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Chittenden Solid Waste District Analysis of Residential Curbside Organics Collection Options

FINAL REPORT

Prepared for:

Chittenden Solid Waste District

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Key Definitions Used in the Report

- Consolidated Collection System is defined as the County is divided into several collection districts, each served by one hauler for the collection of recyclables, trash, and organics.
- Current Collection System is defined as current haulers must offer collection of organics on their current recycling and trash routes as specified in Act 148 without CSWD involvement (except education and outreach).
- Single Hauler for Organics Only is defined as separate collection of organics is bid out for the whole geographical area specified. The current collection system is used for recyclables and trash.
- Food Scraps Program: This service is provided curbside, and the customers receive outside containers and are provided coupons redeemable for in-home containers. We assume liners are not needed (per the pilot and other cities' experiences) but are available locally for purchase.
- Yard Trimmings Program: This program, delivered 8 weeks annually (4 weeks in spring, and 4 weeks in fall), assumes customers use large paper bags to set out the eligible yard trimmings for collection.
- Voluntary vs. Mandatory Options: whether the program is purely voluntary, "mandatory", in which households are required to separate organics but are not required to manage them through curbside service, or "mandatory with pay", in which all households would be paying for the service, whether they participated or not.

1: Executive Summary and Recommendations

Background

Chittenden County Solid Waste District (CSWD) has responsibility for solid waste management in the County and its 18 communities through a mix of public, public / private, and private operations. The CSWD has achieved a well-above-average 39% diversion rate for residential recycling and organics (excluding Bottle Bill and special waste materials), and its research has identified organics as the next practical step for increasing residential waste diversion in CSWD. The District hired a consultant (Skumatz Economic Research Associates / SERA) to explore enhanced, effective, cost-effective, and environmentally sound options for curbside organics service.

The project gathered data on best practices for organics programs from communities across the nation, and used in-depth interviews with half a dozen communities to help craft options for the design of the organics program for CSWD. These efforts also provided information on containerization, charges, participation, pounds per household, capture rates, and other data to help with the modeling efforts. The second major effort for the project involved additional detailed data collection and a comprehensive modeling effort, focused on providing cost, performance, and other results that allowed the District to assess tradeoffs in design and roll-out of “next steps” in the organics sector. To support the model, we gathered data from national sources, from the District, and from detailed interviews and data requests with the local haulers in the County. The results and underlying assumptions were also reviewed with both the District and local haulers.

Scenarios

The project assessed a total of 54 scenarios, including all combinations of the following:

- 3 options for service area – the Entire County, Burlington Metro and the village areas in the rural communities, and Burlington Metro (without villages),
- 3 alternatives for collection arrangement – the current system with private haulers adding organics to their existing collection; a system providing organics collection through a bid-out system to select the organics hauler(s); or consolidated collection in districts for recycling, trash, and organics service.
- 3 specifications for participation – voluntary participation, mandatory participation (separate fee, other management options available), and mandatory participation reinforced with a mandatory fee embedding the cost of the program in the trash fee , and
- 2 options for program design -- food scraps collection with and without a yard trimmings program.

*The **food scraps service** is provided curbside, and the customers receive outside containers and are provided coupons redeemable for in-home containers. We assume liners are not needed (per the pilot and other cities' experiences) but are available locally for purchase. The **yard trimmings** service is assumed to be delivered 8 weeks annually (4 weeks in spring, and 4 weeks in fall), and the program assumes customers use large paper bags to set out the eligible yard trimmings for collection.*

Within these overarching scenarios, we had the opportunity of varying a number of settings. These included changes in collection frequency for each residential service – trash, recycling, yard trimmings, and food scraps, changes in assumptions about how much participation would be realized under voluntary, mandatory, and mandatory/ pay options, and a number of other settings that would allow a comparison of costs and diversion results. Underlying data included locally-tailored information on population, density, starting tons, waste composition, tipping fees, marginal costs for collection and for drop-offs, distances, container prices, administration and customer service costs, and many other inputs. These inputs were derived from national, regional, and local sources, and were reviewed by the District and haulers. The model computes impacts on tons, percent diversion, changes in costs to households, District budgets, and environmental impacts.

Summary Results

Key results and comparisons, County-wide, are presented in Figure 1.1 below, and followed by conclusions. Detail on the assumptions and settings for the model are presented in Appendix B. In addition, a printout of the model results for a base case is presented in Appendix C. Finally, more detailed tables of these results are presented in Chapter 4 in this report.

We compare results against the “Scenario 1” base case of County-wide mandatory collection of food scraps (not mandatory pay), with weekly collection of recycling, trash, and food scraps. The graph presents the cost to the “average” ratepayer, which is the weighted average of those using, and those not using, the new services.¹ The modeling work shows that this base case avoids more than 4,300 metric tons of carbon dioxide equivalent in emissions compared to current waste management and materials flows in the County. These emission impact estimates are generally proportional to the tonnage diverted.

Figure 1.1 includes six scenarios, modeled County-wide:

1. Baseline with food scrap program (no curbside yard trimmings), and mandatory participation program (separate fee, separation required but other management options available), with a participation level of 40%. (Base Case).
2. Same as Scenario 1, adding yard trimmings program.

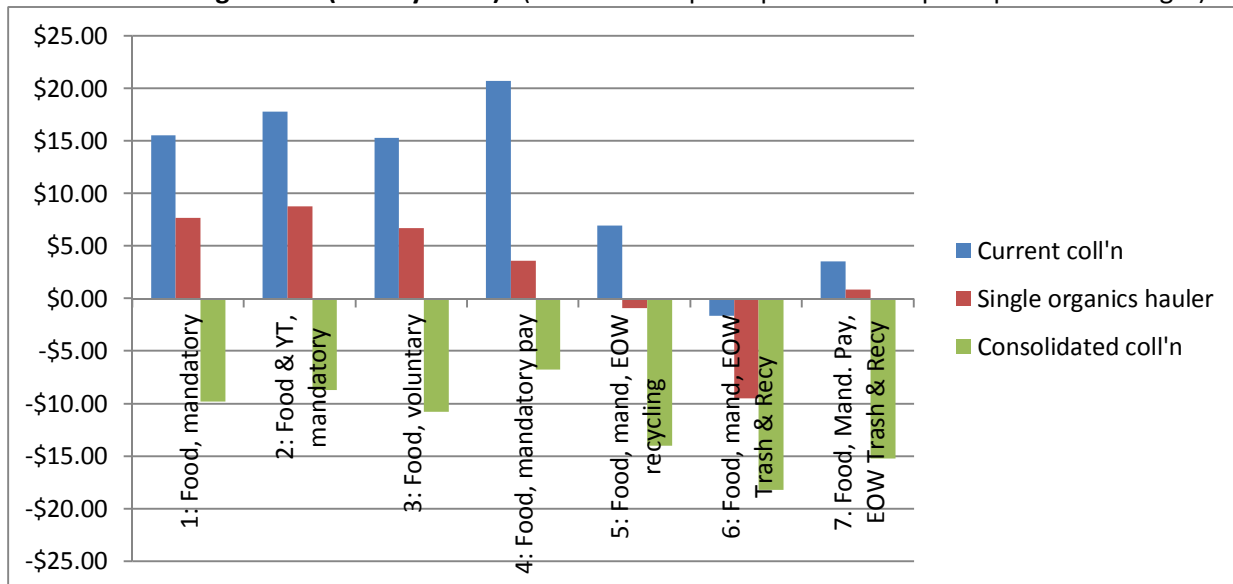
¹ See Chapter 4 for more detail. Under a voluntary or mandatory (not mandatory pay) option, only some customers will be using – and paying for—the service. “Participants” will pay more; non-participants will not incur costs for those optional services. The average is based on a computation of the cost differences plus the percent of households assumed to subscribe to the service.

3. Food scraps program (no yard trimmings) under a voluntary separation program scenario, with a participation level of 25%.
4. Food scrap program (no yard trimmings) under a program that is mandatory and mandatory pay, with participation in the range of 70-80%.
5. The baseline program (Scenario 1), modifying recycling collection to every other week (EOW).
6. The same as scenario 5, including EOW trash collection and EOW recycling collection.
7. Food scrap collection program (no yard trimmings), mandatory pay, including EOW trash and EOW recycling collection.

The settings for the various scenarios are summarized below.

Scenario	Program components included						
	Food Scraps	Yard Trimmings	Voluntary	Mandatory Separation	Mandatory Pay	EOW Recycling	EOW Recycling & Trash
1	X			X			
2	X	X		X			
3	X		X				
4	X				X		
5	X			X		X	
6	X			X			X
7	X				X		X

Figure 1.1: Results on Changes in “All / Average” Customer Rates (\$/hh/mo) from Seven Scenarios for 3 collection arrangements (County-wide). (Results blend participant and non-participant cost changes)



These results show:

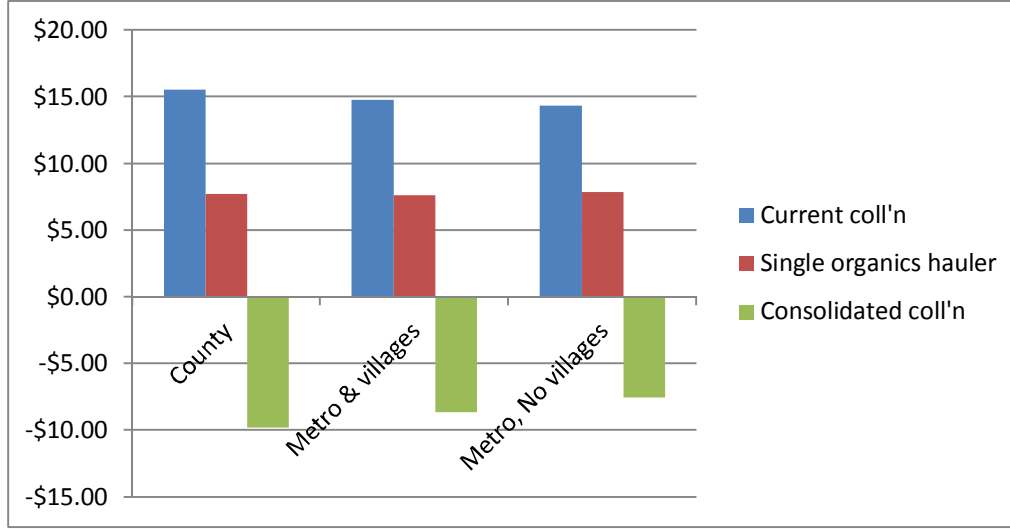
- Consolidated collection leads to significant savings. County customers have the potential to receive more service (added food scrap, with or without yard trimmings service) for lower costs than they currently pay, if the County undertakes an effort to establish consolidated service (green bars are negative in all scenarios).
- Costs are reduced – or savings increase – if recycling and/ or trash service is moved from weekly service to every other week (EOW) (comparing Scenarios 5 or 6 with Scenario 1)
- The current collection system, with private haulers adding new organics collection to their existing services, is the most expensive way for service to be provided. Additional costs are nearly halved by moving to a single organics hauler arrangement (comparing all scenarios, red vs. blue bars).
- Increased participation significantly decreases the costs to participants² under all collection arrangements (current collection, single hauler, and consolidated collection). However, average costs – representing the combination of both those who pay more and those who pay less -- remain a little higher than mandatory separation operations in which fewer opt to participate. (Comparing Scenario 4 with Scenarios 3 or 1). Note that, when coupled with less frequent collection options, costs become more attractive (comparing Scenario 7 with Scenario 4).³

Results of differences for County-wide vs. Sub-county service were also explored. Here we compare the results for the base case of mandatory collection of food scraps (not mandatory pay), with weekly collection of recycling, trash, and food scraps. The results are presented in Figure 1.2. The results show modest increases in costs to participants as the territory becomes broader and less urban-concentrated.

² Figure 4.1 later in the document demonstrates that participant costs for a food scraps program decrease from \$61 to \$39 to \$21 as participation increases from 25% to 40% to about 75% (under current collection system). For the same program, the participant costs for single hauler, and for consolidated collection, change from \$27 to \$19 to \$18; and \$9.50 to 1.82 to savings of \$6, respectively. Under the current collection system and the single hauler option, the costs for non-participants show no change until their participation becomes mandatory in the “mandatory pay” scenario (no non-participants from a pay perspective); they pay \$17-\$20 more in this scenario. Consolidated collection leads non-participants to pay less in all scenarios for this program.

³ The average rates presented blend the results of both participants (whose costs decrease with increasing participation) and original non-participants (whose rates increase as they are required to pay for new services). As the number required to pay for brand new service increases (as it does substantially in the mandatory pay option), then the number of customers with higher rates is higher. The net, presented as the average, represents an overall increase over the options in which non-participants can opt out of paying for the new services.

Figure 1.2: Changes in Rates for “All / Average” Customers (\$/hh/mo) for Variations in Service Territory in Base Case



Consultant Recommendations

From a purely economic and efficiency point of view, the results show high value from the following:

- Invoke a new consolidated collection system, which provides service at lower cost through economies of scale, routing efficiencies, etc. Costs are lower the more that costs are spread across more customers.
- Make the food scrap collection program mandatory with a mandatory fee and embed the program costs into the trash rates; the services will be cheaper, and diversion from the landfill almost doubles the tonnage from voluntary or quasi-mandatory options.
- Consider changing recycling collection frequency to every other week – or better yet, collect trash and recycling on alternating weeks, and collect the organics weekly. Diversion remains high, and costs to the average resident decrease significantly.

Figure 1.3: Summary Results of Highest Efficiency (Recommended) System Changes for adding Food Scraps Collection

County-wide Figures	Change for Participating HH in \$/month	Change in Average HH cost in \$/month	Change in Landfill Diversion
Consolidated Collection, mandatory separation	\$1.82	-\$9.78	5.0%
Current Collection + Mandatory with Mandatory Fee	\$20.76 (vs. \$61.31 for voluntary, \$38.91 for mandatory, no fee)	\$20.78 (vs. \$15.33 for voluntary, \$15.56 for mandatory, no fee, respectively)	9.8%
Current Collection, Mandatory separation +EOW Recycling	\$30.33 (vs. \$38.91)	\$6.97 (vs. \$15.56)	4.8%
Consolidated + Mandatory Fee	-\$6.38	-\$6.75	9.8%
Consolidated + EOW Recycling	-\$2.38 (-\$6.60 with EOW trash)	-\$13.99 (-\$18.22 adding EOW trash)	4.9%
Consolidated + Mandatory Fee + EOW Recycling(+EOW Trash)	-\$10.59 (-\$14.82 adding EOW trash)	-\$10.96 (-\$15.19 adding EOW trash)	9.6%

However, we do recognize the business, political, cost, and organization complexities involved in making these kinds of changes. Any of these changes provide significant improvements in efficiency and customer costs.

- **Consolidated collection** disrupts existing (hauler) businesses, and reduces competition to the number of firms selected for contracts (jurisdictions often award contracts for multiple territories, maintaining multiple firms). Households sometimes dislike losing (their own) choice, in some cases, even if costs decrease significantly. Consolidated collection also increases the District's workload somewhat, during the RFP process, and with contract oversight on an on-going basis.
- **Mandatory pay options:** Mandates are seldom popular; however, the tonnage diversion increases by multiples under mandatory programs compared to voluntary or quasi-mandatory options. Cost and collection efficiencies are also realized when all households receive service. If there is a reluctance to move to mandatory service / mandatory pay, it is always possible to identify a trigger point – a point in time at which the District looks to see if it has achieved desired goals, and if not, the mandatory / mandatory pay option is implemented.
- **Changing collection frequency:** Weekly collection is convenient, and the data indicates it pulls extra recycling diversion out of the waste stream. However, those tons come at a cost.⁴ Many communities are concerned that customers will either look at a reduction in frequency as a reduction in service, or will be confused about which week to set out materials. However, hundreds of communities around the country successfully operate alternate-week recycling service. These choices are part of integrated program planning.

