

**CITY OF CAMBRIDGE – DEPARTMENT OF PUBLIC WORKS**

**CURBSIDE ORGANICS COLLECTION FROM RESIDENTS  
PHASE 2 REPORT**



**BY: RANDI MAIL RECYCLING DIRECTOR AND  
EVERETT HOFFMAN, ORGANICS PROGRAM ASSISTANT**

**SUMMER 2015**

The work for this report was partially funded primarily through a Sustainable Materials Recovery Program grant awarded to the City of Cambridge Department of Public Works by the Massachusetts Department of Environmental Protection (MassDEP).

We graciously thank the many people who shared their expertise, assistance and support for the pilot listed here. Please forgive us if we have forgotten someone! Steve Angier, Kevin Aruda, Lawrence Barriner, Dennis A. Benzan, John Bolduc, Meryl Brott, Fran Buzun, Marianne Buzun, Dennis J. Carlone, Chris Caruso, Leland Cheung, Keith Cialino, Gretel Clark, Eddie Corey, Claire Davies, Renee Dello, Bill Deignan, Susan Dilliard, Jamie Dixon, George Dreckmann, Kevin Drew, Kevin Douglas, Kelly Dunn, John Fitzgerald, Virginia Fitzgibbon, Susan Flannery, Tanya Ford, Lyndsay Forbes, Cathy Foshier, Becky Fuentes, Ritchie Furr, Debby Galef, Kate Geffken, Philip Gianatasio, Rob Gogan, Tom Goldy, Nora Goldstein, Bethany Graber, Linda Haines, Scott Hamilton, Mike Hanley, Billy Hannafin, Raymond Heroux, Joanne Johnson, Kaiti Jones, Susy Jones, Eric Josephson, Ellen Katz, Craig A. Kelley, Paulie Kelsey, Alexa Kielty, Tina Klein, Debby Knight, Jennifer Lawrence, Judy Layzer, Erik Levy, Calvin Lindsay, Rob Linke, Gary Littles, David P. Maher, Leslie Mallory, James Maloney, Ricky Malrani, Sumner Martinson, Nadeem A. Mazen, Ann McGovern, Marc C. McGovern, Art McKenzie, Conor Miller, Adam Mitchell, Debra Morris, Larry Morton, Janet Mosley, Jessica Mullan, Rod Muir, Jahi Murrell, John Nardone, Brooke Nash, Chris Neil, Laura Nichols, Owen O'Riordan, Michael Orr, Marcy Ostberg, Richard Rossi, Kenya Pavon, Lisa Peterson, Charlotte Pitt, Jennifer Pope, Shadan Rahman, Janine Ralph, Susanne Rasmussen, Annette Rodibaugh, Julie Rose, Marcia Rutan, Mark Saidnawey, Matthew Sally, Karl Shuman, E. Denise Simmons, Meera Singh, Helen Snively, Craig Smith, Arianne Sperry, Mark Stiles, George Stylianopoulos, Denise Talerico, Timothy J. Toomey, JR., Steve Travers, Paul Tully, Mark Williams, Joanna Vanden, Mary Verhage, Kristin vonHoffman, Amy Witts, Rhodes Yepsen, Sandra Zavaglia.

# Table of Contents

<b>Executive Summary</b> .....	4
Background.....	4
Pilot Overview .....	4
Program Expansion .....	5
<b>Public Outreach</b> .....	6
Recruiting Participants.....	6
Partnerships .....	8
Events and Volunteers .....	8
<b>Pilot Neighborhood</b> .....	9
North Cambridge.....	9
Participation Rates.....	10
Multi-Family Buildings .....	11
Lessons from Others .....	12
<b>Survey Highlights</b> .....	12
<b>Operations</b> .....	16
Bin Delivery.....	16
Facility Partners .....	17
Database .....	17
Curbside Collection .....	17
<b>Results</b> .....	21
<b>Participant Experience and Surveys</b> .....	22
Resident Updates.....	22
Reducing Trash .....	23
Kitchen Collector.....	23
Sure Close Pilot.....	24
Compostable Bags .....	25
Curbside Green Bin .....	27
Food Scraps .....	28
Odor and Pests .....	30
<b>Conclusion</b> .....	31
Lessons Learned.....	31
Program Expansion .....	32
Explore Policies that Maximize Participation.....	32
<b>Attachments</b> .....	33
Publicity Materials.....	33
Communication with Participating Households .....	33
Feedback from Participating Households .....	33
Project Materials .....	33

# Executive Summary

## Background

The City of Cambridge has worked for nearly 10 years to increase diversion of food scraps (a.k.a. organics) from the waste stream in many ways: backyard compost bin education and sales, workshops on vermicomposting, establishment of compost pickup for businesses, public schools and public drop-off sites. In 2012, the Massachusetts Department of Environmental Protection (MassDEP) awarded the City a 2 ½ year grant for \$73,304 through the Sustainable Materials Recovery Program to research, plan and possibly implement a pilot curbside food scraps collection program for residents. Phase one of the project was a feasibility study, which was completed in 2012 and in 2015, the City completed phase two of the project – a one year pilot program for curbside organics collection. Reports for both projects can be found online at [CambridgeMA.Gov/CompostPickup](http://CambridgeMA.Gov/CompostPickup).



FIGURE 1 CAMBRIDGE COMPOSTS LOGO

The City's motivations to pursue a curbside residential organics program were to reduce waste, curb climate emissions, control trash disposal costs, address rodent control, and meet public demands for compost services. Curbside organics is a key strategy to meet the City's goals to reduce trash by 30% by 2020 and 80% by 2050 over 2008 levels, aligning with the goals in the MA Solid Waste Master Plan. In terms of pounds (lbs) of trash per household (HH) per week the goals are 16 lbs/HH/wk by 2020 and 4 lbs/HH/wk by 2050. A 2011 Cambridge City Council resolution supported curbside composting and a public meeting was held.

The Cambridge Department of Public Works (DPW) ran implemented the one year curbside organics pilot from April 7, 2014 to March 30, 2015. Participating households will continue to receive curbside compost collection from a DPW crew through the fall 2015, at which time the service will be provided by a private hauler. The final results: 647 participating households in 424 residences diverted 85 tons or 170,000 lbs of organics from incineration and landfill. This avoided 76 tons of CO<sub>2</sub> emissions.

## Pilot Overview

A specific area of the Monday collection route in North Cambridge was selected for the pilot because of its mix of housing and lack of access to existing food scrap drop off sites. The City's goal was to recruit 500-800 participating households. From fall 2013 to winter 2014, the City encouraged eligible households to sign up for the pilot via the monthly recycling e-newsletter, A frame signs in the neighborhood, info tables at key community locations, and a letter to families from the Cambridge Public Schools. Eligible residences included single family homes and multifamily buildings (MF) with up to 12 units with City trash service.

554 households signed up by the first collection day of the compost pilot, April 7, 2014. Participating households received a green kitchen container to collect food scraps and soiled paper, a year's supply of BioBags to line the kitchen container, a green curbside bin (to share at multi-family buildings), free collection on the normal collection day (same as recycling, yard waste and trash), a few requests during the pilot to answer online surveys, monthly email program updates, and finished compost great for gardens available at the Recycling Center, April-October.

Based on national estimates available of 8-12 lbs/HH/wk of organics, DPW estimated that households would generate 10 lbs/wk of organics. Before the pilot, the City collected and weight the trash from all participating residences and found 18.8 lbs/HH/wk. During the pilot, the average organics collected was 6.6 lbs/HH/wk reducing trash by nearly 35%. During a pre-pilot trash audit, 43% of the trash was organics at 7.4 lbs/HH/wk. This suggests an 89% capture rate of organics. The total truck weight averaged 3364 lbs and were brought to Rocky Hill Farm in Saugus, MA for composting.

DPW identified vendors for supplies and services, and developed or strengthened working relationships with all involved. BioBag USA donated the MaxAir kitchen containers and compostable bags, curbside green bins were purchased from Orbis Corporation (on MA state contract FAC87), SureClose donated some kitchen containers, education materials were printed by Sterling Printing and Classic Graphx, supplies were delivered to all participating residences by Delta Global, organics were composted by Rocky Hill Farm, and for part of the pilot load scales were used at Northgate Recycling. The Recycling Director designed all educational materials.

During the pilot, the City communicated regularly with participants to encourage best practices and issued six surveys, collecting demographic information and feedback on user experience. The program maintained a satisfaction rate of 95%. During each weekly collection, the Organics Program Assistant (OPA) monitored bins for fill level and contamination. Most bins were under 50% full and the organics stream was very clean with contamination being extremely uncommon. On average, 83% of all green bins were set out at the curb for weekly collection.

## Program Expansion

Based on the success of the pilot, during FY16 budget planning the City decided to expand curbside compost pickup to all eligible residences in the Monday route in the fall 2015. The intent is to expand city wide within two years, and to 13+ unit multi-family buildings on a case-by-case basis in subsequent years. This decision was based a general feeling that the pilot was a success, given high satisfaction levels among participating households, the potential to reduce trash by up to 35%, and demonstrated impact on reduced climate emissions.

The City will initially contract for collection with a private hauler to achieve collection efficiencies needed, primarily for logistical reasons. Similar to the curbside yard waste contract, the hauler will be required to determine the compost processing facility. Once a citywide program is mature, the City will reevaluate whether DPW crews could be utilized. The City requested proposals from several haulers with appropriate experience.

The City hopes that participation will reach at least 40-60% of approximately 2,525 eligible residences in the Monday route, or 1010-1515 stops. The City estimates this program will divert 200-500 tons/year.

With the experience of the pilot and lessons from other communities with curbside organics programs, here are some best practices and learned for effective programs:

1. Provide supplies for free to make participating easy.
2. Aim to engage with as many buildings as possible, in person in the neighborhoods through door to door outreach is best. Internal household participation is secondary and staff energy can be better spent on engaging new buildings.
3. Collect email addresses of participants to communicate regularly.
4. Plan to eventually make participation mandatory, even without an enforcement mechanism.
5. Provide training programs to residents/building managers with incentive to receive supplies or rebates.
6. Conduct recurring outreach to large multi-family buildings. Target high turnover times of year to re-educate residents.
7. Engage landlords as primary point of contact in large multi-family buildings.
8. Involve children to bring message into the home and build cultural norms. Use high school students as volunteers.
9. Determine community policy and messaging for bags (compostable or plastic). Providing compostable bags for kitchen containers or strongly encouraging their use will minimize yuck factor and ensure high participation and diversion rates. Ventilated kitchen containers Wet anaerobic digestion facilities typically will screen out bags during processing.

## Public Outreach

### Recruiting Participants

Many avenues were pursued to target and inform eligible households about this opportunity. Many people were involved in outreach efforts including the Recycling Director, Organics Program Assistant (OPA), DPW Community Relation Managers, members of the Recycling Advisory Committee (RAC) and neighborhood volunteers.

Outreach activities for the pilot included:

- ✓ City website at [CambridgeMA.Gov/CompostPickup](http://CambridgeMA.Gov/CompostPickup), the DPW Facebook at [Facebook.com/CambridgeDPW](https://Facebook.com/CambridgeDPW) and Twitter at [Twitter.com/CambridgeDPW](https://Twitter.com/CambridgeDPW)
- ✓ Cambridge Recycling monthly email newsletter and community listserves
- ✓ A frame signs around in the neighborhood (secure signs to stay upright, weigh down or chain to pole to avoid theft)
- ✓ Flyers placed in libraries, parks and given to many lead residents in multi-family buildings for the common area with photos and dimensions of the bins provided.
- ✓ Direct mailing from the School Department notifying families
- ✓ Information tables at the libraries, parks (Rindge Field, Reverend Williams, Russell Field Path, Raymond), polling places, Pemberton Farms, events (Dudley St Halloween Block Party and North Cambridge Arts).
- ✓ Neighborhood information session and presentation at the Peabody School, 60 people attended. DPW staff gave a presentation in the auditorium, answered questions in a group and one-on-one at the check in desk, and distributed program materials. To advertise it, staff put bright orange signs on the A-frames a week before, emailed all signed up participants in advance and a same day reminder. Whole Foods provided a gift basket which was raffled off, an effective draw for attendees.
- ✓ Emails to lead residents in multi-family buildings with the brochure PDF, then forwarded to neighbors. Hard copies sent, left in mail boxes and placed under doors.
- ✓ Community outreach with support from the RAC, City Councilors, and School Committee Members
- ✓ The initial sign up process included two online forms. Interested residents first completed the "Compost Pilot Interest Form." The OPA reviewed eligibility and emailed the resident a link to the "Acknowledgement Form" to confirm understanding of participation, requirements and asked additional demographic information. There was overlap in the forms and some residents only completed the Acknowledgement Form after a reminder. In October 2014, DPW staff consolidated the two forms, streamlining the signup process. The new Compost Pilot Interest Form asked for all relevant information and agreements, including landlord contact information and a drop down menu with only eligible addresses. If a resident is eligible, staff emailed a confirmation and delivered a starter kit within 1-2 weeks, depending on the volume of requests.

In Survey 1, respondents reported that the most effective marketing strategy was word of mouth. In Survey 3, 86% of respondents said that they spoke with friends and neighbors about the program. The Cambridge Recycling email newsletter and neighborhood signs were effective in publicizing the program, while information tables seem less effective and require more staff time, but is still considered important for public exposure.



FIGURE 2 RANDI MAIL AT NEIGHBORHOOD INFO SESSION



FIGURE 3: JESSICA MULLAN AT NEIGHBORHOOD INFO SESSION



FIGURE 4: EVERETT HOFFMAN AT PEMBERTON FARMS' HARVEST HOOPLA

**TABLE 1: HOW DID YOU HEAR ABOUT THE PILOT? (SURVEY 1, QUESTION 3)**

Word of Mouth	42%
Cambridge Recycling Newsletter	38%
Neighborhood Sign	31%
Information Table	14%
Letter from Public Schools	5%

Targeting tabling efforts in the pilot area was essential to maximize outreach to eligible households and minimize time spent with ineligible households. There was significant interest from ineligible households and they were encouraged to use the drop-off food scraps program, subscribe to the recycling e-newsletter, and some were recruited as volunteers. Displaying the curbside bins and kitchen containers prompted participants to ask questions, and build understanding among new participants. Kids responded well to the worm-apple logo used in the Food to Flowers lunchroom programs operating in the majority of the Cambridge Public Schools, and were proud

of their knowledge and experience with composting.

