year: 2015 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
SF Residential		
Disposable diapers	5%	50%
MF Residential		
Disposable diapers	5%	50%

Diversion Potential

2.5% recovery rate, up to 103 tons by 2038 (0.009% of total waste stream) (when combined with strategy #273)

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$250,700*	$250,700*	$250,700*	$250,700*	$250,700*
Capital 10 Yr.	$0					
Capital 25 Yr.						

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

* Cost increase after year 3 of program assumes that reusable diaper use will increase and surcharge revenue will decrease as a result

* Escalates annually at 80% of CPI

Action Feasibility

The proposed action is feasible given experience in other international jurisdictions. The risk of not achieving objectives is believed to be low, given the value of the incentives provided by the surcharge.

Risk of Not Achieving Results within Timeframe

Pros:

- If projected participation levels are achieved, significant diversion could be realized (~1%)
- Diversion of human waste from landfills creates significant environmental benefits (reduces disease vectors, zinc contamination)
- Nominal surcharge of ~$0.03/disposable diaper would provide sufficient revenue for 1 month free reusable diaper service subsidy for all users at a 40% participation level, and fund program administration.

Cons:

- Increased demand on water, sewer and sewage treatment systems
- Public resistance/resentment of additional taxation
- Complex administrative requirements

- Participation by adult incontinence product users may be lower because health insurance programs may not allow for cost reimbursement on reusable products (CRRA 2000)

Assumptions

- Assume participation levels of up to 40% based on cited experience in Austria. (participation of 5% was modeled for purposes of the combined strategies # 273/# 400)

- High efficiency levels (50%) are assumed for participants willing to sign up for service.

- Disposable diaper use in Seattle is calculated based on the following assumptions:

    - Seattle produces approximately 37,856,000 disposable diapers/year given that: 1) there are approximately 26,000 children under 5 years old living in Seattle at any given time; 2) each child will average 8 changes per day over their toilet training life, equating to 56 diapers/week or ~2,900 diapers/year, and; 3) toilet training lasts for 2.5 years.

    - If each loaded diaper weighs approximately 18 ounces, this equates to approximately 21,300 tons of diaper waste/year (this comports with SPU estimates of 24,600 tons/year for this material category, which also includes adult incontinence products)

- Assuming the average disposable diaper costs $0.40 (a 30 count costs ~$12) the average parent of a single child spends $1,258/year on diapers including tax (or ~$24/week)

- Assuming a 7% tax were applied on disposable diapers that would equate to ~$0.03/diaper or $908,544/year in program revenue, and an increase in average consumer costs of $116/year.

    - A 6 to 7% tax on disposable diapers has been charged in Canada for several years to offset the costs of landfilling (Anderson and Lohoff 1997)

- Assuming program administration absorbs 38% of the surcharge revenue (~$250,700), the remaining budget could fund a $110 coupon for diaper service for all users at a 40% participation level

    - Assumes 2.5 full time FTEs to administer the program

- Due to differences in absorbency, consumers choosing reusable diapers will require 50% more changes than with disposables (~12 diapers/day or 84 diapers/week)

- Costs for reusable diaper service in Seattle at 90 diapers/week service level currently range from $952 to $1,005/year ($18 to $19/week), depending on age (SDS 2007) (coupon would provide over one month of free service)

References

CRRA. 2000. Policy Agenda 2000, Local Government Issues. California Resource Recovery Association. Website viewed on February 1, 2007. http://www.crra.com/policy/policyagenda.html

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SPU. 1998. Seattle's Solid Waste Plan: On the Path to Sustainability. City of Seattle's Recycling Potential Assessment/System Analysis Model (RPA).

SPU. 2003. Revised 60% projections. Microsoft Excel spreadsheet provided by Seattle Public Utilities.

Reduced Volume Discounts on Extra Garbage Cans ($/gallon of capacity) (#402)

Description

Revise the current Pay as You Throw rate structure on additional garbage cans to increase $/gallon fees as can size increases.

Background

Seattle currently utilizes a PAYT rate structure for garbage collection. The goal of PAYT is to charge for individual use of garbage services. PAYT mirrors fee systems used by other utilities, such as water, gas, cable, and electricity.

Many communities use variable rates because many residents see it as more fair than a flat fee. Combined with free or low cost recycling service, a pay-as-you-throw program can be an effective way for residents to pay for refuse collection proportionate to their use of the service. When recycling and composting services cost less for the resident than waste collection, variable rates encourage higher material diversion rates.

When consumers pay for every bag or can of waste they generate for disposal, they are motivated to recycle more and look for creative ways to prevent waste in the first place. As residents come to understand that trash disposal costs more than recycling, they may be more likely to recycle and compost more and throw away less. In communities that implement PAYT programs, research shows that overall waste disposal can decline an average of 14 to 27 percent. In addition, recycling rates often increase dramatically in these communities, sometimes reaching double or even triple what they had been before the program was implemented.

Not only is this type of program environmentally sustainable, it is economically sustainable as well. For communities struggling to cope with rising municipal solid waste management expenses, PAYT can be an effective tool. Well-designed programs generate the revenues communities need to cover their solid waste costs including the costs of complementary programs such as recycling and composting. Residents also benefit because they have the opportunity to take control of their trash bills.

The table below shows current Seattle Residential Garbage can collection rates, and the marginal rates of collection for increased “gallons”:

Service Level	Curb or Alley (per Month)	Marginal Rate ($/Gallon)
Micro-can (12 gallon)	$10.35	
Mini-can (20 gallon)	$12.70	$0.29375
One can (32 gallon)	$16.55	$0.32083
Two 32 gallon cans or one 64-gallon cart	$33.10	$0.5171875
Three 32-gallon cans or one 96-gallon cart	$49.65	$0.5171875
Additional (per can)	$16.55	$0.5171875

The opportunity exists to increase the per gallon fees for services over 32 gallons beyond the current marginal rate, as well as to increase the rate for successive increases in service-gallon-size beyond the flat rate of increase currently.

Program Examples

Austin, Texas-Population 470,000.

Austin implemented its PAYT program in 1997. The city first conducted a test pilot of 3,000 residents and then phased in the program citywide in three stages over 3 years. Surveys and direct observation of the recycling bins showed, when unit pricing was introduced, recycling increased from 50 to 80 percent in some neighborhoods.

San Jose, California-Population 800,000.

San Jose started its PAYT program in 1993. To ensure its success, the city conducted a comprehensive public outreach campaign in three languages and introduced an expanded recycling program at the same time. In the first 3 years of the program, an average of 87 percent of the residents requested 32-gallon trash cans-the smallest size available. In addition, the volume of recyclables and yard trimmings collected more than doubled under PAYT. Most importantly, residents reported strong satisfaction with the program and its results.

Worcester, Massachusetts-Population 170,000.

Worcester began its PAYT program in 1992. Since that time, the city has reduced its municipal solid waste by more than 40 million pounds. This reduction allowed the city to reallocate more than $1 million to other public works programs due to reduced crew sizes and savings in tipping fees.

Athens-Clark County Solid Waste Department – Georgia

Through implementation of its local PAYT program, Athens-Clarke has accomplished the following:

- Bills accurately reflect individual customer use of garbage services.
- Cost of waste services is no longer subsidized.
- The average monthly residential waste disposed per household has decreased 48.85% from 171.99 lb./household/month in FY 1992 to 102 lb./household/month in FY 1998. A similar comparison for commercial waste is not available.

Materials Involved

All Traditionals

Implementation Timeframe

Implementation Year: 2015 Ramp Period: 3 years.

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
SF Residential *		
All Traditionals	4%	50%
MF Residential *		
All Traditionals	2%	50%

* When # 402 implemented with #283

Diversion Potential

SF Residential: 2% recovery rate, up to 301 tons by 2038 (When # 402 implemented with #283)

MF Residential: 1% recovery rate, up to 120 tons by 2038 (When # 402 implemented with #283)

Total: Up to 421 tons by 2038 (0.04% of total waste stream)

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$246,200*	$246,200*	$82,067*	$82,067*	$82,067*
Capital 10 Yr.	$868,800**					
Capital 25 Yr.						

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

* Escalates annually at 80% of CPI
** Total Capital to be amortized at 7%

Environmental Benefits

Implementation of this type of program would provide a low level of environmental benefits, including a moderate amount of waste diverted from landfills.

Action Feasibility

As there are several similar existing programs that have been successful, feasibility for this program locally is high.

Risk of Not Achieving Results within Timeframe

Risks associated with implementing this type of program locally are very low.

Pros:

- Reduces overall consumer costs
- Facilitates increased recycling and increased diversion rates
- Provides a high environmental benefit, including reduction of CO emissions

Cons:

- Could promote illegal dumping
- Revenue system is less predictable

- Administration tasks and processes are more complicated compared to a flat-fee system
- Problems could arise from customers using improper collection containers to customers bagging trash and trying to pass it off as recyclables.

Assumptions

- Participation and efficiency rates are estimates based on qualitative data provided in resources researched
- A community can charge a graduated fee that discourages residents from using more than one or two cans.
- Residents seem to prefer can systems, probably because they don't have to buy new materials (bags) to participate.
- Once the system is in place, the revenue stream is relatively stable, compared to bag and tag systems.
- Containers are reusable and are less vulnerable to destruction by animals than bags.
- Container cost covered by SPU and contract price for collection does not change.

Sources

Athens-Clark County Solid Waste Department
http://www.gradingandexcavation.com/msw_0005_guest_editorial.html

EPA – PAYT Information - http://www.epa.gov/payt/tools/bulletin/summer99.htm

EPA – PAYT Information - http://www.epa.gov/payt/tools/payfact.htm

Resource Recycling Systems: http://www.p2pays.org/ref/07/06846/

Take-Back Program for Electronic Waste (#146)

Description

Implement a cooperative program among electronics manufacturers, distributors and retailers to provide collection and recycling of electronic waste, including computers and monitors, TVs and stereo equipment. Strategy would be to support recently enacted Washington State Electronics Take Back legisslation.

Background

Western Washington generated an estimated 500,000 obsolete televisions in 2005 alone. Assuming that Seattle accounts for 15% of this total, this equates to 75,000 sets per year or an estimated 1,850 tons of e-waste. If all of these units were recovered for recycling, an estimated 187,500 pounds of lead would be recovered from the waste stream. The environmental benefits of keeping this amount of lead out of the disposal stream are potentially significant. Television turnover is anticipated to increase as analog sets are made obsolete by the implementation of federal requirements for transition to digital broadcast signals beginning this year. Establishing local regulations prohibiting the disposal of televisions through the waste stream would improve the participation rate.

Snohomish County is involved with an electronics take-back program and coordinates business, participation, provides technical assistance, and publicizes important information and program benefits to the public. Retailers, non-profits, and electronics repair and service shops provide distribution of Network information, and where possible, also serve as electronics collection sites. Haulers and recyclers work to provide environmentally sound collection, transportation and recycling options that will improve in cost and convenience as the Network continues to develop.

A 2004 retailer television take back program at four Good Guys retail stores was funded by King County, SPU, Tacoma PU, Snohomish PUD, and EPA R10 and serves as a good model for consumer funded retail take-back programs. Good Guys Inc. agreed to participate in the one month pilot study, which required them to accept old televisions from consumers. Recycling fees were nominal, $10 for standard sets and $25 for console models. Customers received a discount coupon for purchase of a replacement television. The program resulted in the recovery of 4,000 televisions weighing an estimated 98.5 tons. This prevented an estimated 10,000 pounds of lead from entering the waste stream. Customer satisfaction with the program was high, with over 95% of participants stating they were satisfied with the service, that the costs were reasonable, and that they would participate in the program again if it were available (noting that the study self-selected motivated participants). The study budget was $228,000 with planning and administration and advertising accounting for the majority (60%) of total costs. Used televisions were packaged and stored for shipping to an electronics recycling company

(Total Reclaim) at a cost of approximately $0.25/pound. JVC, Philips, Pioneer, Samsung, Sharp and Sony contributed $5,000 each to the pilot study to offset recycling costs, which covered $30,000 of the $49,000 total.

Materials Involved

Electronic Waste

Implementation Timeframe

Implementation Year: 2008 **Ramp Period:** Short 1 Year

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
Electronic Waste	20%	80%
Residential		
Electronic Waste	30%	80%
Self-Haul		
Electronic Waste	20%	80%

Diversion Potential

Up to a 16% recovery rate, up to 1,603 tons by 2038

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$50,000	$50,000	$50,000	$50,000	$50,000
Capital 10 Yr.						
Capital 25 Yr.						

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

Consumer Cost: Medium – up to $50/household

Action Feasibility

Proposed action is feasible and has a high probability of success given that the State of Washington has implemented an Electronics Take Back Program with a governing set of requirements. In addition, similar programs have been successfully implemented in several other jurisdictions.

Risk of Not Achieving Results within Timeframe

Proposed action is considered to be low risk given Washingto State regulations, and success in other jurisdictions.

Pros:

- Environmental benefits would be significant, as large quantities of lead, phosphorous, mercury, cadmium and arsenic would be diverted from landfills and prevented from leaching into soil and water sources

- Less illegal dumping would occur as a result of this type of program

- Implementation and ramp up times would be short

Cons:

- Increases consumer costs.

- Increases SPU costs moderately in the beginning of implementation; though costs would decrease over time

- May increase costs for retailers and manufacturers

Assumptions

- Costs to SPU are estimated based on the assumption that this program requires a small portion (5%) of the county recycling program administrative and planning budgets ($1.3 million combined for 2007).

- Program participation and efficiency is expected to be high because state regulations prohibit the disposal of electonics waste to landfills. Current consumer costs are estimated to be medium, based on average program costs for electronics disposal ($10 to $20 depending on device type) and an assumed disposal rate of 2-3 devices/year. Snohomish County endorses producer responsibility, and the eventual development of product recovery systems at no additional cost to consumers (although these costs will likely be embedded at the retail level).

- Initial SPU costs to administer a similar program are estimated in the Medium category, based on the administrative and advertising costs for the pilot study. It is expected that advertising and educational costs will diminish over time as the program matures, more retailers participate, and public awareness grows.

Sources

http://www1.co.snohomish.wa.us/Departments/Public_Works/Divisions/SolidWaste/TakeItBack/Electronics/Background.htm.

http://www.productstewardship.net/PDFs/libraryElectronicsGoodGuysReport.pdf.

Add Dry Cell Batteries to Existing Curbside Recycling Program (#153)

Description

Make curbside collection of dry cell batteries available to all residential sectors. Household battery collection programs are one way to reduce hazardous metals in the waste stream. United States Environmental Protection Agency estimated that over 475 million batteries are used in the United States each year. Dry cell batteries are a concentrated source of heavy metals. The main constituents of concern for human health and the environment include the following metals: zinc, cadmium, lead and mercury.

Background

City of Spokane:

Curbside recycling collection, which includes household batteries was implemented in the City of Spokane (City) in 1990 and serves approximately 60,000 households. In September 1991, curbside service provided by two private haulers was extended to an additional 33,000 urban county households. The Spokane Regional Solid Waste Disposal Project (Project) (an agency created by the City of Spokane and Spokane County) and the City of Spokane Solid Waste Management Department (Solid Waste Department) operate the battery collection program. The Project's office purchases the drop-off containers, provides program administration and public education, and collects from many of the drop-off sites. The Solid Waste Department handles all storage, packing and shipping, and most of the collection within the city limits.

Curbside Collection

Weekly curbside collection of recyclables participation averages 28 percent in the City of Spokane and is somewhat higher in Spokane County. About 10 percent of the bin set outs include household batteries. According to the recycling supervisor for the Solid Waste Department, the curbside recycling collection drivers spend about 1 percent of their daily collection time gathering household batteries. Residents put the used batteries in a sealed plastic bag, such as Ziploc®, and place it on top of the recyclable materials in the curbside collection bin. The drivers place the bag of batteries into a bin inside the collection truck cab. The collected batteries remain inside the truck cab until the end of the week. In 1990, the twelve City curbside drivers each collected about 60 pounds of batteries per week, for a total of approximately 720 pounds per week for the 60,000 City households.

At the end of each week, the batteries are brought to a ventilated metal shed. An employee wearing a dust mask and rubber gloves spends four to eight hours sorting and packing batteries. Alkaline and carbon-zinc batteries account for 86.1 percent by weight of all batteries collected in both the City and Spokane County programs. The bulk of batteries are packed for hazardous waste disposal in government approved 30-gallon metal drums fitted with plastic liners so the batteries do not make contact with the metal drum. These precautions are taken to prevent possible buildups of hydrogen gas or mercury vapor.

The batteries are packed in layers of absorbent material to keep the batteries dry and help keep them separated. The drums are not sealed until they are ready to be shipped. Each drum averages 300-plus pounds of batteries, 60- plus pounds of absorbent material and about 40 pounds of tare weight (drum, lid and ring).

In August 1991, the first 105 drums of collected batteries were shipped to a licensed hazardous waste landfill in Arlington, Oregon, approximately 200 miles from Spokane. Batteries represented over 15 $^{1}/_{2}$ tons of the 22-ton total shipment weight. (Individual drum weights will vary depending on the size and weight of the batteries packed.)

Chemical Waste Management, Inc., operator of the Arlington disposal site, charged $91.85 per drum to dispose of the batteries at its landfill. This included demurrage, transportation, disposal, Oregon state waste handling tax and a one-time profiling cost. With the $300 profiling cost deducted, future shipments should cost about $89 per drum. Chemical Waste Management charges the same rate for 30- or 55-gallon drums.

During the program's first year, Spokane County collected an average of 1 $^{3}/_{4}$ tons of household batteries per month, or a total of 21 tons. Spokane County curbside collection is expected to bring in an additional eight tons of batteries per year. In the year 1991, since the battery program was instituted, an estimated 144 pounds of mercury have been diverted from the area's solid waste incinerator.

City and Spokane County household battery collection program costs

Implementation costs	
Program research and development	$2,880
Drop-off equipment and supplies	$936
Public education	$20,000
Printed materials	$2,840
Total	**$26,656**
Operating costs, Oct. 1990-Oct. 1991	
Packing equipment and supplies	$6,597
Disposal	$12,787
Operation costs (household hazardous waste technician, collecting, sorting, administration program	$17,795
Drop-off equipment and supplies (replacements)	$200
Public education and printed materials	$5,000
Total	**$42,359**
Includes 1 percent of total curbside collection costs, approximately	$10,000

Hennepin County, Minnesota

The Hennepin County, Minnesota dry cell battery collection program is a well-established program that can serve as a model for other communities interested in diverting used batteries from the municipal solid waste stream. It is the largest used dry cell battery collection program in the United States. The program serves approximately one million county residents spread out over 47 municipalities, including Minneapolis and the surrounding suburbs. Prior to initiating curbside collection for all types of batteries in the City of Minneapolis and providing numerous drop-off locations throughout Hennepin County, two pilot studies and a survey of commercial battery users were conducted.

In January 1990, Hennepin County conducted a survey of 83 local businesses thought to use significant numbers of dry cell batteries. The sample included organizations involved in medical care, security, communications, building maintenance, transportation, computer maintenance, government, and traffic control. The survey goals were to get an idea of the types and quantities of batteries used by businesses in Hennepin County and to determine the disposal practices used.

The majority of the organizations surveyed discard their waste batteries into the municipal solid waste stream. In many cases, these batteries are the same types and sizes of those purchased by household users over the counter. Hennepin County used the survey information to plan strategies for helping local businesses identify alternative disposal methods for problem batteries.

Based on the results of the pilot program and the commercial battery waste audit, a countywide retail collection program was established in January 1990. The program began with the collection of button batteries, the small round type typically used for watches. Mercuric oxide and silver-oxide button cells are easy to market for recycling because of their high mercury content by weight and because they pose reduced storage requirements. Button batteries were collected at more than 150 points throughout the county, including jewelry and photography stores.

The button battery collection program accumulated and shipped 292 pounds of mixed button batteries to Mercury Refining in Albany, New York. This recycling company processed approximately 140 pounds of silver-oxide button batteries. This program resulted in the diversion of 49 pounds of pure mercury from the waste stream.

A curbside collection program was initiated in October 1990 for the City of Minneapolis, which has over 100,000 households. This collection program was modeled after the pilot curbside collection of all batteries. In addition to curbside collections, 140 drop-off points located at stores that sell all types of dry cell batteries were established to serve the rest of the households in Hennepin County. Batteries and small appliances containing rechargeable batteries were brought to Hennepin County's permanent household hazardous waste collection site.

Materials Involved

Dry cell batteries

Implementation Timeframe

Implementation Date: 2008 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Residential		
Dry cell batteries	30%	90%
Self-Haul		
Dry cell batteries	30%	90%

Diversion Potential

27% recovery rate, up to 157 tons in 2038

Environmental Benefits

Environmental benefits would be significant if the batteries are recycled, as large quantities of hazardous metals would be diverted from landfills and prevented from leaching into soil and water sources.

Cost

SPU Costs include the costs for recycling batteries. (Shipping, Transportation, Recycling)

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M	$ 206,100	$ 206,100	$ 206,100	$ 206,100	$ 206,100	$ 206,100
Capital 10 Yr.	$ 176,000	-	-	-	-	-

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

Risk of Not Achieving Results within Timeframe

Pros:

- Environmental benefits would be significant if the batteries are recycled, as large quantities of hazardous metals would be diverted from landfills and prevented from leaching into soil and water sources.
- The cost of land filling will be saved if the batteries are recycled
- The metals reclaimed are reused and put back into the manufacturing process to build more batteries.
- Keeps all the hazardous metals in one place

Cons:

- Increases SPU costs moderately in the beginning of implementation.

Assumptions

- City of Seattle household battery collection program's estimated costs:

Implementation costs	
Program research and development	$50,000
Drop-off equipment and supplies	$35,000
Public education	$20,000
Temporary Battery Storage Facility	$73,000
Battery Storage Drums	$18,000
Total	**$176,000**
Operating costs (2008-2013)	
Packing equipment and supplies	$500
Shipping to Recycling Center (Rail Shipping, Semi Truck, Driver	$120,000
Public outreach and Printed material	$30,000
Operation costs administration program	$55,600
Public education and printed materials	$5,000
Total	**$206,100**

- In 2004 Seattle generated 165 tons of dry cell batteries from residential, commercial and self-haul sectors.

- By 2014, the number of households in Seattle is projected to be 270,290, with an average household size of 1.98 persons. The tonnage of batteries generated will be 170 per year.

- Each drum with a capacity to hold approximately 300 pounds costs about $60. City of Seattle needs 25 battery collection drums assuming about 4 tons of dry cell batteries are generated per week. Drums would be rail transported to the recycling/disposal site.

- Temporary storage will be located at a City-owned property requiring minimal site grading. Battery storage location will have a single metal storage building in which a City employee will sort the various types of batteries.

- O&M cost includes a full time employee at an annual cost of $55,600 (includes salary and fringe benefits).

- Educational materials (printed materials) have an annual cost of $30,000.

- Used drums donated by local businesses could save over $6,000 annually in drum purchases.

- Kinsbursky Brothers, Inc., in California offers battery recycling solutions for businesses, government and households to better service environmentally conscious consumers and satisfies compliance with government regulators.

- Kinsbursky Brothers Inc. does not provide transportation service but can help arrange transportation for large quantities.

  Recycling Location:
  Kinsbursky Brothers, Inc.
  125 E. Commercial
  Anaheim, CA 92801
  Ph: 1-800-548-8797

References

Spokane Regional Solid Waste Disposal Project, 1991
Source: Household Batteries: Drop-off and Curbside Collection - by Annete Du Bois and Jessie Lang. http://www.p2pays.org/ref/06/05472.pdf

Hennepin County, Minnesota, 1990.
http://www.p2pays.org/ref/02/01407/0140703.pdf

Source Separated Recycled Material Rate Discount - Generally for Self-Haul to Transfer Stations (#155)

Description

Implement rate structure to provide discount for source separated recycled materials that are self-hauled to the transfer stations. This is an incentive based program and will have the greatest impact in the form of potential cost savings for generators who self-haul the waste to the transfer stations.

Background

Town of Hillsborough, California

Job site separation of non-salvageable but otherwise recyclable debris materials will facilitate recycling, and is strongly encouraged. For example, the separation of both scrap wood and drywall during the construction of a house should be undertaken if feasible, particularly where those materials represent a large portion of the total materials generated.

To encourage source separation, facilities often accept separated materials at a lower fee than mixed debris. Debris box companies may offer similar discounts. Labeling debris containers and educating subcontractors will help ensure clean, source-separated loads.

Materials that have been source separated at the job site and contain very little or no contamination may go to any recycling facility the contractor chooses.

East Hampton, New York

East Hampton started accepting source separated compostable material at the end of March, 1995. The Town Board designated the compostable fraction as a voluntary (not mandatory) recyclable, qualifying it for the reduced rate tip fee of $15/ton, the same rate as other recyclable materials accepted by the town. Since the tip fee for non recyclable waste is $65/ton, it was felt that this $50/ton incentive would encourage commercial generators to participate. (The tipping fee is assessed to haulers and businesses; residential self-hauler does not pay a tipping fee, but instead pay $30/year for solid waste service.)

Portland, Oregon

In Portland, most haulers collect source-separated materials and deliver them directly to markets. EZ Recycling, Oregon Recycling Systems, Energy Reclamation, Inc., and Recycle America operate MRFs that process the majority of material that need to be processed. The facilities employ a variety of sorting techniques, both automated and manual.

The Metropolitan Service District, a regional government agency, owns and operates two solid waste transfer stations in the Portland area. Portland residents who self-haul recyclable materials to these facilities pay no tip fee and can receive up to a $6 rebate.

San Jose, California

San Jose has four landfills operating within its borders: Zanker Road Landfill (independent), Newby Island Landfill (BFI/Allied), Kirby Canyon Waste Management, Inc. (WM) and Guadalupe Mines Landfill (was independent, now WM). Solid waste facility permits written for three of the four landfills in the 1980s required them to assist in meeting the city's waste reduction goals as a condition of their permits. Permit conditions contained included source separation discounts. Landfills were required to offer lower rates to generators for clean, source-separated materials to enable landfills to more easily recycle those materials. Over the last five years, Zanker diverted 94 percent of all wastes entering its facility.

Materials Involved

All Traditional

Implementation Timeframe

Implementation Date: 2010 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Self-Haul		
Traditional	50%	20%

Diversion Potential

10% recovery rate, up to 3,000 tons by 2038.