The choice is one that the District must make, balancing efficiencies, costs, and diversion opportunities; customer service convenience; and political realities. The consultants note that cost-effectiveness and efficiencies are key parts of providing sustainable programs, arguing for the low-cost program elements recommended above. However, an efficient program that is not used is hardly sustainable either. We trust the District will balance these objectives based on known preferences of the citizens in the District, and note that the best program may be one that starts with very attractive, convenient programs including efficiencies, and evolves to incorporate efficiencies and the inevitable technological improvements that will be introduced into the industry.

The remainder of this report presents:

- Background on the project (Chapter 2)
- Program design and performance information gleaned from national research and selected case studies (Chapter 3 and Appendices A and B)
- Description of the modeling work and results from the project (Chapter 4 and Appendices C and D)

⁴ Skumatz, Lisa A., "Every Other Week for Everything", *Resource Recycling*, November 2013.

2: Project Background

The Chittenden Solid Waste District (CSWD) includes 18 municipalities and communities including and around the City of Burlington with 62,000 households and 6,200 businesses. The CSWD provides for and oversees responsible solid waste service through a mix of public, public / private, and private operations. The CSWD's 45% MSW diversion rate puts it in the higher tiers of diversion nationally. The District's activities in organics include on-site composting, yard trimmings management, composting facility, and organics disposal. This project was focused on providing research in support of the District's practical next steps in residential organics management. Organics represents significant additional diversion opportunities for the District. The project's objectives are to explore enhanced, effective, cost-effective, and environmentally sound residential curbside organics diversion options.⁵

To assure the District continues to deliver responsible management of solid waste, CSWD was interested in assessing key characteristics of proven residential organics collection options – including diversion, economic, and environmental performance – and considered comparative performance for County-wide service vs. sub-area geographic options (combination of Burlington Metro and the villages). The project had two main elements:

- Exploration of organics collection (food residuals⁶ and yard trimmings) programs and lessons elsewhere, including six in-depth case studies and broader nationwide findings on how they operate and their performance characteristics (diversion, costs, etc.). This research provided improved understanding of food scraps programs to allow for construction of an appropriate, effective, and cost-effective program to District residents. The project considered the performance of programmatic options for organics, including variations in terms of collection method, materials included, density considerations, and other program design elements. In order to complete the case studies, SERA conducted detailed interviews with city staff and the haulers operating organics collection programs in six comparable jurisdictions, chosen based on their programs, demographics, geographies, and data availability. These communities include: Boulder, CO, Hamilton, MA, Hutchinson, MN, Olympia, WA, Portland, OR, and Wayzata, MN. This work is presented in Chapter 3, and Appendices A and B.
- Development of a model suitable for exploring the tonnage and diversion, cost, efficiencies, and environmental impacts associated with a range of scenarios surrounding organics collection – including variations in service territory, mandatory vs. voluntary options, with and without yard trimmings, and service collection arrangement options. The tailored model and supporting data needed to allow exploration of the performance of the array of scenarios and programs requested by the District. We worked with District staff to identify the specific cases of interest to the District (54 of them for each setting choice), and identified sources of data to populate the model. We assembled input data from secondary sources, individual communities, and information from haulers and other local sources. In addition, to develop a model tailored to conditions in the CSWD – along with the needed program, operational, and cost data -- required extensive coordination and communication with the haulers in the region and CSWD staff, along

⁵ The project does not cover commercial options or analysis of biosolids.

⁶ For the purposes of this report, food residuals and food scraps will include food soiled paper and other compostable paper, unless otherwise stated.

with nationwide contacts. This included a number of on-site meetings (with haulers and staff) and on-line meetings walking through assumptions, modeling approaches, alternative scenarios, and results. We developed a high quality, defensible, flexible, tailored model that could be used to examine the performance, environmental, and other factors contributing to selection of suitable options for CSWD. This work is presented in Chapter 4 (with details in Appendices C and D).

3: Research and Findings on Other Programs

Introduction

The goals of the case study and nationwide program review were to:

- Review programs in at least six communities with organic collection programs (food residuals⁷ and yard trimmings)
- Provide information on how the programs operate and data on diversion and costs

In order to complete this research SERA conducted detailed interviews with city staff and the haulers operating organics collection programs in six comparable jurisdictions. The jurisdictions were chosen based on their programs, demographics, geographies, and data availability. The jurisdictions researched are described briefly in Figure 1.1 below.

Figure 3.1: Researched Jurisdictions

City	Why Chosen	Population	Brief Description
Boulder, CO	City has an open hauler subscription system similar to most of CSWD.	98,900	City ordinance requires all haulers operating in the City to include organics service in the trash rates for all residents, organics (food and yard) collected every other week.
Hamilton, MA	Small northeastern city with similar geography, weather, growing seasons.	7,800	Food scraps are separately collected by a contracted hauler in 13-gallon carts on a weekly basis.
Hutchinson, MN	Smaller city in a somewhat rural area (located outside the twin cities) however, the City has a dense urban-like core, similar to several jurisdictions in CSWD.	13,500	Food scraps are co-collected with yard trimmings on a weekly basis by contracted hauler.
Olympia, WA	Older program with good data. Organics collection is an optional additional fee, an option CSWD is interested in.	49,000	City provides services. Yard trimmings are co-collected with food scraps on an every other week basis. Program is optional additional fee.
Portland, OR	Largest every-other-week trash collection program in US. City has a mandatory program and has good data availability.	594,000	Multiple franchised haulers provide services for residents throughout the City. Collection rates are set by the city, not the market, and organics / recycling collections are included in the rates. Mandatory program (starting 2013)
Wayzata, MN	Smallest community researched, city is located in a northern climate somewhat similar to CSWD.	3,700	Food scraps and food soiled paper are collected weekly using a bag in a can (BlueBag Organics™) program, yard trimmings is separate program.

⁷ For the purposes of this report, food residuals and food scraps will include food soiled paper and other compostable paper, unless otherwise stated.

Along with collecting information on how the programs operate and how they were implemented, the interviews focused on finding the pounds per household of organics diverted, the capture rate for food scraps, participation data, and the costs of collection. The following section summarizes the overall findings and Appendix A provides the details for each of the researched jurisdictions.

Summary of Findings

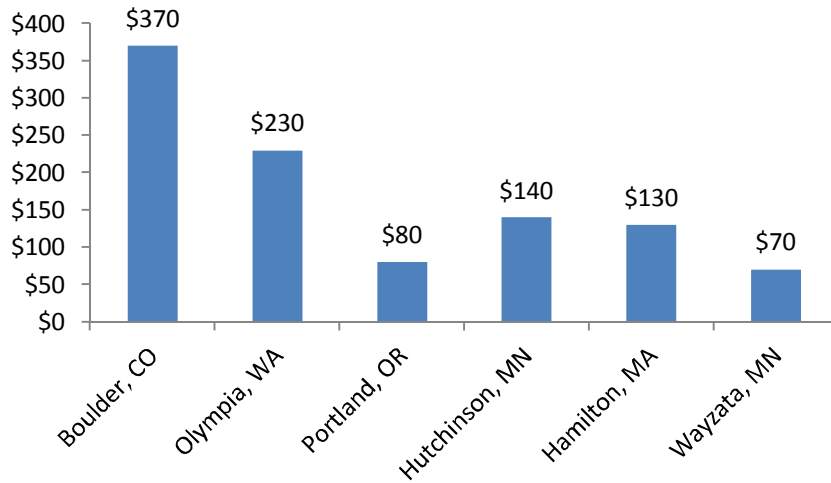
- **Collection Arrangement:** Half of the communities researched have a single contracted hauler providing organics collection services (Hamilton, Wayzata, and Hutchinson), Boulder uses multiple haulers in an open market / subscription based service, Olympia has municipal collection, and Portland has multiple franchised haulers.
- **Collection Frequency:** The majority of communities (4) collect organics on a weekly basis. Boulder and Olympia provide every-other-week organics services. The City of Portland has every-other-week trash collection for all residents and both Hutchinson and Hamilton offer an every-other-week trash collection option.
- **Containers and Materials:** Half of the jurisdictions (Boulder, Olympia, and Portland) give customers a choice of different sized carts and one community (Hutchinson) uses 90-gallon carts. All four of these communities co-collect food scraps and yard trimmings. Hamilton uses 13-gallon containers and collects primarily food scraps only (they do not encourage paper in their stream because of the mess it creates at the processing facility) and Wayzata uses an innovative bag in a can program (called the BlueBag Organics program) to collect food scraps and paper.
- **Variable Rates / Pay-As-You-Throw:** All six communities have pay-as-you-throw trash rates. Hamilton uses a unique PAYT program in which property taxes pay for a base level of service and additional service costs more (described in more detail in the Hamilton section).
- **Organic Collection Rates:** Only one of the communities researched, Olympia, offers organics collection for an optional additional fee, the other 5 communities include the fees for organics collection in the trash rates. One community, Wayzata, charges all households for the service but in order to have organics collected (and have cans and bags delivered) the customer must call the hauler and opt-in.
- **Costs of Collection:** The average cost of curbside organics service⁸ was reported to be \$5.75 per household per month with a range of \$4.00 to a max of \$8.00 per household per month; most were between \$5.00 and \$7.00 per month. When comparing these costs to those estimated for CSWD in this study, note that most of these programs already have franchised or municipal collection systems.
- **Organics Tipping Fees:** The average tipping fee across all six jurisdictions is \$31.40; however this includes the \$0 tip fee at Hutchinson (the City owns the facility and does not charge the

⁸ Average cost of service is the inclusive amount set by the municipality or haulers to cover the full costs of the program. It is assumed to cover collection and processing.

contracted hauler for dropping materials at the site). If Hutchinson is not included, the average tip fee is \$37.70, similar to CSWD’s fee.

- **Cost per Ton:** Based on the reported costs (not including the outreach and education costs) and the reported tons of organics diverted, a cost per ton was derived. The average cost was \$170/ton and the median cost per ton was calculated to be \$140/ ton. The estimated costs per ton are displayed in Figure 3.2.

Figure 3.2: Estimated Cost Per Ton for Organics Diversion⁹



- **Mandatory or Optional:** The majority of programs (4) have programs in which all households must *pay* for organics service but they do not have to *participate*. In Olympia it is voluntary pay and voluntary participation (the City does have every-other-week trash which helps drive participation). Portland has a mandatory pay and mandatory participation program (starting in 2013 the City can fine residents for not source separating their organics).
- **Participation Rates:** The participation rates ranged from a low of 45% (Wayzata) to 90% (in Portland with a mandatory program). The average participation rate was 66% and the median was 64%. It is important to note that the definition of ‘participation’ varied between the cities interviewed and that the percentage of households setting out a cart *every* collection is much lower than 66%.
- **Pounds Diverted per Household:** The average pounds of organics (includes yard trimmings in most cities) collected per household across the entire community (includes participants and non-participants) was reported to be 12.4 pounds per week. If only participants are included, the average increases to 20.1 pounds per household per week¹⁰. Determining the pounds of food scraps and paper per household is more challenging. Portland estimates that about 5% of

⁹ Calculated by SERA based on reported costs of service and the total tons of organics diverted. Note that Boulder’s program is an open, private subscription program.

¹⁰ Note that two of the cities (Boulder and Olympia) use every other week organics collection so the pounds per collection, not week, in those communities would be twice as high.

their stream is food scraps¹¹ (around 2 pounds per household per week) and 1% is paper (less than a pound per household per week)¹². Portland's pilot estimated that households were diverting 3 pounds of food per week. Hamilton does not allow yard trimmings in their 13 gallon carts and the hauler estimates that almost all of the average 13 pounds per participating household per week they collect are food scraps. Wayzata also has a separate program for yard trimmings and they estimate that participating households are diverting about 14.5 pounds of food scraps per week, much higher than Portland, and somewhat higher than Hamilton. Boulder does not have strong data on the actual amounts of food compared to yard trimmings but they estimate that about 25% of the set-outs contain food scraps. Finally, Olympia estimates that when they added food scraps to their yard trimmings stream they increased their overall organics tonnages by about 10% and that participating households are setting out about 12 pounds of food scraps per collection (or 6 pounds per week)¹³.

- **Capture rates:** Estimates of the percentage of food scraps captured ranged from a low of 10% to a high of 70% (Hamilton). The average percentage of food scraps captured is between 30% and 40%.
- **Contamination:** Contamination was generally not reported to be an issue. Portland had the best data on contamination rates and they estimate the contamination was around 1%.
- **Trucks:** The haulers in the majority of communities (4) run a separate fully automated truck for organics collection. Hamilton uses a split bodied truck with manual collection to collect recycling and organics in the same pass, and Wayzata uses the BlueBag Organics program to co-collect organics and MSW in a single truck.
- **Households per Organics Route:** The average number of households collected per route was 750. The high value was 1,000 in a densely populated area in which the hauler has all or almost all of the customers, the low was 400, in a rural area using semi-automated collection.
- **Compostable Bags and Kitchen Containers:** Hutchinson and Wayzata both provide their customers with compostable bags for their collection programs. Hamilton and Wayzata provide their customers with small kitchen composting containers. Portland, Boulder, and Olympia do not provide compostable bags or kitchen containers.

¹¹ Portland published a statistically valid waste composition study of the residential organics collected through their program in November 2012.

¹² These results are similar to a King County, WA Organics Composition study that found that 5.8% of the collected curbside organics stream was food and 1.4% was compostable paper, the same study estimated the capture rates to be 12% across all households and 77% for participating households.

¹³ A previous study conducted by the authors (Best Management Practices in Food Scraps Programs, 2011) found that the average pounds of food residuals set out per participating household per week to be between 7- 9 pounds. The research conducted for this study, including a review of several recently published articles, waste composition studies, and studies, support the estimate of 7 – 9 pounds of food residuals per participating household per week. However, Portland, OR and King County, WA, two jurisdictions with strong data collection and analysis, estimate that the amount of food waste collected in a combined yard and food program is much lower at 2 to 3 pounds per week.

Figure 3.3: Summary of Data Collected

Costs per household per month	\$5.75 average, \$4.00 to \$8.00 range
Estimated cost per ton diverted	\$170 / ton average, \$140 / ton median
Tip fees	\$31.40 average
Participation rate	66% average, range 45% - 90% (definition of participation varies)
Pounds per household	12.4 lbs per HH per week across households, 20.1 lbs per HH per week for participants only, 2 lbs to 14.75 lbs per HH per week for food scraps only (participants), average is in the 6 to 10 pound range.
Capture rate (food scraps)	30% to 40% average
Percentage of organics stream collected that is food	Around 5% - 10%

The detailed case studies from which these results were derived are included as Appendix A at the end of this document. Appendix B discusses containerization options / findings from our research.

4: Development and Results of the Modeling Work

Development of the Model: Inputs and Outputs

The CSWD currently has a system of drop-offs and local organics composting that have produced strong diversion options for residents and small businesses in the County. The District’s education and outreach – and the strong local spirit – have also led to uncommonly high levels of backyard composting (BYC) in the District, presumably much of which is used in local gardens. District waste composition studies make it clear that the combination of BYC and drop-off sites have dealt with diverting the vast majority of yard trimmings; it is estimated that the 29% of the waste stream that is organics includes only 1% yard trimmings, and the remainder is food scraps and associated compostable paper.