Tabling at elections was highly effective given that polling locations are centrally located, many people were there and more engaged. Tabling at the O’Neill library was successful and had a vestibule the OPA to set up in. Tabling at parks was best in warm weather and at centrally located parks rather than parks on the pilot perimeter. Tabling at Pemberton Farms was not fruitful as many customers were from Arlington and Somerville. The Dudley Street Halloween event drew a great local crowd, but talking with adults was challenging with a ton of activity, candy, and kids running around after sunset.

**TABLE 2: WHY DID YOU CHOOSE TO PARTICIPATE IN THE PROGRAM? (SURVEY 2, QUESTION 1)**

To Reduce Waste	83%
To Curb Carbon Footprint	66%
Easier than Composting at Home	60%
To Help Build Healthy Soil	50%
To Save the City Money	42%

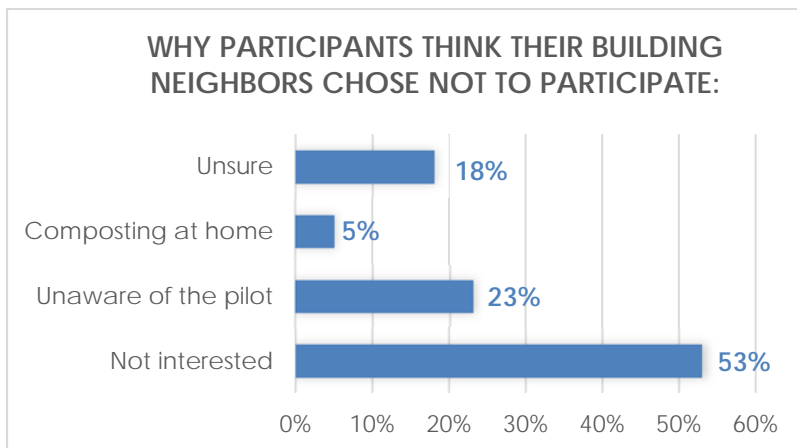


Chart 1: Buildings with 2+ Units Only: Survey 5, Question 5

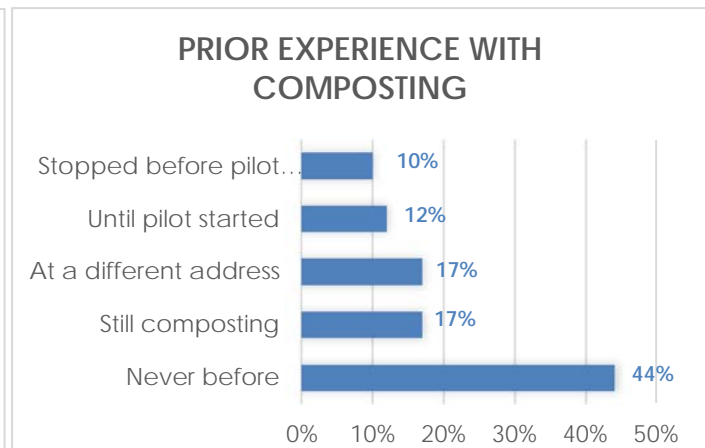


CHART 2: SURVEY 1, QUESTION 4

Overall the community was extremely positive, many wanting this service for a while, thrilled the time had come, and that so many compostable materials were accepted. Residents outside the pilot area were also excited. Many tried the drop-off program but thought the sites were too far, or home composting did not meet their expectations. Saying curbside “food scraps pickup” versus “compost pickup” or “organics” was more effective and clear when communicating, explaining that it is for food scraps and soiled paper. Residents liked that the bins and bags were free, pickup was weekly the same day as trash and recycling, and size of the curbside bins. Overall, the program was received well and viewed as easy to participate.

Negative reactions related to odor, rodents, and the perceptions that sorting organics and storing/setting out another curbside container was a hassle. These concerns generally subsided when staff explained it further: breathable buckets/bags, locking bins, smaller bin size, and same day as trash day. Staff tailored the program pitch to residents that composted at home, explaining that curbside pickup complements home composting since it accepts materials such as meat, dairy, and seafood that cannot be placed in a backyard bin. Also, home compost bins may be inaccessible in the winter due to snow, so curbside pickup allows year-round diversion of food scraps. Some raised the “yuck-factor” of meat in the bin, and staff emphasized the best practice of wrapping it in newspaper or paper bags. Others were confused that meat could be composted, and staff explained how large scale composting gets to higher temperatures than backyard composting. Note that the City has promoted home composting with bins and education since 1994.

## Partnerships

### City Departments:

- *Cambridge Public Schools*: DPW and school staff sent a letter to families of all 300 students that lived in the pilot area, which was about 12% of all eligible households. This effort’s effectiveness is debatable given that in Survey 1, 5% reported learning of the program from the school letter. The partnership with school staff on this positively impacted the program planning team.
- *Cambridge Public Library*: Staff established relationships with two branches in the pilot area (O’Neill and Boudreau) and staffed information tables there, posted flyers and left brochures. Library staff were enthusiastic and happy to help.
- *Gately Youth Center*: Staff were a great resource, though DPW did not coordinate any outreach at their events due to schedule conflicts and high numbers of ineligible households in attendance.
- *Election Committee*: Permitted DPW to table at polling places in pilot area (10-1 and 11-2 precincts) and connected staff with the right people. Election-day outreach was very effective, and should be included when possible in the future.

### Businesses and Community Organizations:

- *Whole Foods (Claire Davies)*: Provided a raffle gift basket for the information session as well as candy and pretzels for table at Dudley St Halloween event
- *Pemberton Farms*: A great business supporter for the poster and brochures. DPW tabled at the store during Halloween pumpkin sales, though it drew many non-Cambridge residents.
- *Vineyard Christian Fellowship*: Staff met with the community outreach coordinator of this church/private school, located in a central location in the pilot area. They posted flyers, displayed brochures and highlighted the program in their newsletter.
- *NOCA Arts (Barbara Thomas)*: Distributed program flyers at the NOCA Arts festival. Helpful and engaged organization.

## Events and Volunteers

On April 7, 2014, to commemorate the first day of curbside organics collection in Cambridge, DPW invited staff from the City Manager’s office, City Council and the residents of the first residence on the collection route for a photo. This was a proud moment for the City as an environmental leader in Massachusetts and New England, being among the first cities to enter the realm of curbside compost pickup. See several articles written about the program in the attachments, including Cambridge Chronicle, Scout Cambridge, Edible Boston, Boston Magazine, EcoRI, and the Environmental Protection Agency.

*Figure 5: Left to Right: Temporary Laborer Delroy Crewe, Councilman Leland Chung, DPW Deputy Commissioner John Nardone, City Manager Rich Rossi, DPW Driver Steve Travers, Organics Program Assistant Everett Hoffman, Recycling Director Randi Mail, Mayor David Maher, 120 Upland Road residents Mr. & Mrs. Seiffer, Councilman Craig Kelly, Deputy City Manager Lisa Peterson, Environmental Services Manager John Fitzgerald, DPW Commissioner Owen O’Riordan, DPW Supervisor of Solid Waste Operations Lenny Silva.*





On Saturday May 31, the OPA hosted a Compost Community Day at Bergin Park to thank participants and promote the program to residents. However, more volunteers than residents came to the table. On Saturday, October 18, the OPA tabled at the Pemberton Farms Harvest Hoopla for 4 hours, hoping to recruit more eligible households. An invitation was sent to all program participants, encouraging their attendance and to invite their neighbors. The OPA talked with ~80 people and about 1/3 came to express approval and gratitude for the program. Many asked about next steps after pilot ended in March 2015 and residents were told that plans to continue the pilot were being considered.

Volunteers from the RAC and some interested North Cambridge residents helped with tabling, distributing educational materials, sorting trash at the pre/post audits, canvassing MF buildings with low sign up rates, conducting set out assessments and confirming the delivery of green bins. Three particularly dedicated volunteers, helped spread the word to many neighbors. Most volunteers understood the program and needed little training, but for the expanded program, a more volunteer training would be helpful. On the sign up form, about 50 participants indicated interested in volunteering, which would help with door to door outreach plans for the full Monday rollout. In Survey 5, 19% of respondents stated they would be willing to volunteer to help City Staff spread the word about the expanded Monday route.

Having volunteers to help the OPA table at the libraries and elections (which both drew many people) was essential to be able to speak with several people at once. Volunteers sent email blasts on community listserves including Porter Square Neighbors, Richdale Avenue Neighbors, North Cambridge Stabilization Committee, and Dudley Street Neighbors. Materials brought to tabling events included example a curbside bin, kitchen container, compostable bags, flyers, etc. Volunteers should have city vests and DPW tablecloth to ensure they are clearly representing the program.

## Pilot Neighborhood

### North Cambridge

A specific area of North Cambridge was selected for several reasons. It was underserved by the organics drop off program, had a good distribution of building sizes, and the population is diverse. Eligible residences included single family homes and MF buildings up to 12 units with City trash service. Since February 2014, the neighborhood has had the St Peter's Field compost drop off site and through April 2015, over 8 tons of organics have been collected there.

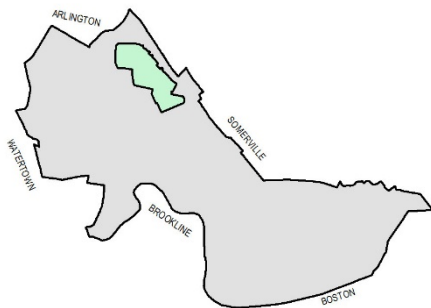


FIGURE 6: PILOT AREA IN CAMBRIDGE

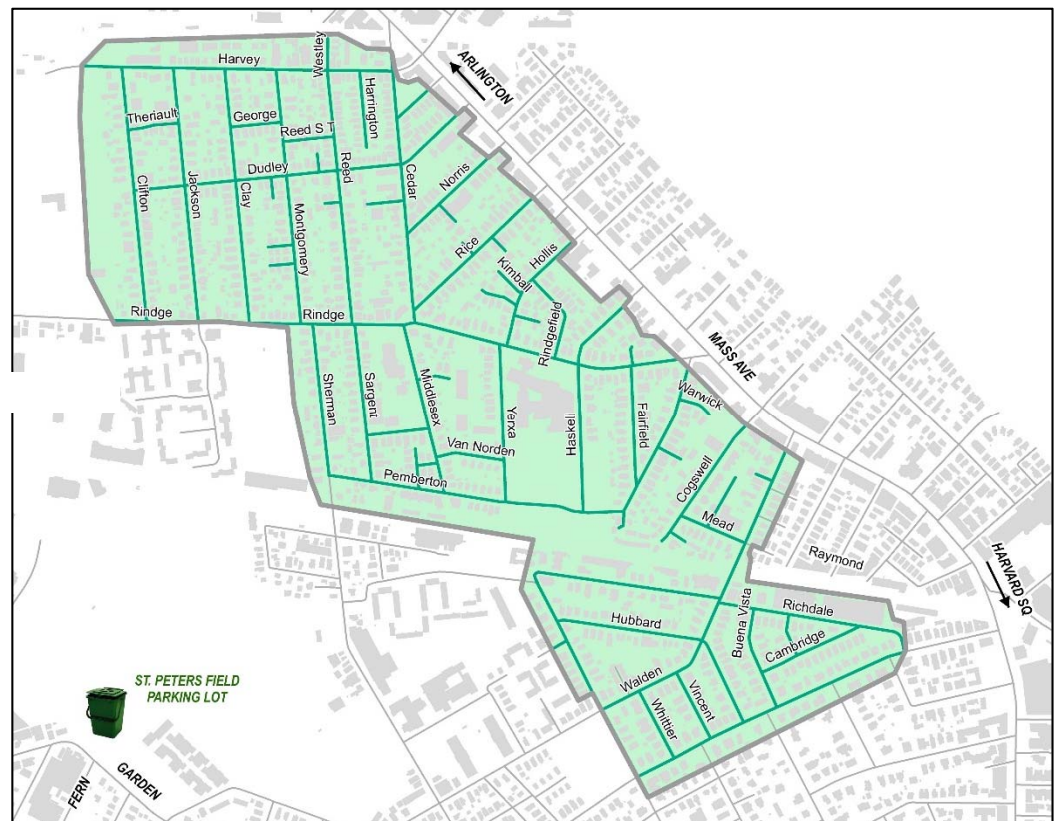


FIGURE 7: NORTH CAMBRIDGE PILOT AREA BOUNDED BY MASS AVE, PORTER SQUARE, DAVIS SQUARE & THE ALEWIFE T STOP.

## Participation Rates

**TABLE 3: BUILDING & HOUSEHOLD SIGN UP**

Building Type	Single Family	2-3 Units	4-6 Units	7-12 Units	Total Buildings
<b>Signups Total # Buildings</b>	152	246	16	10	424
<b># Households</b>	152	415	39	41	647
<b>Participation: Total % Eligible HHs Signed Up in Buildings</b>		70%	58%	47%	

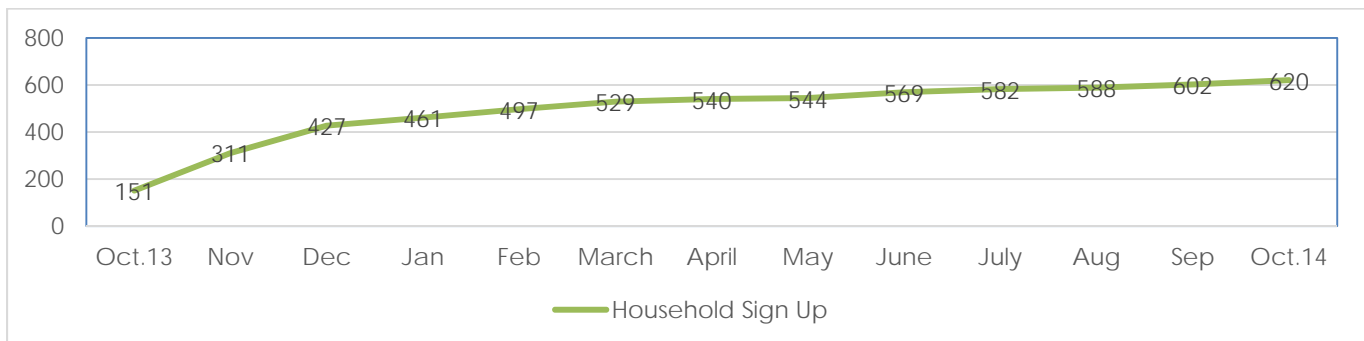
Building Participation: In the pilot area there were 1,119 eligible residential buildings with 1-12 units and City trash service. The initial goal was to recruit 362 buildings, about 32% of all eligible. Most participants signed up in the first three months, during the most intensive community outreach. Signups slowed down as staff became more selective about the building type that could sign up through May 2015.