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M	$8,560	$8,560	$8,560	$8,560	$8,560	$8,560
Capital 10 Yr.	-	-	-	-	-	-

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton	$0	$0	$0	$0	$0	$0

Risk of Not Achieving Results within Timeframe

Pros:

- Provides strong incentive to recycle
- Helps improve recycling infrastructure for specific materials.
- Increases diversion and makes waste disposal cost prohibitive

Cons:

- Must be coordinated with other jurisdictions to avoid shifting waste to other facilities with lower tipping fees (e.g., to King County transfer stations)
- Could result in an increase in illegal dumping.

Assumptions

- O&M cost includes a full time employee at an annual cost of $55,600 (includes salary and fringe benefits).
- Educational materials (printed materials) have an annual cost of $30,000.

Reference

The Town of Hillsborough, California. Debris Recycling
http://www.hillsborough.net/depts/building/debris_recycling.asp

Bio-Cycle. November 1995. Municipal Options, Success with Source Separation
http://www.p2pays.org/ref/33/32578.pdf

Portland, Oregon. Municipal Solid Waste Reduction. Institute for Local Self-Reliance, 1999.
http://www.newrules.org/environment/portland.pdf

Recycling Market Development Zones (#165)

Description

This program provides attractive loans, technical assistance, and free product marketing to businesses that use materials from the waste stream to manufacture their products and are located in a concentrated zone.

Background

In California, the most prominent example of the RMDZ concept, the Recycling Market Development Zone program combines recycling with economic development to fuel new businesses, expand existing ones, create jobs, and divert waste from landfills. The zones cover roughly 71,790 square miles of California from the Oregon border to San Diego.

Assistance is provided by local zone administrators and the Board's Referral Team (R-Team). Local government incentives may include relaxed building codes and zoning laws, streamlined local permit processes, reduced taxes and licensing, and increased and consistent secondary material feedstock supply. Local incentives vary from jurisdiction to jurisdiction. In addition to loans, the Board offers free product marketing through the RecycleStore.

In 1996, the Utah Legislature created the Utah Recycling Market Development Zone Program which focuses on recycling as an economic development tool. This assists businesses that collect, process, distribute or use recycled materials in their manufacturing operations, or compost. Eligible recycling businesses that are located in designated Recycling Market Development Zones qualify for:

- 5% state tax credit on machinery and equipment
- 20% state tax credit (up to $2,000) on eligible operating expenses
- Technical assistance from state recycling economic development professionals
- Various local incentives

In Washington:

- A conservative estimate shows that recycling employs over 5,000 tax paying Washingtonians.

- A conservative estimate shows recycling generates almost $75 Million in taxable income, and almost $500Million in taxable sales in Washington.

- A conservative estimate shows over 500 recycling and reuse establishments do business in Washington

Seattle's development of Recycling Market Development Zones could be linked to the Puget Sound Regional Council's Prosperity Partnership program for clean manufacturing clusters.

Materials Involved

All Materials

Implementation Timeframe

Implementation Date: 2015 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
All Materials	10%	10%
Residential		
All Materials	10%	10%
Self-Haul		
All Materials	10%	10%

Diversion Potential

Up to 1% recovery rate, up to 1,743 tons in 2038.

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$8,560	$8,560	$8,560	$8,560	$8,560
Capital 10 Yr.						
Capital 25 Yr.						

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

Action Feasibility

Proposed action is feasible, but has a low probability of success. Similar programs have been successfully implemented in several other jurisdictions, however, Seattle's industrial land base is increasingly scarce, or of too high a value for the low margins of recycling processors. The zones may be able to attract value-added manufacturing as a way to offset these constraints, to partner with existing businesses.

Examples of businesses in California taking advantage of the RMDZ incentives include:.

- Alameda County Computer Resource Center (ACCRC), is a nonprofit corporation that recycles e-waste. Computers, monitors, software, hard drives, circuit boards, games, speakers, and other e-waste that can be fixed are placed with charity, nonprofit, school, low-income, or disabled individuals.

- California Bio-Mass is in the business of recycling organic material. This innovative family-owned company processes green waste, gypsum, and food solids into compost for sale to farmers and landscape companies. With help from the RMDZ program, this business found the perfect High Desert RMDZ location.

- Earthworm Soil Factory is an innovative company that uses red earthworms to make extremely nutrient-rich, organic soil. Company owners Larry and Karen Royal have found that there is a profit in vermiculture (the breeding of earthworms) and vermicomposting (using earthworms to process organic debris into worm castings).

- Fire & Light Originals, Inc., located on California's north coast, creates hand-poured glass tableware from recycled glass bottles and jars. The company's products are shipped to specialty stores and galleries throughout the country.

- Golden By-Products, Inc., is a full-scale tire recycling business. With an RMDZ loan, the company was able to expand its recycling efforts by adding steel liberation and cracking equipment to existing tire recycling operations and using crumb rubber production to meet the demands of developing markets.

- Looney Bins/Downtown Diversion, which recycles Hollywood movie sets, is an award-winning, progressive, and rapidly growing construction and demolition (C&D) debris waste hauling and recycling company with locations in both the City of Los Angeles and Los Angeles County zones.

- Silicon Recycling Services, Inc. purifies used silicon to be made into solar panels. This unique business began as a recycling scrap yard more than 20 years ago. With a loan from the RMDZ program, this business bought the equipment necessary to recycle silicon from the semiconductor industry.

Risk of Not Achieving Results within Timeframe

Pros:

- South Recycling and Disposal Station may act as the hub of a “zone” now or in the future, if transfer station capacity becomes available. Total Reclaim, an electronics recycler based in Seattle is already co-located at SRDS to take advantage of the supply of e-waste from recycling efforts there.

- Innovative way to encourage manufacturers to move to certain "zones" in Washington.

- Diverts waste, and many studies have concluded that recycling creates jobs and tax revenue.

- Creates partnerships between generators and manufacturers, not the landfill.

Cons:

- Scarcity of land, land values, and/or lease rates may inhibit effective zones from developing in Seattle.

Disposal Ban for Used Oil Bottles (#169)

Description

Ban disposal of used oil bottles by developing new regulations. Used oil bottles must be emptied and taken to the transfer station or oil change business that accepts it for recycling or to the household hazardous waste facility. Combine with household hazardous collection strategies as appropriate.

Background

County of Orange, California

The County of Orange Used Oil Recycling Program has started recycling of used oil bottles in May at two Kragen Auto Parts stores, which are certified used oil recycling locations, one in Stanton, and the other in Tustin. Both locations generate large amounts of oil bottles from "do it yourselfers" that bring in used motor oil, then dump the empty bottles in a recycle bin. The bottles are then collected for recycling.

South Carolina

In May 1992, South Carolina banned the disposal of used motor oil in landfills through the S.C. Solid Waste Policy and Management Act of 1991. Dumping of used oil on the ground or in water systems was already prohibited by the Pollution Control Act. As a result of these two Acts, illegal dumping of used motor oil can result in fines ranging from $200 to $10,000 per violation, per day.

This disposal ban led to the implementation of a program that soon became one of the nation's leading used oil recycling programs, not only based on the gallons collected but the fact that there are more than 600 recycling sites around the state and many of those sites take filters and used motor oil bottles. The recycling sites are a combination of both government owned sites and private retail outlets.

The program initially began with the collection of oil filters and based on the success of filter collection program, the collection of motor oil bottles was initiated. In 1995, Lexington and Charleston Counties participated in a pilot oil bottle recycling project. After a market was found, KW Plastics in Troy, Alabama, the two counties began collection of the traditionally hard to recycle material.
In addition, an oil bottle workshop was held in June 1997 in order to have all of the counties together to lay out plans for motor oil bottle recycling within their county. During workshop sessions held in the afternoon, it was decided to break the state up into regions. Within each region, there would be a host county who would accept the motor oil bottles from all other counties within that region. The host county is responsible for processing the bottles into three-eighths inch flake and storing until a large enough quantity is generated to transport at no charge, based on vendor's requirements.

Recycling HDPE, which is used to make motor oil bottles, is a pretty simple process. The bales are broken apart and ground into small flakes about 3/8ths of an inch. These flakes are then washed and floated to remove any heavy (sinkable) contaminants. This cleaned flake is then dried in a stream of hot air and may be boxed and sold in that form. More sophisticated plastic plants may reheat these flakes, add pigment to change the color and run the material through a pelletizer. This equipment forms little beads of plastic that can then be reused in injection molding presses to create new products.

Some common end uses for recycled HDPE are plastic pipes, lumber, flower pots, trash cans, or formed back into non food application bottles.

Canada

The Used Oil bottle recovery program in British Columbia was launched in 2003. Stewardship programs for the recovery of plastic motor oil bottles operate in four Canadian provinces and the recovery rates vary from 18% to 45%. Oil bottles are mostly collected through service stations acting as private and municipally run depots or eco-centers. Ontario and Quebec will be implementing similar used motor oil bottle stewardship programs soon. Motor oil bottle data were derived from the agencies operating provincial used oil material recovery programs.

Used Motor Oil Bottles Recovery in Western Canadian Provinces

Province	Kg Generated	Kg Recovered	Recovery rate
British Columbia	1,518,780	473,844	31%
Alberta	2,700,411	1,215,185	45%
Saskatchewan	988,786	193,150	20%
Manitoba	911,111	164,000	18%
Total	**6,119,088**	**2,046,179**	**33%**

Materials Involved

Used Oil Bottles

Implementation Timeframe

Implementation Date: 2010 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
Used Oil Bottles	75%	75%
Residential		
Used Oil Bottles	75%	75%
Self-Haul		
Used Oil Bottles	75%	75%

Diversion Potential

55% recovery rate, up to 40 tons in 2038.

Environmental Benefits

A significant amount of residual oil would be diverted from landfills, which would decrease potential for groundwater pollution and other pollution in general. There are over 3.43 billion quart motor oil bottles sold every year in the United States, and residual oil left in the bottle typically equals 4% of the contents in each. That residual oil amounts to about 137 million quarts (nearly 3½ Valdez oil spills) each year. If quarts of oil are purchased in proportion to polulation, Seattle would be generating 342,500 quarts (85,625 gallons) of residual oil per year going into the waste system. Typically the residual oil is disposed in a landfill with the used bottle. One gallon of oil can contaminate up to one million gallons of water.

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M	$ 110,000	$ 110,000	$ 110,000	$ 110,000	$ 110,000	$ 110,000
Capital 10 Yr.	$ 41,000	-	-	-	-	-

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton						

Action Feasibility

Regulatory bans are easily achievable.

Risk of Not Achieving Results within Timeframe

Pros:

- Environmental benefits would be significant, as some quantities of oil would be diverted from landfills and prevented from leaching into soil and water sources.
- High probability of achieving significant diversion rate.

Cons:

- Would require changes in collection strategy, and related capital costs for new collection bins.
- Increases compliance monitoring and enforcement requirements
- May promote illegal dumping

Assumptions

- Approximately 300 tons of oil filters would be present in the 2038 waste stream according to the 2004 waste composition estimate (SPU, 2004). Assuming the average weight of oil bottles per oil filter is 25% that of the oil filter, the tonnage of used oil bottles in 2038 would equal 75 tons.
- Bans result in very high participation and efficiency rates.
- Capital costs include $10,000 for site development, $15,000 for housing facility, $8,000 for centrifuge, $8,000 for chipper and furnishing and installation.
- O&M cost includes: a full time employee at an annual cost of $55,600 (includes salary and fringe benefits); $21,440 for an operator; and educational materials (printed materials) at an annual cost of $30,000. Full time employee coordinates program with customers, prepares press releases, places advertising, and posts notices to City web pages.

References

Environment and plastics industry council 2004. An Overview of Plastic Bottle Recycling in Canada.
http://www.solidwastemag.com/PostedDocuments/PDFs/OctNov04/PlasticBottle.pdf

Arizona State University. Article: *How is it recycled?*
http://property.asu.edu/recycle/how.html

South Carolina. 1998. Recycling Motor Oil, Filters and Motor Oil Bottles in South Carolina. http://www.p2pays.org/ref/15/14147.pdf

Salvage and Reuse Swap Sites (#177)

Description

The City would operate as many as 10 salvage and reuse swap sites in several neighborhoods throughout the City; ideally, the sites would be distributed among the North, Central, and South areas so as to provide convenient access from the City's 106 neighborhood districts (City of Seattle 2007). The swap sites would accept donations of low-value items such as clothing and furniture but would pay cash or issue trade credits on a case-by-case basis for high-value items such as selected building materials; trade credits could be used to purchase items from any City swap site.

The program would allow City residents to save time and fuel by not having to drive long distances to City transfer stations or salvage retail stores to dispose of reusable items. This option would be especially beneficial to low-income residents, elderly people, or others that may face transportation challenges, and would benefit the City by eliminating many self-haul trips to City transfer stations. The City would reserve the right to refuse to accept items such as hazardous materials, items prohibited from resale due to local health department rules (e.g., used mattresses), and items which are determined to be too difficult to sell.

Background

Urban Ore in Berkeley, California provides a disposal service for still-useful goods and operates a successful retail store for salvaged and reusable items that people can buy at a low price (Urban Ore 2007). According to the company's website, about 75% of the merchandise comes from community drop-offs; some people drop off items specifically to avoid paying a City dump fee at a transfer station. The other 25% of merchandise is collected by their Outside Trader Department, which makes on-demand pickups, and by their Salvage and Recycling Department. Urban Ore's salvagers retrieve useful goods from the City of Berkeley transfer station as well as from construction sites. The salvagers also convert un-resalable objects into commodities for recycling such as nonferrous and ferrous metals, and glass.

Urban Ore's retail store encompasses 3 acres and employs approximately 30 people each of whom is paid around $11 per hour. The currency involved in transactions between the store and customers includes cash, credit cards, and Urban Ore Trade Credits; the trade credits may be issued for donated items instead of cash at the request of the customer, and can be used toward purchases at the retail store.

Urban Ore sells or exchanges the following types of salvaged and reusable materials:

- Building materials - doors, windows, sinks, tubs, lumber, bricks, fencing, tile

- General goods - furniture, cabinets, house wares, appliances, collectibles, miscellaneous items
- Hardware - lighting, locks, tools, motors, bikes, sporting goods
- Arts and Media - computers, small electronics, books, art, music

Urban Ore charges a fee to recycle used televisions and does not accept or trade in the following items:

- All-in-one stereos with broken components, or VCRs that are not fully functional
- Card-fed satellite receivers, printers and scanners without a USB port, electric typewriters, electric home appliances that are 5 years old or older
- PCB transformers (found in fluorescent light fixtures)
- Full-sized consumer refrigerators or freezers
- CD jewel cases or audio cassette cases
- Skis
- Mattresses, bedding, or sofa beds
- Particle-board furniture in less than excellent condition

Materials Involved

Reusable items: all reusable items (e.g., furniture, clothing and textiles, appliances and select electronics, salvaged used building materials)

Implementation Timeframe

Implementation Year: 2010   Ramp Period: 1 to 3 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Residential		
Reusable items	25%	50%
Self-Haul		
Reusable items	25%	50%

Diversion Potential

Up to 12% recovery rate, up to 2,838 tons in 2038.

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$130,000	$130,000	$130,000	$130,000	$130,000
Capital 10 Yr.	$0					
Capital 25 Yr.						

* O&M Costs escalate annually at 80% of CPI
Capital costs assumed to include purchase and distribution of new bins (see assumptions)

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

* Variable costs escalate annually at 65% of the CPI

Environmental Benefit

The environmental benefit of this option is considered medium since it diverts materials from landfills and helps reduce the demand for virgin materials.

Action Feasibility

The proposed action is feasible and has a high probability of success. Similar programs have been successfully implemented in other jurisdictions.

Risk of Not Achieving Results within Timeframe

Proposed action is considered to be low risk given success in other jurisdictions.

Pros:

- Provides a high level of convenience especially for low-income residents, elderly people, or others who may face transportation challenges

- May eliminate many self-haul trips to the City transfer stations.

- Raises overall community awareness about reuse and recycling by making it convenient to participate at the local neighborhood level.

- Addresses a wide variety of materials including salvaged C&D

Cons:

- The City may need to monitor the names and addresses of people dropping off items and/or the license plates of vehicles in order to track where items are coming from and to discourage trafficking in stolen goods.

- May be difficult to find sites due to neighborhood opposition

- Would require trained staff and diligent monitoring to screen items being donated, and to prevent illegal dumping after hours.

- Would compete with operations such as Goodwill or the Salvation Army

Assumptions

- Materials covered would include general goods (e.g., furniture, cabinets, house wares, appliances), hardware (e.g., lighting, locks, tools, sporting goods), building materials (e.g., doors, windows, sinks, lumber), and arts and media (e.g., computers, small electronics, books, art, music)

- A minimum of 10 salvage and reuse swap sites would be established among the City's 106 neighborhood areas. Each site would be staffed by 2 FTEs.

- The implementation and ramp period would both be short.

- Participation, efficiency, and diversion would be medium, high, and very low, respectively.

References

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SPU. 2003. Revised 60% projections. Microsoft Excel spreadsheet provided by Seattle Public Utilities.

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Market Development for C&D Materials (#186)

Description

The City could provide low-interest loans, grants, tax-exempt bonds, technical assistance, permitting efficiencies, or other incentives to promote markets for targeted under-recycled materials, especially wood waste, gypsum, and asphalt roofing. The City could also facilitate dialogue between C&D processors, manufacturers, and public agencies such as Washington State Department of Transportation to discuss ways to improve the quality of recycled C&D materials to meet industry engineering specifications and stimulate the market for these materials. Markets for the targeted materials listed above include dimensional lumber, paper pulp, and hog fuel derived from wood; soil amendments and Portland cement derived from gypsum; and asphalt paving and/or asphalt road base, or cold patch for roads derived from composition roofing.

Background

The Washington Economic Development Finance Authority (WEDFA) administers a state program that issues tax-exempt/taxable economic development revenue bonds that can be used to finance land acquisition, building construction, and acquisition of new equipment; projects related to waste disposal qualify as "exempt" (WEDFA 2007).

The Vermont Agency of Natural Resources provides a grant program to support market development for recycled C&D materials; the grants are awarded to cover expenses associated with research, marketing and feasibility, capital, transportation and/or administrative costs. Grant applicants must provide matching funds up to 20 percent of the amount awarded (VANR 2006).

In California, the Integrated Waste Management Board (IWMB) established a Recycling Market Development Revolving Loan Program (under Chapter 1543, Statutes of 1990 [SB 2310, Bergeson]) to support development of markets for recycled materials including recycled C&D waste (CIWMB 2007). Loan funds are available to businesses, not-for-profit organizations, and municipalities located within established Recycling Market Development Zones; the program provides a financial incentive for businesses to create or expand their manufacturing processes to use recycled materials, and for local governments to expand necessary infrastructure to support recycling industries. Many recycling businesses and municipalities find it difficult to obtain funds because private lenders are oftentimes reluctant to invest in the emerging recycling industry which has a limited lending track record and specialized equipment with a limited resale potential should a venture fail. In 1998, 14 companies that had received loans since 1990 diverted 250 percent more tonnage of recyclable materials than projected (6 million tons versus projected tonnage of 2.4 million tons).

In Tacoma, Washington, Recovery 1 successfully collaborated with local cement producers, paper companies, and other manufacturers to find ways to improve the quality of raw materials derived from C&D waste (Gillis 2007). In 2006/2007 Recovery 1 began processing gypsum that is nearly 100 percent free of paper backing impurities and collaborated with a local cement producer to perform materials testing and commit to using the product in the production of Portland cement. Recovery 1 has also found paper producers that are committed to using only paper pulp derived exclusively from recycled clean wood to produce their paper products.

Materials Involved

C&D Wastes: Wood, gypsum, asphalt roofing

Implementation Timeframe

Implementation Date: 2008 Ramp Period: 10 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
C&D Wastes	20%	80%

Diversion Potential

Up to 16% of targeted C&D Materials, up to 1,818 tons in 2038

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$130,700	$130,700	$130,700	$130,700	$130,700
Capital 10 Yr.	$0					
Capital 25 Yr.						

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

Environmental Benefit

The environmental benefit is expected to be moderate due mostly to the reduced demand for virgin resources from materials entering the recovery cycle.

Action Feasibility

Proposed action is feasible and has a moderate probability of success, due mostly to the uncertainty provided by other market factors unrelated to a market development program. Similar programs have been successfully implemented in several other jurisdictions. The California IWMB operates several market development grant programs; the Clean Washington Center was widely acknowledged as having a positive effect on the ability for manufacturers to use recycled raw materials, as well as establishing standards for their use in different end use applications. King County has had some success with its Comission for the Marketing of Recycled Materials and it's successor the LinkUp program, but local programs suffer from less leverage than state or regional market development efforts.

Risk of Not Achieving Results within Timeframe

Pros:

- Helps improve recycling infrastructure for specific C&D materials
- Encourages recycling through market assistance
- Helps businesses obtain loans when private lenders may not accept the level of risk involved.

Cons:

- Lack of local processing facilities
- May require multiple policy actions to account for diversity of targeted sectors

Assumptions

- Materials targeted by this option include under-recycled materials such as wood, gypsum, and asphalt roofing.
- The implementation and ramp up times for this option are 3-5 years and more than 5 years, respectively, which reflect the significant time and committment necessary to achieve tangible results in market development in the form of increased C&D tonnage diverted.

- The environmental benefit of this option is expected to be medium based on the quantity of C&D debris that may be diverted.

- Assumes the following C&D tons still persist in the waste stream

Table 1. Tons of C&D debris disposed…..

NRDS	32,936 (14%)
SRDS	19,413 (8%)
Residential Curbside MSW	7,981 (3%)
Commercial Can/Dumpster MSW	22,237 (9%)
Eastmont	72,733 (31%)
Third and Lander	55,799 (24%)
Black River	13,164 (6%)
Argo Direct	11,764 (5%)
Grand Total	**236,027 tons**

Source: SPU 2005 (disposed tonnage in 2005)

References:

CIWMB. 2007. Recycling Market Revolvoing Loan Program. Viewed February 6, 2007, on the California Integrated Waste Management Board's website: <http://www.ciwmb.ca.gov/rmdz/Loans/>.

Gillis, Terry. 2007. Personal communication (conversation with George Iftner of Herrera Environmental Consultants, Inc.). Owner/operator of Recovery 1, Inc., Tacoma, Washington. February 2, 2007.

VANR. 2006. Request for Proposals – Vermont Agency of Natural Resources Construction Waste and Demolition Debris (C&D) Recycling Market Development Grants.

WEDFA. 2007. Tax-exempt Economic Development Bond Program. Viewed February 6, 2007 on the Washington Economic Development Finance Authority's website: <http://www.wedfa.wa.gov/industrial.htm>.

Eco Parks for Resource Sharing and Material Market Development (#199)

Description

A network of businesses that work together to share resources (materials, water, energy, infrastructure, natural habitat and information). Eco Industrial Parks (EcoParks) already exist in industrial areas of the city through private-sector initiatives—though they do not hold that title. These initiatives could be advanced further through incentives, consulting and technical assistance through SPU funded programs such as the Resource Venture.

Background

The concept of an EcoPark is defined by the President's Council on Sustainable Development (PCSD) as follows:

A community of businesses that cooperate with each other and with the local community to efficiently share resources (information, materials, water, energy, infrastructure and natural habitat), leading to economic gains, gains in environmental quality, and equitable enhancement of human resources for the business and local community. (USPCSD 1997)

The concept of an EcoPark is defined by Pacific Northwest National Laboratory as follows:

An Eco-Industrial Park is a community of manufacturing and service businesses seeking enhanced environmental and economic performance through collaboration in managing environmental and resource issues including energy, water, and materials. By working together, the community of businesses seeks a collective benefit that is greater than the sum of the individual benefits each company would realize if it optimized its individual performance only (Lowe, E et al. 1996)

The goal of an EcoPark is to improve the economic performance of participating businesses while minimizing their environmental impact. The outcomes of this type of development could bolster economic profits, job creation, and environmental responsibility.

EcoParks: History

In the 1990's, spurred by the federal program USPCSD, 15 EcoParks were implemented or planned throughout the United States and Canada. In 2002, of the 15 projects, five were functioning and seven were still the planning stages. By 2005-06, only two of the planned EcoParks fulfilled the main objectives as defined by the program. Many of them failed completely, never made it past the planning stages, regressed back to a traditional industrial park, or became an industrial park but not an EcoPark.

A recent study of EcoParks, found that these early EcoPark projects *relied to a large extent on public funding and although some became active, others died off quickly. In time, however, it seemed as if all of the early projects were lumped together as a single idealized model and, when the success rate was found to be very low, the word got out that eco-industrial parks just do not work (*Chertow**,** M. 2007). The study defines a successful EcoPark as one that is driven by the self- organization of the private sector through the recognition of cost reduction, revenue enhancement, business expansion, and securing long term access to needed natural resources (which may be spurred by regulation or the future or existing supply of a natural resource such as water) rather than a planned or multi-stakeholder process defined by the USPSCD model.

Typically, existing circumstances such as scarcity of resources; opportunities such as by-product use; regulations; and local advantages (market strengths, location, transportation) create a natural transition to symbiosis. Rather than having a planned EIP model the study found that upfront expectations from the community and privately driven symbiotic relationships are developed over time, in the dark so to speak.

Industrial Areas of Seattle

The Duwamish Valley and the Ballard-Interbay-Northend Manufacturing/ Industrial Center (BINMIC) are zoned industrial and major areas of employment. In total, they provide 80,000 jobs, roughly 17% of the city's total employment population. Because of the type of employment activities, the job densities are low, rarely exceeding 15 jobs per acre compared to Downtown with 175 jobs per acre and the University community at 45 jobs per acre. Duwamish Valley in particular has the most vacant land area in the city; it is multimodal (e.g., port, road network (SR-99, I-5), freight rail); and it also provides employment at a higher than average wage for families or individuals with lower levels of formal education and to those who speak English as a second language (Planning Commission 2005). In all, it has the largest concentration of family-wage jobs in the Puget Sound region, generating enormous tax and export revenues (Planning Commission 2005).

