Residential Cart Tagging to Increase Food Scrap Diversion

Proposal for Waste Management's King County 2016-17 Revenue Sharing Agreement

Introduction

Project Background and Goals

King County Solid Waste Division (SWD) is interested in conducting research into the effectiveness of tagging residential curbside carts in order to prompt households to put their food scraps and food soiled paper in their yard waste carts. They are also interested in studying how frequently the carts need to be tagged into order to sustain the behavior over time.

Past cart tagging projects conducted in the region have tested the use of cart tags to increase recycling participation, decrease recycling contamination, and increase waste diversion overall, but no previous project has tested the use of cart tags to specifically increase food scrap diversion, and no previous project has examined the optimal frequency of tagging for achieving sustained behavior change.

This pilot project will be a collaboration between Waste Management and King County SWD. This scope covers planning, cart tag production and reporting support provided by C+C, as well as planning and conducting the tag placement itself and three rounds of evaluation audits to assess the effects of the tagging effort by Cascadia Consulting Group.

Project findings will inform future tagging activities and will be shared with municipalities in the county interested in implementing best practices related to residential outreach.

King County will be facilitating a similar cart tagging pilot with Republic Services beginning in Q4 of 2015 and with Recology through their King County Revenue Sharing Agreement beginning in early 2016.

Project Overview

Project Budget

The total estimated project budget for this work is $144,425 for consultant support. This would be spent over the course of both 2016 and 2017.

Task	C+C	Cascadia	Total
1. Project Planning and Coordination	$8,000	$8,250	$16,250
2. Tag Design and Production (assumes 6,000 tags)	$4,500	$0	$4,500
3. Cart Tag Placement	$0	$9,850	$9,850
4. Evaluation Audits	$0	$103,950	$103,950
5. Analysis and Report	$2,000	$7,875	$9,875
TOTAL	**$14,500**	**$129,925**	**$144,425**

Project Scope

Tactics Used

This project will test the effects of placing cart tags on curbside carts along two residential collection routes at two different frequencies—quarterly and biannually—over the course of one year. Only households already subscribed to yard/food waste collection service and with either a garbage or yard waste cart set out on the day of a tagging event will receive tags.

Tools and Communication Used

The primary communication tool used will be a custom cart tag. The tag will be designed as a "prompt" to educate and remind residents that food scraps and food-soiled paper should be placed in the yard waste cart. The tag will focus on that singular behavior so that the call to action is clear and easily understood. In order to isolate the findings of this pilot to the effectiveness and optimal frequency of cart tag placement, no other tactics will be tested and no other specific communication will be undertaken with the pilot audience. Please note: a cart tag will be developed for this pilot that is taking place in the Republic Services area, beginning in late 2015. The tag will have King County branding but will include the Republic Services logo. It is King County's hope that the same tag can be used for this pilot with Recology and Waste Management but with their respective logos included. By using the same tag across all the three waste hauler pilots, we can minimize study differences so that pilot results can be extrapolated across a wider geographic area.

Project Location and Audience

The pilot project will involve three residential collection routes located in UTC areas of Redmond, Woodinville and Sammamish. Households on two of the three routes selected will receive tags. Households on the third route will serve as a control group. These three routes are being proposed after reviewing route data and locations and based on the following selection criteria:

- Three routes that are relatively close in proximity to one another and may have comparable geographic and demographic areas (still need to verify this)
- Yard waste collection schedules are the same across all routes in the pilot (i.e. all every-other week (EOW) collection, not a mix of schedules).
- At least 400 yard waste subscribers on each selected route.