In June 2014, the City added more residences to the route since operations were running smoothly. Average time per stop was 46 seconds, mostly driving from stop to stop. Since new stops were along the existing route the average time per stop was not really affected. Going forward, new eligible residences were added as they applied and the OPA delivered green bins, kitchen containers, bags and instructions. To encourage more sign ups, the OPA emailed participants asking them to encourage neighbors to sign up, and targeted multi-family buildings with low participation, such as 3 unit buildings with 1 sign up or 4+ unit buildings with 1-2 sign ups. This included door to door outreach, but several hours only yielded several sign ups.

364 buildings were signed up by the program start on April 7, 2014 and one year later 424 were signed up on March 30, 2015, bringing the building participation rate to 38% of all eligible.

Household Participation: In the pilot area there were 2,387 eligible households, in the buildings described above. The pilot goal was to recruit 500-800 households. On April 7, 2014 there were 554 households signed up. By March 2015, 647 households had signed up, bringing the household participation rate to 28% of all eligible.

**Table 4: TOTAL HOUSEHOLD SIGN UPS: OCTOBER 2013- OCTOBER 2014**



## Multi-Family Buildings

The pilot was designed so that households had to sign up to participate and get bins, whether they were renters or homeowners. This approach had pros and cons. Given the large number of 2-3 unit buildings, City staff hoped that these residents would keep their landlord informed. Engaging landlords was difficult since the City did not always have contact information, some connections were made after emailing households in multi-family buildings.

Increasing participation in multifamily (MF) buildings was an ongoing project goal. Most of the door-to-door outreach targeted at MF buildings. Direct landlord outreach did occur with the 4+ unit buildings. And many of them expressed little interest and preferred to have their tenants engage the program. Some landlords worried that the program would be dirty, create more work for them, and one felt that it was “governmental overreach”.

Getting support among residents in a MF building and identifying a lead resident was effective, but left the landlord out. The sign up form was revised and improved about six months after the pilot launch, including fields for landlord contact information. Going forward, landlords will be informed of the program from the onset and all eligible residences will receive a green bin without having to sign up.

**TABLE 5: MULTIFAMILY BUILDING PARTICIPATION DEVELOPMENT DURING THE PILOT**

	5/12/14	11/3/14	3/30/15
<b>Participating Households in 2-3 Unit Buildings</b>	357 sign ups of 502 total 71%	406 signups of 591 total 69%	414 signups of 594 total 70%
<b>Participating Households in 4+ Unit Buildings</b>	60 sign ups of 114 total 53%	71 sign ups of 157 total 45%	76 signups of 159 total 48%

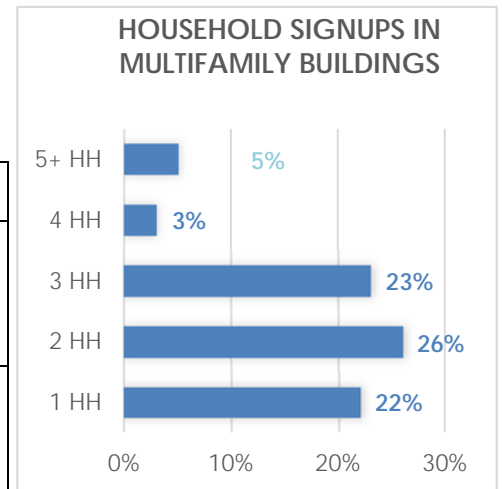


Table 6 shows the number and percentage of households signed up in buildings of various sizes. There was full participation in 51% of 2 unit buildings, 27% of 3 unit buildings and 20% of 4 unit buildings. No buildings over four units had full participation. Based on the pilot and experience from other cities, reaching high participation rates in large MF buildings is a challenge. Word of mouth is the most effective way to increase participation. Residents in MF buildings must be encouraged to invite their neighbors to participate, as their relationship may determine why others do or do not sign up. Co-housing units, condo associations and buildings with central areas are effective buildings for high sign up. Coordinate with building community leaders to distribute program materials and host informational meetings.

**Table 6: Number of Households that Signed Up in Multi-Family Buildings**

Building Size	# of Buildings in Pilot	1HH Sign Ups	2HH Sign Up	3HH Sign Ups	4HH Sign Ups	5HH Sign Ups	6HH Sign Ups	8HH Sign Ups
2 HH	124	61 (49%)	63 (51%)					
3 HH	113	38 (34%)	44 (39%)	31 (27%)				
4 HH	10	2 (20%)	2 (20%)	4 (40%)	2 (20%)			
5 HH	3	1 (33%)	1 (33%)	1 (33%)				
6 HH	3	2 (33%)		1 (33%)				
7+ HH	7	1 (14%)	1 (14%)		2 (28%)	2 (28%)	1 (14%)	1 (14%)
<b>Total Buildings</b>	259	105	111	37	4	2	1	1
<b>Total Households</b>	478	105	222	111	16	10	6	8

## Lessons from Others

The Recycling Director and OPA spoke with staff in Toronto and Seattle to learn more about their maturing curbside collection programs and their experience with MF buildings. These conversations mostly focused on strategies for buildings with 12+ households, usually hundreds.

In Toronto, collection pricing is based on volume, organics are less expensive than trash. Organics diversion is mandatory, though enforcement is not yet established. Buildings not participating in mandatory organics diversion lose all municipal waste services. More people participate when compost collection containers are provided for free. When residents had to provide their own supplies, the sign up rate is lower. Residents and/or building managers must complete a sign up form to get free supplies from the City. Multi-family buildings over 9 units get 32 gallon Orbis green bins and the city provides larger buildings with 2 cubic yard front end dumpsters for organics. To encourage participation in multi-family buildings, the collection area must be brightly lit and clean, especially since resident turnover is high.

Staff conduct annual re-education trainings for multifamily buildings and new residents get an introductory “move-in” package. The city has a team of staff to visit buildings to collect resident information, set up lobby displays, make presentations, distribute kitchen containers, and promotional materials (which are translated into several languages). For public education, 80% of city staff time is in the field, visiting buildings and engaging residents (the remaining 20% is in the office). Sometimes, staff are youth earning community service hours for high school graduation. Children are key to the public education process since they bring the message home. The organics program is advertised on public transit. At a certain point, there is a diminishing return on large multifamily building recruitment.

In Seattle, organics is mandatory, but there is no enforcement authority. Composting does not reduce waste fees, but it does reduce water fees for building managers since it diverts waste from the sewer system. The program has mostly focused on early adopters and people on the fence, getting as many buildings as possible to sign up and working to build cultural norms around composting. The city provides all curbside bins and install new compostable liners in each bin every week. Even with additional time and cost, this is still cost effective for the city. Staff is now focusing more on participation rates with a new, optional Friends of Recycling and Composting Training Program. When building managers attend the training, they receive a \$100 utility rebate and qualify all building units to receive a free kitchen collector from the city – no training no kitchen collector. This is a onetime drop, so buildings are encourage to get extra kitchen containers. Environmentalism is common in Seattle, so some managers are motivated by a desire to learn more and care for the environment. The City or Vendor will install a dispenser for compostable bags in the building.

## Survey Highlights

DPW Staff issued six surveys (using Survey Monkey) of participating households during the pilot year. Data from all surveys appear throughout this report. Full surveys and comments can be found in the attachments, highlights are below. Questions covered the following:

- Demographics
- Changes in Generation of Household “Waste”
- Kitchen Containers, Compostable Bags and Green Bins
- Cooking, Shopping, Leftovers, Wasting
- Odors, Fruit Flies and Rodents

### **Survey 1: May 2014, 67% response rate**

How did you hear about the pilot program? 38% from Cambridge recycling email newsletter; 31% neighborhood signs; 18% staff at info table; 42% word of mouth

Do you use a sink disposal? 18% yes, until pilot started; 44% yes, still do; 11% do not have one, but would like one; 25% would not use a disposal.

How is the compost pilot working for you so far? 94% pilot is great; 6% had some questions/concerns.

Other questions: How long have you lived at your current address? How many people currently live in your household? How old are they? When do you typically eat your leftovers? Approximately, what percent of the food that you buy do you throw out? What percentage of your food waste could be prevented by preparing less, serving less or by changing your cooking habits? \*How many 13 gallon bags of trash do you generate each week? How many compostable bags do you use per week? Have you noticed a change in your trash?\* (See “Recurring Questions”)

**Survey 2: July 2014, 59% response rate**

On average, how many meals do you cook using fresh produce each week? 39% cook 7+ times per week. 43% cook 3-6 times per week. 6% cook 2 or less times per week.

What type of food scraps do you collect in your kitchen container?

1	Veggies	97%	7	Meat/fish (bones)	64%
2	Shells (eggs, seafood, nuts)	87%	8	Rice, beans, pasta	59%
3	Tea/Coffee	82%	9	Baked goods	49%
4	Uneaten food from plates	76%	10	Dairy products	35%
5	Paper products	75%	11	Other	5%
6	Spoiled food	74%			

What prompts you to empty your kitchen container? 20% change every 2-3 days as instructed. 88% when it's full. However, while waiting more than 3 days to change the bag reduces the number of bags used, it can result in odor/moisture problems.

Have you noticed an odor from the kitchen container? 66% do not. Of those that do, 29% related to meat/fish scraps, 23% due to wet scraps and 70% when it's the same bag after 3 days. Staff note: bag fullness and hot weather also contribute to odor.

What do you think of the size of the kitchen container and bag? 72% both are just right, 24% bag too small and hard to tie, 5% container too small, and 5% container is too big. Note that kitchen bags provided were 2 gallon and BioBag recognizes the 3 gallon fits better and that is the size sold at retailers.

Do the bags break? Yes: 28%. No: 72%. 54% of breaks were related to punctures and 38% overfilling the bag/leaving it too long.

Do the bags leak? Yes: 42%, No: 58%. 59% due to transpiration, 19% due to wet scraps, and 18% due to holes in bag. These issues are not an issue when bag is changed every 2-3 days, moisture from foods is drained and tea bags squeezed.

Other Questions:

How many people live in your household? Which meals do you eat at home? Which grocery stores do you shop at regularly?

**Survey 3: October 2014, 55% response rate (333/626)**

Do you feel like collecting food scraps is now a habit? Yes: 98% No: 2%

Have you spoken with friends, family or neighbors about the pilot? Yes: 86% No: 14%

Are you using the kitchen collector the city provided to collect your scraps? Yes: 88% No: 12%.

Where do you keep your kitchen container? 61% on kitchen counter, 27% under sink / in cabinet, 12% in refrigerator or freezer.

Have you had fruit flies? Yes: 72%, No: 28%. More than half of those that did said “only a few in the summer” and “no more than usual”. What did you do to address them? 52% changed the bag; 28% stored KC in their fridge/freezer; 30% used a vinegar trap; 29% ignored them.

Before the pilot, did you notice any rodents around your property?

Yes: 20%. No: 80%. During the pilot, 93% saw no change in rodent activity, 3% increase, 4% decrease.

Other Questions: Have you used the “Buy One Get One Free” coupon for BioBags? What do you think about the latch on the 12 gallon/21 gallon green bins? Have you cleaned your green bin? Have you picked up finished compost from the Recycling Center for your garden? Since the pilot started, have you changed the way you prepare or serve food? Since the pilot started, have your shopping habits changed? What would help to reduce edible food waste?

#### **Survey 4: February 2015, 42% response rate**

Since summer ended, have you experienced less odor collecting and storing your scraps? Yes: 68%. No: 18%. Maybe: 14%.

Have you noticed a change in bag performance since the summer ended? Yes: 10.5%. No: 83%. Sometimes: 6.5%.

Have you purchased more compostable bags? Yes: 29% (16% with coupon, 13% without). No: 71%.

Have you ever stored your kitchen container in the fridge/freezer? Yes: 25%. No: 75%. Of the responses, 34% found no reason to store in fridge/freezer, 30% no space, 8% did not want to, 7% will do so in the summer.

Would you buy compostable bags to participate in the program if it cost \$20-\$30 dollars per year for your household? 84% would pay for bags and 14% would consider paying. The 2% that would thought it was too much, do not think they should pay at all or feel like the cost would turn others off.

#### Other Questions:

When collection was cancelled due to a snow storm, how did that affect your composting experience? On average, how many compostable bags did you use this summer/winter? Since the pilot started, have you noticed a change in your trash?

#### **Survey 5: May 2015, 42% Response rate**

What are the most meaningful aspects of the program for you? Reducing my waste, 90%; Sending food scraps to be made into soil, 87%; reducing my carbon footprint, 74%, being part of a new city program, 44%; reducing odors in my trash, 17%.

How satisfied are you with the composting program? 90% very satisfied; 9% satisfied. 2 respondents are neutral, 3 are dissatisfied, due to rodent issues perceived to be associated with the program.

Since the beginning of April 2015, have you had any issues with compost collection? Yes: 13% (missed collection). No: 87%.

Have you ever considered stopping your participation in the program? Yes: 5% (due to odors and fruit flies). No: 95%.

With weekly recycling and composting, do you think your trash needs to be picked up every week?  
Yes: 44%. No: 38%. Unsure: 18%.

Buildings with 3+ Units Only: You were given a 21 gallon green bin. Do you think a 12 gallon bin would provide enough space for food scraps from your building? Yes: 47%. No: 15%. Maybe: 39%.