An EcoPark strives to create symbiotic manufacturing and industrial land uses with the overall goal of economic profits, job creation and environmental responsibility. The objectives of the Greater Duwamish Manufacturing and Industrial Center Neighborhood Plan (adopted in 1999) includes: the restriction of incompatible or competing land uses; encouragement of manufacturing and industrial job retention and growth; establishment of a growth target of 10,860 new family-wage industrial jobs; retention of existing businesses and encouragement of new manufacturing and industrial development (Seattle DPD 1999). These objectives are also supported through many of the economic development, land use, and environment goals established in the City of Seattle Comprehensive Plan.

Assumption

The City of Seattle could help bolster EcoPark development without outright planning a project entitled "EcoPark". The City could work with private industry to uncover additional cooperative ideas (it may be that two distinct industries may not realize a symbiotic relationship without the assistance of outside help); could assist with the development of ideas by offering technical assistance or offering financial incentives to feed the process, or site publicly funded resource recovery areas such as transfer stations in locations where by-products are easily accessible. In reality, the city has already taken steps to promote this type of development through their planning process (Zoning, Neighborhood Plans, Comprehensive Plan) and programs such as the Resource Venture. Additional incentives occur at the state and federal level through Brownfield tax incentives and grants. Increasing these efforts could bolster additional EcoPark-like activities.

EcoPark California: Recycled Market Development Zones

Recycled Market Development Zones combines recycling with economic development to fuel new business, expand existing ones, create jobs and divert waste from landfills. A government entity could bolster this type of development through a combination of loans, technical assistance, free product marketing, zoning, streamlined permitting, and siting.

In California, Recycled Market Development Zones are located throughout the state. The California Integrated Waste Management Board (CIWMB) has developed a query-based website that assists interested parties in locating suitable sites that contribute to specific goals. The query system provides a description of incentives, target materials, existing infrastructure and contact information.

Materials Involved

All Materials

Implementation Timeframe

Implementation Date: 2015 Ramp Period: 10 years

Expected Participation and Efficiency

Undetermined

Diversion Potential

Undetermined at this time, since the materials specifically targeted would be dependent on the manufacturing and supply participants. However, additional diversion may not be the primary motivation for such ventures, but rather an effort to strengthen market pull and commodity prices for those materials targeted.

Environmental Benefits

The environmental benefit is expected to be moderate to high due mostly to the reduced demand for virgin resources from materials entering the recovery cycle, and a reduction in emissions from reduced transport of raw materials and waste materials.

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$8,650	$8,650	$8,650	$8,650	$8,650
Capital 10 Yr.						
Capital 25 Yr.						

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

Action Feasibility

Proposed action is feasible and has a high probability of success. Similar programs have been successfully implemented in several other jurisdictions.

Risk of Not Achieving Results within Timeframe

Proposed action is considered to be low risk given success in other jurisdictions.

References

Chertow, M. 2007. Special Feature on Industrial Symbiosis: Uncovering Industrial Symbiosis, Volume 11, Number 1 School of Forestry & Environmental Studies, Yale University, New Haven, CT <http://environment.yale.edu/profile/247/marian chertow>

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Seattle Planning Commission Report. 2005. City of Seattle Industrial Lands Roundtable, Seattle, WA.

Seattle Department of Planning and Development. 1999. Greater Duwamish Manufacturing and Industrial Center Plan, Seattle, WA.

Packaging Tax (#202)

Description

The cost of disposing of packaging (e.g.; land filling, recycling) and the associated environmental impacts (e.g.; virgin materials, BTUs) is not reflected in packaged product prices. This market failure could be secured through a packaging tax or levy on the packaged product. The cost would be passed onto the consumer.

Background

A packaging tax could be added to the Washington State Chapter 70.93 RCW Waste Reduction, Recycling and Model Litter Control Act similar to a litter tax that was passed by legislature in the 1970s. Chapter 82.19 RCW Litter Tax targets industries that sell, manufacture, or distribute products and packaging that have a tendency to become litter.

The interesting history behind the tax is that it was introduced by the industry due to opposition of a bottle bill. By lobbying against the bottle bill and the self-induced litter tax, industry put a halt to a beverage container redemption law. Since the early 1970's the targeted industries have been taxed .015 % of their earnings which equates to $150 per $1 million in gross proceeds. The tax does not create a noticeable impact to consumer prices. To the benefit of the state, in the late 1990s the tax generated $5-$7 million per year. The following is the industry list targeted by the litter tax:

1. Food for human or pet consumption.
2. Groceries.
3. Cigarettes and tobacco products.
4. Soft drinks and carbonated waters.
5. Beer and other malt beverages.
6. Wine.
7. Newspapers and magazines.
8. Household paper and paper products.
9. Glass containers.
10. Metal containers.
11. Plastic or fiber containers made of synthetic material.
12. Cleaning agents and toiletries.
13. Nondrug drugstore and sundry products.

It is feasible to increase taxation in order to reflect the cost of disposal and associated environmental impacts of packaging. However, with the variability in the products (e.g.; recyclability, weight, volume, manufacturer energy consumption and emissions), the method of taxation would need to reflect this variability to support an even playing field.

Another major consideration is the significant political and economic implications or imposing such a tax.

New York

Legislature in New York adopted a revision that allows for packaging tax (NYS Tax Law Section 1201 or Article 29). The tax can be levied on retailers or on suppliers of packaging. The law establishes maximum fees based on the type of material used and reduces the rates for packaging containing specified amounts of recycled materials. This law has not been utilized by New York City to date.

CSERGE Study

Based on a study performed by Centre for Social and Economic Research on the Global Environment (CSERGE), the following factors could be considered:

- A package tax should be compatible with existing regulation/legislation.
- Government and producer costs should be low.
- Costs to consumers should not be too dramatic (i.e.; the jump in gas prices).
- The tax should not disproportionately burden the lower income populace.
- The tax should offset the costs to the recycling system.
- Marginal cost of waste disposal (e.g.; disposal costs, trippage rates, container weights)
- Weight of the packaging
- Recyclability/ Reusability

Netherlands

The Netherlands have a working packaging tax system that uses a life cycle assessment model based on environmental effects: greenhouse effect, acidification, eutrophication, photochemical ozone formation; resource consumption: energy consumption and fossil fuel consumption; and waste volumes: bulk waste, hazardous waste, nuclear waste and slag/ash. Some types of environmental impacts weigh heavier than others resulting in the use of an environmental index to estimate the significance of the environmental impact by the targeted industry (Danish EPA 2001).

United Kingdom (UK)

In late 2006, the UK government was urged by the Institute for Public Policy Research and Green Alliance to tax hard to recycle disposable products.

Oakland

The City of Oakland recently (February 2006) approved a tax on fast food restaurants, convenience stores and other businesses to help pay for the cost of litter removal. Businesses were assessed between $230 and $3,815 annually. This averages out to about $0.63 per day with a projected capture of $237,000 annually by the City of Oakland to hire crews to remove the debris where necessary. Some organizations said that the cost would be passed onto the customers who are primarily low income or young people. Surveys indicate that fast food packaging contributes 20% to all litter (Associated Press 2006).

Materials Involved

Traditionals, including paperboard, paper, Kraft/OCC; and plastic packaging (flexible and rgid)

Implementation Timeframe

Implementation Date: 2012 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
Traditionals	n/a	n/a
Residential		
Traditionals	n/a	n/a
Self-Haul		
Traditionals	n/a	n/a

Diversion Potential

Undetermined

Environmental Benefits

The environmental benefit is expected to be high due to the reduced demand for virgin resources with recycled materials re-entering the product life cycle; reduced transport of packaging materials to manufacturers and distributers.

The move towards a packaging tax legislative action would not only encourage the use of more easily recyclable materials but would also serve to encourage design of more environmentally friendly packaging materials. For example, although plastic packaging might not be totally eliminated, the number of types of plastics used might be more uniform or simplified to increase recyclability. Industry may pre-empt legislation—as they already are in some industries.

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$8,560	$8,560	$8,560	$8,560	$8,560
Capital 10 Yr.	$0					
Capital 25 Yr.						

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

Action Feasibility

Proposed action is feasible and has a low to moderate probability of success. Similar programs have been successfully implemented in several other jurisdictions, but the tax may not have a measureable affect on purchasing habits unless the tax rate is substantial, which may generate substantial opposition.

The City of Seattle could start by working with the Washington State Legislature to incorporate a package tax as part of the State Chapter 70.93 RCW Waste Reduction, Recycling and Model Litter Control Act. As with the bottle bill, there could be strong opposition by the packaging industry. Industry would likely encourage tax payers to oppose the bill citing increased consumer costs.

Risk of Not Achieving Results within Timeframe

Proposed action is considered to be high risk.

References

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Danish Environmental Protection Agency. 2001. Environmental Impact of Packaging Materials**,** Revised version, August 2001.

Pearce, D., Turner, K. 1992. Packaging Waste and the Polluter Pays Principle - A Taxation Solution, Centre for Social and Economic Research on the Global Environment (CSERGE), University College London, London, United Kingdom.

Pre-approved Certification of C&D Recycling Compliant Facilities (#212)

Description

The City could certify or pre-approve C&D Recycling Compliant Facilities. A C&D Recycling Compliant Facility is one that must divert (for recycling or beneficial use) a minimum percent of all inbound tonnage determined by the processor to be *appropriate for processing*; the minimum required tonnage diversion would be established under contract between the City and the facility operator. *Appropriate for processing* generally refers to loads of C&D material determined by the processor to contain a majority (e.g., 90 percent) of materials suitable to be delivered offsite for recycling.

Although waste from the City and King County area delivered to the same private facilities, and King County already pre-approves these facilities to be recycling compliant, the City could achieve even higher diversion rates by negotiating more stringent requirements with these facilities.

The certification system would provide the City with the contractual leverage to reward or penalize C&D processors based on the amount of C&D waste recovered. The contracts could be structured to require facilities to achieve increasingly higher diversion rates each year as the contract period progresses.

Background

King County requires C&D processing facilities operated by it's contracted haulers of construction, demolition, and land-clearing waste to recycle a minimum of 40% of all inbound tonnage determined to be appropriate for processing. The City's contracts with the County require processors to report where materials are taken for recycling, and monthly recycling rates for each facility are posted on the County's website (RDC 2004; WMI 2004).

Materials Involved

C&D Wastes: All commingled C&D Wastes

Implementation Timeframe

Implementation Date: 2010 Ramp Period: 1 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
Material	90%	5%

Diversion Potential

4% recovery rate, up to 400 tons by 2038

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$8,560	$8,560	$8,560	$8,560	$8,560
Capital 10 Yr.	$0					
Capital 25 Yr.						

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

Environmental Benefit

The environmental benefit is expected to be moderate due mostly to the reduced demand for virgin resources from materials entering the recovery cycle.

Action Feasibility

Proposed action is feasible and has a high probability of success. Similar programs have been successfully implemented in King County.

Risk of Not Achieving Results within Timeframe

Pros:

- Helps improve recycling infrastructure for all C&D materials.
- Encourages recycling through market incentives.
- Provides the City with some leverage to affect the quantity of recyclable materials diverted through rewards or penalties.

Cons:

- Requires additional site or facility monitoring.
- Does not address space limitations.
- Lack of local processing facilities.
- Allows the processor to determine what materials are appropriate for processing.

Assumptions

- The implementation period and ramp up time are expected to be 1-3 years and 3-5 years, respectively. These timeframes reflect the relatively short time needed to negotiate contracts with processors and the medium to long timeframe needed for development of local processing facilities.
- Participation is expected to be as high as 90 percent because there would be strong contractual and financial incentives to achieve negotiated diversion rates.
- Efficiency is expected to be up to 55 percent based on the average of the published *appropriate for processing* recycling rates for three of the four recycling compliant facilities that process waste from King County (the rate for Recovery 1 is exceptionally high at 98 percent and is not necessarily representative of where City waste would get processed) (KCSWD 2007).
- The environmental benefit of this option is assumed to be medium based on the tonnage of C&D that may be diverted.

References:

KCSWD. 2007. Report of C&D Recycling Facilities. Viewed February 5, 2007 on County website: <http://www.metrokc.gov/dnrp/swd/construction-recycling/rates.asp>.

RDC. 2004. Contract for Construction, Demolition, and Land-Clearing Waste Handling Services. Contract # D17832D By and Between King County, Washington and Regional Disposal Company. September 14, 2004.

WMI. 2004. Contract for Construction, Demolition, and Land-Clearing Waste Handling Services. Contract # D18990D By and Between King County, Washington and Waste Management of Washington, Inc. September 14, 2004.

Product Ban for Polystyrene To-Go Containers and Single-Serve Foodservice (#228)

Description

Ban Polystyrene (PS) take-out containers and require a switch to plates, and cups, etc. made from products such as compostable corn (PLA) and sugar cane fiber (bagasse). This overlaps with a ban on all recyclables and organics in commercial waste.

Background

Polystyrene Retail Food Vendor Products

There are three types of polystyrene (PS) used in food take-out: extruded foamed PS sheet, expanded polystyrene (EPS), and non-foamed PS which can be described as rigid PS. In the retail food vending industry, extruded and expanded PS is commonly used for cups, bowls, plates, trays and clamshell containers and is characterized by its light weight and thermal insulation properties. Rigid PS is commonly used for cutlery, cups and clear take-out containers. It is common for both types of foamed PS to be characterized as EPS without distinction of the two types. To simplify matters, this report will also describe both foamed types as EPS bans unless otherwise specified.

Existing PS Bans

About 100 cities across the United States have adopted some sort of PS food service packaging ban. In Oakland, CA, only EPS is banned while in Santa Monica, any non-recyclable take-out service packaging is banned.

Seattle

According to Seattle's solid waste composition studies, total EPS is about 0.6% of the waste stream. Commercial and residential EPS waste has not been counted separately so it is difficult to ascertain how much of the EPS is generated by retail food vendors. In 1988, Seattle passed an ordinance (#114035) banning the use of all non-recyclable food and beverage containers by the City of Seattle Government and food vendors at City facilities. This ban includes all types of PS food and beverage containers.

On Feb 15, 2007, Seattle Public Utilities' Resource Venture program and Cedar Grove Composting co-hosted the Seattle BioForum that brought together buyers and sellers of compostable foodservice ware, including restaurants, coffee companies, grocery stores, caterers, stadiums, schools and universities, large institutions, and corporate campuses. The forum showcased a variety of commercially available compostable products and suppliers. The Resource Venture website now has a list of biodegradable-product vendors that market food-service ware accepted by Cedar Grove.

Impetus to Ban EPS

The following are common reasons given for a ban:

Environmental Concerns

PS is made from non-renewable resources and does not biodegrade. Raw materials extraction; refining; chemicals used during the manufacturing; and the excessive use of water for cooling pose a variety of environmental impacts.

In the 1990s, EPS manufacturing used methods that emitted ozone depleting gases -- chlorofluorocarbons (CFCs). Now pentane is commonly used as the new manufacturing agent. Pentane is currently not attributed to ozone depletion but does create earth-level smog and contributes to global climate change (Seattle Public Utilities 2006).

Marine mammals and birds confuse polystyrene as a food source which often results in appetite loss and depleted nutrient absorption. In some cases, the ingestion of polystyrene by animals leads to death by starvation (Reany 2002)

Health Concerns

The EPA has suggested that there is evidence of styrene leaching into food or drink stored in PS containers. Some studies show that some in the U.S. have styrene stored in their fat. Styrene is a suspect neurotoxin and carcinogen (Seattle Public Utilities 2006).

Landfill Implications

PS takes a very long time to degrade – up to thousands of years (Santa Monica 2007).

Recycling Issues

Food encrusted PS is considered contaminated and not recyclable. According to the California Integrated Waste Management Board, "there is no meaningful way to recycle food service PS. It also experiences transportation challenges due to its light weight and other collection difficulties." (CIWMB 2004) In 1989, industry established the National Polystyrene Recycling Company (NPRC) to recycle PS food service and molded packaging. Due to food contamination, and the light weight resulting in transportation and other collection challenges, there was a reluctance to collect the food service PS for recycling from all sectors including the commercial food service industry. It was also difficult to compete with cheaper virgin resin that had higher quality. Corporations involved with the NPRC invested $85 million between 1989 and 1997 to operate the recycling facilities, yet never achieved profitability (CIWMB 2004).

Litter Problems

The litter and marine debris impacts of EPS food packaging is difficult to contain. EPS is inexpensive and effective as a food service-ware product but has many drawbacks and hidden costs which are later passed on to the public. What makes EPS a unique management issue is the lightweight nature of the product. It floats easily on water and is taken by the wind even when disposed of properly. In some communities it ends up clogging storm drains and litters otherwise scenic beaches across the nation. (Santa Monica 2007)

According to the City of Oakland, California, 15% of the litter collected in storm drains is polystyrene foam. In a study by the U.S. EPA in nine coastal U.S. cities, including Seattle, plastic pellets and spheres or polystyrene pieces were the most common floating debris items encountered in all but one case. In Seattle, polystyrene pieces were the largest contributor to floating debris (EPA 1990).

Barriers to Banning PS

Landfills

EPS does not take up that much landfill space compared to other waste streams. Nationally, fast food packaging takes up no more than 0.03% of landfill volume compared to paper which takes up 40%. (Seattle Public Utilities 2006)

Non-renewable PS versus Virgin Paper

PS is a one-cycle petroleum product, but when compared to paper, PS is shown to produce less pollution, waste and requires less energy in production. (Seattle Public Utilities 2006)

Health

Alternative studies have shown that the styrene accumulated in human fat tissue from PS is compatable with the amount that is accumulated from naturally-occurring styrene in foods. (Seattle Public Utilities 2006)

Alternative Products

The following are alternative packing analyzed by Seattle Public Utilities.

Bagasse food packaging does not have additives such as plastic or wax lining. Use is for hot and cold items and is soak-proof. According to SPU, they were unable to generate the proper conditions (heat, light, air) needed to biodegrade the product.

Corn Plastic (PLA—polylactic acid) is made from corn. It uses 65% less energy than the production of traditional plastic products according to one of SPU's sources. Because the product requires "controlled" composting (140º, ten days, plenty of oxygen), it is not applicable to home composting or some composting facilities.

Paper Products are poor insulators, the majority are made from virgin sources and do not contain post consumer recycled content. This may be changing, however, because FDA granted approval for Mississippi River Corporation (Starbucks cup supplier) the first-ever approval for recycled content food packaging.

Note: Paper cups tend to be lined with a petroleum-based coating (plastic) to insulate the cups and for rigidity—otherwise unlined paper products do not work well with hot beverages. They currently can be placed in home composting bins but it takes longer for them to break down due to the plastic coating.

Other "bio products" are currently on the market and the number of vendors is increasing. There is now a biodegradable eco-symbol designed by Biodegradable Products Institute for use on products and packages that compost effectively and efficiently to prevent compost contamination. BPI product label -- ASTM D6400-99 certified: A standard set of tests established for biological decomposition of plastic products with the intention of reducing confusion over what is truly an acceptable biodegradable product.

Costs of Biobased Plastics

The major barrier for the food service industry to switch from petroleum based plastic to biobased to-go packaging has been cost. Alternative products may cost the same as PS but they may also double in cost. PLA cups are only a few pennies more per cup than clear plastic PET cups (the differential may change over time with the increasing price of petroleum). A foam bowl or plate to a bagasse fiber product is substantial - 50%-70% higher cost. In some instances, making a switch to a biobased container can be cost neutral or save money. Wild Oats, in an L.A. Times article described a cost-savings through the use of "corn-tainers". Green Mountain Coffee Roasters used a 100% renewably-sourced hot paper cup with PLA lining. It costs the company a penny more per cup. (Green Impact 2006)

Major market drivers may reverse the negative impact of cost as follows:

- Environmental Concerns– Sustainability, global climate change, and waste disposal options have created a market opportunity for "natural" compostable products.
- Agricultural surpluses - Corn is overproduced by 10% annually in the United States (Green Impact 2006).
- Increasing landfill costs – Disposal rates continue to rise.
- Increasing petroleum costs – Crude oil prices per barrel have reached record highs.
- Technology breakthroughs – A variety of biobased packing options have evolved during the past few years that have resulted in expanded product lines

Economics

According to SPU, the economic and environmental impacts of a ban on the use of polystyrene cups, plates and clamshells by Seattle food service businesses depend critically on four characteristics of the substitute products:

- Weight.
- Extent of recycled-content,
- Biodegradability, and,
- Material composition.

Source: SPU 2006

Uncertainties

- Greater specificity regarding likely product substitutes (SPU 2006). This is coming to fruition through Cedar Grove's list of acceptable biobased vendors and product eco-labeling.
- Amount of post-consumer food waste generated by food service establishments (SPU 2006).
- Contamination of compost and recycling. The public has largely been educated on plastic recycling but they will need to re-learn how to deal with compostable plastic packaging. Consumers will need to learn which packaging items they can put with their organic waste (this would coincide well with an organics ban) and which to recycle (where applicable). The city would have to educate both the food service industry and the public on acceptable biobased products that are truly biodegradable and biobased products (e.g.; biota tm spring water bottle) that have the look and feel of traditionals to avoid contamination.

Enforcement Strategies

The following are enforcement strategies used in various municipalities:

- Fines. i.e.; In Santa Monica, the first violation is a written warning, if the business fails to follow the ordinance after the first warning, penalties ensue. The first violation does not exceed $100, the second $250. The fines are cumulative and for every day the business violates the ordinance, a separate violation will be imposed. In Oakland, the third fine shall not exceed $500 after the third violation notice and any future violations thereafter.

- Required Record Keeping of Packaging Purchasing. In Berkley, CA, both suppliers and vendors are held responsible through written, signed agreements not to provide PSF packaging. The supplier must state on each invoice for food packaging supplied that the packaging is not PSF and the identity of the manufacturer. The receiving restaurant is required to keep the supplier agreement on record for one-year.

- Citizens Complaints. In Oakland, customer complaints trigger the warning notices and fines.

- Styro Cop (Portland)

- Voluntary Compliance

- Incentives. In Oakland, if a food vendor wishes to use a biodegradable or compostable disposable food service ware product that is not affordable, they are allowed to charge a take-out fee.

Materials Involved

Traditionals: Polystyrene

Implementation Timeframe

Implementation Date: 2010 Ramp Period: 7 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
All	~85%	~75%

Diversion Potential

Up to 50% recovery rate, approximately 500 tons by 2038

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$8,560	$8,560	$8,560	$8,560	$8,560
Capital 10 Yr.						
Capital 25 Yr.	$0					

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

Risk of Not Achieving Results within Timeframe

Assumptions

- According to Seattle's solid waste composition studies, total EPS is about 0.6% of the waste stream.

- The regulations would affect the commercial sector, but plastic/Polystyrene is reduced from the residential waste stream.

- 13,564 tons of all types of plastics are currently disposed of in residential waste (to-go containers are a small portion of that total.

- Green Seal estimates that in 1997, 120 million pounds of foam polystyrene (polystyrene) hinged containers were used in the U.S. food packaging industry. Each American throws away an average of 100 polystyrene cups each year.

- The total amount of PS for packaging and food service for California is estimated at 166,135 tons (SF Chronicle 2006).

- "An estimated 0.8 percent (by weight) of the material disposed of in California's landfills is PS. However, because of its light weight, the volume of PS disposed of in landfills is much higher than the weight amount would tend to indicate. For example, weight/volume estimates range from 9.6 pounds per cubic yard for expanded polystyrene (EPS) packaging to 22.2 pounds per cubic yard for other forms of PS. This compares to 100 pounds per cubic yard for cardboard and 2,160 pounds per cubic yard for broken glass. (Source: 4) However, because of the minimal amount of PS disposed of, additional management efforts may have only a minimal impact on the available space at California's landfills." (CIMB 2004)

- "A Seattle Times article estimated the cost of collecting litter at $1.11 per pound.

(Source: 44) In Orange County, the cost of collecting litter on 6 miles of beach for one summer is $350,000. (Source: 45) The total litter collection costs for cleaning up 19 beaches along 31 miles in Los Angeles County was more than $4 million in 1994." (CIMB 2004)

- "The City of Long Beach and Los Angeles County currently spend about $1 million a year on litter collection in Long Beach Harbor, at the mouth of the Los Angeles River. (Source: 46) Using a figure of about 3,000 tons collected from 1998 to 1999, the collection cost is more than $300 per ton. (Source: 47, p. 16) The Los Angeles County Department of Public Works also contracts out the cleaning of more than 751,000 catch basins for a total cost of more than $1 million per year. (Source: 47, p. 35) While aggressively enforcing State and local litter laws is a good first step, this effort alone is unlikely to achieve the Trash TMDL mandated zero-tolerance levels in the Los Angeles area." (CIMB 2004)

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Green Impact. 2006. Plastic from Plants, Not Petroleum by Deborah Fleisher

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Don Duncan, "Litter's Bugging Washington," *Seattle Times*, August 13, 1989, p. A-1. Cited in "Plastic Trash and Wildlife—Activity E.k," Tennessee Solid Waste Education Project, http://eerc.ra.utk.edu/tnswep/activitiesPDFs/ek.pdf.

Take-Back Program for Foam Packaging – Negotiate with the Association of Foam Packaging Recyclers (#229)

Description

Expanded polystyrene (EPS) foam packaging is an excellent material for recycling. There are over 200 recycling locations across United States to recycle EPS Foam packaging. Negotiate with the Association of Foam Packaging recyclers to take-back foam packaging.

Worldwide estimates say about 29 countries have successfully implemented the packaging take-back program. The program encourages the retail sellers to take the foam packaging back that is often used for electronic appliances, loose fill packaging called "peanuts", and blocks of foam which protect furniture and shipping containers, and foam that helps preserve perishable foods and medicines. This program could be implemented as mandatory or voluntary.

Background

In July of 1991, more than 80 companies, representing every major manufacturer of EPS protective foam packaging, their raw material suppliers and equipment manufacturers, joined together to form the Alliance of Foam Packaging Recyclers (AFPR). AFPR works to facilitate EPS recycling between EPS manufacturers and original equipment manufacturers. AFPR members also provide community drop-off services at their manufacturing facilities. Currently, more than 110 plants locations serve as collection centers which together receive millions of pounds of post-consumer foam packaging each year.

AFPR members share the concerns of its customers and the public about solid waste and the conservation of natural resources. EPS foam packaging is an economical, efficient and valuable material which can be recycled and reused in foam packaging or durable consumer goods. Working with independent recycling businesses and others, the Alliance of Foam Packaging Recyclers has created a network for the collection, reprocessing and reuse of foam packaging. Because this collection system relies on EPS manufacturers to serve as recycling locations, drop-off sites are not available in all areas.