Proposed WM Routes for Pilot Project:

Route No. (MSW/YW)	Jurisdiction	# of MSW Customers	# of YW Subscribers	Collection Day	Pilot Group
S1GK, S1YG	**Trilogy/Redmond Ridge (Redmond UTC)**	**???**	**1,082**	**Monday**	**Control**
S3GP, S3YG	**Woodinville UTC**	**???**	**727**	**Wednesday**	**Test 1**
S4GK,	**Sammamish UTC**	**???**	**733**	**Thursday**	**Test 2**

Project Tasks and Timeline

The project will involve five tasks:

Task 1. Project planning and coordination

Task 2. Tag customization and production

Task 3. Tag placement

Task 4. Project impact evaluation audits

Task 5. Data analysis and report

The project will span one year, allowing for measurement of the effects of different tagging frequencies on sustained behavior change. The year-over-year measurement will also enable the evaluation to account for fluctuations in seasonal and other changes that occur naturally with food waste.

The following table presents the implementation timeline by task:

Task	Jan '16	Feb '16	Mar '16	Apr '16	May '16	June '16	July '16	Aug '16	Sep '16	Oct '16	Nov '16	Dec '16	Jan '17	Feb '17	Mar '17	Apr '17
1. Project Planning	●	●	●													
2. Tag Design and Production		●	●													
3. Tag Placement (Frequency 1)				●			●			●			●			
(Frequency 2)				●						●						
4. Evaluation Audits			●						●						●	
5. Analysis and Report															●	●

Evaluation Methods

Project impacts will be evaluated using waste audits (sorting and weight-based measurement of random samples of waste collected from households on selected routes). Three rounds of auditing will be conducted, including:

1) **Baseline**, conducted prior to start of cart tag placement
2) **Midpoint**, conducted halfway through the one-year cycle of cart tagging
3) **Final**, conducted after completion of the one-year cycle of cart tagging

During each round of auditing, samples will be collected at random from 50 households on each route (150 households in total) with both garbage and yard waste containers placed at the curb on the day of

the sampling event.[1] The entire contents of the garbage and yard waste containers will be collected from sampled households, resulting in two samples collected from each sample household and 300 samples in total.

Collected samples will be sorted into five categories:

1. **Food**
2. **Compostable paper, plastic, and food-related wood items**
3. **Non-compostable paper and plastic food service items and packaging**
4. **Yard debris**
5. **Other material**

More detail about each category, including descriptions of items defined within each category, is provided in Appendix: Evaluation Audits Material Sorting List and Category Descriptions.

Sorted categories from each sample will be weighed and data will be tracked by household, using a unique identifier assigned to each household so that household-level data can be tracked and compared throughout the pilot.

The methodology for the midpoint and final audits will be identical to the baseline audit except that, where possible, samples will be collected from the same households that were sampled in the baseline audit (rather than being randomly selected). In instances where a household that was sampled during the baseline audit does not have both garbage and yard waste containers set out on the day of a sampling event, another qualifying household on the route will be selected at random for sampling.

In addition to conducting of the household-level audits, route-level tonnage data will be tracked for the duration of the study.

Project Results

Activities Completed

Activity metrics for this project will be reported as follows:

- Number (and percent) of residential customers on each route that received a tag during each tagging event (all residents with either a garbage or yard waste cart set out on the day of each tagging event will receive one tag).

Outcomes

The primary metric used for evaluating the project's impact will be the capture rate; that is, the measure of the percent of all food scraps (and compostable food-soiled paper) in a household's waste that is "captured" for composting (i.e. it is placed in the yard waste cart). For each audit, it will be calculated at the individual household and route-wide levels, using a simple formula:

[1] Several factors were considered when selecting the number of households to audit on each route including the probability of detecting a significantly significant change in the capture rate and the available project budget. The project partners feel that, with this level of sampling, the confidence interval around the capture rate will be small enough to support an analysis of the statistical significance of any change in the capture rate.

$$\text{Capture Rate} = \frac{\text{(Lbs. of food scraps in YW cart)}}{\text{(Lbs. of food scraps in YW cart) + (Lbs. of food scraps in Garbage cart)}}$$

The project impact evaluation will calculate the food scraps capture rate of the baseline, mid-point, and final audits. A statistical analysis will be completed to test for statistically significant changes in the capture rate between the various audits and cart tagging frequencies.