#### Other Questions:

What type of scraps do you collect in your kitchen container? How would you describe who lives in your household? Buildings with 2+ Units: Why do you think that non-participating households in your building choose not to compost? Would you help city staff go door to door this fall to help us educate your neighbors in the Monday collection route about the expanded compost program? What tips would you offer to other Cambridge residents that are new participants in an expanded compost program?

In Surveys 1 and 5, households reported a 94%, and 98% satisfaction rate with the program. In Survey 5 asked what aspects of the program were most meaningful. In the comments, several respondents also mentioned the educational component for their children was an important aspect.

Several surveys included questions to understand more about the participating households:

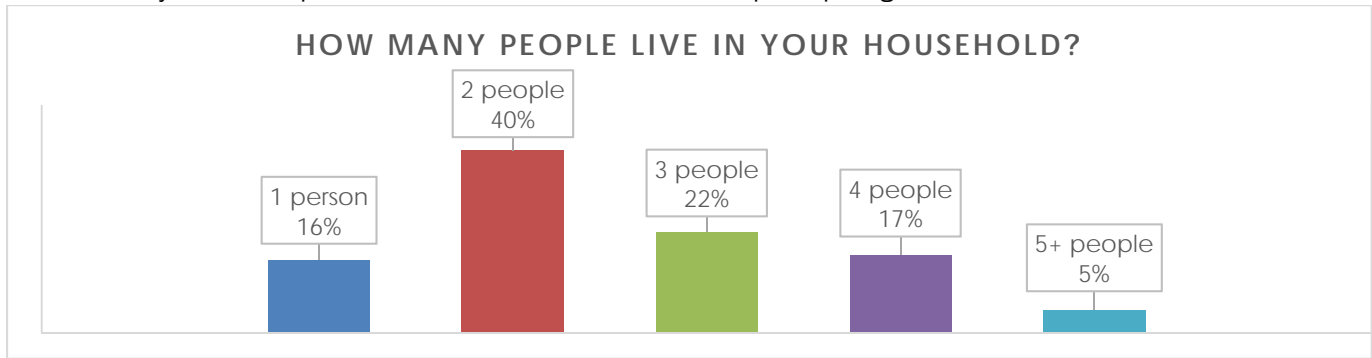


Chart 3: Survey 2, Question 2

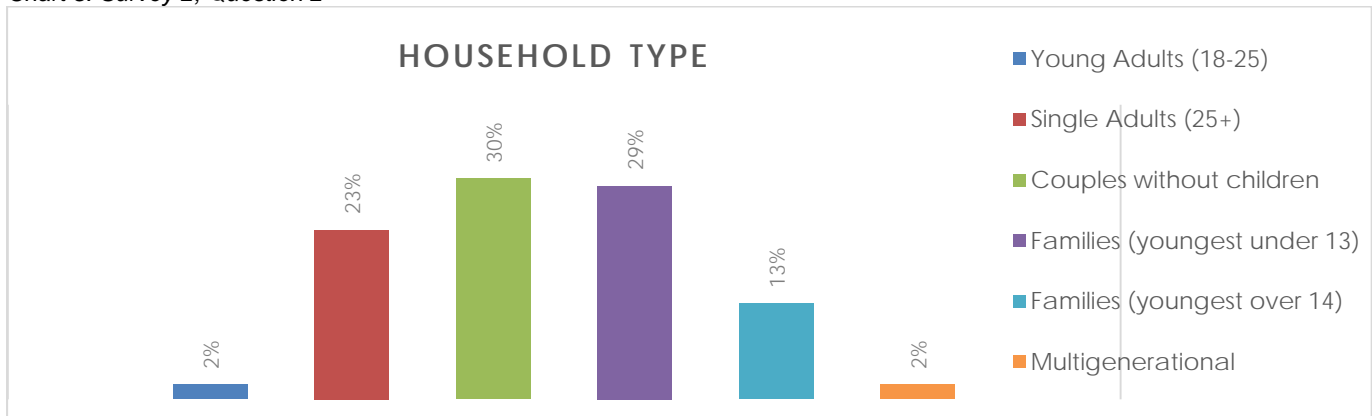


Chart 4: Survey 5, Question 4

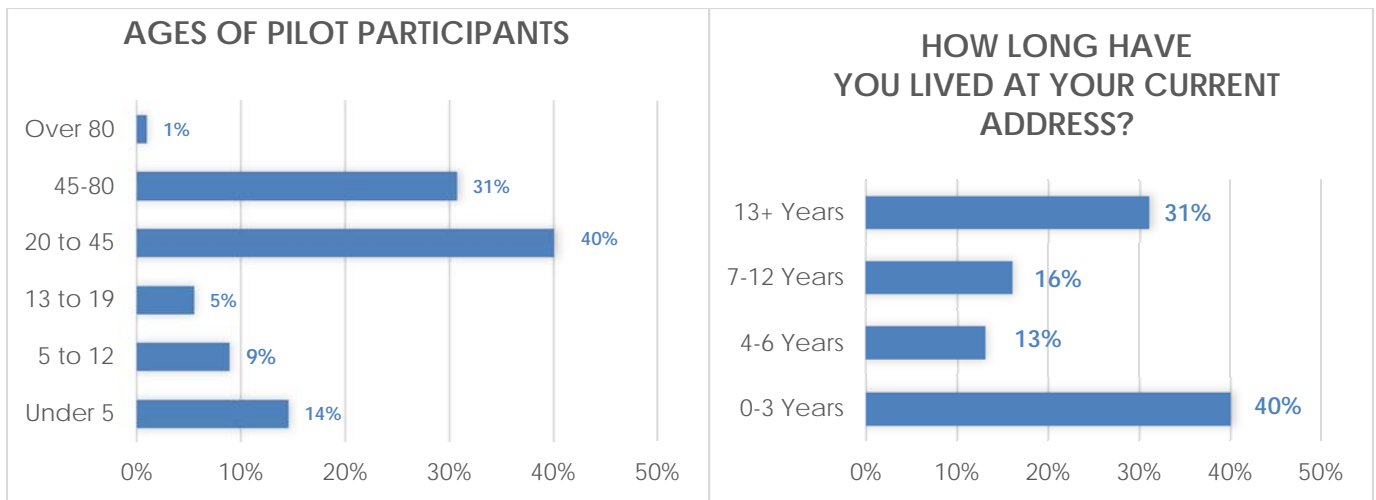


Chart 5: Survey 1, Question 2+1

Based on these Survey responses, the most common pilot household was adults over 25, living in a household with 2-3 people. Just over half of these adult participants are without children, and 44% are part of families with children. 60% have lived in their home for more than four years.

Over half of respondents (56%) signed up for the pilot program with some experience composting. This will probably be higher than the general population given that the program was voluntary and early adopters are naturally on board with the program goals such as reducing waste and protecting the climate.

# Operations

**Table 76: Phase 2 Budget**

Item	Total	Notes
Educational Materials	\$3,404	Total budget \$4,190 so \$1,505 surplus. Posters, brochures, green bin lid stickers, and flyer in kitchen collector
Curbside Green Bins & Door to Door Delivery	\$15,942	Orbis bins: 12-gal at \$32.15 each and 21-gal at \$20.15 each. Delta Global delivery: \$7 per green bin including 2 KCs, 15¢ per extra KC.
Kitchen Containers and Compostable Bags	\$0	Donated by BioBag (small donation by Sure Close)
Compost Tip Fees	\$4,675	85 tons at \$55/ton, \$3,905 surplus
Personnel	\$19,738	\$17/hour for Organics Program Assistant
Collection Costs	\$3,449	Fuel + truck maintenance for city crew. \$12,201 surplus. \$30,528, in-kind costs for collection labor.
Total	<b>\$47,208</b>	Total MassDEP Grant was \$73,304

## Bin Delivery

It was essential to accurately and efficiently deliver curbside bins, kitchen collectors, compostable bags and an instruction flyer to all participating residences. 1-3 unit buildings were notified that delivery would occur on Friday March 28, 2014 through Sunday March 30, 2014, a week before the pilot started. Delta Global (DG) completed this task well, in two days by two employees. DPW delivered bins to the 4-12 unit buildings the week prior so that staff could ring doorbells and try to talk to the residents. The DPW parking lot was used to stage the supplies and the delivery truck. DG was recommended by Orbis and used by New York City for their expanding program. DG used an electronic tracking system to record delivery with a time stamp and bin number for each building. Staff from DPW and BioBag did door to door outreach to all participants on two weekday evenings, March 31 and April 1, 2014. The purpose was to:

1. Ensure residences got the supplies delivered.
2. Ensure that each participating household got their kitchen container and bags, answer questions.
3. Remind residents to set out the green bin every week regardless of how full it is.
4. Ask who will set the green bin at the curb.
5. Ask them to encourage neighbors to sign up.



FIGURE 8: CURBSIDE GREEN BIN DELIVERY BY DELTA GLOBAL



FIGURE 9: DOOR TO DOOR OUTREACH TEAM: RANDI MAIL, EVERETT HOFFMAN, TOM GOLDY, AND JENNIFER POPE



## Facility Partners

The City chose *Rocky Hill Farm (RHF)* in Saugus, MA as its composting facility for low tip fees at \$55/ton, broad range of accepted materials, proximity to Cambridge, and a good working relationship. For years, RHF has provided the Cambridge Recycling Center finished compost which is available to residents for free April-October. RHF uses an in-vessel composting system to process materials. They mix food waste from primarily commercial sources with commercial yard waste and woodchips.

Since RHF does not have a scale, the City identified *Northgate Recycling (NR)* in Revere, MA as a partner to weigh the loads. NR is a construction materials recycling facility with a delivery scale. For the first 15 weeks of the pilot, the DPW truck weighed in/out at NR. The curbside contract for the expanded service in the Monday route will require the hauler to weigh the loads, or have an on-board truck scale.

In July 2014, the City decided to add more participating residences during the existing route. To do so, the City and DEP agreed that visiting the scale once per month from July 2014-March 2015 was sufficient for the data needed. On weeks when the truck did not visit the scale, the OPA calculated the weight by multiplying the average lbs/HH/week by the number of households set out. The monthly weights did not deviate much from the initial range.

## Database

DPW developed an “Organics Collection Database” in Access to collect field data and observations. Each week, the database was uploaded onto a tablet so that the OPA could collect data on the route. There are 4 forms and queries from the database in the attachments:

1. Crew Route Data Entry Form. Collection day details including driver, laborer, weather, start and finish times, route issues, weigh in times and weights and resident interactions.
2. Monitoring Data Form. List of all stops in order of route collection, weekly setout as “out” or “not out”, fill level and contamination. Each individual stop is associated with the number of participating households.
3. Weekly Collection Query. Total number of stops collected and not indicating number of households. This query enables staff to determine lbs/HH/wk or estimate the load weights.
4. “Not Out” Query. Allows staff to monitor individual building participation from week to week and identify buildings with low set out rates.
5. Buildings Monitored on a Given Week Query. Gives a list of buildings monitored by date with data for fill rate, contamination, loose food.

The OPA also used two other files to retrieve and track information about participating residences and the collection operation: the “Toter Database” in Access and “Master Route Data” in Excel.

## Curbside Collection

To prepare for weekly collection, the OPA uploaded the updated database onto the tablet and brought a paper back up. DPW ensured the truck was completely empty to avoid compromising the daily load weight. If the laborer was new to the project, the OPA explained the collection expectations and rules: stay with the truck; do not take any trash, recycling or yard waste; inform OPA of contaminants; pizza and clementine boxes are accepted.



FIGURE 10: DUMPING ORGANICS AT ROCKY HILL FARM IN SAUGUS, MA

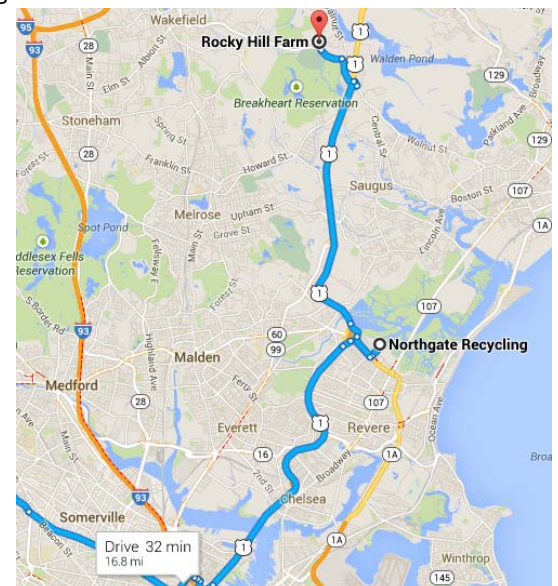


FIGURE 11: ROUTE FROM CAMBRIDGE TO ROCKY HILL



FIGURE 12: ONE OF ROCKY HILL'S IN-VESSEL 2 COMPOSTING SYSTEMS

DPW truck 35, a 20 cubic yard packer, was used 51 weeks of the pilot. The same driver drove for 48 weeks. This consistency helped ensure that the OPA could conduct field observations and assist the laborer, rather than giving the driver route directions.

The laborer changed weekly depending on staff availability, and were either full time or temporary employees. The laborer's speed at emptying bins and moving between stops largely determined how long the entire route took. The faster the laborer, the shorter the route time. The OPA frequently worked with the laborer to speed collection by bringing bins to the street, collecting small loads of 1-2 bags, and helping tip full 21 gallon bins, which could be more than 75 lbs.

After all stops on the route were collected, the crew drove from Cambridge on Route 1N to Northgate Recycling in Revere to record the gross weight, and then on to Rocky Hill Farm in Saugus. The gross weight was recorded at the office, the load was dumped in the tip area, inspected for contamination and the OPA photographed the load. After dumping, the crew returned on Route 1 to Northgate Recycling to record the tare weight. This allowed the OPA to calculate the total weight of organics collected and reported this to RHF.



