Improving Oregon Recycling Systems Infrastructure Research

Customer Engagement Research Summary (Phase 2 Task 3)

February 24, 2020

Overview

Research Focus

Cascadia Consulting Group conducted a literature review and web- and interview-based research on the cost and effectiveness of education, feedback, incentive, and compliance alternatives. The goal of this task was to provide the Oregon Department of Environmental Quality (DEQ) and Partners with information on the state of knowledge regarding the use and effectiveness of alternative engagement, compliance, and incentive programs that are aimed primarily at reducing contamination in set-out recyclables. The available research will inform customer engagement strategies included in scenario analysis.

Researched focused on the following customer engagement strategies:

- **Direct feedback**, such as cart-tagging, phone calls, letters, or visits related to contamination observations.
- **Compliance actions**, such as cart refusal or removal as well as fines, fees or surcharges. Compliance actions were usually preceded by direct feedback efforts.
- **Simplified or standardized accepted material list.**
- **Effects of containers sizes or variable prices** on contamination, primarily pay-as-you-throw (PAYT).

While also of interest to DEQ and Partners, the review was not able to focus on the following strategies due to limitations of time and budget:

- **Broad media and outreach efforts,** such as canvassing/door-to-door campaigns, direct mail, municipal/hauler website, apps/online games, social media campaigns.
- **Audience-tailored outreach efforts,** such as commercial technical assistance; customized materials/signage; multi-lingual, image-based, or transcreated campaigns; property manager engagement; or school-based education.
- **Incentives**, such as rewards for recycling or having low contamination.

Oregon Context

Under Oregon DEQ Administrative Rule 340-090-040, local governments of certain sizes must implement recycling program elements selected from a list of options. Any local government that chooses to implement the "expanded education and promotion" element must develop and implement a Contamination Reduction Education Plan (CREP) that determines and seeks to reduce contamination in recycling set out for collection, focusing on at least one generator type (single-family, multifamily, commercial, or public recycling depot). Almost all cities of 4,000 or more population have chosen to implement the "expanded education and promotion" element as one of the options to meet the number of options required of them by Oregon law.

A CREP must describe how, how often, and at what point in collection the local government will assess contamination. A CREP must also describe the education including content, format, intended audience, and distribution schedule and media. Education can include either broad, community-wide messaging or direct customer messaging through cart tags, door hangers, or information on invoices. While cart tagging is one option for education activities, it is not required of any local government.

High-Level Summary of Data Availability and Limitations

Overall, reliable data on the effectiveness of customer engagement strategies are limited or non-existent. Because customer engagement strategies are often implemented by jurisdictions directly as part of ongoing service operations and programming, rather than by researchers, they are often carried out in the absence of quasi-experimental designs that increase the reliability of results. A high-quality study:

- Isolates the effect of an intervention by applying one strategy at a time.
- Directly measures the changes desired, such as sorting recycling to measure actual contamination.
- Compares the results in treatment groups to control groups who did not receive the intervention.
- Selects samples using a randomized sampling method and while considering the representativeness of the study sample compared to the overall population.
- Uses sample sizes large enough to detect changes and uses statistical analysis to assess whether any changes are statistically significant.
- Measures changes over time, such as one or two years after the intervention to assess whether the changes are durable.

However, may jurisdictions lack sufficient funding for data collection and analysis that would help to provide more robust assessments of the strategies used. Where jurisdictions have measured the effects, studies on specific strategies have been relatively short term (typically a few weeks to a few months) and/or complicated by the use of multiple strategies at the same time, and therefore unable to measure long-term sustained behavior change. Although the specific impact of each factor is unknown, contamination rates may be affected by customer education and compliance strategies, collection methods, pricing structure, and incentives.

Research on campaigns and study data on single-family customer engagement and contamination reduction are more available than for multifamily or commercial efforts. Data are most available for campaigns that use cart tagging with or without compliance efforts such as refusal to collect contaminated carts. Data are not available to isolate the effect of a standardized or simplified materials list or of PAYT.

Some research has been conducted on multifamily outreach efforts, largely focused on increasing recycling quantities through optimizing collection infrastructure, engaging property managers, and conducting door-to-door resident outreach. Oregon DEQ recently conducted a literature review regarding multifamily engagement strategies, which can be found online at: www.oregon.gov/deq/FilterDocs/recMultiTenLitRev.pdf.

Information is extremely limited on commercial contamination in general as well as the use and effectiveness of customer engagement strategies.