To support analysis of the array of scenarios that the District wanted to consider required the construction of a transparent, flexible model with assumptions and settings that supported “what if” analysis work. In all, the project assessed a total of 54 scenarios. These included:

- **Different service areas** including 1) the entire County; 2) Burlington Metro with surrounding villages; and 3) Burlington Metro without villages. This supported an exploration of the tradeoffs and efficiencies available from including concentrated urban, more suburban, and broader options including more rural areas. Eligibility was assumed to be residences in structures with four or fewer units.
- **Different collection arrangements** including 1) current collection adding organics; 2) bidding out to contract for area-wide organics collection; and 3) consolidated collection in districts for recycling, trash, and organics. In this way, we could explore the efficiencies and potential cost savings and efficiencies from current collection or more integrated collection options. Tradeoffs in costs and other topics could be balanced with disruption of current arrangements.
 - *Current - Multiple haulers on current routes for trash and recycling add organics collection.*
 - *Single Hauler for Organics - Multiple haulers on current routes for trash and recycling; single hauler for organics collection*
 - *Consolidated - Contracts for trash, recycling, and organics collection*
- **Including / excluding yard waste** from the organics collection program (2 options). The project modeled two basic programs:
 - **Food scraps:** This service is provided curbside, and the customers receive outside containers and are provided coupons redeemable for in-home containers. We assume liners are not needed (per the pilot and other cities’ experiences) but liners would be available locally.
 - **Yard trimmings:** This program, delivered 8 weeks annually (4 weeks in spring and 4 weeks in fall), assumes customers use large paper bags to set out the eligible yard trimmings for collection.
- **Voluntary vs. mandatory** options related to whether the program is 1) purely voluntary, 2) “mandatory” (separate fee, separation required but other management options available), or 3) “mandatory with pay”, in which all households would be paying for the service, with the attendant increase in participation.

Within these overarching scenarios, we had the opportunity of varying a number of settings. These included changes in collection frequency for each residential service – trash, recycling, yard trimmings, and food scraps, changes in assumptions about how much participation would be realized under voluntary, mandatory, and mandatory/ pay options, and a number of other settings that would allow a comparison of costs and diversion results. Underlying data included locally-tailored information on population, density, starting tons, waste composition, tipping fees, marginal costs for collection and for drop-offs, distances, container prices, administration and customer service costs, and many other inputs.

The interactive model calculated changes in a variety of factors that supported analysis of tradeoffs and results, toward drawing conclusions and recommendations. These outputs included changes in:

- Tons & percent diversion – disposed & diverted for each of the key materials (recycling, yard trimmings, and food scraps / organics) and the location of management (curbside, drop-off, backyard composting).
- Changes in costs to households (& CSWD) from:
 - Collections / “stops” & hauling – for variety of services
 - Tip fee changes (from changes in types / diversion / flows)
 - Containerization changes
 - Outreach, billing, customer service, administration
 - Discontinuation of existing programs
- Changes in customer costs are reported out for 1) those participating in the program, 2) those not participating, and 3) for the “average” household (the appropriate weighted average of participants and non-participants). In the case of “mandatory / pay”, the three should be (close to) equal,¹⁴ but not in the case of voluntary, or mandatory without mandated payment.
- Associated environmental effects (changes in greenhouse gas emissions and vehicle miles traveled)
- Overall budget costs, displayed as:
 - One-time costs spread 5 years; also on-going
 - Modeled *changes* from status quo

Summary Results from the Model

The model was run many times, providing results for dozens of combinations of scenarios, situations, and values for assumptions. Overall, the results provided a few overarching lessons, and we use Figure 4.1 (which isolates the case of County-wide computations)¹⁵ to illustrate those results. We compare

¹⁴ In our model, they are close, rather than strictly equal, because we made slightly different assumptions about the uptake / participation under the “mandatory” scenarios for the three geographic regions.

¹⁵ Other key assumptions are: voluntary participation is 25%, mandatory (no pay) is 40%, and mandatory / pay is 70-80% participation. Most of the comparisons we discuss are for the first cell in the table – assuming the current collection system.

results against the “Scenario 1” base case of County-wide mandatory collection of food scraps (not mandatory pay), with weekly collection of recycling, trash, and food scraps. The modeling work shows that this base case avoids more than 4,300 metric tons of carbon dioxide equivalent in emissions compared to current waste management and materials flows in the County. These emission impact estimates are generally proportional to the tonnage diverted. The main change drivers for changes in tons diverted and cost include:

- changes in collection arrangement,
- changes in collection frequency for various services,
- participation rates (affected by whether services are voluntary, mandatory separation, or mandatory pay),
- whether organics are co-collected, and
- service density differences.

The impacts resulting from each of these factors is discussed in the paragraphs below.

Changes in collection system arrangement (Figure 4.1, Scenario 1): The consolidated scenario reduces costs most dramatically. To obtain new food scraps service would cost participants almost \$39 under the current system, less than \$20 if single organics hauler arrangements are made, or a net increase of less than \$2 monthly under a move to consolidation.¹⁶ Non-participants see no change from the current system or single organics hauler, but the efficiencies from consolidation provide them significant (\$17.50) savings from efficiencies in trash and recycling collection. As a parallel effect, the total new costs show savings (getting more for less) from the consolidated option, overall (-\$4.5 million). Under the consolidated option, the County may be able to reduce costs considerably, but expand diversion services to residents. On the tonnage side, the model assumes that the same service availabilities will result in the same tonnage behaviors, regardless of cost, so each of these options show the same base 5% diversion.

Changing frequency of recycling or other collections (Figure 4.1, Scenario 5 vs. 1): Collection costs are the most expensive part of providing service, and adding extra collections for new services are the largest source of incremental cost increases. Therefore, frequency of collection is a key cost driver. Moving recycling (and/or trash collection) to every other week can counterbalance new organics collections and minimize cost increases for new service. Comparison of the cost impacts for participants (Figure 4.1, Scenario 5 vs. Scenario 1) shows participants under the current collection system would pay almost \$8.60 less for combined service if recycling decreased to every other week. They would pay \$17 less if recycling and trash were both delivered on alternating weeks. The change would also benefit non-participating households, who might save \$22 to \$26 (\$4 to \$8 increment from the weekly option) with less frequent collection. Tonnage is affected, however. Statistical research indicates a modest decrease in recycling tons associated with decreases in recycling collection frequency.¹⁷ The example illustrated in Figure 4.1 indicates 100 fewer new tons diverted annually. When compared with the cost of the extra collection, those extra 100 tons are fairly costly. However, of course, convenience is also a

¹⁶ This does not imply that the new weekly organics service costs only \$2. Rather, it represents savings from economies of scale and integration of all three services – trash, recycling, and organics, under a consolidated arrangement.

¹⁷ Skumatz, Lisa A., “Achieving 50 Percent Recycling: Program elements, analysis and policy implications”, Resource Recycling, September, 1999; Skumatz, Lisa A., “Beyond Case Studies: Quantitative effects of recycling and variable rates programs”, Resource Recycling, September 1996.

consideration. A similar cost savings is realized if, instead, trash collection decreases to every other week, and this can result in positive effects on recycling, and very likely increases the amount of food scraps diverted through the program.¹⁸

Figure 4.1: Changes in Rates for Customers Based on Six Scenarios for 3 Collection Arrangements (County-wide)

Scenario Descriptions Collection System	Change in Monthly Customer Costs from Current System			Total New Costs	Change in Tons
	Per Participating Household	Per Non-Participating Household	Per Average Household	In 1,000's (5 yr amort)	To Landfill
Scenario 1: Food scraps collection service, mandatory					
Current Collection System	\$38.91	\$0.00	\$15.56	\$7,200	-2,900 (5.0%)
Single Hauler for Organics	\$19.33	\$0.00	\$7.73	\$3,576	-2,900
Consolidated Collection System	\$1.82	(\$17.51)	(\$9.78)	(\$4,523)	-2,900
Scenario 2: Food scraps and yard trimmings, mandatory separation (not pay)					
Current Collection System	\$44.60	\$0.00	\$17.84	\$8,253	-3,000 (5.1%)
Single Hauler for Organics	\$22.08	\$0.00	\$8.83	\$4,085	-3,000
Consolidated Collection System	(\$4.57)	(\$17.51)	(\$8.68)	(\$4,014)	-3,000
Scenario 3: Food scraps collection service, voluntary					
Current Collection System	\$61.31	\$0.00	\$15.33	\$7,091	-1,800 (3.1%)
Single Hauler for Organics	\$27.02	\$0.00	\$6.76	\$3,126	-1,800
Consolidated Collection System	\$9.52	(\$17.51)	(\$10.75)	(\$4,974)	-1,800
Scenario 4: Food scraps collection service, mandatory pay					
Current Collection System	\$20.76	\$20.82	\$20.78	\$9,614	-5,800 (9.8%)
Single Hauler for Organics	\$18.42	\$17.20	\$3.60	\$8,352	-5,800
Consolidated Collection System	(\$6.38)	(\$7.60)	(\$6.75)	(\$3,122)	-5,800
Scenario 5: Food scraps collection service, mandatory separation (not pay), every other week recycling collection					
Current Collection System	\$30.33	(\$8.60)	\$6.97	\$3,225	-2,900 (4.9%)
Single Hauler for Organics	\$10.75	(\$8.60)	(\$0.86)	(\$398)	-2,900
Consolidated Collection System	(\$2.38)	(\$21.73)	(\$13.99)	(\$6,473)	-2,900
Scenario 6: Food scraps collection service, mandatory separation (not pay), with every other week recycling AND every other week trash service					
Current Collection System	\$21.73	(\$17.20)	(\$1.63)	(\$754)	-2,900 (4.9%)
Single Hauler for Organics	\$2.15	(\$17.20)	(\$9.46)	(\$4,378)	-2,900
Consolidated Collection System	(\$6.60)	(\$25.96)	(\$18.22)	(\$8,427)	-2,900
Scenario 7. Food scraps service, mandatory pay, with EOW trash & recycling					
Current Collection System	\$3.57	\$3.62	\$3.59	\$1,660	-5,700 (9.6%)
Single Hauler for Organics	\$1.23	\$0.00	\$0.86	\$398	-5,700
Consolidated Collection System	(\$14.82)	(\$16.05)	(\$15.19)	(\$7,026)	-5,700

¹⁸ Although there is insufficient quantitative data from case studies to clearly demonstrate this anecdotal suggestion.

Participation variations / Whether service is mandatory (Figure 4.1, Scenarios 4 and 3 vs. 1): Whether the program is voluntary, mandatory, or mandatory pay, also affects both costs and tons. When all pay (and most participate), costs are lower. The incremental cost to those participating in the program is far lower under the mandatory-pay option than under the mandatory-offer scenario (about twice as much for mandatory no-pay option, and almost 3 times higher for the voluntary option). Those not participating pay the least, as they pay only for trash and recycling, and maintaining the service as voluntary provides this savings option to customers that do not want service; in fact, under the consolidated system they may pay less than they currently do. However, the District loses diversion tons that could take it closer to goal. The voluntary option diverts the fewest tons from the landfill, and mandatory-pay diverts the most. In the cases presented in Figure 4.1, mandatory-pay doubles the new tons diverted from landfill compared to the mandatory / no pay scenario, and more than triples the tons diverted from the voluntary scenario. The environmental emissions effects follow the tonnage effects.

Whether Yard Trimmings Program is also offered (Figure 4.1, Scenario 2 vs. 1): Instituting yard trimmings collection adds on marginally to the diverted tons – about 100 tons out of 3000 newly diverted. This is because CSWD is already very effective at diverting their yard trimmings from the landfill. The CSWD waste composition study shows only 1% of the 29% of organics in the disposal stream are yard trimmings. The addition of this program adds \$1-3 per month extra on average over the no-yard-trimmings scenarios.

Changing Service Territory / Comparing Results by Changes in Geographic Territory (Figure 4.2, Scenarios 8 and 9 vs. 1): Figure 4.2 illustrates differences in results between “County” vs. “Metro with Villages”, vs. “Metro excluding villages”. The tons diverted change with the population covered: there are more residents county-wide than in the Metro region excluding villages; the percent diverted is the same, because the model assumes the same behaviors are induced by the same access to programs and options. Under the current collection arrangement, average collection costs per household for trash and recycling tend to increase slightly moving toward higher populations (from Metro without villages, to Metro with villages to County-wide cases). The low to high costs vary by about \$1.20. However, the results differ for the single hauler and consolidated situations differ: there is barely any difference in average per-household costs under the single hauler arrangement (about twenty cents from low to high), and the costs under the consolidated scenario savings are highest for the county-wide service, with a \$2.25 cost range. These patterns are reflected in both overall costs and participant costs.

Figure 4.2: Results for Variations in Service Territory - - Change in Rates for Customers.

Scenario Descriptions	Change in Monthly Customer Costs from Current System			Total New Costs	Change in Tons
	Per Participating Household	Per Non-Participating Household	Per Average Household	In 1,000's (5 yr amort)	To Landfill
County-wide, Food scraps collection service, mandatory separation (not mandatory pay)					
Current Collection System	\$38.91	\$0.00	\$15.56	\$7,200	-2,900 (5%)
Single Hauler for Organics	\$19.33	\$0.00	\$7.73	\$3,576	-2,900
Consolidated Collection System	\$1.82	(\$17.51)	(\$9.78)	(\$4,523)	-2,900
Burlington Metro plus Villages, Food scraps collection service, mandatory separation (not mandatory pay)					
Current Collection System	\$36.99	\$0.00	\$14.80	\$5,228	-2,200 (5%)
Single Hauler for Organics	\$19.11	\$0.00	\$7.64	\$2,701	-2,200
Consolidated Collection System	\$2.82	(\$16.29)	(\$8.65)	(\$3,056)	-2,200
Burlington Metro (no villages), Food scraps collection service, mandatory separation (not mandatory pay)					
Current Collection System	\$35.90	\$0.00	\$14.36	\$3,771	-1,300 (5%)
Single Hauler for Organics	\$19.71	\$0.00	\$7.88	\$2,070	-1,300
Consolidated Collection System	\$4.28	(\$15.43)	(\$7.54)	\$1,981	-1,300

Our conclusions and recommendations are provided in the Executive Summary, and are recapped here.

Consultant Recommendations

From a purely economic and efficiency point of view, the results show high value from the following:

- Invoke a new consolidated collection system, which provides service at lower cost through economies of scale, routing efficiencies, etc.
- Make the program mandatory with a mandatory fee and embed the program costs into the trash rates; the services will be cheaper, and diversion from the landfill almost doubles or increases the tonnage by 5% from voluntary or quasi-mandatory options.
- Consider changing recycling collection frequency to every other week – or better yet, collect trash and recycling on alternating weeks, and collect the organics weekly. Diversion remains high, and costs to the average resident decrease significantly.