*FIGURE 13: JAHU MURRELL, DPW LABORER, COLLECTING PUMPKINS AFTER HALLOWEEN*

Route time averaged time 4 hrs 15 min, starting at DPW and finishing the last stop on the route in North Cambridge. The slowest time was 5 hrs 40 min after the blizzards in February. The fastest time was 3 hrs 20 min when an excellent temporary laborer was assigned to the crew, who efficiently emptied bins and ran between nearly every stop. In January and February 2015 there were 3 blizzards with record snowfall, 108.6 inches! These extreme weather circumstances cancelled collection on one week and delayed it one day on two other weeks.

The average return time to DPW was 6 hrs 4 min, including driving to RHF and the scale. The truck left DPW between 7:00-7:20 am. The earliest time back was 12:30 pm and the latest time back was 2:15 pm in February.

## Monitoring Bins

The City printed stickers that Orbis placed on the lid of each curbside green bin that said “Food Scraps Only” with further instructions on what is and is not compostable.

During collection, the OPA monitored bins for fill level, contamination and loose food. The route was divided into ten sections and for 26 weeks, two sections were observed on consecutive weeks. This allowed for consistency in observations and follow up when there was contamination. During the first two and last five collections, the OPA monitored as many bins as possible.

Contamination included food scraps in plastic bags, trash and recyclables. No more than 2% of bins had contaminants each week (2-6 bins total). When a small amount was found, the OPA put it back in the bin and placed a Rejection Sticker on the lid. When more contamination was found, the whole bin was rejected and not emptied. Emails were sent to these residences reminding households how and what to compost. Responses indicated that contaminants were likely from non-participants unaware that the green bins were for food scraps only.

A common contaminant at MF buildings was food scraps in plastic bags. This was likely from households not signed up, trying to participate but got a kitchen container or compostable bags. Staff asked participating households to encourage their building

neighbors sign up for the pilot and explain how to participate.

Common types of contamination were:

1. Loose trash/recyclables likely from inobservant pedestrians.
2. Bagged trash from non-participants in building by mistake or disregard.
3. Food scraps in plastic bags from households that had not formally signed up, or households who used up their supply of compostable bags.
4. Compostable bags in plastic bags due to participants taking extra measure with leaky/torn bags.

Loose food was not common, but resulted from a bag not tied closed or ripped. Ripped bags resulted from hard/pointy materials and are more common in warm weather, when the heat possibly degrades the bag more quickly. One 3 unit building consistently put loose food in the bin without compostable bags. This was due to a household that was participating, but chose not to sign up. In the summer, food scrap slop was an issue and in the winter, scraps froze to the bottom of the bin. This bin shows what a program without bags would look like, and demonstrates why bags are necessary to keep the bin sanitary and easy to empty for the collection crew.

The OPA monitored 2,869 individual bins during the pilot. All bins, regardless of size, were usually 50% full or less.



FIGURE 4: CONTAMINATION SUCH AS TIN FOIL AND A PLASTIC BAG FILLED WITH FOOD SCRAPS ARE REMOVED, PLACED IN GREEN BIN WITH A REJECTION STICKER ON LID.



FIGURE 15: COMPOST REJECTION STICKER.



FIGURE 16: STICKER ON LID OF ALL CURBSIDE GREEN BINS

**Table 7: Green Bin Fill Levels**

Level	Monitored	Percent	Level	Monitored	Percent
<b>12 Gallon Bins</b>			<b>21 Gallon Bins</b>		
	1,935	100%		931	100%
<b>100%</b>	63	3%	<b>100%</b>	16	2%
<b>75%</b>	124	6%	<b>75%</b>	60	6%
<b>50%</b>	327	17%	<b>50%</b>	189	20%
<b>25%</b>	943	49%	<b>25%</b>	436	47%
<b>&lt;10%</b>	478	25%	<b>&lt;10%</b>	230	25%



**FIGURE 5: MESSY BIN FROM HOUSEHOLDS NON-SIGNED UP NOT USING COMPOSTABLE BAGS.**

Using the database, the OPA identified the buildings that did not set out their green bin on a weekly basis and then those that had not set it out in about 4 weeks. These households were emailed a reminder to participate. In September, December and March, the OPA surveyed these households, asking if they wanted to participate in the pilot and why or why not. Most responded that they still wanted to and would try to be more consistent setting out their bin. 18 residences did drop out, commonly due to moving or some families with young children found it to be a hassle. Note that 29% of participating households had young children under 13. Three others stopped due to poor management, citing odors and rodents.

On average, 1-3 residents reported a missed bin each week. Their options were to wait for collection the next week, or empty it at the St. Peter's Field food scraps drop off bin. The 12 gallon curbside green bin is 27" tall, making them hard to see by the collection crew, with pervasive on street parking, or if placed behind or between trash barrels or recycling totes. The 21 gallon bin is 32.5" tall, a similar height to a 32 gallon trash barrel. The 65 gallon recycling totes are 43" high. In the expanded program, the City will emphasize the need for the crew to minimize the occurrence of missed bins and to establish liquidated damages for missed "go backs".

After March 30, 2015 and a full year of the pilot, the OPA discontinued weekly data collection and was no longer on the truck. Without the OPA's list and knowledge of bin locations, DPW staff anticipated an increase in missed bins. In response, DPW staff emailed participants asking them to report missed green bins by calling DPW front desk or using iReport, the City's online system to report missed pickups, the same process for missed trash, recycling and yard waste.

## Results

Actual material collected averaged 1.7 tons per collection day (52 days) and 85 tons for the year. The pre-pilot estimate was 2 tons per day and 124 tons for the year. The average set out rate was 83%, ranging between 66-89% (the low rate was in February). The estimate before the pilot was 70%. A 66% set out rate is still considered high and indicates people's support and tenacity for the program, even in extreme weather conditions.

Daily weights ranged from 2,781-3,940 lbs and were affected by holidays and weather conditions. For example, in the weeks after Thanksgiving, Christmas and New Year's, weights noticeably increases, averaging 7lbs/HH/wk while the set out rate remained the same.



FIGURE 18: FIRST COLLECTION, APRIL 7, 2014, 3,400 POUNDS.

TABLE 8: ESTIMATED VS. ACTUAL WEIGHTS

	Actual Weight	Estimate Before Pilot
Average pounds per household per week (lbs/HH/wk)	6.6 lbs*	10 lbs
Average weight per week	3,336 lbs. (1.7 tons)	4,000 lbs (2 tons)
Lowest weight	2781 lbs. (1.4 tons)	N/A
Highest weight	3940 lbs. (1.97 tons)	N/A
Total weight 4/7/14-3/30/15	171,543 lbs. (85.3 tons)	248,000 (124 tons)

\*Before the pilot, the City estimated 10 lbs/HH/wk of food scraps. During the pilot, the actual average was 6.6 lbs/HH/wk, In the Pre Pilot waste sort there was 7.4 lbs/HH/wk in buildings signed up, which would translate to an 89% capture rate during the pilot. BioBag reports that the MaxAir kitchen container and BioBag reduces the weight of food scraps by 33% through evaporation. Other factors that may lower the lbs/HH/wk of food scraps in Cambridge might be that residents are less wasteful due to more waste reduction education, some participants already compost at home, or some are using food waste disposers.

Table 9 Comparative Pilot and Waste Sort Statistics

Average Trash Per Household Pre Pilot	18.8 lbs/HH/wk
Average Compost in Green Bins	6.6 lbs/HH/wk
Trash Reduction Rate by Composting	35%
Organics Recovery Rate (Weekly Average/ PrePilot Compost in Trash)	89%
Average Recycling in Trash Sorts	1.6 lbs/HH/wk
<b>PRE PILOT Waste Sort 3/10/14</b>	
Unsorted Trash	17.4 lbs/HH/wk
Compost in Trash	7.4 lbs/HH/wk
% Compost in Trash	43%
<b>POST PILOT Waste Sort 4/13/15</b>	
Unsorted Trash	15 lbs/HH/wk
Compost Still in Trash	4.1 lbs/HH/wk
% Compost in Trash	27%**
**25% of the households in post pilot sample were not participating, resulting in a higher amount of compost still in the trash.	

**Table 10: Reduction in GHG Emissions**

	<b>Metric Tons CO2 Emissions/Ton of Food Scraps</b>	<b>Pilot Emissions Reduction (85 tons composted)</b>	<b>Equivalent cars/year off the road</b>
<b>Compost Net emissions</b>	-0.20 tons reduced		
<b>Incineration Net emissions</b>	-0.12 tons reduced		
<b>Landfilling Net Emissions</b>	0.69 tons emitted		
<b>Composting vs. Incineration Benefit</b>	-0.08 tons reduced	6.8 Metric Tons CO <sub>2</sub> reduced	1.5 Cars
<b>Composting vs Landfilling Benefit</b>	-0.89 tons reduced	75.6 Metric Tons CO <sub>2</sub> reduced	16 Cars
<b>Cambridge's City trash 50% incinerated, 50% landfilled</b>		<b>41.2 Metric Tons CO<sub>2</sub> reduced</b>	<b>9 Cars</b>
The <a href="#">EPA WARM Model</a> includes all factors, such as diesel truck emissions collecting and driving loads to compost facilities. The reductions are based on the pilot total collection, 85 tons.			From <a href="#">EPA CO2 Calculator</a> <sup>1</sup>

## Participant Experience and Surveys

### Resident Updates

Staff emailed participants monthly with best practices, program performance including total pounds collected to date, other relevant statistics and seasonal tips. These emails included links to the surveys, event announcements and encouragement to remind their neighbors to sign up after June 2014. These emails can be viewed in the attachments.

Many of the resident emails included some of these “Helpful Tips and Best Practices”:

1. Store the kitchen collector in the refrigerator or freezer to minimize odors or fruit flies, especially in the summer.
2. Use a vinegar trap to catch fruit flies, or store fruit in the refrigerator.
3. Wrap meat and fish scraps in newspaper or paper bags to prevent odors.
4. No liquids, such as grease or soup. Drain excess moisture (i.e. squeeze tea bags). Compost paper napkins and paper towels. Place newspapers in the bottom of curbside green bin to absorb liquid.
5. Always tie bags to avoid loose food in the curbside green bin.
6. In summer, regularly wash curbside bin. Pour soapy water into grassy areas, never into storm drains.
7. Do not put yard waste into the curbside green bin.

---

<sup>1</sup> EPA CO2 Equivalencies Calculator: [www.epa.gov/cleanenergy/energy-resources/calculator.html](http://www.epa.gov/cleanenergy/energy-resources/calculator.html)

## Reducing Trash

In Survey 1 and 4, participants were asked about the amount of trash they generated and the perception of their trash. Over the course of the pilot, this changed:

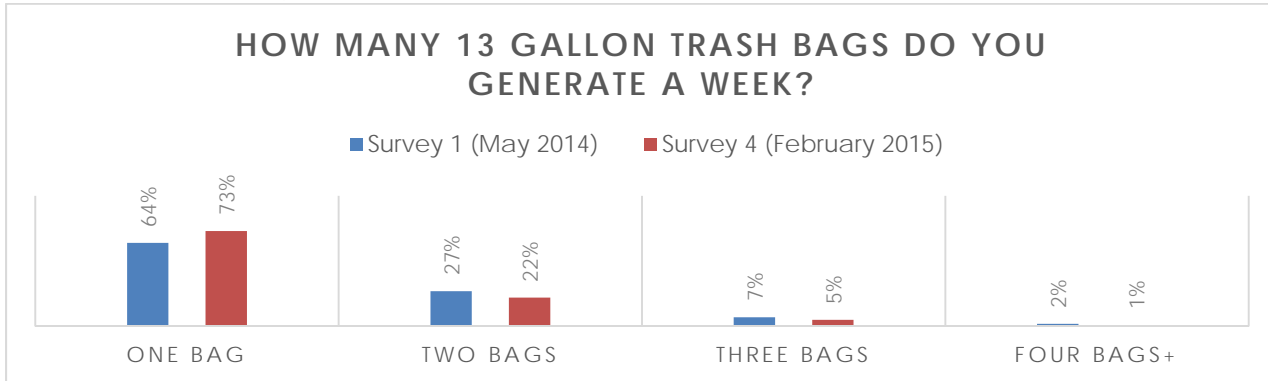


CHART 6: SURVEY 1, QUESTION 5 & SURVEY 4, QUESTION 8

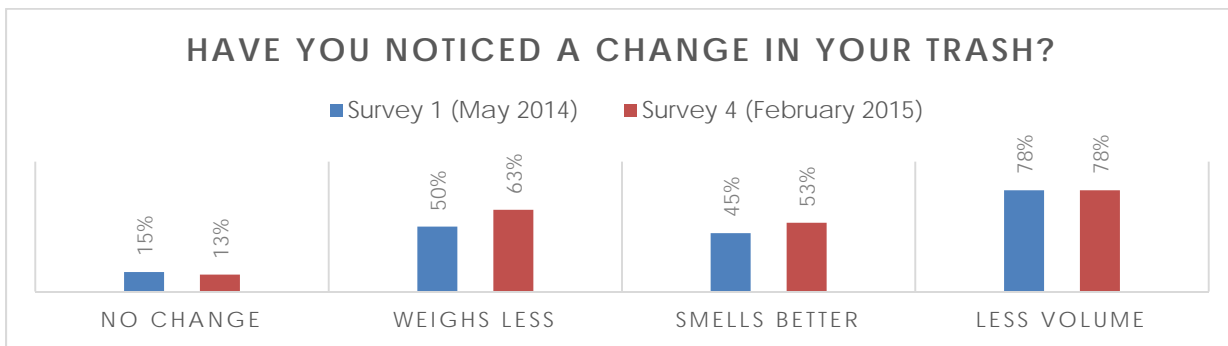


CHART 7: SURVEY 1, QUESTION 7 & SURVEY 4, QUESTION 7

Over the course of the pilot, respondents generated less trash and more respondents perceived that their trash weighed less and smelled better. The reported reduction in weight/volume coincided with the amount of fill levels of the green bins and the trash reduction observed in the waste sorts.

## Kitchen Collector

All pilot households received the MaxAir kitchen container (KC) and 150 BioBags. The MaxAir is well ventilated and the compostable BioBags breathe. This design lets heat escape and moisture evaporate. This lets food scraps dry out, which slows the rotting process and avoids odor. Many households liked the MaxAir citing that it takes up less space and fits well under the sink or in the refrigerator door, well ventilated (less odor and lighter), and straight side makes it easier to sweep peelings in from the kitchen counter.