Without a prior knowledge of how large the change in capture rate will be, it is impossible to predict if the statistical analysis will be able to distinguish between a "real" change in the capture rate from a change due to some sampling bias or other artifact of the sampling design. As this project is the first of its kind in the region, there is no basis for estimating how large the change in the capture rate will be. This project may serve as a baseline for determining the necessary number of households to audit for future projects.

If available from Waste Management, route-level garbage and yard waste tonnage data will also be analyzed. This data may supplement findings from the capture rate analysis, potentially indicating the presence of overall trends in increasing waste diversion at the route level.

Absent any reason to believe that Waste Management's UTC residential customers in this pilot will be particularly susceptible or immune to the messages in the education campaign, it is reasonable to assume that their behavior will be representative of the behavior of other residents around the County. Based on that assumption it is further reasonable to assume that the findings of this study will be applicable to other areas of the County. That is, if the cart tags are effective at changing resident behavior in these UTC areas, then it is reasonable to assume they will be effective elsewhere as well.

Conclusions and Recommendations for Next Steps

Following the completion of the pilot project, the project team will submit a final report that includes an assessment of whether placement of cart tag "prompts" appears to be effective at increasing residential food scrap diversion, and which (if either) of the two tagging frequencies tested appears to support sustained behavior change. The report will also document the costs for tag production and placement for scaling to additional routes within Waste Management's service territory where municipalities may be interested in replicating the approach for their own communities.

APPENDIX: EVALUATION AUDITS MATERIAL SORTING LIST AND CATEGORY DESCRIPTIONS

Evaluation Overview

Cascadia will conduct three rounds of evaluation audits. During each round of auditing, samples will be collected at random from 50 households on each route (150 households in total) with both garbage and yard waste containers placed at the curb on the day of the sampling event (300 samples each audit).

Collected samples will be taken to a King County transfer station. Depending on King County approval, this could be Factoria or Shoreline Transfer Stations for sorting. The contents of each sample will be sorted into five categories (see below). Sorted categories from each sample will be weighed and data will be tracked by household, using a unique, identifier assigned to each household so that household-level data can be tracked and compared throughout the pilot.

Material Categories

Sorting List

Collected samples will be sorted into five categories:

1. **Food**
2. **Compostable paper, plastic, and food-related wood items**
3. **Non-compostable paper and plastic food service items and packaging**
4. **Yard debris**
5. **Other material**

More detail about each category, including descriptions of items defined within each category, is provided below.

Category Descriptions

Food

Includes all edible and non-edible portions of fruits, vegetables, meats, animal and dairy products, grains, and all other food. Includes coffee grounds and tea packets. Excludes the weight of food containers, except when container weight is not appreciable compared to the food inside.

Compostable Paper, Plastic, and Food-Related Wood

Includes **food-soiled and other compostable paper items** without a plastic lining/coating, such as paper towels, napkins, tissues, food bags and wrapping, and other papers that were soiled with food during use; uncoated paper food service packaging (e.g. cups, plates, bowls); pizza boxes; waxed cardboard boxes; and shredded paper.

Includes **compostable plastic items**, such as film “plastic” bags designed to compost (e.g. BioBag, EcoSafe), compostable plastic (“PLA”) food service items and packaging (e.g. cups/lids, bowls, clamshells, cutlery).

Also includes **food-related compostable wood items**, such as: popsicle sticks, chopsticks, toothpicks.

Non-Compostable Paper and Plastic Food Service Items and Packaging

Includes paper food service items and packaging (e.g. plates, bowls, cups, bags, clamshells) not labeled “compostable” and that appear to have a plastic lining or coating.

Includes plastic food service items and packaging (e.g. cups/lids, bowls, clamshells, cutlery) not labeled “compostable”.

Yard Debris

Includes leaves, grass clippings, sod, garden wastes, brush, prunings, logs, and clumped soil and rocks associated with yard debris, as well as household plants and homegrown fruits and vegetables not detached from plant matter.

Other Material

Any material that does not fit into the above categories.