AFPR member plants act as central collection points for foam packaging. They will work directly with their industrial customers, retailers and communities to provide economically viable opportunities for EPS recycling. AFPR provides a packaging insert to original equipment manufacturers which they can place in their packages. This insert explains the advantages of EPS foam packaging and how it can be recycled. The insert encourages consumers to recycle and provides a toll-free number so they can identify the nearest collection center.

EPS protective foam packaging can be recycled and reused in several ways:

- AFPR members reprocess up to 60% of the post consumer foam collected and incorporate it directly into new packaging.

- Some of the material is extruded for use in a wide variety of durable plastic products.

- Loose fill packaging "peanuts" can be reused at thousands of participating mailing services around the country.

With over 110 plants located throughout the United States, EPS manufactures can recycle post-consumer material from various retail or industrial sources. Consumers interested in recycling foam packaging should contact their local recycling coordinator and ask them to get involved. Or, EPS will send the additional information along with complete details on what EPS recycling opportunities may exist.

Clark County, Washington

In Clark County, WA, block Styrofoam is accepted from households, it must have the Recycle Symbol and the numbers 4, 5 or 6 inside of the symbol. It may be of any color, but it must be clean and dry or it will not be accepted. They do not accept Styrofoam peanuts.

Example of Packaging Take-Back Program

EMC Corporation, Massachusetts

EMC Corporation designs information storage and retrieval systems for mainframe and midrange computing environments. The company employs 2,000 people at its headquarters in Massachusetts.

The genesis of the take-back program occurred several years ago when packaging issues, in particular, the reduction of packaging waste were under discussion. EMC soon developed the "We Care Kit" return program for packaging of small to medium sized equipment weighing 90 to 115 pounds. From inception to implementation, the program took 5 months.

The program operates through the Shipping Department. Shipments to customers include a return kit, including a diagram showing which packaging materials can be returned (plastic skids, molded foam plastic, and some of the corrugated) and how to assemble these components for return. Also in the kit are two heavy rubber bands to secure the package; a self-addressed label to EMC's packaging vendor, Tuscarora Plastics, instructions for filling out the shipping form, and an 800 number to call for pick-up. The package weighs about 24 pounds, light enough for most customers to handle without difficulty. Outbound freight and return packages both are handled by an overnight delivery company.

Upon return to Tuscarora, EMC's packaging is checked to make sure it is complete and suitable for reuse. Then it is routed to EMC's Shipping Department. Materials unsuitable for reuse are recycled by Tuscarora.

Of EMC shipments including the "We Care Kit," 35% to 40% of packaging is returned for reuse. Tuscarora covers the cost of inspecting returned packaging. Among package parts, the plastic skids, which cost $16 new, are readily reused, molded foam cushioning can be reused two to three times, and corrugated cardboard has the shortest lifespan. EMC calculated the program, overall has reduced its cost of new packaging by 20%. Customers can avoid the time and expense of recycling or disposing of EMC packaging by sending it back to the manufacturer at no cost.

Materials Involved

EPS Foam Packaging

Implementation Timeframe

Implementation Date: 2015 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
EPS Foam Packaging	10%	10%
Residential		
EPS Foam Packaging	10%	10%

Diversion Potential

1% recovery rate, up to 60 tons by 2038

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M	$ 85,600	$ 85,600	$ 85,600	$ 85,600	$ 85,600	$ 85,600
Capital 10 Yr.	-	-	-	-	-	-

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton	$0	$0	$0	$0	$0	$0

Risk of Not Achieving Results within Timeframe

Pros:

- No additional refuse bins
- Controls illegal dumping

Cons:

- May increase costs for retailers and manufacturers
- Must get cooperation of retail businesses
- Implementation and ramp up times would be long

Assumptions

- Producers, manufacturers, and shippers are expected to take up the responsibility for managing foam packaging waste like collection, sorting, and reuse or recycling.
- Lack of consumer education deters full participation by consumers.
- Costs to Seattle Public Utilities are estimated based on the assumption that this program requires a small portion of the City of Seattle's recycling program administrative and planning budgets.
- Program participation and efficiency would be low if the program is implemented as voluntary. Current consumer costs are estimated to be medium, based on average program costs for packaging disposal.

- O&M cost includes a full time employee at an annual cost of $55,600 (includes salary and fringe benefits). Full time employee coordinates program with retail stores, prepares press releases, places advertising, and posts notices to City web pages.

- Educational materials (printed materials) have an annual cost of $30,000.

References

Case Study. Packaging Take-Back
http://web.indstate.edu/recycle/9705.html

EPS EXPO. Alliance of Foam Packaging Recyclers
http://www.epspackaging.org/additional.html

Take-Back Program for Product Packaging by Retail Sellers (#276)

Description

Implement a cooperative program among retail sellers to provide collection and recycling of packaging used for electronic appliances, and other accessories.

City of Seattle generated approximately 4,500 tons of packaging waste in the year 2004, which is about 0.5% of the municipal solid waste. Packaging uses natural resources and creates a burden on landfill facilities. Worldwide estimates say about 29 countries have successfully implemented the packaging take back program. The program encourages the retail sellers to take the packaging back, for example packaging used for electronic appliances can be paper, plastic, and wood. This program could be implemented as mandatory or voluntary.

Background

Germany has a successful "Green Dot" program for packaging take back. Consumers pay increase prices for Green Dot packaging to cover the costs of the take back. This has given the manufacturers an incentive to reduce packaging quantities and toxicity which lowers costs and allows them to remain competitive. Retailers are required to place collection bins in their stores so that the customers can leave outer packaging at the store. The current packaging recovery rate in Germany is about 65%.

A way to reduce packaging waste at a facility is to work with suppliers. Encourage them to take back whatever packaging they sent or redesign packaging to minimize material used. Another way to reduce packaging is to work with customers. Encourage them to participate in the take back program, buy items with less packaging, and recycle the packaging material. Reducing packaging and shipping wastes will reduce both production and disposal costs. Finally, whatever cannot be reduced or reused should be recycled if possible.

The idea of efficient packaging and waste reduction in packaging in California began with the shipping and distribution partnership and a workshop held in San Jose State University in 1997. Every year California generates 66 million tons of solid waste, of which approximately one third is packaging. Because landfill space is limited, retailers and manufacturers need to work together to reduce packaging waste. A few simple ideas include eliminating packaging, reducing packaging, designing refillable or reusable packages, and producing recyclable packages and packages made of recycled materials.

EMC Corporation, Massachusetts

EMC Corporation designs information storage and retrieval systems for mainframe and midrange computing environments. The company employs 2,000 people at its headquarters in Massachusetts.

The genesis of the take-back program occurred several years ago when packaging issues, in particular, the reduction of packaging waste were under discussion. EMC soon developed the "We Care Kit" return program for packaging of small to medium sized equipment weighing 90 to 115 pounds. From inception to implementation, the program took 5 months.

The program operates through the Shipping Department. Shipments to customers include a return kit, including a diagram showing which packaging materials can be returned (plastic skids, molded foam plastic, and some of the corrugated) and how to assemble these components for return. Also in the kit are two heavy rubber bands to secure the package; a self-addressed label to EMC's packaging vendor, Tuscarora Plastics, instructions for filling out the shipping form, and an 800 number to call for pick-up. The package weighs about 24 pounds, light enough for most customers to handle without difficulty. Outbound freight and return packages both are handled by an overnight delivery company.

Upon return to Tuscarora, EMC's packaging is checked to make sure it is complete and suitable for reuse. Then it is routed to EMC's Shipping Department. Materials unsuitable for reuse are recycled by Tuscarora.

Of EMC shipments including the "We Care Kit," 35% to 40% of packaging is returned for reuse. Tuscarora covers the cost of inspecting returned packaging. Among package parts, the plastic skids, which cost $16 new, are readily reused, molded foam cushioning can be reused two to three times, and corrugated cardboard has the shortest lifespan. EMC calculated the program, overall has reduced its cost of new packaging by 20%. Customers can avoid the time and expense of recycling or disposing of EMC packaging by sending it back to the manufacturer at no cost.

Materials Involved

Cardboard, paper, plastics, wood, and metal strapping

Implementation Timeframe

Implementation Date: 2020 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
Traditional	Medium	Medium
Residential		
Traditional	Medium	Medium
Self-Haul		
Traditional	Low	Low

Diversion Potential

Low to Medium

Environmental Benefits

The environmental benefit is expected to be moderate due mostly to the reduced demand for virgin resources with recycled materials entering the recovery life cycle; incorporation of waste reduction into packaging design standards by manufacturers, and reduced indirect impacts of resource extraction and manufacturing.

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$8,560	$8,560	$8,560	$8,560	$8,560
Capital 10 Yr.	-	-	-	-	-	-

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton	$0	$0	$0	$0	$0	$0

Risk of Not Achieving Results within Timeframe

Pros:

- No additional refuse bins
- Controls illegal dumping

Cons:

- May increase costs for retailers and manufacturers
- Must get cooperation of retail businesses
- Implementation and ramp up times would be long

Assumptions

- Producers, manufacturers, and shippers are expected to take up the responsibility for managing packaging waste like collection, sorting, and reuse or recycling.
- Lack of consumer education deters full participation by consumers.
- Costs to Seattle Public Utilities are estimated based on the assumption that this program requires a small portion of the City of Seattle's recycling program administrative and planning budgets.
- Program participation and efficiency would be low if the program is implemented as voluntary. Current consumer costs are estimated to be medium, based on average program costs for packaging disposal.
- O&M cost includes a full time employee at an annual cost of $55,600 (includes salary and fringe benefits). Full time employee coordinates program with retail stores, prepares press releases, places advertising, and posts notices to City web pages.
- Educational materials (printed materials) have an annual cost of $30,000.

References

The Center for Watershed and Community Health. March 2001. Extended Producer Responsibility and Product Take Back. Applications for the Pacific Northwest.
http://www.uoregon.edu/~cwch/publicationspress/TakeBackReportFinal032701.pdf

Take-Back Program for Household Chemical Waste (#279)

Description

A voluntary or mandatory take-back program that works with retailers and manufacturers to include household paints, solvents, and pesticides. Eco-fees would be implemented with no cost to tax payers. The program would include coordination with Ecology and Puget Sound Partnership to explore a chemical policy approach with a goal of eliminating specific hazardous chemicals from products and to research alternatives to existing chemicals used in those products (see option #355).

Background

BC Post Consumer Residuals Stewardship Program

Waste Management Act, Consumer Residuals Stewardship Regulation that applies to solvents, flammable liquids, pesticides (registered under Pest Control Act) under the jurisdiction of British Columbia, and those that display a poison hazard symbol. The program covers the entire province. There are exceptions to the rule. Initiated in 1997, the program coordinates the collection of these wastes at 35 depots across the province. Program is financed through eco-fees collected by the brandowner who is responsible for implementing and sustaining the program. The long-term target is to have the entire product used for its original purpose. (Environment Canada 2006)

"Product Care" is a third-party organization that represents the brandowner's obligation of managing the program. Brandowners develop and distribute educational material to retailers for consumers regarding the brandowner's approved stewardship program. Retailers are responsible for posting educational signs that include location and hours of operation of the return facilities. Consumers pay eco fees on all applicable products. The provincial government is responsible for enforcing and monitoring the program. Municipal or regional governments run approximately 1/3 of the collection depots. The brandowner must provide an annual report to the director of Pollution Prevention which includes a variety of data (strategy, amount of product sold, amount recovered, etc.). The annual report is not made public because of competition concerns. (Environment Canada 2006)

Funding mechanism: The program is largely funded through eco-fees. Solvents and flammables: $0.40 per liter; aerosol solvents $0.10 per container; pesticides the fees are $0.60 up to 1 litre or kg of product, $1.20 for 1 to 1.99 litres or kg of product, and $2.40 for greater than or equal to 2 litres or kg. Consumers do not pay an eco-fee on gasoline. The program costs may be part of the product price. (Environment Canada 2006)

Product Care reported the following collection rates-- 1998: 98,900 liter. of equivalent containers of flammable liquids and 30,800 litre of equivalent containers of pesticides. 1999: 105,065 litre of equivalent containers of flammable liquids and 22,464 litre of equivalent containers of pesticides. 2000: 71,023 litre of equivalent containers of flammable liquids and 16,334 litre of equivalent containers of pesticides. (Environment Canada 2006)

Product Care reported the following program costs--
1998: approximately $11.40 per equivalent litre container collected and disposed of.
1999: approximately $10 per equivalent litre container collected and disposed of.
1999: approximately $14 per equivalent litre container collected and disposed of.
Note: Program had annual surplus of $500,000 in 1999 and 2000. Gasoline owners have chosen to internalize the costs of the program; it is estimated at $150,000 annually. (Environment Canada 2006)

Product Care representatives state that some brandowners are reformulating their products to use less toxic ingredients to avoid being designated under this program. No big affect on market access due to level playing field. Some producers choose to remove specific products from BC to avoid regulations. (Environment Canada 2006)

Materials Involved

Household Hazardous Waste

Implementation Timeframe

Implementation Date: 2017 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Residential		
Household Hazardous Waste	5%	50%
Self-Haul		
Household Hazardous Waste	5%	50%

Diversion Potential

Up to 2.5% recovery rate, up to 32 tons in 2038.

Environmental Benefits

High. A significant amount of toxic chemicals would be diverted from landfills, which would decrease potential for groundwater pollution and other pollution in general.

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$8,560	$8,560	$8,560	$8,560	$8,560
Capital 10 Yr.	$0					
Capital 25 Yr.						

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

Action Feasibility

Proposed action is feasible, but a moderately low probability of success if enacted on the local level. Effort should be directed at establishing a statewide or regional approach to household chemical waste management through take-back programs. Similar programs have been successfully implemented in other jurisdictions on a higher level of government.

Risk of Not Achieving Results within Timeframe

Proposed action is considered to be moderate risk given the focus in jurisdictions at a higher level of government.

Assumptions

- Existing chemical waste management infrastructure could be accessed and paid for by manufacturers through a coordinating body to distribute costs among participating businesses.
- SPU costs account for 1/10th FTE for program development, stakeholder involvement, coordination, and marketing.

References

Environment Canada. 2006. http://www.ec.gc.ca/epr/inventory/en /Detail View. cfm?intInitiative=57 accessed on 12-27-2006 by Katheryn Seckel with Herrera Environmental

Rate Structure Review for Recyclables Collection (#284)

Description

This option includes a review of the rate structure for recyclables collection. A rate structure can be used to support key goals such as waste prevention, greater equity, extended landfill capacity, and revenue stability. The goal of a rate structure review is to determine the price that solid waste planners will charge customers for each container of recyclables they set out for collection and increase participation in recycling by either raising the variable rates for garbage can sizes (Option #283) or decreasing the recyclables collection rate or a combination of the two. The rate structure proposed by this option should have the end effect in which customers are encouraged to source separate materials and increase recycling rates.

Decreasing the rates for recyclables would potentially increase the participation in recyclables collection. Similarly, increasing the unit price for garbage cans and not charging for recyclables provides a strong incentive for customers to divert recyclable waste into the recyclables container. Reducing the total volume of garbage disposed should save the customer money by being able to use a smaller garbage can.

Materials Involved

Traditional Recyclables

Implementation Timeframe

Implementation Date: 2020 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Residential		
Traditional Recyclables	2%	50%

Diversion Potential

1% recovery rate, up to 3,000 tons by 2038

Environmental Benefits

The environmental benefit is expected to be moderate due mostly to the reduced demand for virgin resources with recycled materials entering the recovery life cycle.

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M	$0	$138,100	$138,100*	$138,100*	$138,100*	$138,100*
Capital 10 Yr.	$0	$0	$0	$0	$0	$0
Capital 25 Yr.	$0	$0	$0	$0	$0	$0

* O&M costs escalate at 80% of CPI.

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton	$0	$0	$0	$0	$0	$0

Action Feasibility

Proposed action is feasible and has a high probability of success. Rate payers' incentive to save money by reducing waste has been successfully proven through economic and statistical techniques used to measure source reduction (SERA, 2000).

Risk of Not Achieving Results within Timeframe

Proposed action is considered to be low risk.

Pros:

- Has the goal of increasing participation in recyclables collection.
- Increased landfill life by reducing disposal quantities through the diversion of recyclables from the waste stream.
- High likelihood of success and medium risk

Cons:

- Potential for inadvertent or intentional improper diversion of materials into the recyclables containers by customers that want to take advantage of the lower recyclables collection rates.

Assumptions

- Both theory and empirical evidence indicate that people tend to recycle more as garbage rates increase or recycling rates decrease (SPU, 2004). The tendency to recycle more as garbage rates increase is driven by the behavior of the rate payer to save money. By reducing the total volume of garbage rate payers will pay a lower monthly disposal cost.

- Restructuring rates to encourage recyclables collection and recycling would not, by itself increase participation (SPU 2004). To increase participation, rate changes need to be complemented with convenient service options, such as weekly curbside recyclables pick up.

- Annual program management and educational costs breakdown is as follows:

    - Manager at a time equivalent to half a year at an annual salary of $107,000.

    - An analyst at a time equivalent to half a year at an annual salary of $73,600.

    - An administrative personnel at a time equivalent to half a year at an annual salary of $55,600.

    - Educational materials at $20,000 per year.

References

SPU. 1998 revised 2004. Seattle's Solid Waste Plan: On the Path to Sustainability. City of Seattle's Recycling Potential Assessment/System Analysis Model (RPA).

Skumatz Economic Research Associates (SERA). 2000. Measuring Source Reduction: Pay As You Throw/Variable Rates As An Example.

Reusable Transport Packaging (#289)

Description

Create strong tax incentives for grocers to use reusable packaging to transport items from distributor to the store, especially for fruits and vegetables to eliminate wax-coated non-recyclable cardboard. Transport packaging includes containers used to store, ship, handle, protect and identify goods. Selecting reusable options generally reduces the long-term costs, prevents the creation of unnecessary garbage, and often makes it possible to make the entire supply and distribution chain more efficient.

Background

The food and beverage industry receive more shipments in corrugated boxes than any other industry. Food Marketing Institute surveys indicate that old corrugated containers (OCC) can make up about 84 percent of a large supermarket chain’s waste and 46 percent of a smaller operation’s waste. Nearly 80 percent of grocery distributors and retailers have OCC recovery programs. But about 30 percent of grocery store OCC is not recyclable because it is waxed or contaminated. Even when recycling OCC would generate revenue, the labor and handling costs of preparing the material for recycling may exceed that revenue.

Waxed corrugated containers used to ship fresh produce make up 3-5 percent of the OCC stream, accounting for about 17 percent of all grocery waste, according to the Grocery Manufacturers Association’s committee on solid waste. The produce industry alone disposes of 100-200 million waxed boxes per year. According to Franklin Associates, between 1972 and 1987, corrugated containers used for produce constituted the fastest growing segment of the corrugated packaging waste stream for food and kindred products.

Produce industry segment in particular has shown increased interest in reusable packaging. The waxed cardboard commonly used for produce is not recyclable, so reusable containers such as plastic can save retailers money in disposal costs and also save growers money in reduced packaging expenses.

Comparing number of boxes, weight of box, and total weight of box material used to make 1 million shipments of equal volume in one-way and reusable corrugated boxes and reusable plastic boxes:

Box material and number of times used	Number of boxes used for 1 million shipments (thousands)	Weight of box (pounds)	Total weight of box material used per million shipments (tons)
One-way corrugated, one time	1,000	1.5	750
One-way corrugated, two times	500	1.5	375
Reusable corrugated, five times	200	2.2	220
Reusable plastic, 250 times	4	5.5	11

A case study done by INFORM Inc., in New York City identifies two kinds of distribution systems that are compatible with reusable shipping containers:

1. Direct delivery from product manufacturer to store

Many grocery goods are distributed through warehouses, but direct delivery to stores is still common in the milk, baked goods, and soft drink industries and in cases where supermarkets run their own production facilities. The manufacturer ships products either to its own stores or to other companies' retail outlets.

2. Break-bulk operations

When individual stores order in quantities smaller than full cases of products, distributors may unpack bulk cases and repack products in smaller reusable plastic boxes for store delivery.

Promoting Reuse

INFORM Inc has identified at least five government policies that alone or in combination could promote the use of reusable packaging in the United States:

- Government mandates to use reusable shipping containers, including requiring the use of standardized containers.
- Economic incentives to encourage reuse
- Government procurement policies favoring reusable packaging
- Manufacturers' responsibility legislation
- Broad materials policies encouraging reuse

Germany

In 1991 Germany passed a packaging ordinance that makes industry financially responsible for its primary, secondary, and transport packaging to the end of the packages' life cycles, including the costs of collecting, sorting, and recycling packages after they are discarded. The goal of the ordinance was to shift the cost of managing packaging waste from the public sector to private industry.

One component of Germany's Packaging Ordinance is the requirement that manufacturers and distributors "take back" transport packaging for reuse and recycling independent of the public waste management system. The requirement has led manufacturers and distributors either to arrange for third parties to pick up used packaging or to compensate retailers for managing waste based on the materials and quantities involved. By adding the cost of waste management to the overall cost of single use transport packaging, the ordinance has encouraged shippers of consumer goods and other products to shift to reusable packaging.

Many new reusable packaging systems have been developed for various products, including the International Fruit Container Organization (IFCO) system for fruits and vegetables and other container systems for fish, medicine, bicycles, furniture, and the general line of consumer products sold in supermarkets. IFCO designs and markets standardized reusable plastic shipping crates not for individual companies but for the fruit and vegetable industry in general. IFCO does not sell crates to growers and packers. Instead, it leases the containers to them.

IFCO leases containers to growers and packers of produce on an as-needed basis. After delivery to retail food outlets, the empty containers are collected by a logistics service company hired by IFCO, which cleans, stores, and redelivers empty containers to growers. In Germany alone, the company has 30 depots for reconditioning and storing empty containers.

To be competitive with makers of single-use packaging, IFCO must keep its rental costs lower than the purchase price of single-use containers. For IFCO, this means keeping the cost of storage, handling, transportation, and depreciation lower than the cost of manufacturing and recycling single-use containers. IFCO crates themselves last up to five years and may be recycled at the end of their useful life into new crates.

In the United States, it may be possible to implement third-party container systems in response to market demand, without legislative catalyst. Such a system could reduce many of the costs associated with using reusable packaging outside of a closed-loop distribution system.

United States

CHEP USA, United States, a global leader in pallet and container pooling services, in Park Ridge, New Jersey, provides plastic pallets through a similar service in the United States and other countries, including Australia, Canada, South Africa, New Zealand, and various European countries.

CHEP USA operates a national pallet rental service for grocery manufacturers and distributors, mass merchandisers, warehouse clubs, discount drug stores, and fresh produce companies. CHEP USA rents pallets to manufacturers who deliver goods on CHEP USA's pallets to participating distributors. The distributor is responsible for returning the pallets to one of the more than 140 depots that CHEP USA operates nationwide. CHEP USA maintains pallets and helps both manufacturers and distributors track pallets. The chief benefits of this system would be lower damage rates for products shipped, quicker delivery, and elimination of distributors' pallet storage costs.

Australia

A personal care company operating in Australia replaced single-use cardboard cartons with reusable plastic bulk bins. The move saves 200,000 cartons every year. Freight costs have decreased by 30 percent; and the new bins stack to double the height in the warehouse, avoiding a costly relocation.

Materials Involved

Packaging Materials: Cardboard, Paper, Pallets

Implementation Timeframe

Implementation Date: 2015 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial (grocers only)		
Cardboard, Paper	10%	20%

Diversion Potential

Up to 2% recovery rate for target materials, up to 466 tons in 2038, mostly exhibited as waste reduction.

Environmental Benefits

The environmental benefit is expected to be moderate due mostly to the reduced demand for virgin resources with recycled materials entering the recovery life cycle.

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$8,560	$8,560	$8,560	$8,560	$8,560
Capital 10 Yr.	-	-	-	-	-	-

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton	$0	$0	$0	$0	$0	$0

Risk of Not Achieving Results within Timeframe

Pros:

- Greatly reduces old corrugated containers (OCC), especially non-compostable wax-covered OCC
- Better use of vehicle and warehouse space as durable containers can stack higher
- Reduced product damage since reusable containers are more rugged than OCC
- Reduces packaging costs
- Reduce labor costs since workers don't have to break down cardboard boxes
- Prevents the creation of unnecessary garbage

Cons:

- High initial costs but long-term cost savings
- Need standardization for containers across the industry, can use an industry wide container leasing system that grocers pay into to eliminate concerns about container return.
- Resistance to change.

Assumptions

- Collapsible, nestable, or stackable shipping containers are to be used instead of cardboard
- O&M cost includes a full time employee at an annual cost of $55,600 (includes salary and fringe benefits). Full time employee coordinates program with grocers, prepares press releases, places advertising, and posts notices to City web pages.
- Educational materials (printed materials) have an annual cost of $30,000.

Reference

INFORM INC. 1994. Delivering the Goods. Benefits of Reusable Shipping Containers. http://www.p2pays.org/ref/03/02141.pdf

Reusable Transport Packaging. http://sydney.foe.org.au/SustainableConsumption/epr_pamphlets/reusable_pack.html

Take-Back Program for Fluorescent Tubes (#297),

Take-Back Program for Fluorescent Lamps to Include Thermostats and to Build Business Participation (#219) and

Add Mercury Thermometers to Take-Back Program for Auto Switches, Thermostats, Lamps, Fluorescent Lamps, Dental and Medical Equipment Waste (#244)

Description

Implement a cooperative program among fluorescent tube manufacturers, distributors and retailers to provide collection and recycling of fluorescent tubes, mercury thermometers and thermostats. Fluorescent bulbs and tubes, mercury thermometers and thermostats contain significant amounts of mercury. This metal can cause damage to living organisms at very low concentrations and tend to accumulate in the food chain. If a broken mercury thermometer is not cleaned up properly, the mercury can get into air and could pose a health risk.

An average of 15 tons of mercury in thermostats is sold in the U.S. every year. 6 million mercury thermometers and roughly 650 million fluorescent lamps are sold in the U.S. market each year. The majority (600 million) is fluorescent tubes and the remaining 50 million are compact fluorescent lamps. The U.S. commercial market for fluorescent lamps continues to grow as commercial floor space increases and it was estimated that there was an increase of 2.4% in the year 2002. In addition, energy conservation drives an increase in residential use of compact fluorescent lamps, in particular.