The majority found the MaxAir kitchen container and the 2 gallon bags to be the right size. Note that the BioBags sold at retailers are 3 gallon which gives more slack to tie off bags. In Survey 3, 88% of respondents keep their KC's outside of the refrigerator. In Survey 4, 75% reported never keeping their KC in the fridge: 43% said that they had no need, 40% said they have no space and 11% said they would not want to put food scraps ("garbage") in with their other refrigerated food.

In Survey 3, 88% of respondents continued to use the MaxAir KC's provided to them. Of the respondents who explained why they stopped, 30% cited fruit flies, 27% already had a collection container; 21% had functional issues and 16% found them aesthetically displeasing.



FIGURE 19: MAX AIR KITCHEN CONTAINER

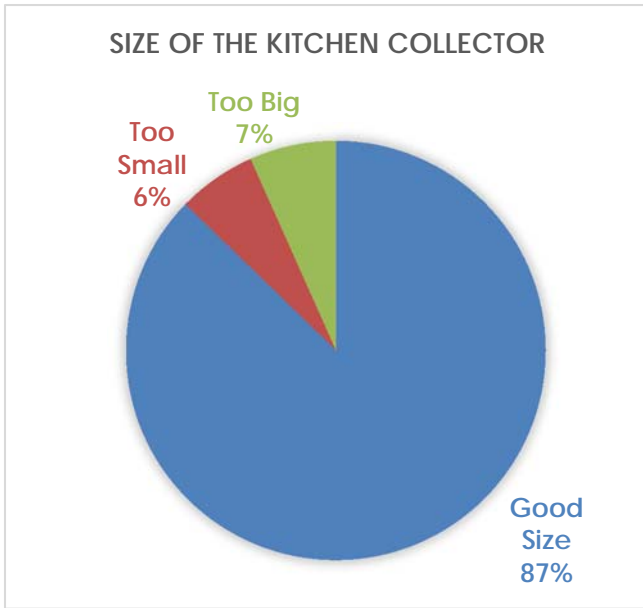


CHART 8: SURVEY 2. QUESTION 11

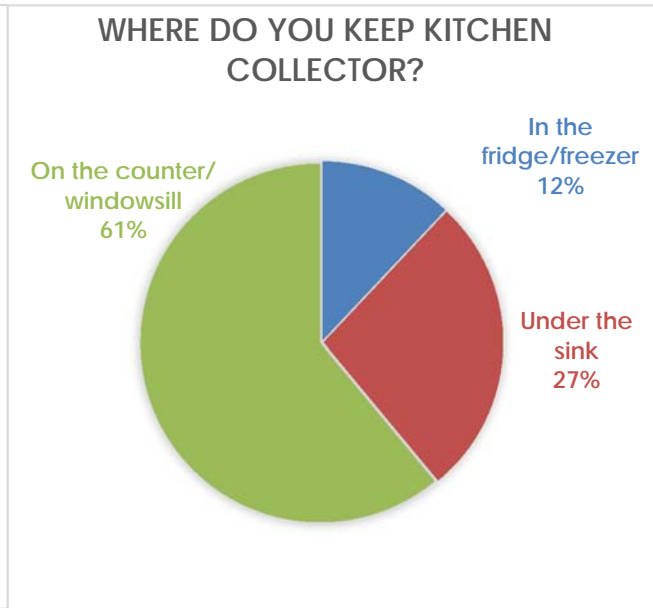


CHART 9: SURVEY 3. QUESTION 4

**Sure Close Pilot**

In February 2015, 90 households volunteered to try the SureClose kitchen container as an alternative. The primary difference is that the Sure Close has solid plastic sides so is less ventilated. In May, a survey was issued to these households; 55 responded. 84% are still using the Sure Close and 69% prefer the Sure Close over the Max Air.

Many households liked the Sure Close citing that it led to fewer bag breaks with a more solid bottom, easy to clean, lid stays up for counter use and shuts securely, and generally more sturdy. While the Sure Close pilot respondents found the Max Air reduced more moisture, they felt the Sure Close had less odors and preferred it. Since the Sure Close were delivered in February and the Survey was issued in May 2015, participants did not experience it during the summer with warmer weather in concert with odors, moisture, and fruit flies.

City and BioBag staff are evaluating survey responses from the households that tried both related to performance. Considerations are minimizing moisture, odor, ease and convenience of use. BioBag has identified another kitchen container called the “Stelo” that is sturdier construction, well ventilated, and features improved lid design and performance. Ultimately, the City wants a kitchen container that performs best (minimize moisture to reduce odors, weight, and avoid bag breakage) while being easy to use for residents (tops stays open and on, more stable when upright, etc.)



FIGURE 20: SURE CLOSE



FIGURE 21: STELO



## Compostable Bags

Most participants had good experiences with the compostable bags. Best practices can resolve any problems. To avoid bag punctures and leaks, avoid overfilling bag, and cut or break scraps first to make the pieces smaller. Replacing the bag 2-3 times per week is key to avoid overfilling, bag rips, and leaks. Given the design of the bags and Max Air containers, moisture is meant to evaporate and heat escape. Continued education around the system will help to manage expectations.

Participants usually change the bag when it is full. However, only 20% of respondents change the bag every 2-3 days, which helps avoid issues. It seems that it takes most households longer than 2-3 days to fill the kitchen container with food scraps. Waiting until the KC is full can cause issues with odor and pests. Note that the bags distributed in the pilot were 2 gallons. Bags sold at retail stores are 3 gallons. The extra space will reduce overfilling and make bags easier to tie off.

Compostable bags should be required or strongly encouraged to ensure continued participation. They minimize the “yuck” factor by keeping KCs and curbside bins clean. This helps to ensure participants stay committed. The City understands that compostable bags are acceptable in windrow composting as well as dry anaerobic digestion, but would be screened out in wet anaerobic digestion systems or in pre-processing facilities that slurry the material for addition to a waste water treatment operation.

The City wants compostable bags to be composted and not separated as residue for disposal. The City’s collection contract for curbside compost will require the hauler to bring organics to a composting or anaerobic digester facility of their choice that is registered with and in compliance with all DEP and other regulations.



FIGURE 22: CAMBRIDGE PILOT BioBAG

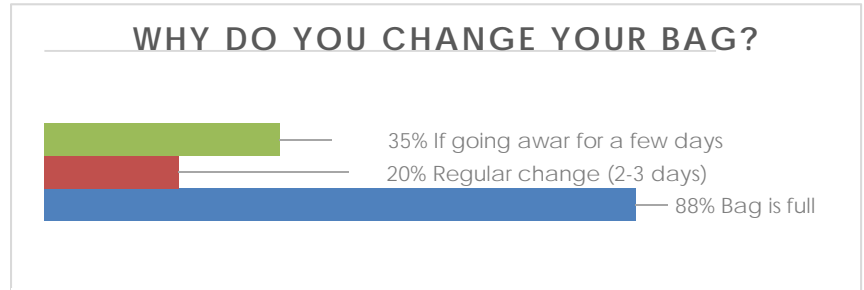


CHART 10: SURVEY 2, QUESTION 8

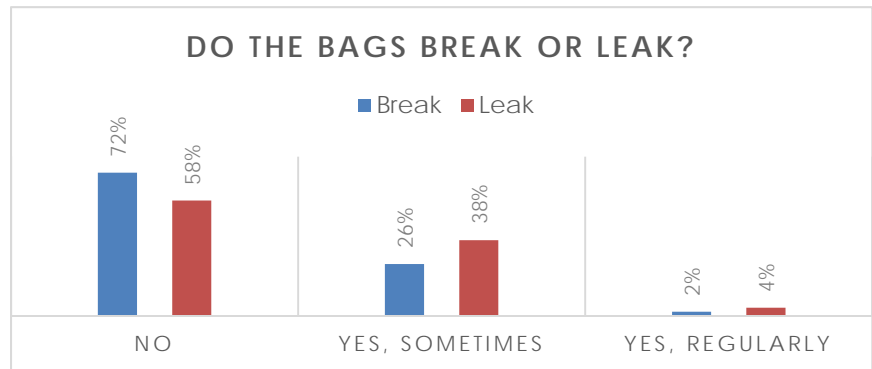


CHART 11: SURVEY 2: QUESTIONS 12+13

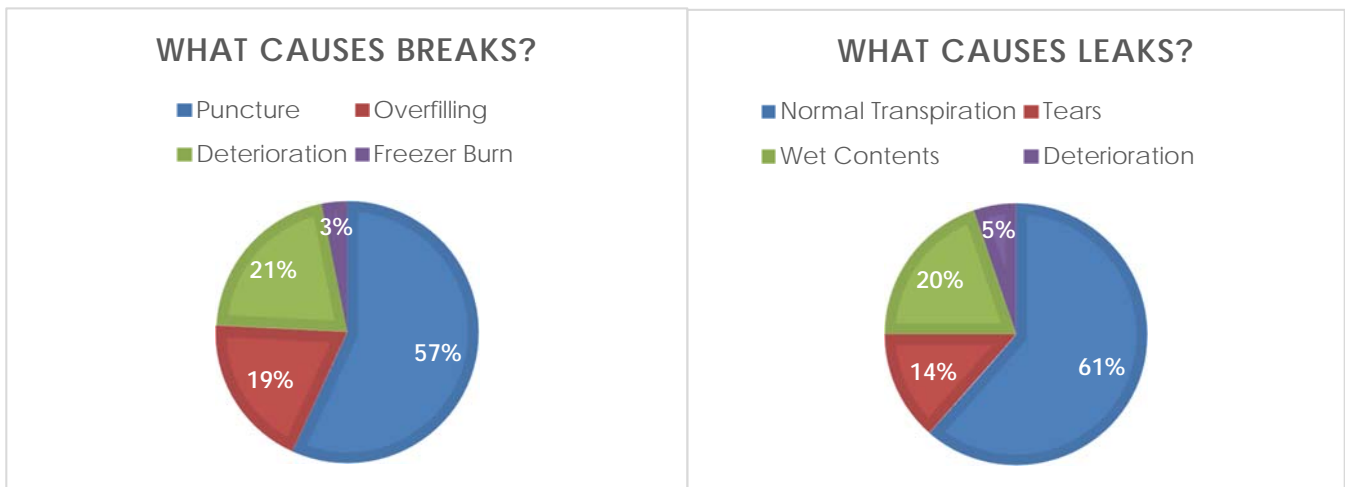


CHART 12: DATA FROM COMMENTS, SURVEY 2, QUESTIONS 12+13

City and BioBag staff worked with local retailers to encourage them to sell compostable bags. Currently, the following retailers sell boxes of BioBags or If You Care bags: Star market, Cambridge Naturals, Pemberton Farms, and Whole Foods. 67% of respondents in Survey 1 report using 2-3 compostable bags per week. A 25 or 30 count box of bags sold at local retailers is \$4.99-\$6.99 a box, or 20-24 cents per bag. Based on these prices, households could pay \$20-36/year for their bag needs. BioBag has extended its Buy One Get One Free coupon to Cambridge residents through April 2016, enabling households to purchase 50 bags for the price of 25, a 50% savings. In other cities, as curbside programs matured and other companies entered the bag market, the price decreased including specially designed paper bags.

Bag usage remained consistent across the seasons, especially with 2-3 bags per week users. The most noticeable shifts were in one bag per week in the summer (18%) to winter (23%) and in 4+ bags per week in summer (15%) to winter (8%).



FIGURE 6: BUY ONE GET ONE FREE BIOBAG COUPON

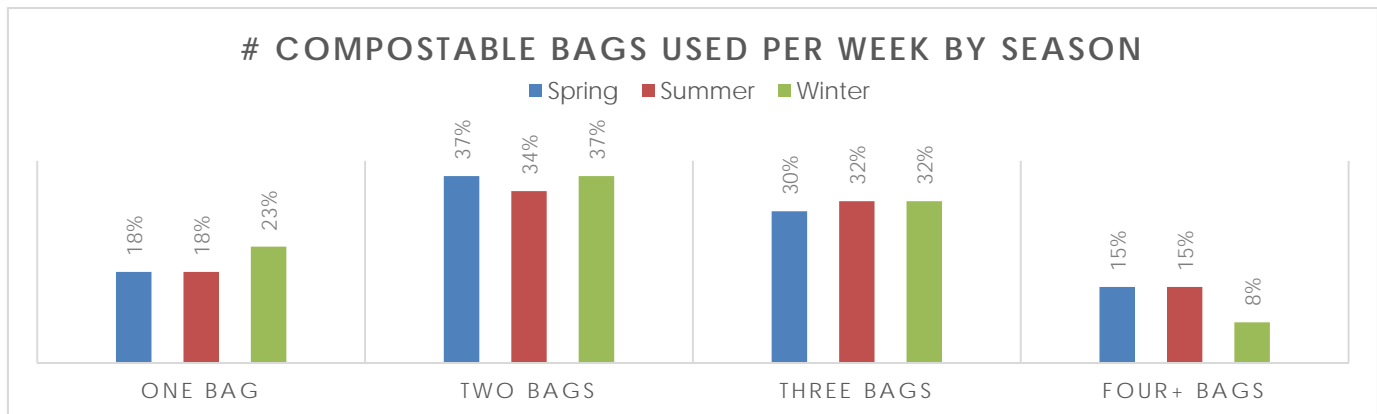


Chart 13: Survey 1, Question 6 & Survey 4, Question 2-4

## Curbside Green Bin

Residences were generally satisfied with both the 12 and 21 gallon Orbis curbside green bins, in size and ease of use. Only one out of ten reported that they are too big, though that gives residences the capacity to take on more participating households.

The respondents' comments indicate that 44% rinse out the bin with a hose with some regularity and 13% rinsed them once or twice. As expected, some participants said that washing the bin is a communal chore that has not been assigned in MF buildings.

Other communities using the Orbis curbside green bins include the City of Toronto and many communities in Ontario, and New York City. Cambridge will continue with these bins and is excited that the new 12 gallon Orbis bin has an extendable handle, making it easier to roll.