Figure 4.3: Summary Results of Highest Efficiency (Recommended) System Changes for adding Food Scraps Collection

County-wide Figures	Change for Participating HH in \$/month	Change in Average HH cost in \$/month	Change in Landfill Diversion
Consolidated Collection, mandatory separation	\$1.82	-\$9.78	5.0%
Current Collection + Mandatory with Mandatory Fee	\$20.76 (vs. \$61.31 for voluntary, \$38.91 for mandatory, no fee)	\$20.78 (vs. \$15.33 for voluntary, \$15.56 for mandatory, no fee, respectively)	9.8%
Current Collection, Mandatory separation +EOW Recycling	\$30.33 (vs. \$38.91)	\$6.97 (vs. \$15.56)	4.8%
Consolidated + Mandatory Fee	-\$6.38	-\$6.75	9.8%
Consolidated + EOW Recycling	-\$2.38 (-\$6.60 with EOW trash)	-\$13.99 (-\$18.22 adding EOW trash)	4.9%
Consolidated + Mandatory Fee + EOW Recycling(+EOW Trash)	-\$10.59 (-\$14.82 adding EOW trash)	-\$10.96 (-\$15.19 adding EOW trash)	9.6%

Of course, these decisions are not only about economics. The District must balance efficiencies, costs, and diversion opportunities; customer service convenience; and political realities. The consultants note that cost-effectiveness and efficiencies are key parts of providing sustainable programs, but programs that are not also convenient are not used / under-used. The District may start with one program offering, and elect to modify it over time if goals (tons, participation, sustainability, costs, etc.) are not met.

Figure 4.4: Pros and Cons of Highlighted Organics Program / Solid Waste System Design Elements

	Advantages	Disadvantages
Consolidated Collection	<ul style="list-style-type: none"> Least expensive / reduces customer rates Efficient collection, uniform service, clear service provider(s) Less wear / tear on streets 	<ul style="list-style-type: none"> Disrupts hauler businesses Eliminates customer choice on haulers Extra CSWD effort for RFP and monitoring
Mandatory Pay	<ul style="list-style-type: none"> Least expensive Diverts the most tons 	<ul style="list-style-type: none"> Mandates are seldom politically popular Loses the option under voluntary that lets some customers (non-users) pay less
EOW Recycling and/or Trash Collection	<ul style="list-style-type: none"> Least expensive Increases diverted organics tons (for EOW trash) 	<ul style="list-style-type: none"> Decreases diverted tons a bit (for EOW recycling) Introduces a fundamental service change that may be perceived as a reduction in service Communities worry it will confuse customers

Appendix A: Case Study Jurisdictional Details

The details of each of the six comparable jurisdictions interviewed are included below.

Boulder, Colorado

(98,900 total population, 43,034 households)

City: Boulder CO
Contact Name: Kara Mertz and Jamie Harkins (City of Boulder Environmental Staff), Bryce Isaacson and Sarah Van Pelt (Western Disposal)
Number: (303) 441-1931
Email: MertzK@bouldercolorado.gov, HarkinsJ@bouldercolorado.gov

Trash Services and rates

Collection arrangement: Multiple haulers in open competition
Variable rates (yes or no): Yes- implemented through ordinance
Cart sizes available: 32, 64, 96- One hauler offers a bag service option and one offers EOW option (very low participation)

Recycling Services

Collection arrangement: Same as MSW
How many streams: Single stream
Cart sizes available: 32 to 96 gallon, as many as customer wants
Materials collected curb: Typical single stream mix

Organics Services

Collection arrangement: Same as MSW
Cart types sizes available: 32 to 96 gallon, as many as customer wants, most choose 64. No additional cost for different sizes
Food scraps co-collected or separate: Yes- Vegetative food scraps only for res. The pilot included meat and dairy and the plan was to include it curbside. The day before the City council was set to vote a bear was coincidentally put down by DOW for being in a residential part of town, it had nothing to do with the program. So the Council voted to only have vegetative food scraps in the cart. The commercial sector and other parts of the County include meat and dairy.

Collection Frequency

Trash: Weekly
Recycling: EOW alternating
Organics: EOW alternating

Rates

Rate structure: 32- gallon-~\$25, 64-gallon - ~\$35, 96-gallon- \$45 per household per month (note: because it is multiple haulers in open competition rates may vary, also the rates include a city 'trash tax' (about \$3/hh/month)
Recycling fees embedded: Yes- embedded in trash rates
Organics fees embedded: Yes- embedded in trash rates

Facilities

<i>What facilities does the city own:</i>	None
<i>Landfill ownership:</i>	Privately owned and operated
<i>Compost facility ownership:</i>	Privately owned and operated (windrows)

Tipping Fees

<i>Landfill:</i>	Depends on hauler, range is \$13 - \$17 / ton
<i>Compost (and process):</i>	Depends on hauler, range is \$ 40 - 45 / ton
<i>MRF (revenue):</i>	Depends on hauler- is always above \$0

Curbside Organics Questions

Program Basics

<i>Briefly describe how program works:</i>	All haulers operating in the City are required to embed the costs of organics collection and recycling in the trash rates. Households are provided with cart based service and organics are collected on alternating weeks with single stream recycling.
<i>Year started:</i>	Pilot in 2006- went full scale in 2007/ 2008
<i>Who does it cover:</i>	Residential only- private haulers offer in the commercial sector but no requirement
<i>Service mandatory or optional:</i>	Mandatory pay for organics, no mandate to participate, trash not required
<i>% of HHs participating in the organics program:</i>	Estimate that participation in organics is high ~80- 90% but that only about 25% are putting food scraps in
<i>Organics disposal bans:</i>	No
<i>% of households back yard composting:</i>	Did a survey in the 1990s and found it was about 20%. Have not done any work since then to examine

Implementation

<i>Implementation steps:</i>	The program was adopted through a City ordinance. There was a drop-off only program first. The City ran a pilot project in 2005 / 2006 and found that there was a large potential to divert organics from the waste stream. The primary local hauler (one hauler has about 80% of the town) was very supportive and built a compost facility in the city limits to handle the incoming materials. They accept materials from other residential haulers at the compost facility but they do not commercial streams from other haulers.
<i>Other changes at the same time organics collection implemented:</i>	Yes- they switched from dual stream recycling collection with alternating weeks (containers week one, fibers week two) to single stream. This allowed them do alternating weeks of recycling one week, organics the next, without significantly increasing costs for collections. They also dropped the fall leaf collection and dropped the spring clean up to reduce costs
<i>How to build public support for the program implementation:</i>	They did a pilot, surveys, and outreach. There were two reasons why people fought the program at first 1) The switch to single stream and some people thought that the City wouldn't be able to recycle as well with single stream and 2) concerns about wildlife getting into carts. Neither of these concerns have been a real issue once the program went in place.
<i>Implementation notes:</i>	Took between 3 - 4 months to complete the cart exchanges. They send multiple postcards to every household telling them about the program yet ~50% never get back to them about what size carts they want, thus they had to do change outs for the first 4 – 6 months. There was no change in overall collection costs because of the way it was implemented.

Organics specific truck: Same truck makes two passes by each house, one for MSW, one for Organics

What type of trucks are used: Automated side loaders, one staff per truck

Households collected per route: All trucks collect trash and then another stream so they are running the route 2 x day. Some rules of thumb are ~1000 in relatively dense areas, for alley collections in dense parts of Boulder (where they are almost like a contracted hauler) can do 770 per route with 2 men and a semi-auto tipper, in rural 400 - 500 HHs is good.

Are HHs provided with bio-bags or kitchen containers: No for both. The organics processor does not like the bio-bags, although they are allowed

Costs of Service

Total cost per household: The cost is estimated to be around \$5 per HH per month (EOW collection)

Disposal cost: \$40- \$45 ton

Outreach and Education: 1 FTE but it includes zero waste and energy so it is a shared position

Tonnage data (residential)

Reported residential diversion rate: 52%

MSW: 14,011

Recycling: 7,671

Organics: 4227

Other Data

Data on average set out (weight) per household: Pounds per HH per week¹⁹: 21 lbs MSW, 15 lbs Recycling, 8.6 lbs organics (note- the program has EOW collection so for each collection it is 30 lbs of recycling and 17.2 lbs of organics)

% of the organics stream that is food vs. yard waste vs. paper: Unknown, guess that only 25% of set out have food scraps in them. They did a pilot and found that the majority of participants (~75%) were putting about a quarter of their food scraps in the compost container

Waste composition studies available: No - County only

Contamination rate in the organics stream: Unknown but they report that it is not a large issue in the residential sector

Pre / post organics collection data available: No, but if you compare Lafayette to Boulder (Lafayette is a neighboring community that does not have organics) Lafayette sets out more MSW (32lb / HH / week compared to 21) and less recycling (12 lbs recycling / HH / week compared to 15 in Boulder)

Organics remaining in the waste stream: A 2011 waste composition study conducted at Western Disposal found that Lafayette (neighboring community without organics collection) had 16% of their MSW stream was food and Boulder had 10.5% food.

Open Ended

¹⁹ The pounds per household per week presented are reported by Western Disposal. The hauler keep the collected the most accurate data available for the City, however, the hauler only services about 80% of the City so the total tons and pounds per household data does not match.

<i>How did you deal with the 'yuck' factor, odors in the summer, and vectors:</i>	Education and outreach and the fact that they only include vegetative food scraps keep these issues at a minimum
<i>Any major ongoing issues in the program:</i>	Compost marketing is a challenge for the hauler / processor. The City and County is trying to figure out ways to improve the local compost market but it is still an issue. The fact that they cannot sell compost easily means that the costs of collection are a little bit higher than if they could sell the end product
<i>Advice for communities thinking about going forward with a food scraps program:</i>	Have standardized containers for all households that are the same for recycling, organics, and MSW with different stickers to allow for easy change out. Tell all customers multiple times that the program is coming, they did about 4 - 6 mailings about the program, sent postcards 30 days out, including inserts in bills, and had articles in the paper, people were still taken by surprise.

Hamilton, MA

(7,800 total population, 2,600 households serviced)

City: Hamilton, MA (there is a 'sister' program in Wenham)
Contact Name: Michael Lombardo (City Manager) John Tognazzi (Hiltz Disposal)
Number: (978)468-5572
Email: mlombardo@hamiltonma.gov

Trash Services and rates

Collection arrangement: Single Contracted hauler
Variable rates (yes or no): Yes- Modified (see below)
Cart sizes available: 35 gallon carts

Recycling Services

Collection arrangement: Same as MSW
How many streams: Single stream
Cart sizes available: Supply your own 35 gallon barrel
Materials collected curb: Typical single stream mix

Organics Services

Collection arrangement: Same as MSW
Cart types sizes available: 13 gallon carts
Food scraps co-collected or separate: Food scraps only

Collection Frequency

Trash: Weekly- The town contract and property taxes only cover every-other-week collection of trash in 35-gal carts. If households want trash collection every week they must purchase and use pre-paid bags for the off weeks. Can also use the pre-paid bags for overflow.
Recycling: Weekly
Organics: Weekly

Rates

Rate structure: No 'cost' (included in property taxes) for base level of service (35 gallons collected every other week), extra bags are \$1 for 16-gal and \$1.75 for 32-gal
Recycling fees embedded: Yes- embedded in trash rates
Organics fees embedded: Yes- embedded in trash rates

Facilities

What facilities does the city own: None - However, they are considering an anaerobic digester for the residential organics in the future
Landfill ownership: Privately owned and operated WTE facility
Compost facility ownership: Privately owned and operated (windrows now, opportunity for anaerobic digester in the future)

Tipping Fees

Landfill: \$72 / ton (at the WTE)
Compost (and process): \$42 / ton
MRF (revenue): n/a

Organic Program Basics

<i>Briefly describe how program works:</i>	Contracted hauler collects MSW, recycling, and organics on the same day. MSW is collected by one truck (fully automated) and recycling and organics are collected in a different split bodied truck (manual collection). The contracted hauler is a strong partner in the program.
<i>Year started:</i>	Went town wide in 2012
<i>Who does it cover:</i>	Single family residential
<i>Service mandatory or optional:</i>	Service is included for all in taxes, participation is voluntary
<i>% of HHs participating in the organics program:</i>	Around 50% now, when it was an extra fee to participate they were able to get about 18- 20% of the HHs to sign-up for the program with lots of outreach.
<i>Organics disposal bans:</i>	Leaves and yard waste (statewide 1990). There is a commercial food scrap disposal ban planned for 2014 and a residential disposal ban may be enacted in the next 3 - 5 years
<i>% of households back yard composting:</i>	No

Implementation

<i>Implementation steps:</i>	Town implemented PAYT in 2004 / 5 and saw positive results. A citizen driven initiative wanted the town to go further and the recycling committee organized an organics pilot. The pilot was small scale (74 HHs) for two months and was no cost. The recycling volunteers were integral in making the pilot work, they answered calls and did home visits to assist participants. They ran an expanded pilot with 500 HHs in 2010; each HH had to pay \$75 per year to participate which also saw good results. The two pilots led the town to implement the program for all households in September / October of 2011.
<i>Other changes at the same time organics collection implemented:</i>	Yes- switched to fully automated collection of trash at the same time- they gave all households a trash cart, an organics cart, and a kitchen container at the same time
<i>How to build public support for the program implementation:</i>	The town recycling committee (volunteer and citizen based) does the outreach- it included flyers, personal contacts, events and media. There was lots of press about the program because it was new. The pilot showed that HHs supported the program, there was an increase in diversion, and that the City would save money in the long run in MSW tip fees. Uses green team 'neighborhood captains' to help push the program. Despite the two pilots, tons of outreach, and newspaper coverage, they report that there were still people who said that the program 'snuck up on them' and were confused about it.
<i>Implementation notes:</i>	Hauler charged \$16K for the contract
<i>Separate truck for Organics Collection:</i>	No
<i>What type of trucks are used:</i>	Using dual stream rear load packers from Heil (\$300K each)- manual collection with 2 men per truck (note: they are using the front load 'Curroto Can' system for residential MSW and they like it because it allows them to see what they are tipping)
<i>Households collected per route:</i>	About 700 households
<i>Are HHs with bio-bags or kitchen containers:</i>	Under sink containers are included, bags are not- the city does not bar the use of bio-bags but they do not encourage it. Since the program started a few stores have started to carry and sell compostable bags. City is strong

advocate for kitchen containers

Costs of Service

Total cost per household: The cost for containers (both the 13 gallon cart and under counter is about \$29/HH). The program costs in the contract (which includes some Wenham households) is about \$24K / year, the cost per household per month is reported to be between \$6-\$8/hh (this is as close an estimate they could provide)

Disposal cost: \$42 / ton - The City reports they have saved around \$110K in tipping fees over the first year of the program.

Outreach and Education: n/a

Tonnage data (residential)

Reported residential diversion rate: 56%

MSW: Not reported

Recycling: Not reported

Organics: Not reported

Other Data

Data on average set out (weight per household): 15 - 17 lbs organics per participating HH per week during pilot, full scale it is about 13 lbs per HH per week.

% of the organics stream that is food vs. yard waste vs. paper: Not know. They guess that it is much more food than paper. They think that paper towels, napkins, tissues, etc. are a big untapped stream, there is very little yard waste, if any, in the stream

Waste composition studies available: No

Contamination rate in the organics stream: Exact number unknown but reported to be very low

Pre / post organics collection data available: No

Organics remaining in the waste stream: Estimate that the participating households are able to get about 70% of the food out of the stream (the town looked at tonnage reports to come up with this number, no waste composition studies conducted to confirm it)

Open Ended

How did you deal with the 'yuck' factor, odors in the summer, and vectors: Have 'free' leaf collection during the year (leaves must be in paper bags and set at the curb on designated days)- in terms of food they do not have any major issues. There are about two weeks in August where some households experienced issues with blowflies and maggots but it was not a large enough issue to change the program The town recommends freezing meat prior to set out in the summer. The hauler has installed deodorizing sprayers in their truck hoppers to keep odors down, they also retrofitted all their trucks to ensure there are no leaks, splashes, or spills

Any major ongoing issues in the program: There are a small handful of people (3 to 5 households) who do not like the program; these same households tend not to like any government run program. Other than this there are no regular complaints or issues.