It has been estimated that the number of fluorescent lamps disposed in the State of Washington is 437 to 505. Seattle generates about 0.0148% of fluorescent tubes from commercial sector, 0.0068% from residential sector, and 0.0088% from self-haulers every year by weight in the municipal solid waste.

Background

King County, WA:

The Local Hazardous Waste Management Program in King County (LHWMP) has promoted commercial fluorescent lamp recycling since 1999, providing outreach, a Web site with information about recycling firms, and cash incentives.
In summer 2002 the LHWMP conducted a study and review of mercury-related products and produced a report documenting quantities of mercury, discharge of mercury to the environment, health risks associated with products and alternatives to mercury use. It has been estimated that 150 – 300 pounds of mercury is being discharged by fluorescent lamps in King County per year.

As of October 1, 2005, fluorescent light bulbs, and tubes are no longer accepted in the garbage or at King County Transfer Stations. King County recommends that these products be recycled at one of the "Take it Back Network" recyclers. Take it Back Network recyclers accept fluorescent bulbs and tubes and recycle them domestically in an environmentally sound manner. Take it Back Network members charge a fee for their recycling services. Seattle lighting charges $0.50 per each bulb.

King County does not accept the disposal of mercury fever thermometers or mercury containing thermostats in the garbage. Mercury-containing devices are accepted by all household hazardous waste collection services in King County.

The planning process also led to the following recommendations for 2002 to 2003 by the LHWMP:- **Fluorescent lamps:** Increase the recycling of mercury-containing lamps with in King County from 20 percent (the estimated 2002 rate) to 40 percent.

City of Seattle:

The City of Seattle prohibits the disposal of fluorescent bulbs and tubes from any residential or commercial customer in the municipal solid waste or at the Seattle transfer stations.

Seattle Public Utilities (SPU) currently partners with local businesses to take back fluorescent tubes from consumers through the Northwest Product Stewardship Council. However, this program is limited in scale and participation and efficiency is expected to be low. Currently only five local businesses are participating in the take back program. More aggressive efforts to enlist other local businesses, particularly larger retailers such as Fred Meyer, Lowes and Home Depot, should improve program participation and efficiency.

The City would encourage heating and plumbing wholesalers and other local businesses that sell thermostats and other electronic appliances to include used thermostats and mercury thermometers in the take back program of fluorescent bulbs, auto switches, and medical and dental equipment waste.

Each out-of-service thermostat contains about 3 grams of mercury; therefore they are considered a hazardous waste. Unfortunately, they are frequently discarded as solid waste and the mercury is being emitted to the environment if improperly incinerated or disposed of in landfill.

Current Waste Stream

The EPA has developed a nationwide generation rate for burned out fluorescent lights of 2.0 to 2.5 lamps/person/year for all lamp types for use in calculating environmental and waste stream impacts (Lorch 2006). Based on Seattle's current population of approximately 570,000 (2000 census data), this equates to between 1.14 and 1.425 million lamps per year, 95 percent of which come from the commercial sector. The remaining 5 percent come from the residential sector targeted by retailer take back programs.

This estimate, now 10 years old, covers all fluorescent tubes used in commercial and residential applications. Due to its age, it may not adequately account for the relatively recent increase in the use of compact fluorescent lamps (CFLs). The Zero Waste Alliance recently developed phased pilot study to support the development of a permanent CFL recycling program in the Pacific Northwest (ZWA 2001). CFLs are small fluorescent bulbs designed to fit in standard light sockets, that were broadly promoted to residential users by energy utilities for energy conservation purposes. A broader percentage of CFLs would therefore be accessible through retailer take back programs.

The authors of this study used retail CFL sales figures and average product lifespans to estimate the annual volume of CFLs entering the waste stream. They determined that King, Snohomish, Skagit and Whatcom Counties would produce an estimated 515,000 burned out CFLs per year. Assuming that CFL use is proportional to population Seattle's annual spent CFL production would equal 20.7 percent of this total equal or approximately 106,600 CFLs/year. Adding the two produces an estimate of 1.25 and 1.58 million lamps year (ZWA 2001, 2003).

The combined fluorescent and CFL waste stream range between 403 and 497 tons per year. SPU currently estimates that 50 tons of fluorescent lamps (including CFLs and all other types) enter the disposal stream each year, based on waste composition study results. This would suggest that current diversion rates are between 88 and 90 percent. However, EcoLights and other regional fluorescent recyclers estimate that they are currently capturing at best 34 percent of the burned out bulb market (Lorch 2006), or 138 to 169 tons/year. This suggests that current SPU composition estimates are low, or that the majority of commercial tubes are being discarded through another disposal pathway.

New Hampshire:

Funded by Honeywell, GE and White-Rogers, the Thermostat Recycling Corporation (TRC) provides a collection and recycling program that offers High Voltage Alternating

Current (HVAC) contractors, builders and homeowners a safe, easy way to properly dispose of spent thermostats. The New Hampshire Pollution Prevention Program purchased TRC thermostat collection bins and provides them, free of charge, to participating HVAC suppliers and contractors. Once full, the bins are sealed and shipped to TRC where the mercury-containing ampoules are removed and sent to a mercury refiner who distills the mercury and sells it for reuse in new thermostats and switches. To ship a bin, the participant only needs to attach the provided shipping label and call for pick up. This service is entirely free of charge.

City of Evanston, Illinois

City of Evanston offers a thermometer exchange program at the collection location. All mercury thermometers will be exchanged for new mercury-free thermometers at no cost.

Materials Involved

Mercury Contained: Fluorescent light bulbs and tubes, Thermometers, Thermostats

Implementation Timeframe

Implementation Date: 2010 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
Household Hazardous	50%	75%
Residential		
Household Hazardous	50%	75%
Self-Haul		
Household Hazardous	50%	75%

Residential take back program efficiency should generally estimated by comparing the total number of bulbs recovered through take back efforts against the number of bulbs projected to burn out in any given year.

Diversion Potential

30% recovery rate, up to 50 tons in 2038

Environmental Benefits

A significant amount of mercury from fluorescent tubes and other mercury containing switches would be diverted from landfills, which would decrease potential for groundwater pollution and other pollution in general.

The non-CFL component of the waste stream would weigh between an estimated 376 to 470 tons and contain anywhere between 15,066 and 18,833 pounds of mercury, based on the following assumptions:

- 4 foot fluorescent tubes account for 80% of all lamp types, weigh approximately 0.6 lbs each, and contain 5 grams of mercury

- 8 foot fluorescent tubes account for 10% of all lamp types, weigh approximately 1.2 lbs each, and contain 12 grams of mercury

- Remaining lamp types (specialty bulbs, halogen lamps, etc.) account for the remaining 10 percent of bulb types, average 0.6 lbs each, and average 8 grams of mercury

The CFL component of the waste stream would weigh approximately 27 tons and contain anywhere between 1,200 pounds of mercury, based on the following assumptions:

- Various CFL bulb types weigh an average of 0.5 lbs each

- The average CFL bulb contains between 5 of mercury

Cost

O&M Costs include administrative costs and education material costs.

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M	$ 130,600	$ 130,600	$ 130,600	$ 130,600	$ 130,600	$ 130,600
Capital 10 Yr.	-	-	-	-	-	-

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton	$0	$0	$0	$0	$0	$0

Risk of Not Achieving Results within Timeframe

Pros:

- Environmental benefits would be significant, as large quantities of mercury would be diverted from landfills and prevented from leaching into soil and water sources.

- Very low cost to the City

- Provides convenience to consumers to drop off used recyclable materials when they visit the stores to buy new materials.

Cons:

- May increase costs for retailers and manufacturers

- Increases consumer costs

- Increases SPU costs moderately in the beginning of implementation; though costs would decrease over time.

Assumptions

- It is expected that advertising and educational costs will diminish over time as the program matures, more retailers participate, and public awareness grows.

- The City of Seattle would have to provide strong coordination between the public, home improvement stores, distributors, manufacturers, and salvage/retail stores to make this option effective.

- Included in O&M costs is the cost for the City to transport the collected mercury-containing materials to approved recyclers. The assumed annual tonnage is 62 tons, which is the current waste stream of fluorescent tubes from residential, consumer, and self-haul customers plus an additional 25% to account for other mercury-containing products (thermostats, auto switches, lamps, dental and medical equipment waste).

- O&M cost includes a full time employee at an annual cost of $55,600 (includes salary and fringe benefits). Full time employee coordinates program with retail stores and manufacturers, prepares press releases, places advertising, and posts notices to City web pages.

- Educational materials (printed materials) have an annual cost of $30,000.

- Even after the implementation of this take-back program, there may be a small amount of mercury-containing materials that will be discarded with the garbage stream, since it is not a ban. The disposal of these materials in the garbage stream will not incur additional costs to the City, because it will be treated in the same manner as garbage and will be landfilled.

Reference

LHWMP 2002. Final Report. Mercury in King County
http://www.govlink.org/hazwaste/publications/MercuryFinal.pdf

Mercury Education and Reduction in Washington State. Washington state Department of Health
http://www.doh.wa.gov/ehp/mercury/govtmercpres.pdf

http://www.suscon.org/projects/pdfs/fluorescent_lamp.pdf

Residential Curbside Collection of Electronic Waste (#316)

Description

Add electronics waste to traditional curbside collection program (versus an on-demand pickup program).

Background

This program option would integrate collection of electronic waste into the existing residential recyclables collection program, rather than a dedicated on-demand pickup system (see option # 376).

The U.S. Office of Technology Policy recently completed an evaluation of policy issues associated with collection of electronic waste from the residential sector (OTP 2006). OTP concluded that curbside collection was a less favorable strategy for collecting used electronics for recycling. They reasoned that electronic waste must be collected and shipped to processors carefully to avoid damage that would release hazardous substances and/or reduce the value of recovered materials.

The careful packaging, handling and transportation of reclaimed materials to recovery centers are significant components of recycling costs for this reason. This level of care cannot be reasonably expected from traditional curbside collection programs (OTP 2006). Curbside pickup would increase exposure of recyclable materials to weather, risk of vandalism and unavoidable rough handling that is likely to result in reduced recovery value and possible increased residential exposure to hazardous substances. On this basis this program option is not recommended.

Materials Involved

Small Appliances and Electronics: TVs, computer monitors, other computer parts, A/V equipment, small appliances

Implementation Timeframe

Implementation Date:	2020	Ramp Period:	5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
SF Residential		
Electronics/Computers	10%	100%
MF Residential		
Electronics/Computers	5%	100%

Diversion Potential

SF Residential: 10% recovery rate, up to 250 tons by 2038

MF Residential: 5% recovery rate, up to 320 tons by 2038

Total: Up to 570 tons by 2038 (0.048% of total waste stream)

Cost

See documented assumptions for O&M and variable cost estimation methods

O&M Cost	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6-20
Per Year	$142,400*	$145,928	$19,521	$20,106	$20,709	$21,331**

* Advertising component O&M escalates at 80% of CPI and labor cost component escalates at 100% of CPI between year 1 and year 2

** Labor costs continue to escalate at 100% of CPI/year

Variable Cost	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6-20
Per Ton	$560	$560	$560	$560	$560	$560

* Variable costs continue to escalate at 80% of CPI/year.

Environmental Benefits

A significant amount of toxic chemicals from electronic waste would be diverted from landfills, which would decrease potential for groundwater pollution and other pollution in general. However, collection related breakage of certain type of waste (e.g., television sets, computer monitors) could result in release of

Action Feasibility

Given the success of electronics recycling programs in other jurisdictions, implementing this type of program locally should be very feasible.

Risk of Not Achieving Results within Timeframe

The proposed program would be expected to result in a reliably high level of electronics waste diversion from the residential sector. However, there is risk that variable costs for recycling could increase because the proposed collection strategy would reduce the value of recovered materials. The proposed program also increases the risk of release of toxic substances during collection and handling, in turn presenting risks of residential or waste management worker exposure.

Pros:

- Increased diversion of residential electronic waste stream
- Diversion of hazardous materials from landfills and illegal dumping

Cons:

- Net diversion potential are relatively small (SPU 60% projections)
- Program costs are high for the amount of diversion achieved
- The collection strategy will result in reduced value of recycled materials and increased recycling fees
- Potential residential community and waste collection worker exposure to hazardous substances

Assumptions

Diversion potential is estimated to be very low (up to 0.3% or 2,400 tons), based on the following assumptions:

- Based on current disposal tonnage, diversion would be low:
  - The total available waste residential sector waste stream is approximately 730 tons/year (SPU 60% projections)

    - Curbside collection of recyclable electronics would result in a very high diversion rate (85% total)

    - At 85% total diversion, the total residential waste stream would equal approximately 570 tons/year (2038)

- However, total waste generation would be expected to increase if this service were offered because residential users are storing a substantial amount of electronic waste awaiting convenient disposal options:

    - King County found that approximately 25 percent of households are storing at least one unused computer for disposal, and 16 percent are storing one TV (NPSC and EPA 2005)

    - Given that there are over 270,000 housing units in Seattle (OFM 2002), this translates to approximately 67,500 monitors and 43,200 TV sets

    - Assuming the average television weighs 70 pounds and the average monitor weighs 40 pounds, this translates to at least 2,850 tons of potential electronic waste, not including other materials such as computer CPUs, peripherals, and small appliances

    - The number of obsolete televisions is expected to increase as conversion to digital HDTV signals is implemented over the next five years

Program O&M costs – O&M costs for this program are estimated using the following assumptions:

- The program will be administered under the existing recycling program, with 0.25 FTE additional analyst time per year for coordination

- Advertising and education costs totaling $124,000/year are assumed to be comparable to those for a residential organics disposal ban (option # 182) will be incurred during the first two years of the program

Variable costs are calculated based on the following assumptions:

- Additional incremental costs for collection would be incurred by the contractor and passed directly to ratepayers, no additional variable costs would be incurred by SPU

- SPU would incur variable costs for handling and packaging of recovered materials at the transfer station and transport to commercial electronic waste processing providers

- SPU costs for handling, packaging and recycling would be similar to those incurred by the Northwest Product Stewardship Council during their 2005 King County retailer take-back program pilot study, or $543/ton (NPSC and EPA 2005)

    - Handling and packaging: $43/ton

    - Transportation from transfer station to recycler: $162/ton

    - Material recycling fee: $338/ton

    - Variable costs are expected to increase at 80% of CPI/year

Total costs to SPU for year 1 are estimated to be medium, based on the above assumptions:

- Year 1 O&M costs are $142,400

- Year 1 variable costs are $335,500, based on an estimated 618 tons of diversion at $543/ton

- Assuming that 50% of the estimated total legacy monitors and TV sets in Seattle were collected in any give year (1,425 tons), and recycling of other electronics remained constant (643 tons), total collections could exceed 2,000 tons/year, incurring recycling costs in excess of $1.1 million/year

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Eco-labeling Program (#340)

Description

Like the Energy Star Program, require labels (ecolabels) indicating score for recycled content, recyclability, package volume, and toxic content against standards either developed by the City or adopted from existing standard (e.g., Green Seal, Swan).

Background

Types of Ecolabeling

According to the EPA, there are two types of ecolabeling verification methodologies: First party is performed by marketers on their own behalf. Third party verification is carried out by an independent source that awards labels to products based on certain environmental criteria or standards. They can be characterized as positive (attribute based), negative (warning based) or neutral (summary, left to customers own interpretation of the data presented). (EPA 1998)

An ecolabeling program developed by the City of Seattle would be considered a third-party verification system that may require regional or greater coordination (multi-state) to avoid multiple standards for different jurisdictions. The program could be modeled similarly to existing, legitimate labeling programs for consistency.

EPA criteria for a legitimate third-party certifier:

- "An open, public process that involves key stakeholders (businesses, environmental and consumer groups, states etc.) In developing its criteria or standards;

- Award criteria, assumptions, methods and data used to evaluate the product or product categories that are transparent (i.e., they are publicly available, easily accessed and understandable to the lay person);

- A system of data verification and data quality;

- A peer review process (with representation of all stakeholders) for developing the standards or criteria;

- Criteria which are developed based on a "systems" or life cycle approach (i.e., "cradle to grave");

- An outreach program to educate the consumer, which includes clear communications to consumers that provide key information concerning environmental impacts associated with the product;

- An established goal of updating standards or criteria as technology and scientific knowledge advance;

- Authority to inspect the facility whose product is certified to ensure compliance with the standards or criteria;

- Testing protocols for the products that are certified which ensure testing is conducted by a credible institution;

- Access to obtaining the seal by small and medium sized companies (e.g., the cost of the seal is not so high as to prevent access by companies);

- Compliance with the Federal Trade Commission's (FTC) Guides for the Use of Environmental Marketing Claims."

Note: These criteria are the same as the Global Ecolabeling Network (GEN) admission criteria for ecolabeling entities.

Green Seal: United States

The nonprofit organization, Green Seal, provides science-based environmental certification standards that are credible and transparent. The seal certifies hundreds of products and services from major companies such as 3M, Benjamin Moore, and Andersen Windows with the number of major product categories exceeding 40. Green Seal has also established a significant market among large institutional purchasers through procurement programs (e.g.; government agencies, universities) and the lodging and architectural building industries. They actively advise and assist these entities with green purchasing, operations, and facilities management functions. (Green Seal 2007)

Green Seal evaluates products using a life-cycle approach to ensure that all significant environmental impacts of a product are considered (e.g.; raw materials extraction, manufacturing, use, and disposal). Green Seal meets the criteria of ISO 14020 and 14024, the standards for ecolabeling set by the International Organization for Standardization (ISO); the U.S. EPA's criteria for third-party certifiers of environmentally preferable products; and the criteria for the Global Ecolabeling Network. The ISO standards for ecolabeling were established by a large number of countries in the 1990s to develop standards for sustainable environmental management. ISO 14020 is a set of principles that must be followed by any user of environmental labeling, while ISO 14024 defines the procedures and principles that third-party certifiers or eco-labelers must use. (Green Seal 2007)

Green Seal considers a number of scenarios in selecting product categories: the level of environmental impact; the opportunity to reduce environmental impact, including product differentiation in the market (eco-label versus no eco-label); public interest and input, including that of institutional purchasers; manufacturer interest; available funding; and promotional opportunity. Environmental standards for major product categories takes one to three years in advanced planning to identify specific categories to be addressed.

When standards for a project category have been established, Green Seal analyzes and determines whether interested parties meet all criteria and quality control specifications to use the Green Seal logo with accompanying text describing the basis for certification. The product manufacturer agrees in its contract with Green Seal to abide by Green Seals policies for use of the seal. If a product fails to meet the standard, Green Seal notifies and explains the source of non-conformity and gives the manufacturer an opportunity to bring the product up to the standard. The nonconforming manufacturer has to pay a fee for nonconformity. This covers the cost of evaluation and the amount depends on the product type and the number of manufacturing facilities. (GEN 2007)

Funding: Green Seal is a non-profit organization, funded from numerous sources. Funding includes grants, contracts, revenue from certification and monitoring fees and special projects.

Swan Seal: Nordic Council of Ministers

The non-profit organization, Swan, represents the official Nordic ecolabel, introduced by the Nordic Council of Ministers. The Nordic Council is the inter-parliamentary body involving the representatives from Denmark, Finland, Iceland, Norway and Sweden including three autonomous regions: Faroe Islands, Greenland and Åland. The Nordic Council acts in an advisory and supervisory capacity on issues and matters of interest to official Nordic co-operation (including environmental issues). (Norden 2007)

The Swan ecolabel symbol is available for around 60 product groups. Everything from hand soap to furniture and hotels carry the Swan label (if they qualify). The Swan program uses similar methodology to that of the Green Seal used in the United States.

Funding: The Swan is a non-profit organization financed through parliamentary subsidies, and fees from companies that have ecolabelled products.

When a manufacturer applies for a licence, Swan charges an application fee. This fee covers the administrative costs and the site visit to the applicant, which must be carried out before the licence can be allocated. Once the licence has been granted, there is an annual charge based on the company's turnover for the products carrying the Swan label to which the licence applies. The application and annual fees vary from region to region. The annual charge does not exceed 0.4% of product turnover. Fees pay for the development of criteria, product checking and general information (e.g.; fairs, newsletters, etc.). (Norden 2007)

Local and Regional eco-labels:

Vermont Mercury-Added Consumer Products Labeling Law: By law, manufacturers and retailers are required to label mercury-added consumer products. The primary responsible party is the manufacturer not the wholesaler or retailer. All levels of product manufacturing with mercury-added products are responsible to file a labeling plan. Manufacturers and retailers found to knowingly sell unlabeled mercury-added goods are subject to penalties. Wholesalers, distributors and retailers are encouraged to inform manufactures of the state law to evidence a good-faith effort for compliance.

Protected Harvest: Using quantifiable performance measures for the reduction of high-risk pesticides, this Wisconsin-base certification program, Protected Harvest; evolved through the collaboration of the World Wildlife Fund, the Wisconsin Potato and Vegetable Growers Association, and the University of Wisconsin. The program is designed to certify that crops have been raised with integrated pest management (IPM) standards designed to reduce pesticide use. IPM is a systematic approach to pest management that considers all factors affecting crop health, including plant nutrition, horticultural practices, and all suitable means of pest suppression. IPM programs are based on information obtained by sampling and monitoring. Grower adherence to these practices is verified by an independent third-party inspection prior to harvest.

The Northeast Eco Apple Project: Massachusettes-based agriculture Initiative and an anonymous foundation that qualifies participating growers using a set of mandatory standards for ecological production in the Northeast. Grower adherence to these practices is verified by an on-site, independent third-party inspection prior to harvest. The standards were drafted by the IPM institute with input from a working group including area growers and consultants, and scientists from University of Massachusetts and Cornell University.

Materials Involved

Multiple

Implementation Timeframe

Implementation Date: 2020 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
Multiple	5% to 20%	Up to 5%
Residential		
Multiple	5% to 20%	Up to 5%
Self-Haul		
Multiple	5% to 20%	Up to 5%

Diversion Potential

Less than 1% recovery rate of targeted materials by 2038

Cost

SPU costs are anticipated to include initial consulting for label development, retailer and manufacturer outreach, and education. Labeling requirement costs are expected to be passed on to consumers, resulting in a modest increase in per household cost.

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$8,560	$8,560	$8,560	$8,560	$8,560
Capital 10 Yr.	$0					
Capital 25 Yr.						

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

Action Feasibility

Risks are anticipated to be high, because of the extensive research, partner collaboration, and manufacturer and retailer negotiation requirements. The city could hire an experienced third party such as Green Seal to develop and manage the program.

Risk of Not Achieving Results within Timeframe

Pros:

- Demonstrates that the producer cares about improving the health and welfare of people and the planet.
- A well-reputed trademark is a great marketing tool for producers.
- Cost-effective and simple way (symbology) of communicating environmental work and commitment to customers and suppliers.
- Environmentally suitable operations preempt legislation.
- The expertise of the non-profit labeling organization aids producers with the complexities of environmental issues.

- Effectively promotes quality and environmentally sensitive products to consumers in a format that is simple and straightforward.

Cons:

- Potential violations of trade laws and conformity with international standards.

- Ecolabels may be perceived as creating unfair marketing advantages.

- Ecolabels may mislead consumers.

As described earlier, an aspect of ecolabeling utilizes a life cycle review to determine the life cycle stages of the product that poses the greatest environmental burden. Life cycle reviews can range from simple to complex but the goals of the review types are the same. A small number of distinguishing features effectively segregate non-environmentally friendly products. Thus, criteria is established which generally is stated as a threshold quantity or standard performance. Criteria are usually set where few products meet the criteria. This creates a marketing advantage for those products which qualify which ultimately creates a competitive advantage and drives the market but may also be perceived as an unfair advantage. (Jim Salzman 1998)

An example of how this can backfire or mislead: In Canada and Germany, the eco-label and eco-seal target "solvent-based" paints that develop a less harmful product. This has decreased the level of bad solvents getting into the waste stream but because the label targets solvent-based paint rather than water-based paints (the more eco-friendly alternative), there is an imbalance and a disadvantage to water based paint producers and misleads consumers. (Jim Salzman 1998)

Opponents of eco-labels question the effectiveness, potential violations of trade laws and conformity with international standards. The Coalition for Truth in Environmental Marketing Information, Inc. claims that "eco-labels are misleading, prevent consumers from making informed choices, do not improve environment and restrict international trade." They have been lobbying the World Trade Organization (WTO) to realize down sides to eco labeling. They believe that ecolabeling is a non-tariff trade barrier. (Jim Salzman 1998)

Assumptions

To make a noticeable impact, the City of Seattle would have to create guidelines that are volume-based such as recycled content, recyclability and package volume. Toxic content is another facet of the evaluation that would have equal weighting.

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Green Seal Criteria: Performance, Environmental Impact, Packaging, Labeling.

Sweden: Largest grocery store chain, ICA, has required laundry detergent and home cleaning product suppliers to qualify for an eco-label or be removed from their shelves. (Salzman 1998)

Anaerobic Digestion Reactor for Organics Processing and Biofuels Production (#350)

Description

Develop an anaerobic digestion reactor facility to process organic waste and produce biofuels for energy production.

Background

Anaerobic digestion reactors are an efficient method for processing food waste and other organic waste. The processed material is sterilized and with additional aerobic composting produces a high quality compost product.

Several European towns and cities are currently using anaerobic digestion (AD) of organics to preprocess organic waste prior to composting and produce biofuels for energy production. Toronto, Ontario has implemented the technology and San Francisco is currently investigating two alternatives, development of their own dedicated facility, or directing organics to an existing East Bay MUD AD facility.

Directing SPU's organics waste stream through an AD reactor would provide several advantanges. An AD system directing biogas to electricity generation can produce between 75 to 150 kWh per ton of waste input. In contrast, aerobic composting alone consumes 50-75 kWh electricity equivalent/ton (for aeration fans, etc.) (AEA Technology Environment 2001). On this basis, running Seattle's combined food and yard waste through an AD reactor for power production could produce between 0.9 to 1.8 continous megawatts of carbon neutral electricity. Power generation calculations using formulae provided by Tetra Tech (2003b, 2003c) exceed this estimate, indicating power generation potential of 2.2 to 3.1 megawatts, depending on system efficiency for gas to energy conversion. Assuming that 1 megawatt

On this basis, an AD reactor could potentially turn Seattle's organic waste stream into a profit center, assuming reasonable amortization of land and facilities costs. Partnering with Seattle City Light on the project would make a significant contribution towards the power utility's alternative energy sourcing targets mandated under Initiative 937.