FIGURE 24: ORBIS 12 GAL CURBSIDE BIN

FIGURE 25: ORBIS 21 GAL CURBSIDE BIN

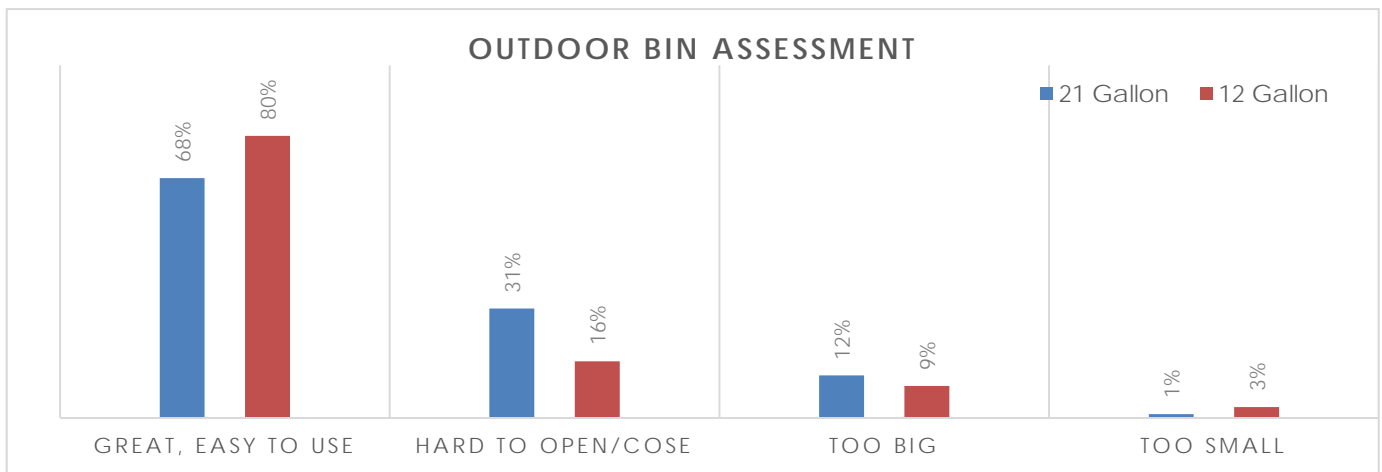


CHART 14: SURVEY 3, QUESTIONS 10+11

## Food Scraps

Survey 4 respondents report that for 98% of them, collecting food scraps has become habitual. In every category, more respondents reported collecting that type of food as the pilot progressed. The largest changes occurred in meat/fish, rice/beans/pasta, baked goods and dairy products, perhaps suggesting that people became more comfortable composting these scraps over time.

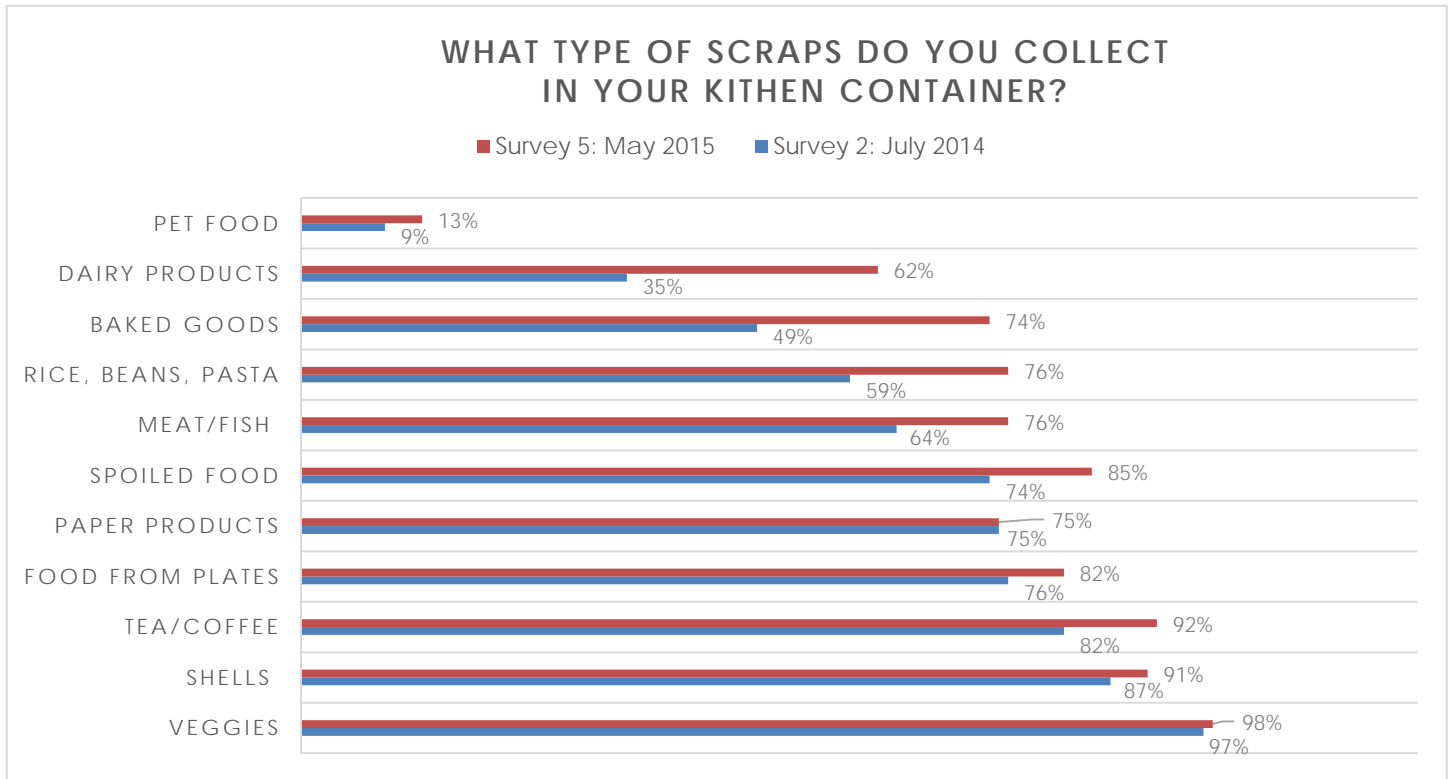


CHART 15: SURVEY 2, QUESTIONS 4+5

Households reported cooking more than eating pre-prepared meals. This increases the amount of food scraps generated. The variance in home cooked meals vs. pre-prepared meals accounts for the green bins in which the OPA would find one partially filled bag and for the bins at single family homes that are nearly full. Voluntary participants may cook at home more than the average household based on food value systems.

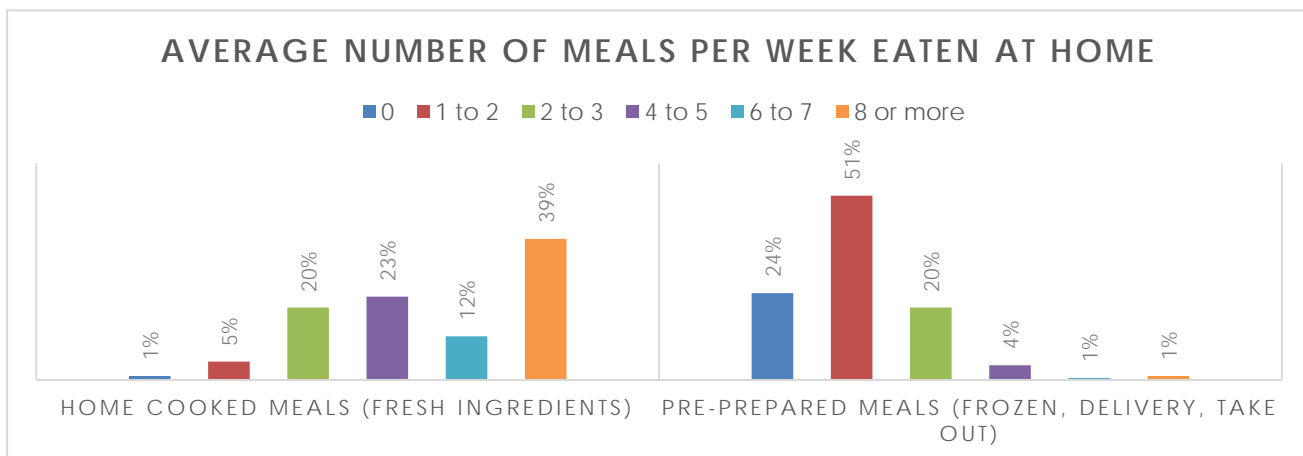


Chart 16: Survey 2, Question 7 & Survey 5, Question 3

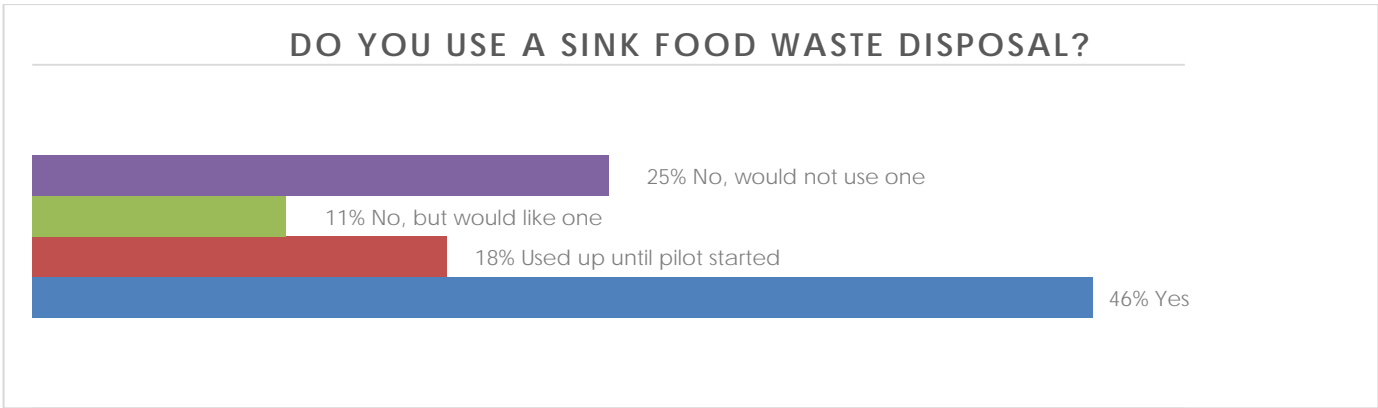


Chart 17: Survey 1, Question 11

46% of respondents choose to use the curbside compost program instead of a food waste disposer (FWD). After two months of the program, 57% feel that they still needed a disposal. In past years, DPW estimated that 30% of households may have a FWD. Curbside composting and properly used FWDs are complementary ways to manage scraps, given that the Deer Island Wastewater Treatment Facility turns solids into a commercially sold compost product and the methane gas is used immediately as renewable energy in the facility. FWDs made by Insinkerator grind food into tiny particles. All particles pass through a 1/2" sieve; most pass through a 1/4" sieve; and, most are collected on a 1/8" sieve.

In Survey 1, participants were asked about their perceptions of what percent of food was being thrown away and how much of that waste could be prevented.

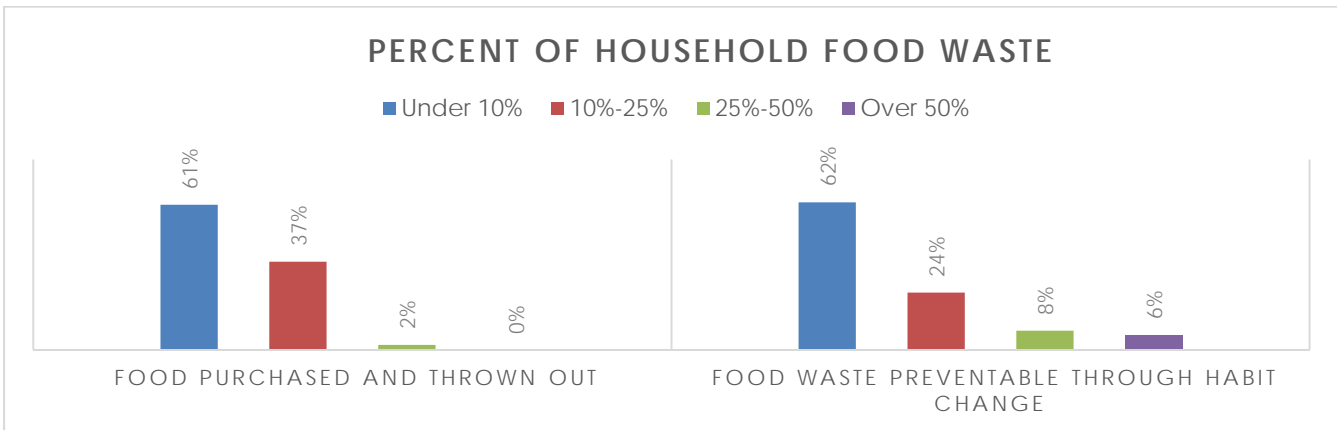


Chart 18: Survey 1, Question 9+10

DPW chose to emphasize ways to reduce food waste in the program messaging. Many resources exist in this area such as:

1. EPA's Food: Too Good to Waste campaign and [King County's campaign](#)
2. [Love Food Hate Waste](#) (Europe)
3. [Think.Eat.Save](#)
4. [Natural Resource Defense Council's report, Wasted: How America Is Losing Up to 40 Percent of Its Food from Farm to Fork to Landfill](#)
5. [Intermarche's Inglorious Fruits and Vegetables campaign](#) (French grocer)
6. [Recycling Works brochure How to Reduce Food Waste, A guide for Businesses and Institutions in Massachusetts and other resources](#)
7. [Book by Jonathan Bloom: American Wasteland, How America Throws Away Nearly Half Its Food](#)

**Remember, reducing waste is even better than composting.**

Whatever food you love, you can reduce waste and save money! Here are some tips to get you started:

- 🌿 **Make It Last**  
Storing your food the right way in your fridge, freezer and cupboard will keep it fresh longer.
- 🌿 **Portion & Plan**  
Plan meals, write (and stick to) a shopping list. Get your portions right and eat the food you buy.
- 🌿 **Love Your Leftovers**  
Use leftovers for lunch or a base for a new meal. Use up produce in smoothies, soups, frittatas, and casseroles.