Advice for communities thinking about going forward with a food scraps program:

The easier you can make it to participate the better. Having a way to encourage participation is important- they use the every-other-week trash program, PAYT or disposal bans would also work. The hauler has tried to offer organics collection for an added fee in places without PAYT and almost no one signs up (it is an extra cost and you can't cut you trash costs). Lots of PR is needed and the PR needs to be positive. Finally, they definitely recommend the in-kitchen containers; say they are necessary for getting more households to participate and more pounds from each household.

Hutchinson, MN

(13,500 total population, 4,000 households serviced)

City: Hutchinson, MN
Contact Name: Becky Colbal (Creekside Recycling)
Number: (320)234-5685

Trash Services and rates

Collection arrangement: Single contracted hauler
Variable rates (yes or no): Yes
Cart sizes available: 30, 60, 90 gallon carts

Recycling Services

Collection arrangement: Single contracted hauler (different hauler than for MSW and organics)
How many streams: Single stream
Cart sizes available: 18 gallon containers
Materials collected curb: Conventional recyclables

Organics Services

Collection arrangement: Same as MSW
Cart types sizes available: 90 gallon carts
Food scraps co-collected or separate: Yes- food scraps co-collected with yard waste

Collection Frequency

Trash: Weekly (with EOW option)
Recycling: Weekly
Organics: Weekly

Rates

Rate structure: \$20 - 30 gallon, \$29 - 60 gallon, \$48 - 90 gallon
Recycling fees embedded: Yes- embedded in trash rates
Organics fees embedded: Yes- embedded in trash rates

Facilities

What facilities does the city own: Compost facility
Landfill ownership: Privately owned and operated
Compost facility ownership: City owned enterprise (use in-vessel for curbside organics, windrows for yard waste and leaves)

Tipping Fees

<i>Landfill:</i>	~ \$30 / ton
<i>Compost (and process):</i>	\$0 (this City does not charge the hauler for bringing C/S organics to the city owned facility)
<i>MRF (revenue):</i>	n/a

Organic Program Basics

<i>Briefly describe how program works:</i>	City contracted hauler collects organics weekly, all households must pay for program.
<i>Year started:</i>	1999
<i>Who does it cover:</i>	Single family residential
<i>Service mandatory or optional:</i>	Mandatory pay, voluntary participation, note that while the City does not require EOW trash collection a number of HHs have chose the EOW option to save money
<i>% of HHs participating in the organics program:</i>	Estimate between 70% to 80%
<i>Organics disposal bans:</i>	There is a state-wide yard waste disposal ban (1993)
<i>% of households back yard composting:</i>	Estimate it is around ~30%

Implementation

<i>Implementation steps:</i>	City started with a yard waste composting site in the 1990. They next did an at home composting push with education and bin give-aways to try and reduce what was being disposed at the curb (got about 30% participation in the at home program). In the late 1990s the city got some grant money to do a source separated curbside program demonstration project. The pilot (225 HHs) sent materials to an in-vessel composter for 2 years using bio-bags placed in a cart for collection. The program went full scale in 1999 based on the positive results observed in the pilot.
<i>Other changes at the same time organics collection implemented:</i>	N/A
<i>How to build public support for the program implementation:</i>	Did a pilot, showed that they could save money for the town through the program- once they did that it was easy to get both elected officials and residents to support it
<i>Implementation notes:</i>	N/A
<i>Separate truck for Organics Collection:</i>	Yes
<i>What type of trucks are used:</i>	Fully automated rear loaders
<i>Households collected per route:</i>	N / A (Hauler would not respond)
<i>Are HHs with bio-bags or kitchen containers:</i>	Yes- 8 bags per month per household are included. The bags used to be delivered to all households (whether or not they were participating) 3 times a year. Changed it 2 years ago to say if you wanted bags they are still 'free' but they need to be picked-up at the City facilities

Costs of Service

<i>Total cost per household:</i>	Not sure of exact costs- guess \$5 - \$7 per HH
<i>Disposal cost:</i>	\$0
<i>Outreach and Education:</i>	1/4 FTEs

Tonnage data (residential)

<i>Reported residential diversion rate:</i>	53%
<i>MSW:</i>	2,405
<i>Recycling:</i>	703
<i>Organics:</i>	2,012

Other Data

<i>Data on average set out (weight) per household:</i>	25 lbs per HH per week (participant) for all organics- not sure what is food
<i>% of the organics stream that is food vs. yard waste vs. paper:</i>	No
<i>Waste composition studies available:</i>	No
<i>Contamination rate in the organics stream:</i>	It has gotten much better- started very high (as much as 30%!) but they are working to try and bring it down
<i>Pre / post organics collection data available:</i>	No
<i>Organics remaining in the waste stream:</i>	They estimate that it is more than 50% but exact number is not known

Open Ended

<i>How did you deal with the 'yuck' factor, odors in the summer, and vectors:</i>	Still have leaf collection in the spring (2 weeks) to deal with high volume periods; they also do a leaf vacuum in the fall.
<i>Any major ongoing issues in the program:</i>	Contamination is the big challenge for them. They use a tag system that puts stickers / tags on carts that are contaminated. The hauler has a camera in the hopper and monitors materials going in, if they see something they will tell the City and the City follows up with a resident. They will also tag the cart and if it is high contamination they do not collect the cart. After two warning tags the cart is removed. The customer must come down to the compost site to get the cart back and they are required to take a tour of the facility. Another issue is broken carts and lids- the hauler owns the carts and 'rents' them to the customers. The city is working closely with the hauler to make sure everyone has a fully functioning cart.
<i>Advice for communities thinking about going forward with a food scraps program:</i>	Make sure to address education early on so households know what can be composted and to reduce contamination. They recommend the program for other communities, not only were they able to significantly reduce costs by not sending materials to the landfill, they were also able to sell 1.6M bags of compost last year and make a profit.

Olympia, WA

(49,000 total population, 14,000 households serviced)

City: Olympia, WA
Contact: Ron Jones and Spencer Orman (Recycling Program Specialists)
Name:
Number: (360)753-8509
Email: rjones@ci.olympia.wa.us

Trash Services and rates

Collection arrangement: Municipal Collection
Variable rates (yes or no): Yes
Cart sizes available: 20, 35, 65, 95 gallon

Recycling Services

Collection arrangement: Same as MSW
How many streams: Single stream
Cart sizes available: 35, 65, 95 gallon
Materials collected curb: Typical recycling mix- also includes pots and pans, plastic buckets, and paperback books, rigid plan pots

Organics Services

Collection arrangement: Same as MSW
Cart types sizes available: 35, 65, 95 gallon carts
Food scraps co-collected or separate: Includes food scraps (meat and dairy)- co-collected with YW, does not include diapers and pet waste

Collection Frequency

Trash: EOW- collected on Tuesday thru Friday
Recycling: EOW- collected on Tuesday thru Friday
Organics: EOW - collected on Mondays

Rates

Rate structure: Rates are Bi-Monthly- 20g - \$16.26, 35g - \$28.10, 65g- \$38.36, 95g - \$66.46. Additional pre paid tags for overflow are \$4.99 each, untagged bags are charged \$8.19 each, organics collection is extra \$15.44 bi-monthly
Recycling fees embedded: Yes - if HH opts for not recycling they pay MORE, not less, additional fee is \$7 - \$17/ month depending on size of trash cart
Organics fees embedded: No, bi-monthly rate is \$15.44 regardless of cart size

Facilities

What facilities does the city own: None
Landfill ownership: County transfer station and then sent to privately owned / operated landfill
Compost facility ownership: Privately owned and operated

Tipping Fees

Landfill: \$119 / ton
Compost (and process): \$34 per ton (contracted rate, posted is \$43)
MRF (revenue): processing cost \$75 / ton, only one in area- they get a 70/30 split of

revenue with company

Curbside Organics Questions
Program Basics

<i>Briefly describe how program works:</i>	City staff collects trash and recycling on alternating weeks Tuesday through Friday and Organics are collected on alternating Mondays, half the city one week, the other half the next week, from the residents that sign-up and pay for the service.
<i>Year started:</i>	Added food scraps in 2008
<i>Who does it cover:</i>	Single family residential, primarily
<i>Service mandatory or optional:</i>	Optional service for organics, trash service is required
<i>% of HHs participating in the organics program:</i>	53% of HHs (note: it is an additional fee to have collection)
<i>Organics disposal bans:</i>	No
<i>% of households back yard composting:</i>	No but anecdotally they believe the percentage of HHs that backyard compost has gone down since they added the convenient and full scale curbside program

Implementation

<i>Implementation steps:</i>	The city was facing budget issues in the late 1990s and was looking at options to reduce costs including privatization of the trash system. They instead chose to reduce the number of collections to cut costs and go to every other week with optional yard waste collection (note: although EOW trash is optional, almost 100% of residents choose the option). The City added food scraps to the yard waste collection program once the processor was able to accept the materials
<i>Other changes at the same time organics collection implemented:</i>	N /A
<i>How to build public support for the program implementation:</i>	Public are in support of the program. They saw it as an added service and since it is optional, it is up to them whether or not they want to participate
<i>Implementation notes:</i>	N/A
<i>Separate truck for Organics Collection:</i>	Yes
<i>What type of trucks are used:</i>	Automated side loaders, one staff per truck
<i>Households collected per route:</i>	Depends on time of year, low season (winter) is 800 -1000, high season is less. They use 4 - 6 trucks to collect about 3,750 HHs in one day. They have two collection days (one each week)
<i>Are HHs with bio-bags or kitchen containers:</i>	No- the processor is actually talking about not accepting bags in the future

Costs of Service

<i>Total cost per household:</i>	Around \$7.70 per hh per month
<i>Disposal cost:</i>	\$34 per ton
<i>Outreach and Education:</i>	There is three staff dedicated for all programs, outreach, etc. in the city. The budget for the Waste Prevention and Reduction program is \$286K

Tonnage data (residential)

<i>Reported residential diversion rate:</i>	57%
<i>MSW:</i>	6297

Recycling: 4764
Organics: 5049

Other Data

Data on average set out (weight) per household: Lbs / person / year- 405 MSW, 306 Recycling, 325 Organics, 1,036 total- City estimates that the organics program is capturing 12 pounds of food scraps per participating household per collection (6 lbs per week)

% of the organics stream that is food vs. yard waste vs. paper: No

Waste composition studies available: Yes

Contamination rate in the organics stream: Exact number not known but they report that loads are not being rejected by the processor

Pre / post organics collection data available: No but they guess that adding food scraps increased tonnages of organics collected by about 10%

Organics remaining in the waste stream: 2008/9 waste comp found that 4.8% of stream was YW and 23.4% was food

Open Ended

How did you deal with the 'yuck' factor, odors in the summer, and vectors: Not an issue for them even with every other week collection. They attribute it to their northerly climate and very few days in which the temperature exceeds 90 degrees.

Any major ongoing issues in the program: Nothing of note

Advice for communities thinking about going forward with a food scraps program: Two important issues **1)** Be sure you are able to process a designated material (i.e. bio-bags) before you tell customers they can put it in their cart. Once you add a material to the stream it is very hard to take it back out **2)** unlike trash and recycling, organics generation and collection is very seasonal, this means you have to plan for the peak season even though for other times of the year you may require less staff or trucks.

Portland, Oregon

(594,000 total population, 143,000 households serviced)

Contact Name: Bruce Walker (Solid Waste and Recycling manager)
Number: 503-823-7772.
Email: Bruce.Walker@portlandoregon.gov

Trash Services and rates

Collection arrangement: Franchised haulers (19 total), rates set by city and they are reviewed annually, the city has geographic designations and haulers are assigned to certain areas of the city (started in 1992). Rates are uniform throughout most of the city with some areas paying a geographic fee (hard to reach areas that cost more to service)
Variable rates (yes or no): Yes
Cart sizes available: 20, 32, 64, 96. City says 8.1% of HHs are on 20 gal and combined 81.1% are on 35 gallon trash service or lower

Recycling Services

Collection arrangement: Same as MSW
How many streams: Modified single stream- glass is collected separately
Cart sizes available: 35, 65, 95 gallon
Materials collected curb: Typical recycling mix with the addition of flower pots, aseptics, phone books, plastic buckets. Glass is collected in a separate open topped container; motor oil is collected at the curb.

Organics Services

Collection arrangement: Same as MSW
Cart types sizes available: 60, 90 gallon carts
Food scraps co-collected or separate: Yes- food scraps co-collected with yard waste

Collection Frequency

Trash: Every other week
Recycling: Weekly
Organics: Weekly

Rates

Rate structure: 20 gal- \$25.80, 35 gal- \$29.70, 60 gal- \$37.80, 90 gal- \$43.80, 35 gal monthly- \$23.15, recycling and composting only- \$18.35. Note: There is a terrain service surcharge for some customer areas that is ~\$4.- 20% of HHs are on 20 gallons, 60% are on 32 gallons, and 20% are on 60 gallons or more
Recycling fees embedded: Yes- embedded in trash rates
Organics fees embedded: Yes- embedded in trash rates

Facilities

What facilities does the city own: None
Landfill ownership: Private owned and operated facility- directed through flow control regulations
Compost facility ownership: Regional transfer station (public owned / operated) then sent to privately owned / operated compost yard (windrows)

Tipping Fees

<i>Landfill:</i>	\$95 / ton
<i>Compost (and process):</i>	\$55 / ton
<i>MRF (revenue):</i>	\$30
Organic Program Basics	
<i>Briefly describe how program works:</i>	City passed an ordinance that changed trash service to every-other-week with weekly collection of organics from all households.
<i>Year started:</i>	Oct 31 2011, ran a pilot in May 2010
<i>Who does it cover:</i>	Single family residential
<i>Service mandatory or optional:</i>	Mainly mandatory pay in 2012- it will be mandatory source separation ²⁰ in 2013 but enforcement will be more informational than fine based. The City staff will do enforcement
<i>% of HHs participating in the organics program:</i>	Nearly all HHs put out organics cart and they estimate 78% of households are diverting food scraps in the organics stream
<i>Organics disposal bans:</i>	No
<i>% of households back yard composting:</i>	No
Implementation	
<i>Implementation steps:</i>	They ran a pilot in 2010 of every other week trash collection combined with weekly organics. The pilot resulting in significant reduction in trash disposal (about 45%), large increases in recycling (12%) and about a tripling of organics diversion. The pilot also found that residents supported the program. For Portland, the organics collection was not controversial or difficult to implement, it was more so the every-other-week trash collection.
<i>Other changes at the same time organics collection implemented:</i>	Yes- EOW. The switch to EOW trash allowed them to keep the costs about the same with the new program as before (no increase in number of overall collections)
<i>How to build public support for the program implementation:</i>	Pilot program was a large part of it, major education initiative. While most households do support the new program there are some that are very much against it including the local paper, the opposition is not related to food scraps (everyone seems to really like that option) but instead the mandatory EOW trash program.
<i>Implementation notes:</i>	Costs remained about the same because they were already collecting yard waste and they just changed the collection frequency
<i>Separate truck for Organics Collection:</i>	Yes
<i>What type of trucks are used:</i>	Depends on the hauler- mostly fully automated
<i>Households collected per route:</i>	N/A (depends on which hauler)
<i>Are HHs with bio-bags or kitchen containers:</i>	No
Costs of Service	

²⁰ The City is using a mandatory source separation not a disposal ban, for their program. This puts the onus of action on the generator and enforcement (when started) will take place at the point of generation, not disposal.