Materials Involved

Organics: Food waste, yard waste, compostable paper

Implementation Timeframe

Implementation Date: 2020 Ramp Period: 5 years

Expected Participation and Efficiency

Participation and efficiency rates are not directly applicable to this option. Expected organic feedstock volume is based on anticipated diversion rates resulting from proposed organics disposal bans (options #182 and #285).

Diversion Potential

Diversion potential is not directly applicable to this option. As above, expected organic feedstock volume is based on anticipated diversion rates resulting from proposed organics disposal bans (options #182 and #285).

Cost

Fixed Cost	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6-20
O&M	$6,212,770	$6,361,877	$6,514,562	$6,670,911	$6,831,013	$6,994,958

Note: 45% of O&M costs are for processed material and residue disposal, which are existing disposal costs
* O&M costs continue to escalate at 80% CPI/year

Fixed Cost	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6-25
Capital 25 Yr.	$4,385,540	$4,385,540	$4,385,540	$4,385,540	$4,385,540	$4,385,540

25 year capital cost is the average of the estimated cost range for the 275,000 ton facility ($54,684,768) amortized at 7% annual interest

Variable Cost	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6-20
Per Ton	$18.54*	$18.54*	$18.54*	$18.54*	$18.54*	$18.54*

Variable costs for disposal of processed product to composting facility and process residuals (e.g., inorganic grit) to landfill (note that these costs replace existing disposal costs)
* Variable costs continue to escalate at 65% of CPI per year

Variable Revenue	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6-20
Per Year	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000

Variable revenue represents the value of surplus electricity generation from biogas produced by the selected AD facility option

Environmental Benefits

Development of an anaerobic digestion reactor would produce significant secondary environmental benefits. Biogas from processing of organics waste could be converted to up to 2.1 megawatts of surplus electricity. This renewable, carbon neutral power source could replace an equivalent amount of power generated using non-renewable sources.

Action Feasibility

A considerable capital cost investment would be required for property acquisition and AD facility development. While feasible, high annualized capital and O&M costs may limit the feasibility of this option.

It is important to consider however that the passage of Initiative 937 will require Seattle City Light to obtain at least 15% of new electricity generation from non-hydroelectric renewable sources. Electricity generated from biogas produced by the facility would apply towards this target. This presents a cost sharing opportunity that could offset some of the capital and O&M cost.

Risk of Not Achieving Results within Timeframe

Pros:

- The process produces biogas useful for energy generation, converting the composting process from a net consumer to a net producer of energy (and revenue).
- The process breaks down meat, oils and fats allowing these materials to be efficiently composted.
- The digested product improves the efficiency of the composting process and the quality of the finished product.
- The process would reduce the volume of organic material sent to composting facilities, lowering total tip fees.
- Current technologies are odorless and efficient.
- Project would provide a high profile statement of SPUs commitment to sustainability.

Cons:

- High capital and O&M costs
- Anaerobic digestion is ineffective at decomposing wood waste or other compounds with high lignin content, therefore commingled yard and food waste would need additional aerobic processing to produce marketable compost

Assumptions

Diversion potential and efficiency are presumed based on current yard waste program particiaption and efficiency and assuming implementation of a ban on organics disposal (option # 182).

- Assuming food waste diversion under commercial and residential disposal bans is 85% (see options #182 and #285), yard waste diversion remains as high as current levels (88%), and compostable paper were collected at 50% efficiency across all sectors, commingled waste volume would amount to almost 220,000 tons of diverted organic waste based on revised SPU 60% projections (SPU 2004).

- An appropriately sized AD facility would accommodate this waste and have sufficient capacity for future growth (i.e., at least 250,000 ton capacity)

Facility capital cost estimates were based on two sources:

1) Toronto's projected costs for a scaled AD reactor processing 250,000 metric tons of SSO/year (AKA and EnvirosRIS 2001):

   - 250,000 metric ton capacity (~276,000 tons) is sufficient capacity for commingled food and yard waste plus compostable paper (~220,000 tons/year assuming food and yard waste diversion at 88% efficiency and soiled compostable paper at 50% efficiency)

   - Estimated capital costs for this sized facility in Toronto were ~$46 to $67 million CAD in 2001

   - $1.00 CAD in 2001 is worth $1.136 CAD in 2007 (Bank of Canada 2007), and $1.00 CAD in 2007 is worth $0.853 USD (xe.com 2007)

   - At these escalation and exchange rates the 2001 plant cost estimates range from ~$44.5 to $64.8 million in 2007 USD, with mean of $54.7 million

   - Amortized over 20 years at 7% interest, this equates to capital costs of ~$4.0 million/year to ~$5.8 million /year, with a mean of $4.4 million/year

2) Estimated capital costs for a 51,000 ton design load facility developed for SPU by TetraTech (2003a, 2003d):

- 51,000 ton capacity was estimated based on 50% diversion of food waste only (noting that these estimates are low based on revised SPU 60% projections)
- Estimated facility engineering and construction costs of $11.0 million in 2003 USD, which equates to $12.1 million in 2007 USD (U.S. DOL 2007)
- Amortized over 20 years at 7% interest, this equates to capital costs of ~$1.1 million/year

The Toronto facility matches the anticipated capacity requirements for commingled food and yard waste, therefore it provides the best estimate of total capital cost requirements for a similarly scaled facility in Seattle.

Facility O&M and variable cost estimates were developed by converting O&M costs/ton of feedstock estimates developed for the Toronto study (AKA and EnvirosRIS 2001), and estimated O&M costs for the 51,000 ton facility prepared by Tetra Tech (2003d). A cost ratio of $41/ton of feedstock was used to estimate the O&M costs for the hypothetical 275,000 ton capacity facility, based on the following:

- The estimated cost of a 275,000 ton capacity facility in Canada was $47/ton of feedstock in 2001 CAD (AKA and EnvirosRIS 2001)
- This equates to $41/ton of feedstock in 2007 USD using the inflation and exchange rates applied above (Bank of Canada 2007, xe.com 2007)
- O&M costs for the hypothetical 51,000 ton capacity facility calculated by TetraTech (2003d) equate to ~$2.2 million/year or $42.17/ton in 2003 USD, including the following elements:
  - Labor
  - Facility maintenance
  - Grit disposal, water/wastewater, equipment fuel, treatment polymer
  - Product utilization
  - Supplies
  - Permitting and monitoring
  - Contingency (15%)

- This equates to $46.39/ton of feedstock in 2007 (U.S. DOL 2007), which comport with the above estimates for the larger facility when considering economy of scale (AKA and EnvirosRIS 2001)

- On this basis, estimated O&M costs for the 275,000 ton facility would be ~$11.3 million/year

- O&M as estimated for the Toronto facility includes the following components (AKA and EnvirosRIS 2001):
  - Labor, plant and building O&M, vehicle fuel (22% of total)
  - Pre-treatment, water/wastewater (11%)
  - Disposal costs for processed product and process residue (i.e., currently paid costs tipping fees at composting facility) (45%)
  - Compost Curing (10%)
  - Profit (12% of total O&M)

- The disposal cost component of processed product (i.e., transfer to aerobic composting facility) and process residual (i.e., grit and inorganic materials), totaling an estimated $5.1 million/year, are considered variable costs

- These are existing costs currently paid for disposal of organic and inorganic components of these waste streams

Power generation estimates were calculated using two methodologies based on the larger of the two facility options evaluated above, providing a range of possible values:

1) A general range of power production potential for anaerobic digestion reactors of 75 to 150 kWh/ton of waste input based on European experience (AEA Technology Environment 2001).

- Total food waste generation is 122,300 tons/year

- At 88% diversion, this equates to 107,650 tons/year of feedstock (yard waste and compostable paper are is not included in power potential due to non-digestible lignin content)

- 107,650 tons/year equates to 295 tons/day, or 12.3 tons/hour of feedstock

- 12.3 tons/hour x 75 kWh/ton x 1 megawatt/1000 kW = 0.92 megawatts;
  12.3 tons/hour x 150 kW x 1megawatt/1000 kW = 1.84 megawatts

2) Calculated power production potential based on anticipated biogas production potential using biogas production estimates per ton of feedstock based on European experience, and typical biogas to energy conversion ratios (TetraTech 2003b, 2003c):

- Feedstock assumptions are the same as method 1 above
- Anaerobic digestion produces ~2,900 cubic feet of biogas per ton of feedstock
- 295 tons/day of feedstock x 2,900 cubic feet/ton = 855,305 cubic feet/day of biogas
- When combusted, biogas produces ~600 BTU/cubic foot of heat energy
- 855,305 cubic feet/day x 600 BTU/cubic foot = 513,182,739 BTUs/day or 21,382,614 BTUs/hour
- At 1 megawatt = 3,415,179 BTU/hour, this equates to 6.3 megawatts in thermal energy
- At 35% thermal to electrical energy conversion efficiency (typical of internal combustion generators), this equates to 2.2 megawatts of electrical energy
- At 50% thermal to electrical energy conversion (typical of emerging fuel cell technologies), this equates to 3.1 megawatts of electrical energy (the King County South Municipal Waste Treatment Facility is currently running a 1 megawatt demonstration fuel cell electricity converter.

Value of power produced is calculated using the following assumptions:

- The large plant option could produce the equivalent of 2.2 to 3.1 megawatts of electricity
- This equates to ~19.2 to ~27.4 million kWh/year of electricity
- Assuming that ~8.8 million kWh/year (1 megawatt) is required for plant operation, surplus electricity production would range from 10.4 to 18.7 million kWh/year
- At $0.10/kWh the value of the surplus electricity produced ranges from approximately $1.0 to $1.9 million/year
- The value of waste heat from power generation using internal combustion generators is not considered in the value of power.

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Product Tagging System in Retail Stores (#364)

Description

Retail stores are required to install labels on channel strips to encourage altered purchasing habits through some or all the following messages: bulk packaging, concentrates, lightweight packaging, recycled content, biodegradable packaging, discouragement of individual sized packaging or disposable products, overpacking, recyclability, package volume, and toxic content of the products sold.

Background

The program could at start as a pilot program for several years to determine the feasibility of permanence. The pilot program should target grocery chains where the target audience is highly diversified. Consumers have the power to implement prevention and recycling, it is important that they receive adequate education and be motivated to change their habits.

Education

If applied correctly, a shelf tagging program can be successful. For example, a post program survey for an environmental shopping campaign (shelf tagging) in the Von's grocery store (California) chain found that 71 % of the respondents who shopped where the program was active agreed that there was a garbage crisis in California while only 51% of the survey respondents from the stores which did not participate in the awareness program agreed there was a crisis. Successful education methodology may include the following: determining the best promotional materials; targeting school-age children; know your target audience; and duration. (EPA 1999)

Content of the Program -Use a combination of education, disincentives, and incentives and dispel misconceptions about recycling like for instance, the perceived inferior quality of recycled-content products versus non-recycled content products.

Simplicity, Convenience and Quality of the Program - If consumers and retailers cannot quickly and easily understand a program, or if the program requires significant shopping habit changes, the program could be viewed as a burden and may be rejected.

Tone of message – Keep the tone of the campaign positive.

Timing of Program – Don't want another campaign taking place concurrently. Consumers are constantly bombarded with information—you want the shelf labeling program to stand out, not compete. In San Diego, California, a marketing campaign to increase awareness of the recycle symbol failed to reach its audience (only 6% compared to the 84% recognition in the San Francisco Bay Shop Smart Program) because the grocery chain was also running another ad compaign. (EPA 1999)

Program

Vermont

In 1991, the State of Vermont Solid Waste Division initiated the Vermont Household Hazardous Product Shelf Labeling Program making it mandatory for retailers stocking household hazardous products to identify those products through shelf labeling. The program was promoted through brochures and posters for both consumers and retailers; media and advertising campaigns at recycling depots, schools, and businesses.

Initially, the retailers were required to label the shelf space below every hazardous product and non-hazardous products had to petition to receive and "exempt" label by proving to the Vermont Secretary Agency of Natural Resources that their products are free of what constitutes hazardous waste. The program was later modified to give retailers the choice of using a larger, centrally prominent sign describing what the symbols on hazardous packaging means and only when the over 20 percent of the shelf or display area contains hazardous products. (EPA 1998) Due to low compliance and opposition by those subject to the law, the law was repealed in 2002.

Pilot Program

San Francisco – Shop Smart Pilot Program

The San Francisco Bay area implemented a consumer waste reduction program in area grocery storesfor several weeks in 1996 and 1997. In 1996, the campaign included 103 Bay Area Cities and the cost of the program exceeded $350,000. It lasted 3 weeks. Promotional materials included 150-200 shelf tags and one or two posters in each store; six different brochures, grocery gift certificates; shopping bag ads, and intense media coverage (i.e.; 1600 radio commercials, 780 television commercials, ads in 50 newspapers, 1-800 hotline). The radio and print ads were translated into Chinese and Spanish. The following were the messages that were dispelled:

- Close the Recycling Loop: Choose recycled packaging: glass, aluminum and steel
- Close the Recycling Loop: Look for "Made with Recycled Content" on products and packaging
- Reduce Waste: Bring your own reusable bag
- Reduce Waste: Concentrates and economy sizes use less packaging
- Reduce Waste: Reusable products save resources

- Reduce Waste: Items with less packaging save resources

- Reduce Waste: Compost your fruit, vegetable & plant trimmings

Source: (Clarke, M. 1999)

The second campaign in 1997 was larger than the first event and lasted for seven weeks. The main differences between the two years were the cost applied, shelf labeling methodology and number of labels (250), duration and take home message. This campaign had a lower budget than the first year, was longer in duration (7 weeks) and limited the take-home message to four instead of the above listed seven. (Clarke, M. 1999) The four messages were as follows:

- Save Resources: Choose Less Packaging

- Save Resources: Reuse Bags, Containers and Products

- Close the Recycling Loop: Choose Recycled Packaging: Steel, Aluminum and Glass

- Close the Recycling Loop: Look For Made With Recycled Content

(Clarke, M. 1999)

The labeling in the second year used highly visible display tags that were a different color for each take home message and were prominently placed near products that represented the tag's message all throughout the store. The second year of the Shop Smart Program utilized the same polling system that was used in the previous year for consistency. The recognition of campaign materials and interest in messages increased from 72% in 1996 to 84% in 1997 even though the media coverage was much lower; and the effects on habits increased from 30% in 1996 to 54% in 1997. The purchasing of recycled packaging increased from 18% to 30%; the use of own bags increased from 10% to 23% while the bulk purchasing of items decreased from 29% to 19%. In both studies only 3-4% of the customers took a brochure home with them. The displays were the most favored education method (74%). Recollection of main message decreased in the second year. The support of recycling message decreased from 37% to 35%, the reduce waste message went from 34% to 27% and the buy in bulk message decreased from 17% to 15%. (Clarke, M. 1999)

Materials Involved

Multiple

Implementation Timeframe

Implementation Date: 2020 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Residential		
Multiple	5% to 20%	5% to 20%

Diversion Potential

Less than 1% recovery rate of targeted materials in 2038.

Cost

SPU costs are anticipated to include initial consulting for tagging development, retailer and manufacturer outreach, and education. The cost of the tagging requirement is expected to be passed on to consumers, resulting in a modest increase in per household cost.

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$85,600	$85,600	$85,600	$85,600	$85,600
Capital 10 Yr.	$0					
Capital 25 Yr.						

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

- In the San Francisco Bay Area (103 participating cities) kick off year, the cost of the Shop Smart Program exceeded $350,000.

Action Feasibility

Risks are anticipated to be medium, because of the extensive research, collaboration, and retailer negotiation requirements. The city could hire an experienced third party such as Resource Venture to develop and manage the program. Assumptions

To make a noticeable impact, the City of Seattle would have to create guidelines that are volume-based such as recycled content, recyclability and package volume. Toxic content is another facet of the evaluation that would have equal weighting.

Projections of Population, Goods and Packaging Generated in the U.S. Waste Stream

	1995	2000	2010
U.S. Population (millions)	262.76	274.63	297.72
Durable Goods* (millions of tons)	31.23	33.94	38.29
Nondurable Goods ** (millions of tons)	57.04	62.14	72.72
Packaging and Containers (millions of tons)	72.86	80.49	94.89
Other wastes *** (millions of tons)	46.92	45.10	47.10
Total (millions of tons)	208.05	221.67	253.00

*** *Other wastes are predominantly food and yard wastes.*
Source: (Clarke, M. 1999)

- Supermarket packaging constituted 12% of the nation's solid waste by weight (Advertising Age 1995-96).

References

U.S Environmental Protection Agency (EPA). 1998. *Environmental Labeling Issues, Policies, and Practices Worldwide, Office of Prevention, Pesticides and Toxic Substances*, EPA 742-R-98-009, Washington DC.

Clarke, M. 1999. *Testing the Effectiveness of Supermarket-Based Environmental Shopping Campaigns in Changing Consumer Behavior in New York City,* New York City, NY

Total Measured U.S. ad spending by Category and Media in 1996, 1995. Advertising Age's website: http://adage.com/dataplace/archives/dp208.html

United States Environmental Protection Agency (EPA). 1999 Recycling Works! *State and Local Solutions to Solid Waste Management Problems,* -K-99-003, Washington D.C.

Pesticide Container Recycling Program (#369)

Description

Implement a cooperative program among manufacturers, retailers, consumers to provide collection and recycling of pesticide containers. The containers of some commonly used pesticides are classified as hazardous wastes if not properly rinsed. Improper disposal of a hazardous waste can result in environmental contamination.

Background

Virginia

Virginia's container recycling program began in 1993 in six localities with more than 35,000 containers recycled. The number of participating localities has steadily increased from 6 in 1993 to 19 in 2006. In addition, individual pesticide dealers also participated in the program. In 2006, 9 pesticide dealers either hosted a recycling site for the locality or collected their own containers for granulation. A total of 72,595 plastic pesticide containers were recycled in 2006, for a total of over 817,595 recycled since 1993.

Grant monies are provided to participating local government to defray the costs. Recycling sites are established in participating localities to accept properly rinsed plastic pesticide containers. Other sites will be established as the program expands. All pesticide containers are inspected by trained local personnel. There are two methods to thoroughly rinse the pesticide containers, they are pressure rinsing and triple rinsing.

Pressure Rinsing:

Equipment and material needed for pressure rinsing are Pipe Vise (or equivalent), Arc Welder (or Oxy/Acetylene Torch), Electric Drill, 1/8" Drill Bit, Center Punch, Ball Peen Hammer, Bench Grinder, and Hacksaw.

- Empty contents of container into spray tank, turning the container so that any product trapped in the handle is allowed to flow out. Once flow is down to a drip, allow the container to drain for an additional 30 seconds.

- Immediately begin rinsing procedures or the product may become difficult to remove.

- Hold the container so the opening can drain into spray tank.

- Force tip of the pressure nozzle through the lower portion of the side closest to the handle.

- Connect nozzle to a clean water source of at least 40 pounds per square inch. Turn the nozzle inside the container to assure good coverage of all sides, including the handle.

- Rinse for at least 30 seconds.

- Rinse cap under water coming out of the drum and into the spray can and then dispose of cap appropriately as regular municipal solid waste.

- Drain all rinse water into the spray tank.

Triple Rinsing:

Triple rinse means the flushing of containers three times, each time using a volume of the normal diluents equal to approximately ten percent of the container's capacity, and adding the rinse liquid to the spray mixture or disposing of it by a method prescribed for disposing of the pesticide. Triple rinsing does not require special equipment.

- Empty contents of container into spray tank, turning the container so that any product trapped in the handle is allowed to flow out. Once flow is down to a drip, allow the container to drain for an additional 30 seconds.

- Immediately begin rinsing procedures or the product may become difficult to remove.

- Fill the empty container ¼ full of clean water.

- Replace the cap on the container. With the container opening facing left, shake the container left to right over a distance of four to six inches. Shake the container about twice per second for 30 seconds.

- Drain rinse water into spray tank as previously described.

- Fill the empty container ¼ full of clean water a second time.

- Recap the container. With the opening of the container pointed towards the ground, shake the container as described before. Then drain the rinse water into the spray tank.

- Finally, fill the empty container ¼ full once more with clean water.

- Recap the container. With the container in the normal, upright position, shake the container as described before.

- Pour the rinse water into the spray tank. Carefully rinse and spray residue from the outside of the container.

- Carefully rinse cap over spray tank opening and then dispose of cap appropriately as regular municipal solid waste.

Rinsed water should not be poured into a household drain, on the ground, or into a gutter or storm drain. The rinse water may be used to dilute the pesticide in the sprayer or applicator container to the correct concentration, or it may be sprayed directly on the target agricultural site.

Containers are granulated by a contractor with assistance from Virginia Department of Agriculture and Consumer Services and local personnel. Granulated chips are transported to recycling facilities and fabricated into items such as pallets, fence posts, field drain tiles and parking stops.

South Carolina

Thousands of empty pesticide containers that once were sent to landfills by commercial applicators and farmers throughout South Carolina are now being collected for recycling.

Sponsored by the Clemson University Cooperative Extension Service (Extension) and Clemson's Department of Pesticide Regulation, the recycling program has been in operation since November 1993. Successful collection days have been held in the majority of South Carolina's counties, with Extension agents making an effort to schedule collection days between seasonal harvests.

More than one million containers have already been accepted for recycling, with only two percent of the containers being turned away due to improper rinsing. The success of any disposal or recycling program hinges on the guarantee that only properly rinsed containers will be submitted for recycling. Therefore, only empty, dry containers that have been triple- rinsed or pressure-rinsed will be accepted for recycling. Containers are to be rinsed immediately for best results. Certified inspectors conduct on-site monitoring to ensure containers have been properly rinsed. Product booklets, plastic sleeves and lids should be removed before inspection.

In addition to being properly rinsed, containers need to be stored where they will remain dry and clean. This is essential because the recycling machinery does not perform well if containers are contaminated with dirt and debris. A portable granulator (chipper) is used to shred plastic containers accepted for recycling. Shredded plastic is taken to a recycler and eventually molded into plastic pallets, landscape timbers, fence posts, and new pesticide containers.

Northwest United States Ag Plastics (NWAP) is contracted by the Agricultural Container Recycling Council to recycle pesticide containers in Washington, Idaho and Oregon. Service has expanded by collecting or granulating containers at-your-site to better accommodate those who wanted to recycle. In addition, the schedule of public collections has been expanded for those who can bring their containers to a central location. NWAP has “on-call” service available for large customers who can store their containers. Acceptable plastic containers range from half pints to 55-gallon drums. Service is provided at no charge.

Materials Involved

Plastic: Pesticide Containers

Implementation Timeframe

Implementation Date: 2008 Ramp Period: 1 year

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
Pesticide Containers	75%	50%
Residential		
Pesticide Containers	75%	50%

Diversion Potential

Up to 30% recovery rate, up to 95 tons in 2038.

Environmental Benefits

Environmental benefits would be significant, as some quantities of pesticides would be diverted from landfills and prevented from leaching into soil and water sources.

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$8,560	$8,560	$8,560	$8,560	$8,560
Capital 10 Yr.	-	-	-	-	-	-

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton						

Risk of Not Achieving Results within Timeframe

High probability of achieving significant diversion rate.

Pros:

- Recycles a product for second life
- Saves the costs for long haul and landfill 'tipping' fees

Cons:

- Would require changes in collection strategy
- Complicated rinsing process.
- May promote illegal dumping if pesticide containers are banned

Assumptions

- NWAP is currently contracted by the Agricultural ACRC to recycle pesticide containers in Washington, Idaho and Oregon and service is provided at no cost.

  Northwest Ag Plastics Inc., is located at
  350 Hoff Road
  Moxee, WA 98936
  (509) 457-3850

- The current O&M costs are estimated for a full time employee at an annual cost of $55,600 (includes salary and fringe benefits). Full time employee coordinates program with customers, prepares press releases, places advertising, and posts notices to City web pages; and educational materials (printed materials) at an annual cost of $30,000.

- If the City incurs the cost to recycle the containers, the estimated cost would be $143,000. This includes adding the pesticide containers to the recyclables collection bin and delivered to the City's transfer stations or other facility. Capital costs include $20,000 for pressure rinsing facility (including spray tank) and $8,000 for plastic container chipper furnishing and installation; and O&M costs would include: a full time employee at an annual cost of $55,600 (includes salary and fringe benefits); $6,000 for disposal of wash water on a monthly basis at an agricultural site; $21,440 for City personnel to perform the rinsing of the containers; and educational materials (printed materials) at an annual cost of $30,000. Full time employee coordinates program with customers, prepares press releases, places advertising, and posts notices to City web pages. The City may have to coordinate with NWAP to dispose of the rinse water.

Reference

Virginia Department of Agriculture and Consumer Services
http://www.vdacs.virginia.gov/pesticides/recycling.shtml

Department of Pesticide Regulation, Clemson, South Carolina
http://dpr.clemson.edu/SpecialPrograms/

Northwest Ag Plastics Inc.,
http://www.nwagplastics.com/schedule.php

Enhanced Waste Screening at Transfer Stations for Exclusion of Banned Recyclables (#382)

Description

Expand efforts to require businesses to comply with laws and regulations pertaining to disposal of product bans, or recycling requirements. This can be done through a combination of goals, incentives and penalties that seek to improve the performance of waste reduction and recycling programs to reduce the amount of waste that is diverted to waste disposal facilities.

Background

City of Seattle prohibits the disposal of recyclables with the regular municipal solid waste at the transfer stations. In order to avoid any illegal dumping of recyclables, the City should enhance waste screening at transfer stations for exclusion of banned recyclables. Both the transfer stations should screen incoming waste for prohibited items.

Michigan

State of Michigan developed a similar program in the year 2005 for the screening of prohibited items in the solid waste stream in Michigan. The best management practice (BMP) documents recommended practices for effective screening and management of prohibited items at solid waste transfer stations in Michigan. The monitoring and outreach document development for this program were conducted by Tetra Tech EM, Inc., under EPA Contract and at the direction of EPA Region 5.