FIGURE 26: TIPS FOR FOOD WASTE REDUCTION

61% of participants report wasting less than 10% of the food they purchase and they could reduce less than one tenth of their waste by changing their cooking or serving habits. However, people may underreport the wasting of food due to lack of true awareness or even guilt. One might guess that the general public might waste even more of the food they purchase and could reduce more of that waste through habit change. Note that the National Resources Defense Council’s report, *Wasted*, states that, “American families throw out approximately 25 % of the food and beverages they buy. The cost estimate for the average family of four is \$1,365 to \$2,275 annually.”

Respondents either thought no tips could help them reduce the amount of food waste (30%) or thought that one or more tips would be useful, the most popular being tips on “Smart Storage” “How to Eat All Leftovers” and “How to Eat Everything Purchased.” These three selections suggest that usually produce was not stored to delay ripening, leftovers were not used in time or frozen, either spoiled before while in the fridge, and less could be purchased in a given shopping trip.

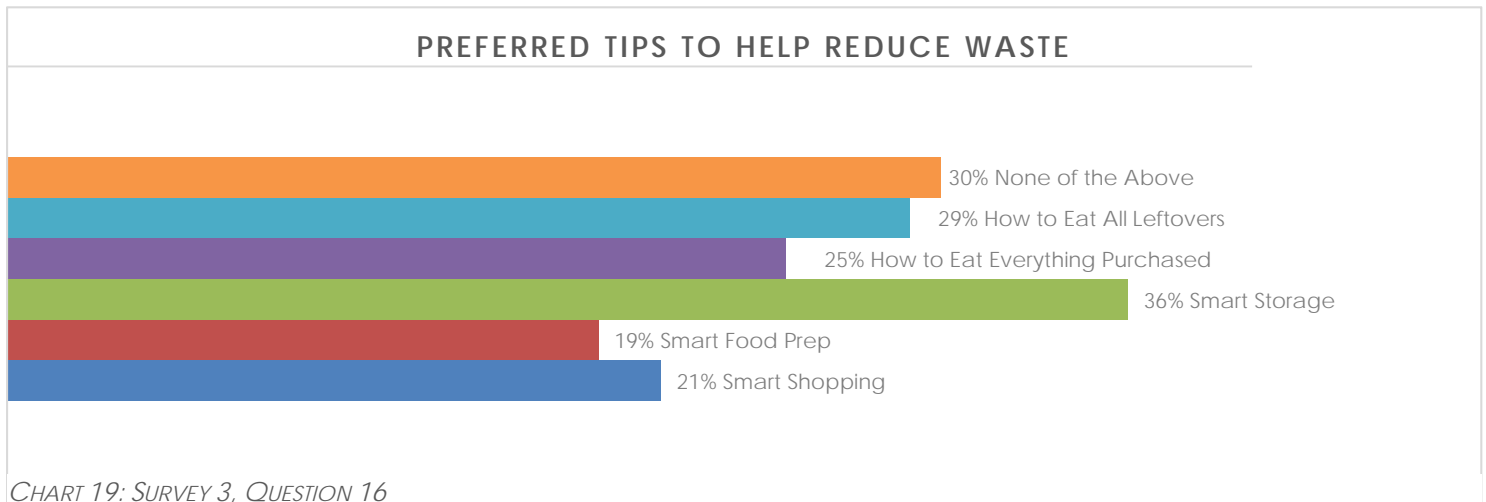


CHART 19: SURVEY 3, QUESTION 16

### Odor and Pests

The two most common complaints from households were odors and fruit flies. Best practices to reduce odors and avoid/manage fruit flies were continually addressed in the monthly email updates, which include:

1. Change the bag every 2-3 days.
2. Wrap meat/fish in newspaper scraps.
3. Store the kitchen container in the refrigerator or freezer.

In Survey 2, respondents reported that 66% do not notice odor coming from their kitchen container and 34% do. Other responses included warm weather and contents such as onions.



Chart 20: Survey 2, Question 10

In Survey 3, 72% of respondents reported having fruit flies. More than half of those that did said “only a few in the summer” and “no more than usual”. In prior communications with participants, staff suggested ways to deal with fruit flies and in the same survey, respondents reported on their method of dealing with them:

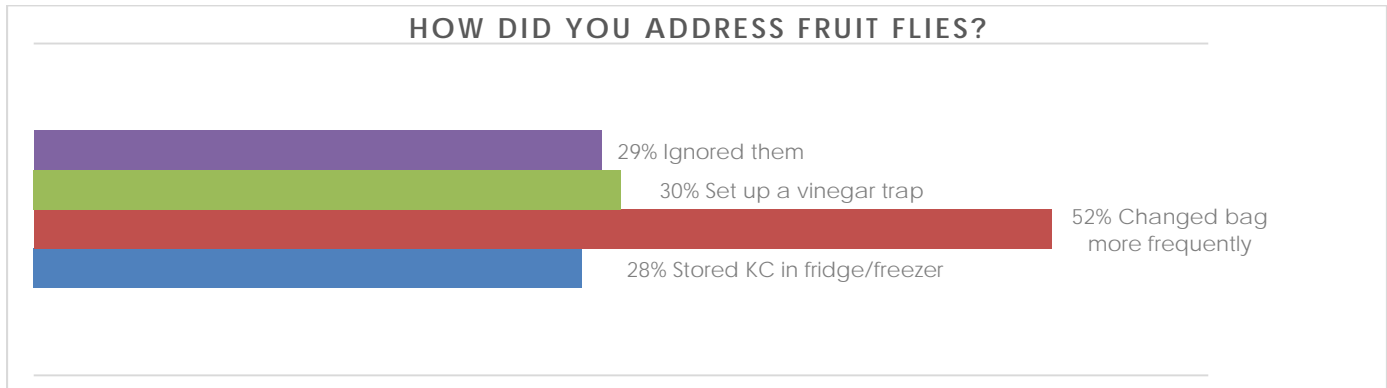


Chart 21: Survey 3, Question 7

About 70% of respondents addressed a fruit fly problem by either changing the bag more often, storing the KC in the fridge/freezer, or using a vinegar trap. Reactions from pilot households may be more patient and responsive than the general public. Staff continually think about ways to encourage storage of scraps in the refrigerator and freezer, especially. The comments on this question provide a nuanced view into this the user experience.

In Survey 3, 20% of respondents reported noticing rodents at their property before the pilot. Of the 3% who cited an increase in rodent activity, the comments suggest that increase was unrelated to the pilot. However, two respondents that had rodent experiences felt that the ventilated sides of the MaxAir KC emitted odors and attracted mice. Squirrels, rats, skunks, raccoons and opossums were also noted in the comments.

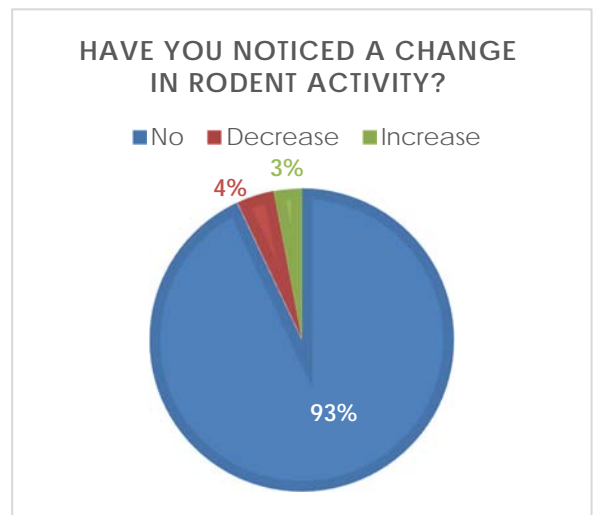


CHART 22: SURVEY 3, QUESTION 9

## Conclusion

### Lessons Learned

The pilot program revealed several important lessons, as staff plan for the expansion of the program to more households in the Monday collection route:

1. There are two approaches to a voluntary programs. The first is to require households to sign up and request a curbside green bin/kitchen container. In the pilot, this resulted in about 30% participation rate among eligible households. The second approach is to give a green bin to all eligible households – similar to the roll-out of single stream recycling totes. Consultants from HDR Inc, who are extremely well versed in curbside organics programs in Canada, suggest that a “green bins for all” approach results in voluntary participation rates between 40-60% depending on the amount of program promotion to residents.
2. Providing households with a kitchen container is a must. Using compostable bags and strongly encouraging households to use them is also a must, to minimize the “yuck factor” in order to retain participation over time. HDR also suggested the “3Bs” are key to high participation rates for curbside organics programs: giving kitchen Bins, strongly encouraging compostable Bags and Biweekly trash collection.
3. Regular communication with participants is key to share timely best practices and program performance, receive feedback and encourage questions, and thank households for participating and being part of the solution to reduce waste, protect the climate, control trash costs, and create jobs and wonderful soil.

4. Emphasize that storing food scraps in the refrigerator or freezer, and changing the bag every 2-3 days are effective ways to minimize odors and avoid fruit flies.
5. Dealing with missed pickups is tricky when the collection truck is only on the road one day a week. The resident could choose to wait until the following week or use the food scraps drop-off location at St. Peter's field, or if reported by 12 noon the following day, City staff would pick it up.
6. Promote ways to reduce food waste in the first place. Reducing waste is even better than composting, and saves the City both trash disposal fees and compost tip fees. This is a big opportunity since approximately 75% of pilot households compost uneaten food from their plates and spoiled food.

## Program Expansion

As discussed previously in this report, the City is planning to expand curbside organics service to eligible households in the full Monday collection route in the fall of 2015. The City created a new full time position, Waste Reduction Program Manager, to work under the direction of the Recycling Director to help launch the program and work on other waste reduction projects. Staff is reviewing collection proposals from private haulers, estimating curbside green bins needed, preparing for bin delivery effort by a contractor, thinking about volunteer needs for door to door outreach, updating educational materials, evaluating which kitchen container to use, and preparing for a target mailing to eligible households and landlords.

## Explore Policies that Maximize Participation

The City will need to identify effective policies to drive organics participation higher to maximize diversion and cost efficiency with the new organics program. Future policies may include consistent enforcement (i.e. trash limits – 48 gal per household), financial measures (i.e. pay for excess trash), or convenience (weekly organics and every other week trash collection).

### Weekly organics collection with every other week trash collection (EOW).

This policy could significantly reduce trash tons and disposal costs. It could be an excellent complement when the City adopts a Mandatory Organics policy to ensure high participation. In Portland, Oregon, one year after changes to weekly food scraps and EOW trash, residential trash collected curbside decreased by 38% (94,100 tons in 2011 to 58,300 tons in 2012). As seen in Portland, frequency of collection can be an incredibly effective motivator for households that want to get rid of food scraps every week in the green bin, instead of waiting every other week for trash collection.

Every other week trash was introduced in West Vancouver in 2013 and trash decreased by 31%. “The move to biweekly garbage collection gives residents even more reason to use their Green Cans,” said Mayor Michael Smith. “By continuing to adjust service levels for garbage collection, we will meet our regional waste diversion targets of 70% for 2015 and remain one of the most efficient and cost-effective garbage services in the region.” The Peel region in Southern Ontario is moving to EOW trash with weekly organics in 2016.

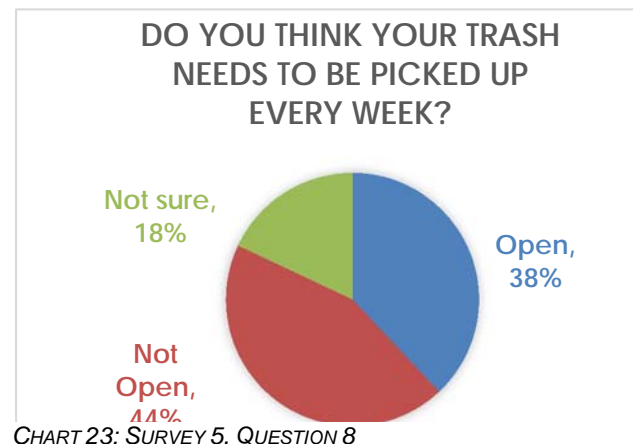
In Survey 5, 44% were not open to EOW trash collection, 38% respondents were open to it, and 18% were unsure. Comments raised concerns about odor, which would be an issue only if residents placed food scraps in the trash bins; and about disposable diapers and pet waste. Further analysis is needed as to how this would be implemented in Cambridge. Recycling staff suggest that the policy would apply to residences with up to six units and that larger multi-family buildings could request extra weekly trash pickups for a fee.

### Variable Trash Barrel Sizes & Pricing

The Recycling Director and Recycling Advisory Committee researched cities with zero waste goals, including San Francisco, Seattle, Portland Oregon, Oakland, Austin, and Vancouver. All communities charge for weekly trash collection and charge less for smaller barrels. This could create a new revenue stream for the City to help recoup collection costs.

### Mandatory Composting

The City has discussed implementing mandatory composting after the weekly organics service has been introduced citywide. This would complement a shift to every other week trash collection.





## Attachments

### Publicity Materials

1. A-frame sign
2. Brochure
3. Instruction flyer with kitchen container
4. Curbside green bin sticker on lid
5. Wall posters used at the neighborhood information session
6. Articles:
  1. Boston Magazine – March 26, 2013
  2. EcoRI – August 2, 2013
  3. Wicked Local – April 9, 2014
  4. EPA – May 15, 2014
  5. Biocycle – July 1, 2014
  6. Scout Cambridge – March 10, 2015
  7. Edible Boston – July 1, 2015

### Communication with Participating Households

1. Sign up form
2. Letter to landlords
3. Green bin delivery notices
4. Monthly email updates (March 2014-May 2015)
5. Post-delivery outreach script March 2014
6. Door to door outreach script June 2014

### Feedback from Participating Households

1. Survey 1
2. Survey 2
3. Survey 3
4. Survey 4
5. Survey 5
6. Survey 6

### Project Materials

1. Map of pilot area
2. Processing contract with Rocky Hill Farm
3. Database screenshots