<i>Total cost per household:</i>	From the city's annual rate audit report (2011/12) - \$255/HH Direct costs of operations/year for all services- composting is estimated to be \$48/HH/year, recycling \$61.60, and trash \$145.76. The total cost per HH that includes the profit and admin costs is \$377/hh/year. The gross profit (the charges above the \$255 direct cost of operations (67% of the total \$377)) is 33%
<i>Disposal cost:</i>	\$55 per ton
<i>Outreach and Education:</i>	\$3.00 per HH on outreach materials first year, \$1.50 subsequent years. Plan on about \$1.50 per HH additional cost for staffing to deliver outreach
Tonnage data (residential)	
<i>Reported residential diversion rate:</i>	70%
<i>MSW:</i>	58,300
<i>Recycling:</i>	n/a
<i>Organics:</i>	85,400
Other Data	
<i>Data on average set out (weight) per household:</i>	22lbs / HH / week total organics, 13.5 lbs / HH / week recycling, 14.5 lbs / HH / week landfilled (these are SERA calculated numbers). (Pilot program was about 15 lbs/HH/week in trash, 16 lbs YW and 3 lbs food)
<i>% of the organics stream that is food vs. yard waste vs. paper:</i>	The pilot found that about 15% of the organics stream is food scraps. The full scale program evaluation (a recent waste composition of organics collected) found that ~1% is paper, ~5% is food, ~89% is yard scraps, and ~5% is wood
<i>Waste composition studies available:</i>	Yes- the City worked with the State DEQ to conduct waste composition studies in 2009. The studies look at multiple streams and sources in the City, the region, and the state. The waste studies can be found at: http://www.deq.state.or.us/lq/sw/disposal/wastecompstudy2009.htm The City has also done their own waste composition studies since the fall of 2011.
<i>Contamination rate in the organics stream:</i>	About 1% in the residential sector over the first year of the program
<i>Pre / post organics collection data available:</i>	Over the first year of the full- scale program implementation the City reports that garbage disposal decreased by 38% and organics collection has increased by nearly 300%.
<i>Organics remaining in the waste stream:</i>	They guess there is a food scraps capture rate of around 45%, higher than other cities with weekly trash collection (the high performing weeklies are maybe around 20% (tops) but some are around 10%). Additionally, they estimate they are capturing 85% of the available recyclables and 99% of the yard debris, and that 78% of households are diverting at least some food scraps.
Open Ended	
<i>How did you deal with the 'yuck' factor, odors in the summer, and vectors:</i>	They collect organics weekly so it is not really an issue- larger one is diapers in the trash

Any major ongoing issues in the program: They have some issues with public opposition to the EOW program and they are also are running into processing capacity related issues. The Mayor fast tracked the program and the processors weren't quite ready to go from zero to 100 in basically week one. The major processor ran into odor problem and the community it is located in barred them from accepting residential food, the processor was contracted to accept the regions organics and to meet the contract terms they are forced to send the organics to multiple facilities, some of which are out of state.

Advice for communities thinking about going forward with a food scraps program: There is no reason not to do food scraps. Every other week trash can work but takes more planning, outreach, and support to implement. However, EOW is the best way to drive food scrap diversion, capture, and participation. Without some sort of reason to participate in food scraps recycling the capture rates will be low.

Wayzata, MN

(3,700 total population 1,300 households serviced)

City: Wayzata, MN
Contact Name: Heidi Nelson (City Manager), Deb Gatz (Randy's Environmental)
Number: (952)404-5309
Email: dgatz@bluebagorganics.com, hnelson@wayzata.org

Trash Services and rates

Collection arrangement: Single Contracted hauler
Variable rates (yes or no): Yes
Cart sizes available: 35, 65, 95 gallon carts

Recycling Services

Collection arrangement: Same as MSW
How many streams: Single stream (started in 2013- before it was multiple streams)
Cart sizes available: 65 gallons
Materials collected curb: Typical single stream mix

Organics Services

Collection arrangement: Same as MSW
Cart types sizes available: Used to be 35-gallon carts for organics - they switched to a Blue Bag Organics™ program in January 2012, They use Kraft paper bags, compostable bags, or bundles, for yard waste
Food scraps co-collected or separate: Collect food scraps and yard waste separately

Collection Frequency

Trash: Weekly for most, there is an EOW option (about 14% choose EOW)
Recycling: EOW
Organics: Weekly

Rates

Rate structure: \$17.70- 35 gal, \$23.20 - 65 gal, \$29.07 - 95 gal
Recycling fees embedded: Yes- embedded in trash rates

Organics fees embedded: Organics is embedded but households must opt-in, the Extended Yard Waste program (allows for yard waste pick-up in bags and bundles) is an extra \$78 for the season

Facilities

What facilities does the city own: None
Landfill ownership: Privately owned and operated
Compost facility ownership: Privately owned and operated (windrows)

Tipping Fees

Landfill: \$45 / ton
Compost (and process): \$15 / ton
MRF (revenue): \$0

Organics Program Basics

Briefly describe how program works: Each customer had their organics carts taken away (January 2013) under the new BluBag Organics program. Customers must now call the hauler to receive **1)** a 32 gallon can and lid **2)** 60 32-gallon compostable bags and **3)** kitchen compost container and **4)** a coupon for a free bag of compost (with a Bluebag label). Households are instructed to put food scraps in the blue bag, hand tie it, and put it in their trash cart on their weekly trash day. The hauler pulls the bags out at the transfer station and sends them to compost processing- the hauler is trying to market this program to other haulers regionally and nationally.

Year started: 2006 for curbside- current program iteration started in January 2013

Who does it cover: Single family residential

Service mandatory or optional: Optional participation- all households used to have the cart program, now with the Bluebag they must call the hauler and ask for the service (this is to prevent the HH from just using the BlueBags as trash bags). They estimate that about 60% of households will opt in (this is probably a higher percentage than other communities may see because they already had a successful organics programs prior to BlueBag)

% of HHs participating in the organics program: Under the cart system estimated that about 25% of all households were setting out a container each week and about 50% set out at a container as a 'participant'. Under new program they estimate 40% - 50% will participate. About 60% have opted-in

Organics disposal bans: There is a state yard waste disposal ban (1993)

% of households back yard composting: No but they think it is pretty low- they are in a small densely populated town

Implementation

Implementation steps: Started with a pilot in 2003 and the pilot went to 2005. The majority of HHs participated in the 'pilot' program in 2005 with only 150 households opting out of the program. From 2006 through 2012 they used a brown cart with automated collection for the program- in 2013 they switched to the Blue Bag Organics program as a result of the hauler running a pilot of the collection system and recognizing that it can drastically reduce costs (they do not need to run a separate organics truck).

Other changes at the same time organics collection implemented: Yes - switched to single stream

How to build public support for the program implementation: Lots and lots of outreach and education did mailings, advertisements, TV show segments, facebook, twitter, and have answered a lot of phone calls

Implementation notes: Minimal costs for the new program- they use the same trucks as trash and the blue bags go in the trash cart- there are some costs related to 1) the bags (maybe \$.30 each?) and 2) pulling the bags out of the trash at the transfer station

Separate truck for Organics Collection: No

What type of trucks are used: From 2005/6 through 2012 they used an automated collection and organics carts for program. 2013 got rid of carts and are doing 'blue bag' program with fully automated collection side loaders

Households collected per route: N/A

Are HHs with bio-bags or kitchen containers: Yes for both

Costs of Service

Total cost per household: Under the BlueBag program the contracted hauler bills the City \$8/HH/Month for recycling and organics collection- the recycling portion of the bill to the City (from the contactor) is \$3 and the organics portion is \$5. The city bills residents and passes the costs on directly to the customers.

Disposal cost: \$15/ton

Outreach and Education: n/a

Tonnage data (residential)

Reported residential diversion rate: Not reported

MSW: Not reported

Recycling: 380

Organics: Not reported

Other Data

Data on average set out (weight) per household: 12.5 to 17 lbs organics per participating HH per week (depending on the season) in the cart program- not known for the BlueBags yet but the pilot data from the hauler indicates it will be similar. Note that the data includes some yard waste but the program was geared to primarily gather food scraps

% of the organics stream that is food vs. yard waste vs. paper: No actual numbers but the hauler estimates that it is almost the entire stream is food scraps with nearly no paper or yard scraps. They do not encourage people to put in paper because it is messy (blows around) at the compost yard

Waste composition studies available: No

Contamination rate in the organics stream: It was low in the cart program and was never an issue- not sure about the bag program yet

Pre / post organics collection data available: Yes- residential garbage disposal went down by 12%, diversion up by 23%

Organics remaining in the waste stream: No

Open Ended

How did you deal with the 'yuck' factor, odors in the summer, and vectors: Odors and vectors have not been an issue

Any major ongoing issues in the program: The BlueBag program is new so there have not been a lot of issues yet- the hardest part has been getting people used to the change because they no longer have an organics cart

Advice for communities thinking about going forward with a food scraps program: Recommend hitting the community with every type of outreach you can- facebook may work for some but mailing and newspaper works better for others Lots of education and awareness is integral to success. The BlueBag program will help keep collection costs down (they do not have to run a separate organics truck) but the impacts are not yet known. For the BlueBag program having a bag that doesn't rip or break is integral, also the bag strength should be able to handle full compaction in a trash truck without breaking.

Appendix B: Containers

Appendix B contains responses to additional questions about interior and exterior collection containers.

1) Indoor containers for food scraps

Depending on which jurisdiction you speak to, the perceived efficacy of providing free, discounted, or no interior kitchen pails for residents varies. Figure A1 displays the range of options and the benefits of the design.

Figure A1: Kitchen Pail Distribution Examples

Location	Description	Benefits of Design
Castro Valley Sanitation District, CA	Residents can pick-up free kitchen pails at district offices (2 types available). However, they encourage residents to 'Go Beyond the Pail' and use their own containers, pizza boxes, paper bags, or other items to collect food scraps	Less expensive than providing a free container for all households, those that want a pail can still get one for no cost, encourages source reduction
Morgan Hill, CA	Gave residents 2 juice pitchers to use, this way one could be in use and the other could be in the dish washer	Was less expensive than providing 'official' kitchen pails for the City, reportedly a very well received option
San Ramon, CA	Kitchen pails are available from the contracted hauler upon request	No cost to community, the costs are included in contracted hauler cost, only households that want pails get them, limits costs, city involvement is limited
Shoreline, WA	Pails were distributed to all households when the program started	Provided good outreach about the upcoming program change to all residents, when they saw a 'free' container they knew something was changing in their collection system
Seattle, WA	Coupons that could be redeemed for 'free' kitchen pails were sent to residents and available for download from the city website during the inaugural year, now discounted coupons are available (but not 'free')	Only residents that wanted pails got them, reduced the initial costs of the program, retailers liked the coupons because it drove customers to their stores
Federal Way, WA	Provided highly discounted coupons for pails to residents (approximately 75% of MSRP)	Limits costs to City, only households that would actually use pails got them and not households that just wanted something for 'free'
Lafayette, CO	No kitchen pails provided	Less expensive than providing coupons or free containers, easier to administer

2) Outdoor collection containers for food scraps.

The most common containers for food scrap collection in the US are 96 gallon roll carts. However, this is because most of the programs in the US co-collect food and yard scraps. We examined our database of food scrap only programs and found the following:

- 13 gallon Norseman containers are being used in several communities for food scraps only collections and are more common than the 21 to 23 gallon containers for food scrap only collection.
- Other options used include clear or specially marked bags that are either co-collected with the MSW stream or collected separately, customer provided paper bags or cardboard boxes, or other self provided containers for food.
- Although not commonly used for food only collection, 17 to 23-gallon ‘mini-can’ options are becoming more popular for MSW collection and have been found to integrate relatively well with automated collection schemes. For the smaller ~20-gallon containers to work with automated collection the collection arms must be retrofitted to handle the containers. If the containers are on a slope they can be challenging to collect automatically, even with the retro-fitted arms. Although automated collection works for the mini-cans, some communities (such as Seattle) use manual collection for the 21-gallon containers because they report it is quicker and easier to get out and manually load them.
- The communities using 13-gallon containers (for either food or MSW) employ a manual collection scheme for the containers.
- Orbis Corporation, the maker of the 13-gallon Norseman container reported that the purchase price of ... *“the 13-gal organic bin is less expensive than the 21-gal, almost half of the price”*. However, City of Seattle staff (the City uses both 13 and 21-gallon carts) reported that there is *not* a large cost differential for them to purchase the varying sizes of containers and that they get both for around \$10 - \$12 each.

City Contacts for More Information on Carts

13-Gallon Carts for Food

Dubuque, IA

- Paul Schultz
- pschultz@cityofdubuque.org,
- 563.589.4249

Hamilton, MA

- Michael Lombardo (City Manager) John Tognazzi (Hiltz Disposal)
- mlombardo@hamiltonma.gov
- (978)468-5572

17 to 23-Gallon Carts for MSW

Olympia, WA

- Ron Jones
- (360)753-8509
- rjones@ci.olympia.wa.us

Loveland, CO (17 gallon)

- Tyler Bandemer (Solid Waste Superintendent)
- Phone: 970-962-2609
- E-mail: Tyler.Bandemer@cityofloveland.org

Both 13 and 21 gallon Containers

Seattle, WA

- Hans Van Dusen
- Phone: (206)684-4657
- Email: hans.vandusen@seattle.gov

Appendix C: Assumptions for the Modeling Work

CSWD Residential Organics Collection Study: Assumptions Used in Economic Model

The following summarizes the key assumptions used in the organics collection model.

Definitions

Geographical Areas Considered

- **County** is defined as households in 1-4 unit structures in all municipalities in Chittenden County.
- **Metro** is defined as households in 1-4 unit structures in Burlington, Colchester, Essex Junction, Milton, South Burlington, Williston, and Winooski.
- **Metro plus Village** is defined as households in 1-4 unit structures in the Metro communities plus the village, center, and metro areas in the other communities as delineated in the Chittenden County Regional Planning Commission ECOS Plan Map.

Collection Systems Considered

- **Current Collection System** is defined as current haulers must offer collection of organics on their current recycling and trash routes as specified in Act 148 without CSWD involvement (except education and outreach).
- **Single Hauler for Organics Only** is defined as separate collection of organics is bid out for the whole geographical area specified. The current collection system is used for recyclables and trash.
- **Consolidated Collection System** is defined as the County is divided into several collection districts, each served by one hauler for the collection of recyclables, trash, and organics.

Participation Requirements Considered

- **Mandatory** is defined as residents must separate organics from other solid waste but have the choice of managing it through curbside collection, backyard composting, or drop-off as envisioned in Act 148. Mandatory does not mean that curbside customers must set out food scraps and yard trimmings and pay for the service.
- **Voluntary** is defined as residents are not required to separate organics but curbside collection is available for a fee. This will be the case from July 1, 2017 until June 30, 2020 under Act 148.
- **Mandatory Pay** is defined as all households on an organics collection route pay for the service whether they use it or not.

Population & Participation

- Populations used in model exclude institutional populations and multi-unit residential buildings over 4 units. In the baseline, the assumption is that 25% of households use CSWD Drop-Off Centers for their regular trash and recycling. In the scenarios examined, the assumption is that with the addition of curbside service for organics 15% of households will use Drop-Off Centers.