Program Overview

Screening should focus on truckloads of waste. If trucks from a specific hauler or generator are repeatedly found to contain prohibited items, then they should be screened more frequently. It is recommended that transfer stations have a written standard operating procedure (SOP) on screening waste for prohibited items. The SOP should describe

- How frequently trucks should be screened,
- Where within the transfer station property trucks should be screened,
- Health and safety requirements that should be followed while conducting the screening,

- Equipment and personnel to be used for screening,
- What to look for during the screening,
- How to document findings, and
- Required follow-up actions if prohibited items are found.

Transfer station employees should be trained when they are hired, and thereafter annually, on implementing the SOP.

Frequency of Screening

The frequency at which trucks are screened will depend on the volume of waste typically received at each transfer station. In general, most loads should be inspected visually as the loads are dumped individually on the floor to discover major items (such as tires, appliances). Trucks should be screened before, during, and after loads have been dumped.

Preliminary Screening

Preliminary screening should take place on all trucks at or near the entrance to the transfer station. This should consist of a brief interview with the driver regarding the contents and origin of the waste, review of relevant documentation such as bills of lading, manifests, and characterization data for authorized industrial waste, required documents, and a cursory visual inspection of the truck contents (if possible). This visual inspection could be conducted using surveillance mirrors or cameras to allow the operator to see into the open top trucks.

Safe Locations for Screening

Once a truck enters the transfer station, the operator should designate a space where the load can be safely dumped for further screening. This location will depend on the volume of waste that typically comes into the transfer station. Large operations may need to designate a spot away from but close to the tipping floor to minimize disruption to ongoing dumping. Smaller operations may be able to conduct the dumping and screening at the tipping floor.

Documents for Out-of-State Trucks

If an out-of-state truck is not accompanied by one of the required documents, the transfer station operator should reject the truck or screen the truck for prohibited items and complete the "Prohibited Waste Removal Record." The operator should identify the transfer station as the generating facility on the record.

Screening during Dumping

Transfer station operators should observe the load as it is being dumped and identify any prohibited items as they are emptied from the truck. The feasibility of this task will depend on the type of operation at the transfer station. Direct dumping from a truck to a compactor is not recommended because direct dumping limits opportunities for screening and sorting of prohibited items.

Screening after Dumping

After the load is dumped, it should be spread to facilitate a more thorough visual inspection. Excavators or front end loaders can be used to pick through the waste. Transfer station operators should screen the load for volatile organic compounds (VOC) and radioactivity using appropriate instruments such as a photo ionization detector (PID) or Ludlum radioactivity meter. If VOC or radiation levels are above background levels then sampling of material from the truck should be considered. Transfer station operators should walk around the load and look for the following prohibited or non-uniform items.

If a waste load appears to contain prohibited waste, the transfer station operator may collect a sample of the waste to confirm whether the waste exhibits any hazardous waste characteristics such as ignitability, corrosivity, reactivity, or toxicity or the waste contains other prohibited material such as asbestos or PCBs. The sample can also be field-tested for certain hazardous characteristics such as solubility, pH, combustibility, or presence of oxidizers, peroxides, cyanides, or sulfides to determine whether the waste poses a hazard and requires special handling procedures.

Documenting Screening Results

Screening results should be documented either in a field logbook, on hard copy inspection forms, or in personal digital assistants (PDA) containing downloaded inspection forms. At a minimum, the following information should be recorded: the inspector name, date, time, hauler, type and extent of prohibited items found, and corrective actions taken. Also, prohibited items should be photographed, and the photographs should be stored with the other inspection records.

Handling Prohibited Items Found During Screening

If prohibited items are found, they should be removed if they can be separated from the rest of the load. If most of the load consists of prohibited items that cannot be easily separated from the rest of the load, and the transfer station is not equipped to handle those specific prohibited items, then the entire load should be rejected.

The transfer station operator should give a copy of the "Alternative Disposal Recommendations for Transporters and Generators" in the attachment to the BMP, to the hauler and the generator. After prohibited items have been removed, several options are available to the transfer station operator. The specific options implemented from those listed below will depend on the type and nature of operation at each transfer station.

- If the hauler is still on site, the hauler should be instructed to take the items or the entire load (if the prohibited items are inseparable) off site.

- If the hauler has left the site but is a regular customer and is expected to return, the items or load can be given back to the hauler when they return for transport off site.

- If the hauler is not on site, the items should be stored in an appropriate location where they will not interfere with other operations and they can be safely stored until further corrective actions are identified. If the items have the potential to release hazardous constituents to the environment via leaking to the ground, wind dispersal, or runoff, proper containment precautions should be taken, such as the use of tarps, covers, roll-off containers, or drums.

- If the generator of the items or load can be identified from available documentation or interviews with the hauler, the generator should be contacted and instructed to pick up waste from the transfer station.

Occasionally, the transfer station operator assumes responsibility for proper disposal of the prohibited items. In these cases it may be beneficial for the transfer station to adopt policies holding clients financially responsible for disposal costs.

Materials Involved

All Materials

Implementation Timeframe

Implementation Date: 2010 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Self-Haul		
All Materials	20%	75%

Diversion Potential

Up to 15% recovery rate, up to 1,800 tons in 2038.

Environmental Benefits

The environmental benefit is expected to be moderate due mostly to the reduced demand for virgin resources with recycled materials entering the recovery life cycle.

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M	$ 147,200	$ 147,200	$ 147,200	$ 147,200	$ 147,200	$ 147,200
Capital 10 Yr.	-	-	-	-	-	-

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton						

Risk of Not Achieving Results within Timeframe

Pros:

- Facilitates recycling, waste management and conservation of natural resources
- Reduces adverse effects of pollutants on natural resources.
- Controls illegal dumping at the transfer stations

Cons:

- Requires facility monitoring

Assumptions

- O&M cost is made up of two inspectors, one at each transfer station, to perform thorough waste screening. Each inspector is paid an annual salary of $73,600 (salary and fringe benefits). No other O&M costs and no capital costs is expected to be incurred by this option.

Reference

California, June 1995. Inspection Guidance for Transfer Stations, Materials, Recovery Facilities, and Waste-to-Energy Facilities
http://www.ciwmb.ca.gov/LEAAdvisory/23/TransferMRF.pdf

C&D Waste Pre-processing Requirement for Commingled Material (#383)

Description

The City could require that all mixed C&D waste from commercial and private projects must be delivered to a material recovery facility (MRF) to remove the maximum amount of recyclable/reuseable materials. This option could be combined with Option 209 whereby the City would support the development of a private MRF. The assumption is that all C&D material generated within the City would go to one private facility and the City would not be involved in building or operating the facility. The materials most likely to be recovered at high rates include clean wood, new gypsum, demolition gypsum, cardboard, metals, and asphalt roofing.

Background

A 2006 technical memorandum – C&D Processing Facility Profiles and Literature Search – found that construction and demolition (C&D) processing facilities nationwide process mixed C&D waste with varied levels of success (SPU 2006). Although facilities that accept and process source separated materials generally have the highest recycling rates (up to 80 percent diversion), facilities that process commingled materials are able to achieve from 55 to 90 percent diversion.

Factors influencing recycling rates include:

- Facility size and process capacity and space constraints
- Whether or not a facility can reject undesirable loads (e.g., loads containing painted wood or asbestos)
- Facility capitalization and technology
- The amount of the avoided tip fee.

The facilities that report commingled recycling rates of 90 percent or more are able to screen their loads and accept only loads deemed recyclable. Recovery rates for processed commingled C&D waste are highest when the disposal facility tip fee is high and facilities are well capitalized and have better sorting technology. When disposal tip fees are low, facilities tend to rely more on labor to sort through materials, resulting in lower recovery rates.

Table 1. Example material reuse facility data and associated tipping fees for commingled C&D waste

Facility	Diversion rate	Facility Size	Facility Tipping Fee for C&D	Landfill Disposal Tipping Fee
Recovery 1, Tacoma, WA	98% recovery rate	5.2 acres with 87,000 ft^2 tipping floor	$56/ton	$82.50/ton [a]
Environmental Resource Group, Epping, NH	80% including ADC	35 acres with 10,890 ft^2 tipping floor	$90/ton	$80 - $120/ton
San Fransisco Recycling and Disposal, Inc., CA	82% mostly wood, metal	4,000 ft^2	$103/ton	$80/ton
Taylor Recycling Facility, Montgomery, NY	97%	35,000 ft^2	$75/ton	$77/ton
Zanker Material Processing Facility, San Jose, CA	95%	12 acres with 43,560 ft^2 tipping floor	$18/ton	$40 - $60/ton

Source: SPU 2006 except as noted.
[a] WMI 2007.

Materials Involved

C&D Wastes: All commingled C&D wastes

Implementation Timeframe

Implementation Date: 2020 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
C&D Wastes	90%	50%
Residential		
C&D Wastes	90%	30%
Self-Haul		
C&D Wastes	90%	50%

Diversion Potential

Up to 36% recovery rate, up to 79,200 tons in 2038 (includes tonnage currently going to private waste transfer or processing facilities.

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M						
Capital 10 Yr.						
Capital 25 Yr.						

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton						

Environmental Benefit

The environmental benefit is expected to be moderate due mostly to the reduced demand for virgin resources with recycled materials re-entering the product cycle.

Action Feasibility

As a regulation, this option should achieve a high level of diversion. However, for this option to succeed, the City must ensure that there is also adequate private facility development to handle the quantities of C&D that must be processed, as well as adequate market development to provide outlets for materials diverted.

Risk of Not Achieving Results within Timeframe

Proposed action is considered to be low risk given success in other jurisdictions.

Pros:

- Would mandate that essentially all mixed C&D wastes go through a facility where there is an opportunity to divert recyclable materials.

- Would greatly reduce the quantity of C&D that the City would handle (assuming that the MRFs are private facilities).

- Would stimulate the C&D recyclables market and incentivize private facility development.

- Ratepayer cost could actually be negative if tipping fees for mixed C&D at a MRF are lower than the current fee to dump C&D into the MSW stream at transfer stations and landfills.

Cons:

- May require significant City incentives (tax-exempt bonds, research grants, permitting assistance) to encourage private facility development

- A private facility should be centrally located if possible in order to provide convenience and limit the quantity of fossil fuels burned by thousands of truck and private vehicle trips from jobsites to the facilities

- Would require educational outreach and enforcement

Assumptions

- The materials involved would include all C&D waste. The materials most likely to be recovered at the highest rates include clean wood, new gypsum, demolition gypsum, cardboard, and metals.

- The implementation period and ramp up times are both assumed to be 3-5 years which accounts for time needed to negotiate contracts with facility operators, for facility development, and market development.

- As a regulation, the expected participation rate should be very high since diversion rates will be incentivized under contract with the City.

- Private C&D sorting facilities in other jurisdictions achieve diversion rates from 55 to 90 percent.

- City costs would include program management including enforcement, educational costs including outreach and advertising to inform contractors and the public about the new requirements.

- The ratepayer costs could be negative considering that the tipping fee at the MRF would likely be considerably less than tipping fees at City or private transfer stations or landfills.

- Assume that a facility would need a capacity of 470,000 tons per year (350,000 tons per year with 1% waste growth in waste stream per year over 30-year facility lifespan).

- Combined C&D disposed at City transfer stations is 27,182 (SPU 2003).

- The environmental benefit of this option is assumed to be high based on the significant tonnage that may be diverted.

- 236,027 tons of C&D disposed Citywide in Seattle (SPU 1998): RPA program #25 transfer station material recovery center: 80,000 tons per year, 50,000 square feet, staffed by 40 people, customers pay full tip fee. O&M costs $2,797,000 1 -20 years; capital 7 years costs $342,000

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Health Department Permit Requirement that Restaurants Must Have Food Waste Collection Space and Material Handling Facilities (#386)

Description

Enact Seattle/King County Public Health regulation that requires all restaurants have space dedicated to collecting and handling food waste. This program assumes that the regulatory and enforcement burden has been passed from SPU to Seattle/King County Public Health. However, the lack of penalties for actual disposal of food waste is likely to lead to lower participation and efficiency overall.

Materials Involved

Organics: Food Waste.

Implementation Timeframe

Implementation Date: 2015 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
Food Waste	85%	5%

Diversion Potential

Up to 25% recovery rate, and up to 2,525 tons by 2038.

Cost

Capital costs for this option would be negligible since no new facilities would be required to modify the collection system to accept additional organics. Commercial users will initially incur nominal costs to develop sites for source separation.

O&M costs required for program advertising and education, monitoring, and enforcement actions as necessary.

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5-20
O&M	$168,740	$70,390	$72,079	$73,809	$75,580	$77,394

* O&M costs for labor continue to escalate annually at 100% of the CPI

Consumer Cost: up to $10/household

Action Feasibility

Regulatory requirements are achievable. However, significant questions remain over the status of legacy buildings requirements and the cost effects on new buildings. "Level playing field" will likely be an issue among those regulated. This strategy would not be enacted concurrent with a commercial food waste ban, but would be enacted as a way to compel food waste diversion in the absence of an outright ban. It's effects would not likely be comparable to an outright ban.

Risk of Not Achieving Results within Timeframe

Risk to SPU regarding achievement of desired results is estimated to be high. A high level of risk is assumed because the burden of enforcement necessary to produce compliance leading to behavioral change is being passed to another local agency. In addition, significant opposition from the applicable trade associations is likely as additional space required for recycling may impact restaurant revenue producing activities. The result in the absence of enforcement may be a curtailment of use of the space for recycling purposes. As a consequence, there is a high level of uncertainty around the estimated efficiency rate of 5%.

Pros:

- Significant diversion rate
- Costs to SPU, ratepayers and consumers are expected to be nominal
- Should ultimately result in reduced ratepayer costs as more of the commercial waste stream is shifted to organics for composting (which incurs lower tip fees)

Cons:

- May result in an uneven "playing field" by subjecting new restaurants to a requirement that may be inconsistent with the spaces occupied by existing restaurants.
- Increases compliance monitoring and enforcement requirements

- Requires contractors to work with commercial sector to design individual collection systems
- Likely to face opposition from restaurant industry until benefits become clearer following implementation

Assumptions

Potential diversion is calculated based on the estimated amount of compostable organics produced by the restaurant component of the commercial sector. This estimate was developed using the following assumptions:

- Restaurants account for 15% of total commercial sector waste generation (MDEP 2002)
- Based on this percentage, restaurants account for approximately 86,800 tons of waste in 2038 (SPU 60% Projections)
- Approximately 70 to 80% of restaurant waste is compostable organic material, with an estimated 76 percent is applied here based on statewide estimates in Massachusetts (MDEP 2002)
- Based on this percentage, the compostable portion of restaurant waste is approximately 66,000 tons in 2038

The total diversion rate is estimated using assumed participation and efficiency rates as follows:

- Participation rates are expected to be very high (85%), assuming that restaurants will be compelled to comply with space provision requirements by routine inspections and fines
- Efficiency rates are estimated to be very low (5%) due to the fact that enforcement is not being applied at the level of disposal (there is a higher level of uncertainty surrounding this estimate because no real world supporting data could be identified)
- At these rates total diversion for this option is estimated at 2,525 tons in 2038.

Program O&M costs are estimated using the following assumptions:

- SPU will cover all advertising and education costs, totaling $100,000 in year 1.

- SPU will subsidize 10% of Seattle/King County Public Health enforcement costs, estimated using the following assumptions:
  - Inspections will be administered as part of the existing Seattle/King County Public Health restaurant inspection system
  - There are approximately 3,000 restaurants in Seattle, each of which is inspected an average of two times per year (Seattle 2007)
  - Each inspection requires 1.5 hours of inspector (i.e., Analyst) time and 1.5 hours of additional administrative time for record keeping and enforcement
  - One FTE equals 2,000 total hours
  - On this basis, a total of 4.5 inspector/analyst and 4.5 administrative FTEs are necessary to administer the inspection program
  - Total labor costs to SPU, 0.45 Inspector/Analyst FTE and 0.45 Administrative FTE, plus 0.10 Manager II FTE
  - Based on these assumptions, total subsidized labor costs equal $68,740 in year 1

This program is assumed to incur no capital or change in variable costs to SPU. Collection of increased organics diversion would be incorporated into the existing system.

References

MDEP. 2002. Commercial Waste Disposal Assessment Report for Year 2000. Massachusetts Department of Environmental Quality, Bureau of Waste Prevention. November 2002. 30 p.

Seattle. 2007. City of Seattle Business License Database output. Available at: http://Seattle.gov/biz. Website viewed on February 22, 2007.

SPU. 1998. Seattle's Solid Waste Plan: On the Path to Sustainability. City of Seattle's Recycling Potential Assessment/System Analysis Model (RPA).

SPU. 2003. Revised 60% projections. Microsoft Excel spreadsheet provided by Seattle Public Utilities.

Seattle “Green Dot” Program (#391)

Description

Initiate fee system targeting product producers, administered by third party, to brand products with a "Green-Dot"-like symbol and use a fee to offset municipal costs of curbside recycling collection.

Background

The majority of the following data is synthesized from the Package Recovery Organization Europe (PRO EUROPE) website: http://www.pro-e.org/

Germany’s Green Dot Program

Green Dot is a trademark used on packaging that notifies consumers, retailers and government authorities that payments are being made to a national packaging recycling company to collect, sort and recycle packaging waste. The program was first developed in Germany in the early 1990’s and has since been expanded to an additional 20 European Union (EU) countries, four non-EU (candidate) countries, Norway and Canada. The manufacturer (brand owner) must either take back packaging or contribute to national recycling program. The amount the manufacturers pay is based on the type of packing and the volume or weight of the material.

The program is implemented and overseen by Package Recovery Organization Europe (PRO EUROPE). PRO EUROPE’s main objective is to provide trademark licenses to all existing, nationally recognized collection and recycling organizations (recovery organization) and to establish the Green Dot as a European trademark. Each national recovery organization is responsible for implementing producer responsibility to manufactures and ensuring that packaging recycling complies with EU legislation. The recovery organizations all provide their own special services and do not necessarily offer the same services as the other national recovery organizations. However, all recovery services have the same goals: transparent operations; are backed by the brand names, retailers and the packaging producers; promote packaging prevention, optimize recycling and recovery, provide environmental education, and conserve resources. In addition, the uniform financing model and Green Dot licensing agreements have similar structure. To enforce the program, Government authorities and Green Dot organizations provide surveillance and regular checks of retail locations to ensure that all products displaying the Green Dot trademark are genuine. If they are not, the manufacturer is breaking international law and will be held accountable.

- More than 130,000 licensees use the Green Dot trademark marking more than 460 billion pieces of packaging worldwide.

- Over 200 million people recycle their packaging via a collection system set up by a Green Dot organization.

- More than 20.5 million tons of packaging was recovered in 2005.

- More than 1.6 million tons of plastic packaging was recycled in 2005.

Green Dot – Canada

The Canadian CSR, Green Dot North America program works on behalf of brand owners, retailers, and the packaging industry providing cost effective management solutions for managing packaging, printed materials and other products at end of life. Their focus is as follows:

- Promote equalization of new EPR initiatives being implemented in provinces throughout Canada to ensure a level playing field and to lessen the burden on industry.

- Lessen the costs to Green Dot members by administering the program in the most efficient manner.

Unlike Europe where Green Dot license fees pay for package recovery programs, the Green Dot North America mandate managed by Canadian CSR is meant to protect the Green Dot trademark in Canada, United States and Mexico—these North American Countries do not have Green Dot packaging ordinances. The license fees cover the cost of identifying and licensing users of the Green Dot symbol sold in North America. There is not a national regulation in Canada, the United States or Mexico like the program in Europe. In Canada, the solid waste responsibility is created by the provincial government and waste management and operations are the responsibility of individual municipalities.

Public awareness of the Green Dot symbol in Canada is low because few packages carry the symbol. Green Dot North America identifies and locates products with the symbol, notifies the company and facilitates the licensing agreement and fee payment. At this time, 160 companies are paying the licensing fee on an annual basis to continue using the Green Dot in the North American market. These companies are typically international in nature and have incorporated the Green Dot symbol on their packaging (with payment of fees) to comply with the PRO EUROPE program. When in non-Green Dot countries, these companies tend to use the same packaging designs that display the symbol. They must pay a separate license fee to be able to display the Green Dot in the Canada, United States, and Mexico or remove the symbol on the packaging used in these countries.

Canadian Provincial Non-Green Dot EPR Regulations Currently in Effect:

In Ontario, packaging and printed paper regulation was implemented in 1994. The program requires brand owners and importers (first level) to fund 50% of the municipal recycling programs. A similar program is started in Quebec in 2006.

The following describes the 2007 Quebec Corporation Recycling Support fees per ton per specific sectors and associated materials:

Category	Material	2007 Obligation Fees Dollars/Ton (Converted from Euro to U.S Dollars 3-8-07)
Printed Materials		
	Newspaper Publishers	1.70
	Newsprint – Flyers	5.74
	Magazines and Catalogues	15.67
	Telephone Directories	15.67
	Other Printed Paper	**Total: $54/ Ton**
Paper Packaging		
	Corrugated Containers	61.04
	Boxboard/Other Paper	61.04
	Gabletop Containers	85.66
	Aseptic Containers	85.66
	Paper Laminate Packaging	85.66
		Total: $379/ Ton
Plastic Packaging		
	PET Bottles and Jars	99.19
	HDPE Bottles and Jars	85.89
	Other Rigid Plastics	125.40
	Plastic Laminants	125.40
	Polystyrene	125.40
	LDPE/HDPE Film	125.40
	Textile Packaging	125.40
		Total: $812/ Ton
Steel Packaging		
	Paint Cans	37.47
	Aerosol Containers	37.47
	Other Steel and Metal	37.47
		Total: $112/ Ton
Aluminum Packaging		
	Food and Beverage Cans	-15.90
	Foil and other packaging	49.95
		Total: $34/ Ton
Glass Packaging		
	Flint/Clear	30.64
	Colored	34.75
		Total: $65/ Ton
Total All Categories: $1,456/ Ton		

Materials Involved

Traditionals: Multiple

Implementation Timeframe

Implementation Date: 2020 Ramp Period: 10 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial	Undetermined	Undetermined
Traditionals	Undetermined	Undetermined
Residential	Undetermined	Undetermined
Traditionals	Undetermined	Undetermined
Self-Haul	Undetermined	Undetermined
Traditionals	Undetermined	Undetermined

Diversion Potential

Undetermined

Environmental Benefits

The environmental benefit is expected to be high due to the reduced demand for virgin resources with recycled materials entering the recovery cycle; a significant amount of toxic chemicals could also be diverted from landfills, which would decrease potential for groundwater pollution and other pollution in general.

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$8,560	$8,560	$8,560	$8,560	$8,560
Capital 10 Yr.	$0					

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton		$0	$0	$0	$0	$0

Positive impacts for such a program would mainly be the supplemental revenue produced by fees paid by manufacturers that would help offset the cost of solid waste management by the City of Seattle. The total amount is not estimated here, however, using the SPU March 24 projections, estimated 2004 tonnage (46,596 tons) of newspaper recycled from all sectors would generate $79,825 in support of the City of Seattle recycling program. Note: For purposes of estimation, Euros were converted to U.S. dollars. Total dollars are based on metric tons.

Consumer costs would like rise as a result of this program unless specifically excluded under the enabling legislation.

Action Feasibility

Proposed action is feasible and has a low probability of success. The State of Washington has already enacted an EPR program targeting e-waste which indicates a trend that is likely to target other sectors within the next few years. However, the implementation of a program similar to the PRO EUROPE Green Dot program or the Quebec program would be better suited at the state and federal level rather than at the city level. The City of Seattle could be actively involved in the promotion of this type of program through capturing broad support similar to the Mayor Greg Nickels Climate Protection agreement established with 418 majors across the United States.

Risk of Not Achieving Results within Timeframe

Proposed action is considered to be high risk.

Assumptions

References

Product Recovery Organization Europe (PRO EUROPE). http://www.pro-e.org/, 2006-2007 Brochure: Europe Goes Green Dot, updated November 2006, access on 3-5-07 by Herrera Environmental Consulting.

Emphasize 'Closed-Loop Recycling' in Processing Contracts not 'Down-Cycling' (#394)

Description

Implement a cooperative program among manufacturers and key hauling and processing organizations to emphasize closed-loop recycling in processing contracts rather than down cycling. Closed loop recycling involves the use of products that can be taken back after use, recycled and remanufactured back into the same products. This ensures that the waste stream is tailored to maximize the amount of product recycled and to minimize waste sent to the landfill.

Background

'Closed-loop' since creates efficiencies with product manufacturing, maximizes the substitution of virgin raw materials, and reduces the impacts of resource extraction. Steel is an example of a material that after recycling can be re-manufactured intothe same application. ‘Down-cycling’ or ‘open-loop recycling’ is when materials from one type of product are recycled and remanufactured into a different product. The remanufactured product may have a lower value (which impacts the strength of the commodity market), or may have a limited useful life and be difficult to recycle from that application.

Problems with Recycling

- Contamination: To make products with recycled materials and meet manufacturer expectations for cost and efficiency, and customer expectations on quality, the material must be clean and contain only one specific material. For example, contaminants such as plastic in recycled paper cause blemishes in the final product, or maintenance problems with machinery that reduce efficiencies and increase costs. Manufacturers that must rely on spot market purchases of raw material run a high risk of inconsistent quality.

- Consistent Supply: Manufacturers require a consistent and ongoing supply of raw material to meet production schedules, and cost targets, particularly with the advent of “just in time” inventory procedures. In addition, recycled materials may require specialized material handling equipment. Since the supply of recycled material is subject to a variety of independent factors, such as economic conditions, changes in product configuration, product substitution, etc., manufacturers are reluctant to invest the capital to configure manufacturing processes to an inconsistent supply of raw material.

- Lack of Markets: In many instances, the supply of recycled material exceeds the manufacturing capacity to use it. This means that it may not be recycled, or that commodity prices fall so low that recyclers stop handling the material because prices do not justify costs. The cost of collecting, transporting and recycling is often higher than the price for which recycled materials can be sold.

London, UK

A closed-loop recycling project in the UKfocuses on sustainable packaging for the food and beverage industry. Closed Loop recycling is achieved by working with iconic retail and fast food organizations to tackle packaging waste. By helping public place vendors and retailers to source packaging materials that can be recycled after use, levels of waste are greatly reduced. Closed loop systems address the supply, usage and capture of materials; examining systems and process changes to drive greater efficiencies that deliver marketable advantages; contributing to an organization's ability to meet their corporate social responsibility objectives.