Figure C.1: Population Figures for communities within CSWD

Municipality	Baseline County 25% DOC	Baseline Metro 25% DOC	Baseline Metro & Village 25% DOC	Scenarios County 15% DOC	Scenarios Metro 15% DOC	Scenarios Metro & Village 15% DOC
Bolton	328		49	328		49
Burlington	8,872	8,872	8,872	9,717	9,717	9,717
Charlotte	1,281		115	1,441		130
Colchester	4,612	2,465	4,176	5,124	2,739	4,640
Essex	2,467		1,899	2,847		2,192
Essex Jct.	2,143	2,143	2,143	2,565	2,565	2,565
Hinesburg	887		171	1,064		205
Huntington	411		183	493		220
Jericho	1,793		764	1,920		818
Milton	2,335	992	992	2,972	1,262	1,262
Richmond	930		188	1,184		239
Shelburne	2,350		2,097	2,426		2,165
So. Burlington	3,982	3,982	3,982	4,800	4,800	4,800
St. George	173		167	216		209
Underhill	1,093		161	1,157		170
Westford	865		60	865		60
Williston	2,264	1,661	1,661	2,786	2,044	2,044
Winooski	1,768	1,768	1,768	1,890	1,890	1,890
Total	38,553	21,882	29,446	43,795	25,017	33,373

In the scenarios examined, the following estimated household participation rates were used:

- 15% participation in yard trimmings collection in voluntary scenarios, 30% in mandatory.
- 25% participation in food scraps collection in voluntary scenarios, 40% in mandatory.
- 50% participation in backyard composting in voluntary scenarios, 55% in mandatory.
- 9% participation in drop-off composting in voluntary scenarios, 5% in mandatory.

Materials, Baseline

- Annual tons of materials disposed/diverted excluding Bottle Bill containers redeemed and special wastes for households in 1-4 unit structures:

Figure C.2: Annual Tons Disposed within CSWD

Materials	County	Metro	Metro + Villages
Total Disposal	31,900	18,106	27,625
Curbside Disposal	28,882	16,393	25,012
Drop-Off Disposal	3,018	1,713	2,614

Materials	County	Metro	Metro + Villages
Recycling Curbside	12,200	6,925	10,565
Yard Trimmings Curbside*	261	261	261
Food Scraps Curbside*	0	0	0
Recycling Drop-Off	3,235	1,836	2,802
Yard Trimmings Drop-Off	3,000	1,703	2,598
Food Scraps Drop-Off	330	187	286
Back Yard Composting	6,256	3,551	5,418

*An unknown amount of yard trimmings and food scraps are collected from a limited number of households by local haulers.

- Based on waste composition studies (and due to yard trimmings disposal ban), 99% of residential organics currently disposed are food scraps and non-recyclable paper.
- 29% or 9,158 tons of residential MSW disposed by households in 1-4 unit buildings is food scraps and non-recyclable paper.
- 92 tons of residential MSW disposed by households in 1-4 unit buildings are yard trimmings.

Materials, Movements, and Flows in Scenarios

- Capture rates for food scraps are less than for yard trimmings due to the yuk factor. The capture rate is the percentage of food scraps and yard trimmings generated by a household that is diverted to composting.
- Capture rates for yard trimmings are 75% in voluntary scenarios, 85% in mandatory, and 95% in mandatory pay. Capture rates for food scraps are assumed to be 85% of these values or 64% for voluntary scenarios and 72% for mandatory. The capture rate for food scraps under mandatory pay is assumed to be 85%.
- The program and corresponding educational and outreach efforts result in increased attention on recycling and diversion, leading to some source reduction (0.5% reduction in generation), and some new recycling (1% of disposed tons).
- Under the mandatory scenarios, it is assumed:
 - The portion of currently disposed food scraps that is captured is moved, with 45% going to new curbside collection, 5% to drop-off sites, and the remainder to backyard composting.
 - The portion of currently disposed yard trimmings that is captured (very little material) is moved, with 35% going to curbside, 60% to drop-off sites, and 5% to backyard composting.
- The convenience/availability of curbside service draws material away from the drop-off sites as follows:
 - 45% of drop-off food scraps, 30% of drop-off recyclables, and 20% of drop-off yard trimmings move to curbside. The rest remain at drop-off sites.
 - None of the drop-off food scraps or yard trimmings goes to backyard composting.

Incremental Costs and Savings for Materials

- \$183.27 savings for drop-off program per MSW ton diverted to curbside collection. This is the incremental savings, or marginal savings, excluding effects from fixed costs.
- \$38.54 savings for drop-off program per ton of recyclables diverted to curbside collection. This is the incremental savings, or marginal savings, excluding effects from fixed costs.
- \$109.66 savings for drop-off program per ton of food scraps diverted to curbside collection. This is the incremental savings, or marginal savings, excluding effects from fixed costs.

Collection

- Baseline transportation cost per stop for trash and recycling collection:

Figure C.3: Baseline collection costs

Housing Density	Baseline cost per stop trash & rec. (excluding tip fees)	Communities in the Class
Rural	\$9.60	Bolton/Charlotte/Hinesburg/Huntington/Jericho/Milton/Richmond
Suburban/rural	\$8.38	Essex/Shelburne/St. George
Suburban	\$7.16	Colchester/Essex Jct./So. Burlington/Williston (less dense but fewer obstacles and less traffic than urban)
Urban	\$7.16	Burlington/Winooski (denser than suburban but more traffic and obstacles, e.g., parked cars)

- Cost per week to provide recycling, trash, and food scrap collection in the various scenarios:

Figure C.4: Cost per week to provide collection service in various scenarios

Housing Density	Current Collection	Single Organics	Cons. Collection
Urban	\$15.25	\$10.74	\$7.28
Suburban	\$15.25	\$10.74	\$7.28
Suburban/Rural	\$17.85	\$12.57	\$8.19
Rural	\$20.45	\$14.40	\$9.10

- Households behave similarly (in terms of waste management behaviors, participations, etc.) under each type of collection service. The collection arrangement is considered relatively invisible and does not influence behaviors. They see collection service being provided, period.

- Tipping fees per ton:

Trash	\$90
Recyclables	\$5
Yard Trimmings	\$0
Food Scraps	\$40

- Average round-trip distance to each of the processing facilities (transfer stations, GMC, MRF) is 20 miles.

- Average round-trip distance to CSWD Drop-Off Centers is 10 miles.
- Food scraps, trash, and recycling collections are weekly.
- Yard trimmings are collected for four weeks in the spring and four weeks in the fall.
- Capital costs for new vehicles are not included.
- Consultant costs for designing a system are not included.

Collection Containers

- Yard trimmings are collected in paper bags purchased by participants at a cost of \$7.50 per year.
- Food scraps are collected in 13- 22- or 32-gallon wheeled carts at \$35.00 each.
- Each cart has a label at \$0.16 each.
- Costs per household to assemble and distribute carts are:

Figure C.5: Cost for Cart Distribution

Separation	County	Metro + Villages	Metro
Voluntary	\$11.31	\$11.10	\$10.78
Mandatory	\$9.03	\$8.32	\$7.81

- Estimated annual maintenance cost per cart is \$2.40.
- 9% inventory of carts needed on hand.
- Households are provided with a \$6.00 coupon for kitchen collection containers; 50% of participants redeem.
- Container liners are not provided but are available for purchase.

Billing

- CSWD does billing under consolidated collection and single organics hauler scenarios.
- \$50,000 cost for one-time billing system change.
- \$2.50 cost per bill, billed quarterly.
- Haulers do billing under current collection scenario.
- The costs for billing are a wash to residents. They affect how much CSWD would have to budget for its own costs, but otherwise, we assume whoever does the billing, the cost of that bill would be reflected in the household’s bill.

Education

- \$1.00 additional per household for outreach in the first year with cost spread over 5 years.
- \$0.65 per household for the first year for temporary customer service staff for phone calls and e-mails. It was calculated assuming there would be 3 months of calls, handled by 1 temporary staffer at \$50/hour fully loaded (\$26,000; the cost for 40,000 households is about \$0.65 per household). A smaller salary could be assumed, or if this is handled by shifting workload for staff, it could be zero. This is a one-time, implementation cost.

APPENDIX D: Output of the Modeling Work

The following provides the full output from the model, for the “base” case – mandatory program, not mandatory pay, weekly collection services. The output from the 54 different cases is provided in the three tables.

Chittenden Residential Organics Collection Model

Sheet 3: Outputs

V57Final, Dec 2013/Feb 2014/May 2014

Skumatz Economic Research Associates, Inc. (SERA)

skumatz @ serainc.com; 303/494-1178

6/27/2014 11:52

NOTE: MANDATORY FOR THIS SCENARIO RUN MEANS:

MANDATORY MATERIAL MANAGEMENT, NOT MANDATORY C/S PAY

CHITTENDEN SWD SUMMARY RESULTS - ALL

Summary Tables for 1) all, 2) mandatory vs. voluntary, and 3) yard trimmings vs. not. User may hide any rows or columns they wish.

Scenario Description: Basic, with weekly collection for recycling and for other services, 8 weeks yard waste

		Settings & Values		Pct Diversion		Tonnage Changes				Customer Costs and Cost/Diverted Ton				Environmental Effects-Emissions & E			
		Mandatory	With Yr	Percent away from Landfill (Incl. BYC)	Incremental percent away from Landfill	Change in landfills tons	Change in organics tons EXCL BYC	Change in organics tons INCL BYC	Change in recycling tons*	Change in monthly cost per AVG HH	Change in monthly cost per PARTIC HH	Change in monthly cost per NON-Partic HH	Total new costs (5 yrs for amort)	Cost per ton drawn away from landfill	Carbon emissions from recycling (MTCO2E)	Carbon emissions from organics**(MTCO2E)	Energy Use from recycling (BTU)
Consolidated Collection (in Districts for Recy, Trash, Organics)	Chittenden County	Mandatory	With Yr	49.4%	5.1%	-3,000	1,100	2,400	290	-\$8.68	\$4.57	-\$17.51	-\$4,014	-\$1,350	771	3,570	4,396
		Mandatory	No Yr	49.3%	5.0%	-2,900	1,100	2,400	290	-\$9.78	\$1.82	-\$17.51	-\$4,523	-\$1,540	771	3,559	4,396
		Voluntary	With Yr	47.5%	3.1%	-1,800	600	1,300	290	-\$9.95	\$12.73	-\$17.51	-\$4,602	-\$2,500	771	3,120	4,396
		Voluntary	No Yr	47.4%	3.1%	-1,800	600	1,300	290	-\$10.75	\$9.52	-\$17.51	-\$4,974	-\$2,720	771	3,115	4,396
	Burlington Metro Incl. Villages	Mandatory	With Yr	49.4%	5.1%	-2,300	800	1,800	220	-\$7.59	\$5.46	-\$16.29	-\$2,683	-\$1,190	589	2,727	3,358
		Mandatory	No Yr	49.3%	5.0%	-2,200	800	1,800	220	-\$8.65	\$2.82	-\$16.29	-\$3,056	-\$1,360	589	2,718	3,358
		Voluntary	With Yr	47.5%	3.1%	-1,400	500	1,000	220	-\$8.82	\$13.61	-\$16.29	-\$3,115	-\$2,220	589	2,383	3,358
		Voluntary	No Yr	47.4%	3.1%	-1,400	500	1,000	220	-\$9.58	\$10.55	-\$16.29	-\$3,386	-\$2,420	589	2,379	3,358
	Burlington Metro Excl. Villages	Mandatory	With Yr	49.4%	5.1%	-1,300	500	1,000	130	-\$6.52	\$6.84	-\$15.43	-\$1,712	-\$1,330	334	1,548	1,906
		Mandatory	No Yr	49.3%	5.0%	-1,300	500	1,000	130	-\$7.54	\$4.28	-\$15.43	-\$1,981	-\$1,550	334	1,543	1,906
		Voluntary	With Yr	47.5%	3.1%	-800	300	600	130	-\$7.74	\$15.31	-\$15.43	-\$2,033	-\$2,550	334	1,353	1,906
		Voluntary	No Yr	47.4%	3.1%	-800	300	600	130	-\$8.48	\$12.34	-\$15.43	-\$2,228	-\$2,810	334	1,350	1,906
Current Collection System (multiple haulers, must offer organics)	Chittenden County	Mandatory	With Yr	49.4%	5.1%	-3,000	1,100	2,400	290	\$17.84	\$44.60	\$0.00	\$8,253	\$2,780	771	3,570	4,396
		Mandatory	No Yr	49.3%	5.0%	-2,900	1,100	2,400	290	\$15.56	\$38.91	\$0.00	\$7,200	\$2,450	771	3,559	4,396
		Voluntary	With Yr	47.5%	3.1%	-1,800	600	1,300	290	\$17.07	\$68.26	\$0.00	\$7,895	\$4,290	771	3,120	4,396
		Voluntary	No Yr	47.4%	3.1%	-1,800	600	1,300	290	\$15.33	\$61.31	\$0.00	\$7,091	\$3,870	771	3,115	4,396
	Burlington Metro Incl. Villages	Mandatory	With Yr	49.4%	5.1%	-2,300	800	1,800	220	\$16.97	\$42.42	\$0.00	\$5,996	\$2,650	589	2,727	3,358
		Mandatory	No Yr	49.3%	5.0%	-2,200	800	1,800	220	\$14.80	\$36.99	\$0.00	\$5,228	\$2,330	589	2,718	3,358
		Voluntary	With Yr	47.5%	3.1%	-1,400	500	1,000	220	\$16.22	\$64.90	\$0.00	\$5,733	\$4,080	589	2,383	3,358
		Voluntary	No Yr	47.4%	3.1%	-1,400	500	1,000	220	\$14.57	\$58.27	\$0.00	\$5,148	\$3,680	589	2,379	3,358
	Burlington Metro Excl. Villages	Mandatory	With Yr	49.4%	5.1%	-1,300	500	1,000	130	\$16.46	\$41.14	\$0.00	\$4,322	\$3,360	334	1,548	1,906
		Mandatory	No Yr	49.3%	5.0%	-1,300	500	1,000	130	\$14.36	\$35.90	\$0.00	\$3,771	\$2,960	334	1,543	1,906
		Voluntary	With Yr	47.5%	3.1%	-800	300	600	130	\$15.70	\$62.80	\$0.00	\$4,123	\$5,170	334	1,353	1,906
		Voluntary	No Yr	47.4%	3.1%	-800	300	600	130	\$14.10	\$56.41	\$0.00	\$3,703	\$4,670	334	1,350	1,906
Single Hauler System (for Organics only)	Chittenden County	Mandatory	With Yr	49.4%	5.1%	-3,000	1,100	2,400	290	\$8.83	\$22.08	\$0.00	\$4,085	\$1,380	771	3,570	4,396
		Mandatory	No Yr	49.3%	5.0%	-2,900	1,100	2,400	290	\$7.73	\$19.33	\$0.00	\$3,576	\$1,220	771	3,559	4,396
		Voluntary	With Yr	47.5%	3.1%	-1,800	600	1,300	290	\$7.56	\$30.24	\$0.00	\$3,497	\$1,900	771	3,120	4,396
		Voluntary	No Yr	47.4%	3.1%	-1,800	600	1,300	290	\$6.76	\$27.02	\$0.00	\$3,126	\$1,710	771	3,115	4,396
	Burlington Metro Incl. Villages	Mandatory	With Yr	49.4%	5.1%	-2,300	800	1,800	220	\$8.70	\$21.75	\$0.00	\$3,074	\$1,360	589	2,727	3,358
		Mandatory	No Yr	49.3%	5.0%	-2,200	800	1,800	220	\$7.64	\$19.11	\$0.00	\$2,701	\$1,200	589	2,718	3,358
		Voluntary	With Yr	47.5%	3.1%	-1,400	500	1,000	220	\$7.48	\$29.91	\$0.00	\$2,642	\$1,880	589	2,383	3,358
		Voluntary	No Yr	47.4%	3.1%	-1,400	500	1,000	220	\$6.71	\$26.84	\$0.00	\$2,371	\$1,700	589	2,379	3,358
	Burlington Metro Excl. Villages	Mandatory	With Yr	49.4%	5.1%	-1,300	500	1,000	130	\$8.91	\$22.27	\$0.00	\$2,339	\$1,820	334	1,548	1,906
		Mandatory	No Yr	49.3%	5.0%	-1,300	500	1,000	130	\$7.88	\$19.71	\$0.00	\$2,070	\$1,620	334	1,543	1,906
		Voluntary	With Yr	47.5%	3.1%	-800	300	600	130	\$7.68	\$30.73	\$0.00	\$2,017	\$2,530	334	1,353	1,906
		Voluntary	No Yr	47.4%	3.1%	-800	300	600	130	\$6.94	\$27.77	\$0.00	\$1,823	\$2,300	334	1,350	1,906

Settings & Values				Sources of Changes in Monthly Customer Costs-AVERAGE across all HHs							Sources of Changes in Monthly Customer Costs - for Participating HHs						
				Tip fee cost change	Hauling costs changes	Coll'n cost changes (Avg HH)	Outreach, Billing, Rates, Admin change	Changes from dropoff & Other programs	Containers cost changes	Total Change in AVG Cost /HH/Mo	Tip fee cost change	Hauling costs changes	Coll'n cost changes (Partic HH)	Outreach, Billing, Rates, Admin change	Changes from dropoff & Other programs	Containers cost changes	Total Change in Participan t Cost /HH/Mo
Consolidated Collection (in Districts for Recy, Trash, Organics)	Chittenden County	Mandatory	With YT	-\$0.48	\$0.00	-\$9.67	\$0.93	-\$0.04	\$0.59	-\$8.68	-\$1.20	\$0.00	\$2.07	\$2.33	-\$0.11	\$1.48	\$4.57
		Mandatory	No YT	-\$0.48	\$0.00	-\$10.63	\$0.93	-\$0.05	\$0.44	-\$9.78	-\$1.19	\$0.00	-\$0.30	\$2.33	-\$0.12	\$1.10	\$1.82
		Voluntary	With YT	-\$0.30	\$0.00	-\$10.86	\$0.88	-\$0.03	\$0.36	-\$9.95	-\$1.21	\$0.00	\$9.07	\$3.53	-\$0.11	\$1.45	\$12.73
		Voluntary	No YT	-\$0.30	\$0.00	-\$11.59	\$0.88	-\$0.03	\$0.29	-\$10.75	-\$1.21	\$0.00	\$6.15	\$3.53	-\$0.11	\$1.15	\$9.52
	Burlington Metro Incl. Villages	Mandatory	With YT	-\$0.48	\$0.00	-\$8.83	\$1.18	-\$0.04	\$0.59	-\$7.59	-\$1.20	\$0.00	\$2.36	\$2.95	-\$0.11	\$1.47	\$5.46
		Mandatory	No YT	-\$0.48	\$0.00	-\$9.74	\$1.18	-\$0.05	\$0.44	-\$8.65	-\$1.19	\$0.00	\$0.09	\$2.95	-\$0.12	\$1.09	\$2.82
		Voluntary	With YT	-\$0.30	\$0.00	-\$9.98	\$1.13	-\$0.03	\$0.36	-\$8.82	-\$1.21	\$0.00	\$8.97	\$4.52	-\$0.11	\$1.45	\$13.61
		Voluntary	No YT	-\$0.30	\$0.00	-\$10.67	\$1.13	-\$0.03	\$0.29	-\$9.58	-\$1.21	\$0.00	\$6.20	\$4.52	-\$0.11	\$1.15	\$10.55
	Burlington Metro Excl. Villages	Mandatory	With YT	-\$0.37	\$0.00	-\$8.24	\$1.54	-\$0.03	\$0.58	-\$6.52	-\$0.92	\$0.00	\$2.54	\$3.85	-\$0.08	\$1.46	\$6.84
		Mandatory	No YT	-\$0.36	\$0.00	-\$9.12	\$1.54	-\$0.04	\$0.43	-\$7.54	-\$0.91	\$0.00	\$0.35	\$3.85	-\$0.09	\$1.08	\$4.28
		Voluntary	With YT	-\$0.23	\$0.00	-\$9.34	\$1.49	-\$0.02	\$0.36	-\$7.74	-\$0.93	\$0.00	\$8.90	\$5.97	-\$0.08	\$1.44	\$15.31
		Voluntary	No YT	-\$0.23	\$0.00	-\$10.01	\$1.49	-\$0.02	\$0.29	-\$8.48	-\$0.92	\$0.00	\$6.24	\$5.97	-\$0.09	\$1.14	\$12.34
Current Collection System (multiple haulers, must offer organics)	Chittenden County	Mandatory	With YT	-\$0.48	\$0.00	\$17.69	\$0.08	-\$0.04	\$0.59	\$17.84	-\$1.20	\$0.00	\$44.23	\$0.20	-\$0.11	\$1.48	\$44.60
		Mandatory	No YT	-\$0.48	\$0.00	\$15.57	\$0.08	-\$0.05	\$0.44	\$15.56	-\$1.19	\$0.00	\$38.91	\$0.20	-\$0.12	\$1.10	\$38.91
		Voluntary	With YT	-\$0.30	\$0.00	\$16.98	\$0.05	-\$0.03	\$0.36	\$17.07	-\$1.21	\$0.00	\$67.93	\$0.20	-\$0.11	\$1.45	\$68.26
		Voluntary	No YT	-\$0.30	\$0.00	\$15.32	\$0.05	-\$0.03	\$0.29	\$15.33	-\$1.21	\$0.00	\$61.27	\$0.20	-\$0.11	\$1.15	\$61.31
	Burlington Metro Incl. Villages	Mandatory	With YT	-\$0.48	\$0.00	\$16.83	\$0.08	-\$0.04	\$0.59	\$16.97	-\$1.20	\$0.00	\$42.07	\$0.20	-\$0.11	\$1.47	\$42.42
		Mandatory	No YT	-\$0.48	\$0.00	\$14.80	\$0.08	-\$0.05	\$0.44	\$14.80	-\$1.19	\$0.00	\$37.01	\$0.20	-\$0.12	\$1.09	\$36.99
		Voluntary	With YT	-\$0.30	\$0.00	\$16.14	\$0.05	-\$0.03	\$0.36	\$16.22	-\$1.21	\$0.00	\$64.57	\$0.20	-\$0.11	\$1.45	\$64.90
		Voluntary	No YT	-\$0.30	\$0.00	\$14.56	\$0.05	-\$0.03	\$0.29	\$14.57	-\$1.21	\$0.00	\$58.24	\$0.20	-\$0.11	\$1.15	\$58.27
	Burlington Metro Excl. Villages	Mandatory	With YT	-\$0.37	\$0.00	\$16.20	\$0.08	-\$0.03	\$0.58	\$16.46	-\$0.92	\$0.00	\$40.49	\$0.20	-\$0.08	\$1.46	\$41.14
		Mandatory	No YT	-\$0.36	\$0.00	\$14.25	\$0.08	-\$0.04	\$0.43	\$14.36	-\$0.91	\$0.00	\$35.62	\$0.20	-\$0.09	\$1.08	\$35.90
		Voluntary	With YT	-\$0.23	\$0.00	\$15.54	\$0.05	-\$0.02	\$0.36	\$15.70	-\$0.93	\$0.00	\$62.16	\$0.20	-\$0.08	\$1.44	\$62.80
		Voluntary	No YT	-\$0.23	\$0.00	\$14.02	\$0.05	-\$0.02	\$0.29	\$14.10	-\$0.92	\$0.00	\$56.07	\$0.20	-\$0.09	\$1.14	\$56.41
Single Hauler System (for Organics only)	Chittenden County	Mandatory	With YT	-\$0.48	\$0.00	\$7.83	\$0.93	-\$0.04	\$0.59	\$8.83	-\$1.20	\$0.00	\$19.58	\$2.33	-\$0.11	\$1.48	\$22.08
		Mandatory	No YT	-\$0.48	\$0.00	\$6.88	\$0.93	-\$0.05	\$0.44	\$7.73	-\$1.19	\$0.00	\$17.20	\$2.33	-\$0.12	\$1.10	\$19.33
		Voluntary	With YT	-\$0.30	\$0.00	\$6.64	\$0.88	-\$0.03	\$0.36	\$7.56	-\$1.21	\$0.00	\$26.58	\$3.53	-\$0.11	\$1.45	\$30.24
		Voluntary	No YT	-\$0.30	\$0.00	\$5.92	\$0.88	-\$0.03	\$0.29	\$6.76	-\$1.21	\$0.00	\$23.66	\$3.53	-\$0.11	\$1.15	\$27.02
	Burlington Metro Incl. Villages	Mandatory	With YT	-\$0.48	\$0.00	\$7.46	\$1.18	-\$0.04	\$0.59	\$8.70	-\$1.20	\$0.00	\$18.65	\$2.95	-\$0.11	\$1.47	\$21.75
		Mandatory	No YT	-\$0.48	\$0.00	\$6.55	\$1.18	-\$0.05	\$0.44	\$7.64	-\$1.19	\$0.00	\$16.38	\$2.95	-\$0.12	\$1.09	\$19.11
		Voluntary	With YT	-\$0.30	\$0.00	\$6.32	\$1.13	-\$0.03	\$0.36	\$7.48	-\$1.21	\$0.00	\$25.26	\$4.52	-\$0.11	\$1.45	\$29.91
		Voluntary	No YT	-\$0.30	\$0.00	\$5.62	\$1.13	-\$0.03	\$0.29	\$6.71	-\$1.21	\$0.00	\$22.49	\$4.52	-\$0.11	\$1.15	\$26.84
	Burlington Metro Excl. Villages	Mandatory	With YT	-\$0.37	\$0.00	\$7.19	\$1.54	-\$0.03	\$0.58	\$8.91	-\$0.92	\$0.00	\$17.96	\$3.85	-\$0.08	\$1.46	\$22.27
		Mandatory	No YT	-\$0.36	\$0.00	\$6.31	\$1.54	-\$0.04	\$0.43	\$7.88	-\$0.91	\$0.00	\$15.77	\$3.85	-\$0.09	\$1.08	\$19.71
		Voluntary	With YT	-\$0.23	\$0.00	\$6.08	\$1.49	-\$0.02	\$0.36	\$7.68	-\$0.93	\$0.00	\$24.33	\$5.97	-\$0.08	\$1.44	\$30.73
		Voluntary	No YT	-\$0.23	\$0.00	\$5.42	\$1.49	-\$0.02	\$0.29	\$6.94	-\$0.92	\$0.00	\$21.67	\$5.97	-\$0.09	\$1.14	\$27.77

				Total monthly coll'n cost (not "changes")					
Settings & Values				Coll'n cost changes (Non-Partic HHs)	Pct HHs participating	Monthly Coll'n Cost, Current per HH	Monthly Coll'n Cost, AVG HH	Monthly Coll'n Cost, PARTIC HH	Monthly Coll'n cost, NON-partic HH
Consolidated Collection (in Districts for Recy, Trash, Organics)	Chittenden County	Mandatory	With YT	-\$17.51	40%	\$34.41	\$24.73	\$36.48	\$16.90
		Mandatory	No YT	-\$17.51	40%	\$34.41	\$23.78	\$34.10	\$16.90
		Voluntary	With YT	-\$17.51	25%	\$34.41	\$23.54	\$43.48	\$16.90
		Voluntary	No YT	-\$17.51	25%	\$34.41	\$22.82	\$40.56	\$16.90
	Burlington Metro Incl. Villages	Mandatory	With YT	-\$16.29	40%	\$32.76	\$23.93	\$35.12	\$16.47
		Mandatory	No YT	-\$16.29	40%	\$32.76	\$23.02	\$32.85	\$16.47
		Voluntary	With YT	-\$16.29	25%	\$32.76	\$22.78	\$41.73	\$16.47
		Voluntary	No YT	-\$16.29	25%	\$32.76	\$22.09	\$38.96	\$16.47
	Burlington Metro Excl. Villages	Mandatory	With YT	-\$15.43	40%	\$31.55	\$23.31	\$34.08	\$16.12
		Mandatory	No YT	-\$15.43	40%	\$31.55	\$22.43	\$31.89	\$16.12
		Voluntary	With YT	-\$15.43	25%	\$31.55	\$22.20	\$40.45	\$16.12
		Voluntary	No YT	-\$15.43	25%	\$31.55	\$21.54	\$37.79	\$16.12
Current Collection System (multiple haulers, must offer organics)	Chittenden County	Mandatory	With YT	\$0.00	40%	\$34.41	\$52.10	\$78.64	\$34.41
		Mandatory	No YT	\$0.00	40%	\$34.41	\$49.97	\$73.32	\$34.41
		Voluntary	With YT	\$0.00	25%	\$34.41	\$51.39	\$102.33	\$34.41
		Voluntary	No YT	\$0.00	25%	\$34.41	\$49.73	\$95.68	\$34.41
	Burlington Metro Incl. Villages	Mandatory	With YT	\$0.00	40%	\$32.76	\$49.59	\$74.83	\$32.76
		Mandatory	No YT	\$0.00	40%	\$32.76	\$47.56	\$69.77	\$32.76
		Voluntary	With YT	\$0.00	25%	\$32.76	\$48.90	\$97.33	\$32.76
		Voluntary	No YT	\$0.00	25%	\$32.76	\$47.32	\$91.00	\$32.76
	Burlington Metro Excl. Villages	Mandatory	With YT	\$0.00	40%	\$31.55	\$47.74	\$72.04	\$31.55
		Mandatory	No YT	\$0.00	40%	\$31.55	\$45.79	\$67.17	\$31.55
		Voluntary	With YT	\$0.00	25%	\$31.55	\$47.09	\$93.71	\$31.55
		Voluntary	No YT	\$0.00	25%	\$31.55	\$45.57	\$87.62	\$31.55
Single Hauler System (for Organics only)	Chittenden County	Mandatory	With YT	\$0.00	40%	\$34.41	\$42.24	\$53.99	\$34.41
		Mandatory	No YT	\$0.00	40%	\$34.41	\$41.29	\$51.61	\$34.41
		Voluntary	With YT	\$0.00	25%	\$34.41	\$41.05	\$60.98	\$34.41
		Voluntary	No YT	\$0.00	25%	\$34.41	\$40.32	\$58.07	\$34.41
	Burlington Metro Incl. Villages	Mandatory	With YT	\$0.00	40%	\$32.76	\$40.22	\$51.41	\$32.76
		Mandatory	No YT	\$0.00	40%	\$32.76	\$39.31	\$49.14	\$32.76
		Voluntary	With YT	\$0.00	25%	\$32.76	\$39.08	\$58.02	\$32.76
		Voluntary	No YT	\$0.00	25%	\$32.76	\$38.38	\$55.25	\$32.76
	Burlington Metro Excl. Villages	Mandatory	With YT	\$0.00	40%	\$31.55	\$38.73	\$49.51	\$31.55
		Mandatory	No YT	\$0.00	40%	\$31.55	\$37.86	\$47.32	\$31.55
		Voluntary	With YT	\$0.00	25%	\$31.55	\$37.63	\$55.88	\$31.55
		Voluntary	No YT	\$0.00	25%	\$31.55	\$36.96	\$53.21	\$31.55