Barriers Identified

The Closed Loop Project (CLP) was not able to implement true closed loop systems in most cases with projects often focused on purchasing food and beverage packaging that were recyclable rather than purchasing recycled content food and beverage packaging. This was due to a lack of recycled content packaging available for specification and purchase within the UK. The only available recycled content disposables were items such as serviettes and carrier bags. Glass bottles have contained post-consumer waste glass for some time due to the economic benefits of remanufacturing it and its ability to be cleaned thoroughly.

There are no businesses manufacturing recycled content plastic or paper food or drink packaging in the UK. Closed Loop London is currently developing a 35,000 ton-capacity plant to recycle PET and HDPE plastic in Dagenham. The plant will take in mixed bottle materials, PET and HDPE, sourced from the London and greater London region. The materials will be sorted and the PET processed to food grade standard for the use in a range of food packaging applications; bottles, salad bowls, trays and sandwich wedges.

Closed Loop London's protracted experience in bringing recycled content plastic food packaging to London provides an example of the critical barriers to the development of recycled packaging products - both paper based and plastic, leading to a lack of product availability.

Materials Involved

All recyclables

Implementation Timeframe

Date: 2010 **Ramp Period:** 5 – 10 Years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial	Medium	
Traditional		
Residential	Medium	
Traditional		
Self-Haul	Medium	
Traditional		

Diversion Potential

Undetermined

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M	$ 8,560	$ 8,560	$ 8,560	$ 8,560	$ 8,560	$ 8,560
Capital 10 Yr.	-	-	-	-	-	-

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00

Risk of Not Achieving Results within Timeframe

Pros:

- Environmental and economic benefits would be significant as large quantities of materials will be diverted from landfill and recycled.
- Fewer materials disposed at landfills and more kept in the cycle of use.

- Lower cost, raw materials reduces product prices

- Companies gain recognition for their recycling efforts with consumers, the community and investors

- Ensure future demand for recycled materials

Cons:

- Increases SPU costs moderately in the beginning, though costs would decrease over time.

- Behavior change issues.

- Contamination, to make new products from old, the material must be clean and contain only one specific material.

Assumptions

A ‘closed loop’ recycling program is expected to complete the following:

- To develop a flexible approach to the closed loop recycling concept to enable it to be adapted to different client types within different market sectors.

- To raise the awareness and acceptance amongst potential clients and to increase the general public’s awareness of recycling and buying recycled products

- To increase tonnage recycled and to decrease tonnage to landfill

- To increase product and market development opportunities

- To assist businesses to operate in an economically and environmentally sustainable manner

- O&M cost includes a full time employee at an annual cost of $55,600 (includes salary and fringe benefits). Full time employee coordinates program with retailers, manufacturers, recyclers and consumers, prepares press releases, places advertising, and posts notices to City web pages.

- Educational materials (printed materials) have an annual cost of $30,000.

- The City of Seattle would have to provide strong coordination between the public, home improvement stores, distributors, manufacturers, and salvage/retail stores to make this option effective.

Reference

Department of Environment and Conservation http://www.environment.nsw.gov.au/publications/html/downtoearth/allaboutwaste.htm

London Remade. December 2006. Closed Loop Project Final Report.http://www.londonremade.com/download_files/Closed_Loop_Project_Report_FINAL.pdf

Ban PVC Plastic Packaging (#399)

Description

Develop new regulations to ban the use of Polyvinyl Chloride (PVC) plastic as packaging material. PVC is dangerous to human health and the environment throughout its entire life cycle, at the factory, in our homes, and in the trash. Human bodies can be contaminated with poisonous chemicals released during the PVC lifecycle, such as mercury, dioxins, and phthalates, which may pose irreversible life-long health threats.

In Europe, PVC packaging is the second largest use of PVC, accounting for approximately 20% of all PVC produced. It is being aggressively phased out in Europe. Switzerland has banned PVC mineral-water bottles. PVC packaging has been virtually eliminated by all Austrian supermarkets. The Danish supermarket chain, Irma, has achieved a 99% reduction in PVC in all products sold. Sony-Europe, one of the world's largest users of packaging, now has a PVC-free packaging policy. Two large mineral-water producers, SPA and EVIAN, have phased out PVC bottles in favor of other plastics.

Many municipalities across the U.S. are banning PVC or strongly recommending that it be phased out. Following are the examples of regulations in other jurisdictions:

- It is banned for use by retail food vendors in Rahway, NJ.

- Oakland, CA has urged health care institutions to reduce PVC use and eventually become PVC-free.

- San Francisco, CA has adopted a resolution to eliminate dioxin wherever possible. The Marin County Board of Supervisors passed a resolution to eliminate dioxin emissions, promoting less-toxic, non-chlorinated, sustainable alternative products and processes, such as chlorine-free paper and PVC-free plastics.

Background

In 1997, more than 14 billion pounds of PVC were sold in the U.S., making PVC the second most commonly used plastic resin. The vast majority of PVC is used in construction applications, such as PVC pipe and vinyl siding. In 1994, only 7% of PVC sales were in the area of packaging, and PVC represents less than 5% of the U.S. in all plastic packaging applications.

As a packaging material, PVC is most commonly formed into very thin (0.5-4 mil.) plastic "film" (such as that used to wrap meat) and as thicker plastic "sheet," which is molded into some type of rigid container shaped like a "clam shell." Other common food packaging applications include clear blow-molded bottles and as "coatings" on other types of plastic packaging materials.

Use of PVC in packaging applications has declined substantially from the late 1980's, totaling a 40% decline in the U.S. alone. By weight, PVC constitutes only roughly 0.5% of the municipal waste stream. Even this small amount, however, contributes roughly 50% of the total chlorine found in a typical municipal solid waste incinerator.

Many within the health care community have already used these same findings to spearhead efforts to reduce or eliminate PVC use in medical products and product packaging. However, no comparable campaign has been established in the U.S. targeting PVC use in food, cosmetic, and consumer product packaging applications, despite the fact these categories constitute a market size far larger than medical product packaging.

PVC packaging use on consumer and food products has declined over the past few years. However, there still remains a need for coordinated efforts to highlight the detrimental impacts of PVC and pressure manufacturers to adopt alternative packaging strategies:

- Establish a corporate policy statement on PVC use
- Conduct an internal audit of store-brand products, working with the manufacturer/ packager of these products to find alternative packaging strategies
- Conduct a review of national brands in the product categories most likely to be packaged in PVC , encouraging the manufacturers to switch to alternate packaging materials
- Establish a promotional campaign saluting companies which switch from PVC packaging
- Establish an education campaign targeting store customers
- Support efforts to expand use of the voluntary resin code labeling scheme used on rigid plastic packaging

PVC alternatives are affordable and already competitive in the market place. In many cases, the alternatives are only slightly more costly than PVC, and in some cases the costs of the alternative materials are comparable to PVC when measured over the useful life of the product. Phasing out PVC in favor of safer alternatives is economically achievable. A PVC phase-out will likely require the same total employment as PVC production. The current jobs associated with U.S. PVC production (an estimated 9,000 in Vinyl Chloride Monomer and PVC resin production, and 126,000 in PVC fabrication) would simply be translated into production of the same products from safer plastic resins.

Materials Involved

PVC plastic packaging

Implementation Timeframe

Implementation Date: 2015 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
Material		
Residential		
Material		
Self-Haul		
Material		

Diversion Potential

High

Environmental Benefits

According to the Center for Health Environment and Justice,

> *"Unlike the many plastics made without chlorine, PVC poses serious environmental health threats from the start. The production of PVC requires the manufacture of raw chemicals, including highly polluting chlorine, and cancer-causing vinyl chloride monomer (VCM) and ethylene dichloride (EDC). Communities surrounding U.S. vinyl chloride chemical facilities, half of which are in Louisiana, suffer from serious toxic chemical pollution of their groundwater supplies, surface waters and air. Residents of the town of Mossville, Louisiana had dioxin levels in their blood that were three times higher than normal. PVC plastic also requires large amounts of toxic additives to make it stable and usable. These additives are released during the use (and disposal) of PVC products, resulting in elevated human exposures to phthalates, lead, cadmium, tin and other toxic chemicals. Dioxin emissions from PVC combustion occur regularly due to the 1 million annual fires that burn buildings and vehicles, two sectors that use substantial amounts of PVC.*

Significant debate still exists on the environmental and human health benefits of banning PVC packaging. Given that most PVC production is external to Seattle, and none of Seattle's waste is combusted, any environmental benefits would accrue to those communities that host such operations.

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M		$8,560	$8,560	$8,560	$8,560	$8,560
Capital 10 Yr.	-	-	-	-	-	-

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton	$0	$0	$0	$0	$0	$0

Action Feasibility

Regulatory bans are easily achievable, but risks remain high for this strategy due to potential opposition from retail establishments that have no control over manufacturer packaging choices.

Risk of Not Achieving Results within Timeframe

Pros:

- High probability of achieving significant diversion rate
- Reduced health impacts

Cons:

- Increases costs for manufacturers and retail sellers
- Resistance from manufacturers and retail sellers

Assumptions

- A PVC Free Policy Agenda: Accomplish Time: 1 – 5 Years.
  - Educate the public about PVC hazards.
  - Establish the Right-to-Know about PVC.
  - Label all PVC products with warnings.

- Give preference to PVC-free purchasing.
- Ban PVC use in bottles and disposable packaging.
- Ban sale of PVC with lead or cadmium.
- Phase out other disposable PVC uses.
- Phase out other high hazard PVC uses.
- If safer alternatives are not yet available, extend the PVC phase-out deadlines for specific purposes.
- Fund efforts to reduce the amount of PVC generated through fees on the PVC content of products.
- Phase out remaining durable PVC uses.

- O&M cost includes a full time employee at an annual cost of $55,600 (includes salary and fringe benefits). Full time employee coordinates program with retailers, manufacturers, recyclers and consumers, prepares press releases, places advertising, and posts notices to City web pages.

- Educational materials (printed materials) have an annual cost of $30,000.

Reference

The Case against PVC Packaging. April 1998. By Stephen A. Hammer. http://www.masspirg.org/enviro/sw/pvc/page2.htm

PVC: The Poison Plastic. Center for Health, Environment and Justice. New York. http://www.besafenet.com/pvc/documents/bad_news_exec_sum.htm

Fee on Incandescent Bulbs to Fund Fluorescent Bulb Recycling (#401)

Description

Work with Northwest Product Stewardship Council and other jurisdictions to lobby state lawmakers to establish a statewide fee on the purchase of incandescent bulbs to fund fluorescent bulb recycling. Implement a cooperative program among fluorescent tube manufacturers, distributors and retailers to provide collection and recycling of fluorescent bulbs and tubes.

Background

Fluorescent bulbs use less energy to produce light than do standard incandescent bulbs and are four to six times more efficient than incandescent bulbs. This helps to reduce the amount of coal burned to provide light and thus reduces mercury emissions from burning coal. There are significant energy savings to be had by encouraging the replacement of standard incandescent bulbs with compact fluorescent bulbs. Fluorescent lights themselves contain mercury though, and are the second largest source of mercury in landfills.

Fluorescent Bulbs and Tubes Recycling Procedure

The recycling of fluorescent lights and high intensity discharge lamps is a proven technology capable of reliably recovering greater than 99% of the mercury in the spent lights. Recovery begins by separating the components by a method such as the crush-and-sieve method. In this process, the spent tubes are first crushed and then sieved to separate the large particles from the mercury-containing phosphor powder. The phosphor powder is collected and processed under intense heat and pressure. The mercury is volatilized and then distilled to the required purity. The glass particles are segregated and recycled into fiberglass. Aluminum components are also segregated and recycled separately.

All of the components of the used lights are recycled into reusable/saleable raw materials except for any polychlorinated biphenyl contained in some ballasts, which is incinerated.

There are two basic models of fluorescent bulb recycling programs and both programs collect fluorescent bulbs at one site from households free of charge.

- Recycling program run by county or municipal governments to collect household and conditionally exempt generator bulbs.
- The other model uses local retail stores as collection sites for household fluorescent bulbs, also known as “take-back” programs.

The convenience of recycling locations and the advertisement of the program appear to be the major factors that affect the amount of bulbs collected. Having a broad network of retail stores brings in more bulbs than having one facility or collection event.

Since the price of recycling the bulb will be free, a high participation rate is expected. Cost of fluorescent bulbs recycling program in Minnesota was estimated to be $300,000 per year.

Sydney, Australia

The Australian government announced plans to phase out incandescent light bulbs and replace them with more energy efficient compact fluorescent bulbs across the country. Legislation to gradually restrict the sale of the old style bulbs could reduce Australia's greenhouse gas emissions by 4 million tons by 2012 and cut household power bills by up to 66%.

Under the Australian plan, bulbs that do not comply with energy efficiency targets would be gradually banned from sale. Exemptions may apply for special needs such as medical lighting and oven lights. Fluorescent bulbs are currently more expensive than incandescent bulbs, but use only about 20% of the power to produce the same amount of light and last longer, making them more competitive over time.

Research for this option analysis yielded no examples of a municipality that charged fee on the purchase of incandescent bulbs. It is anticipated that the implementation of this program would be difficult to gain support from the manufacturers and retailers, which could prevent such an ordinance from being adopted.

Materials Involved

Incandescent bulbs, and Fluorescent light bulbs and tubes

Implementation Timeframe

Implementation Date: 2015 Ramp Period: 5 years

Expected Participation and Efficiency

Sector / Material	Participation	Efficiency
Commercial		
Incandescent bulbs, and Fluorescent light bulbs and tubes		
Residential		
Incandescent bulbs, and Fluorescent light bulbs and tubes		

Self-Haul		
Incandescent bulbs, and Fluorescent light bulbs and tubes		

Diversion Potential

Diversion Potential: Low to Medium

Environmental Benefits

A significant amount of mercury from fluorescent tubes and other mercury containing switches would be diverted from landfills, which would decrease potential for groundwater pollution and other pollution in general.

The non-CFL component of the waste stream would weigh between an estimated 376 to 470 tons and contain anywhere between 15,066 and 18,833 pounds of mercury, based on the following assumptions:

- 4 foot fluorescent tubes account for 80% of all lamp types, weigh approximately 0.6 lbs each, and contain 5 grams of mercury
- 8 foot fluorescent tubes account for 10% of all lamp types, weigh approximately 1.2 lbs each, and contain 12 grams of mercury
- Remaining lamp types (specialty bulbs, halogen lamps, etc.) account for the remaining 10 percent of bulb types, average 0.6 lbs each, and average 8 grams of mercury

The CFL component of the waste stream would weigh approximately 27 tons and contain anywhere between 1,200 pounds of mercury, based on the following assumptions:

- Various CFL bulb types weigh an average of 0.5 lbs each
- The average CFL bulb contains between 5 of mercury

Cost

Fixed Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
O&M						
Capital 10 Yr.						

Variable Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Per Ton						

Action Feasibility

Risk of Not Achieving Results within Timeframe

Pros:

- Generates funds to recycle fluorescent lamps
- Promotes the use of fluorescent bulbs and tubes
- Recycling fluorescent light tubes mitigates the potential for mercury to enter the environment
- Recycling fluorescent light tubes reduces raw materials production needs

Cons:

- Increases consumer costs.

Assumptions

- Program participation and efficiency is expected to be high as fee is collected.
- Households will not be allowed to dispose of fluorescent bulbs as solid waste.
- Convenience, price and advertising are three major factors that influence success in a fluorescent bulb recycling program.

Reference

Recycling fluorescent Light tubes and high Intensity Discharge Lamps. May 2003
http://p2library.nfesc.navy.mil/P2_Opportunity_Handbook/2_II_6.html

Portland General Electric. 2001. Compact Fluorescent Bulb Recycling: Program Case Studies and Recommendations.
http://www.zerowaste.org/publications/CFL/CFL_case_studies.htm

Appendix

All Strategies Considered During the Zero Waste Study

Table V.2-1
All Strategies Considered During the Zero Waste Study

ID	Strategy
104	Expand Public Space Recycling
105	Increase Frequency of Residential Recyclables Pickup
107	Single Contractor For Residential Recyclables Collection
108	Mandatory Commercial Recycling Services
109	Add Glass To Residential Commingled Recyclables
117	Backyard Food Waste Vermiculture Program
118	Rate Structure Review for Commercial Organics Collection
123	Multifamily Residential Organics Program
124	Commercial Weight-Based Garbage Rates
127	Collection Payments Based On C&D Recovery Levels
132	Separate C&D Waste Collection Contract(s) Material Diversion And/Or Destination Requirements
133	Collection Rate Incentives For C&D Recycling By Contracted Haulers
134	Collection Payments Based On Tons Recycled And Containers Served
138	Enhance Business And Industry Resource Venture
152	(Other) Disposal Bans
153	Add Alakaline Batteries to Existing Curbside Recycling Program
155	Source Separated Recycled Material Rate Discount
157	Expand The Traditional Recycling Education Campaign.
160	Expand Inspection & Enforcement Program
164	Enhanced Educational Outreach
165	Recycling Market Development Zones
169	Disposal Ban For Used Oil Bottles
170	On-Demand Annual Or Biannual Bulky Item Recycling Collection (With Set # Limit)
172	C&D Debris Facilities Reporting Program
173	C&D Recyclables Disposal Ban
174	Development Incentives For Green Building Practices
175	Deconstruction (Salvage And Reuse) Requirement
176	LEED Certification Requirement For All New Commercial And Residential Building Permits
177	Salvage And Reuse Swap Sites
181	Annual Or Biannual Compost Giveaway

ID	Strategy
182	Residential Food Waste Disposal Ban
186	Market Development For Gypsum, Asphalt Roofing, Wood Waste To Non-Fuel Markets, Except ADC
187	Incentive Program to Encourage Biomass/Organics To Energy
188	Incentive Program for Application of Organics Compost on Farmlands
189	School Campus Recycling
190	Recovered Materials Certification & Reporting
192	Pet Waste Composting
193	Plastic Bag Initiative
195	Take Back Program for Used Tires
196	Take-Back Program fo Used Motor Oil
197	Wood Salvage Program
199	Eco Parks for Resource Sharing and Material Market Development
200	Lobby Senior-Level Government To Eliminate Economic Incentives For Virgin Resource Extraction
201	Disassembly For Recycling Regulation
202	Packaging Tax
203	Enhance EnviroStar and Construction Works Program With Enhanced Marketing And Outreach
204	Building Permit C&D Reuse And Recycling Fee Deposit
206	Require Use Of Recycled Crushed Glass For Various Construction Within City Limits.
207	Develop Private Facility For Intermodal Waste Transfer And Waste Processing
208	Design Movable Push Walls To Ensure Site Flexibility And Adaptive Reuse
209	Incentivize Development of Private Mixed C&D Debris Recycling Facility
211	Processing Requirements For C&D Receiving Facilities
212	Pre-Approved Certification Of C&D Processing Facility With Diversion Incentives
215	Automated Collection System For Recycling And Refuse
216	Take-Back Program For Ink Jet Cartridges
217	Self-Haul Computer Parts
218	Take-Back Program For Household Sharps
219	Expand Take-Back Program For Fluorescent Lamps to Include Thermostats and to Build Business Participation
220	Take-Back Program For Used Athletic Shoes

ID	Strategy
221	Residential On-Demand Collection Of Waste (C&D) Building Materials
226	Wood Waste Drop Off Center
227	Hard To Recycle Materials Drop Off Center
228	Product Ban for Styrofoam To-Go Containers and Single-Serve Foodservice
229	Take-Back Program For EPS Foam Packaging – Negotiate With The Association Of Foam Packaging Recyclers
231	Take-Back Program For Furniture.
235	Incentive Program for Application of Yard Waste Compost For Erosion Control
240	Performance-Based Contracting For Solid Waste Service Contracts
241	Green Lodging Program
242	Promote Green Roofs
243	Expand City of Seattle Sustainable Purchasing /Buy Recycled Program
244	Add Mercury Thermometers to Take-Back Program For Auto Switches, Thermostats, Lamps, Flourescent Lamps, Dental Waste, Medical Waste
245	Large Venue/Event Waste Reduction Ordinance
246	Deposit Program for Plastic Grocery Bags and Other Common Items
249	Commercial / Institutional On-Site In-Vessel Composting
253	Expand Residential Curbside Organics Collection to Include All-Food
265	Take-Back Program For Carpet
270	Tiered Commercial Garbage Rates
273	Residential Diaper Composting
276	Take-Back Program For Product Packaging By Retail Sellers
279	Take-Back Program for Household Chemical Waste
280	Self-Haul Food Waste
281	Residential Weight-Based Garbage Rates
283	Rate Structure Review for Garbage Collection
284	Rate Structure Review for Recyclables Collection
285	Commercial Organic Waste Disposal Ban
287	Decrease Frequency of Garbage Pickup
288	Alter Container Sizes For Residential Recycling
289	Reuseable Transport Packaging

ID	Strategy
291	Take-Back Program For Cell Phones
293	Market Development For Color-Separated, Bottle-To-Bottle Glass Recycling.
298	Beverage Container Deposit System
301	Incentive Program for Waste Audits/Assessments
302	In-Vessel Composting Facility
307	Tiered Commercial Organics Rates
311	Disposal Ban For Vehicle Batteries
312	Rate Structure Review for Residential Organics Collection
314	Ban on PBDE Flame Retardants
315	Take-Back Program For Printer Toner Cartridges
316	Residential Curbside Collection of Electronics Waste
318	Cooperative Promotion of Private Recycling Initiatives
320	Universal Waste Disposal Ban
322	Conduct a Waste Sort to Collect Data on the Quantities, Types and Brands of Products Being Disposed and Allocate Costs to Respective Manufacturers
323	Ban Self Haul Disposal at City Owned Transfer Stations
324	Create Bonus/Incentive Program for SPU Staff for Material Diversion Targets at RDSs
325	Increase Hours of Operation And Have Both Transfer Stations Accept Household Hazardous Waste (HHW)
326	Create Distributed Drop-Box Yard Waste Collection Sites for Commercial Businesses
328	Create a Policy Link Between Recycling, Zero Waste, Clean Manufacturing, and Economic Development
329	Create Regional SWAC to Lead, Establish and Implement Cooperation on Zero Waste, Waste Reduction, Recycling, Market Development, "Design For Recycling" Standards, Collection, Facilities, and Disposal Activities
330	Mandatory Commercial/Institutional Waste Audits
332	Raise Self Haul Tipping Fees and Illegal Dumping Fines
333	Mandatory Multi-Family Residential Building Waste Audits/Cash Awards for Winning Apartment Building (best participation in recycling)
334	Enhance Current Website
335	Backyard Pet Waste Composting
336	Create a Policy Link Between Recycling, Zero Waste, Clean Manufacturing, and Other Environmental Initiatives
339	Computer Waste Disposal Ban

ID	Strategy
340	Create or Adopt Eco-Labeling Requirements for Recycled Content, Recyclability, Product Packaging Ratio, and Toxic Content.
342	Minimum-Content Legislation
343	Provide Tax Breaks or Incentives for Meeting Maximum Packaging-to-Product Ratio by Weight Standards
344	Organize "Design For Recyclability" Summit
345	Establish/Enhance Disaster and Storm Debris Recycling Plan
349	Disposal Ban For Recyclables In Commercial Waste
350	Anaerobic Digestion Reactor for Organics Processing and Biofuels Production
352	Implement a Tiered B&O Tax System to Encourage Product Stewardship
353	Compostable Plastic Bags
355	Chemical Policy and Precautionary Principal
356	Pesticide/ Herbicide Policy or Regulation
360	Expand Scrap Metal Residential Curbside Recycling
361	Post Consumer Residuals Stewardship Program
362	Residential Curbside Collection Of Waste (C&D) Building Materials
363	Take-Back Program for Used Building Materials at Home Product Centers
364	Product Tagging System in Retail Stores.
365	City Property Tax Deduction for Salvage/Deconstruction
366	Expand Current Tire Recycling/Collection Programs
367	Adjust Rate Structure for Self Haul Disposal at City Owned Transfer Stations
369	Pesticide Container Recycling Program
370	Exchange Event for Usable Household Chemicals
372	Annual City and/or Neighborhood Report Cards for Recycling Successes Published on City Website
373	Limit the amount of municipal solid waste/C&D waste that City-contracted haulers can divert to City transfer stations.
374	Meet with the Greater Vancouver Regional District (B.C.) to share strategies on increasing diversion.
375	Set Product Stewardship/Take-Back Program Support Requirements for City Procurement
376	On-Call Curbside Electronic Waste Recycling Including Appliances with Circuit Boards
377	Free Economic Analysis Tool for Assessment of Commercial Recycling by Commercial Generators

ID	Strategy
378	Maximum Commercial Recycling Container Rate
379	Create Larger Differential Between Disposal Tip Fee and Fee to Dump Recycleables
381	Mixed Waste Processing (Dirty MRF)
382	Waste Screening at Transfer Stations for Exclusion of Banned Recycleables
383	C&D Waste Pre-Processing Requirement for Commingled Materials
384	Ban Plastic Film in the Garbage
385	Commercial Consolidation Equipment Loan Fund (Balers and Compactors)
386	Health Department Permit Requirement that Restaurants Must Have Food Waste Collection Space and Material Handling Facilities
387	Wood Waste Self-Haul Ban and Wood Waste Drop off Facility Development
388	Flushable Diaper Incentives
389	Waste "Cap and Trade" Program
391	Seattle "Green Dot" Program - Producers Share in the Cost of Curbside Recycling
393	Initiate Distinction in Measuring Recycling Rates by 'Closed-Loop Recycling' vs. 'Down-Cycling'
394	Emphasize 'Closed-Loop Recycling' in Processing Contracts not 'Down-Cycling'
396	Grocery Bag Fee
397	Take-Back Program for Asphalt Roofing
398	Ban PBDE in Products
399	Ban PVC Plastic Packaging
400	Subsidize Reuseable Diaper Services from Fee on Disposable Diaper Purchases
401	Fee on Incandescent Bulbs to Fund Fluorescent Bulb Recycling
402	Reduce Volume Discounts on Extra Garbage Cans ($/gallon of capacity)
403	Mandatory Waste Reduction & Recycling in Public School Curriculums
407	Mandatory Plastic Bag Take Back Program