Summary of Findings

Direct Feedback with Education Only

Overview

Cascadia's review found many jurisdictions using cart tagging to educate residents on what can and cannot be recycled. Cart tagging is frequently combined with other forms of education or with compliance efforts. The most common variations of cart tagging are:

- **Generic campaign**: a time-limited and dedicated campaign focused on specific routes that tags every cart with the same generic message without inspecting the cart's contents.

- **Feedback-only campaign**: a time-limited and dedicated campaign focused on specific routes that inspects all carts on a route and attaches an "Oops!" tag to carts with contamination. These campaigns may also use "Good job!" tags for carts without contamination and/or additional education through signs on collection vehicles, direct mail, local or social media, or other broad-based outreach.

- **Feedback and rejection campaign**: a time-limited and dedicated campaign focused on specific routes that adds a compliance element to the feedback-only campaign by refusing to collect the cart until contamination is removed.

- **Ongoing driver inspections**: an ongoing effort in which route drivers inspect all or a selection of containers and attach "Oops!" tags. These campaigns may use additional education or compliance efforts.

Available Data

Cart tagging is one of the most commonly used methods of direct feedback. However, through Cascadia's review, we have found that municipalities often combine cart tagging with another method, either education (described in this section) or compliance (describe in the following section). The Recycling Partnership recommends that municipalities conduct outreach, specifically mailers and community signage, to educate customers about what materials are accepted in curbside recycling before using cart tagging.

Cart-tagging studies most commonly reported the number of tags distributed, noting changes between the first round of cart tagging and subsequent rounds (aka interventions). Some measured actual contamination rates using a cart-based waste characterization study conducted before and shortly after the campaigns. No studies are currently available regarding long-term effects of cart tagging.

Data from studies or interviews were found from:

- Clackamas County, Oregon
- Snohomish County, Washington (through Waste Management)
- Chicago, Illinois (through The Recycling Partnership)
- Denver, Colorado (through The Recycling Partnership, focused on increasing recycling)

Effect on Contamination or Quantity of Recyclables Collected

Studies identified consistently found cart tagging to reduce recycling contamination in the short-term, although results are not comparable across studies because of differences in intervention and measurement methods. Both tagging all containers with a generic message and inspecting containers to provide direct feedback with "Oops!" tags on only contaminated containers were found to be effective.

Cascadia investigated several case studies where the impact of cart tagging was isolated from compliance efforts. While no studies provided reliable long-term data, all studies showed improvements in contamination rates in the short term.

Case Study Highlights

Clackamas County, Oregon, conducted a 6-week cart-tagging experiment in 2018 to test the efficacy of using cart tags to reduce the number of contaminated recycling carts (Tomolla Consulting, for Clackamas County, 2018). Over the course of six weeks, the study conducted 22,286 household visits and inspected 11,809 cart set-outs, leaving either an "Oops!" tag or a "Gold Star" tag. Tagging was tested in isolation, without other interventions. The percentage of contaminated carts decreased from 63% in the first week to 43% in the sixth week. The most common contaminants were plastic clamshell packaging and plastic bags.

In Snohomish County, Washington, a 2018 effort by Waste Management tested the effectiveness of two types of cart tagging (generic education versus feedback with refusal to collect) to reduce plastic bags

and bagged recyclables showing up in roll carts (Cascadia Consulting Group prepared for Waste Management / Snohomish County Solid Waste / King County Solid Waste, 2018). In the study, over 1,300 households in each group received two rounds of tagging. Group A received a customized "Oops!" tag indicating the type of contamination or a "Good job!" tag based on a visual inspection of their carts. Group B received a generic tag with simple recycling instructions that was attached to all recycling carts without inspecting the contents. Contamination rates were measured before and after tagging using a cart-based waste characterization study consisting of samples from 80 randomly selected households from each group before and after two rounds of tagging. The sample size was anticipated to be able to evaluate whether a change in contamination rates of at least 20% occurred with statistical significance at the 90% confidence level.

- In both test groups, the number of household samples that included clean plastic bags & film decreased at a statistically significant level, and the number of households with bagged materials decreased as well. The decrease in the occurrence of bagged materials was larger in Group B (generic tags). The decrease in occurrence of clean plastic bags & film was similar in both groups.

- While the overall weight-based contamination rate did not change after tagging, more households had low contamination (less than 5% of the cart by weight) and fewer households had high contamination (20% or more of the cart by weight).

  - Composition analysis showed that the overall contamination rate increased across samples between baseline and post-treatment audits; however, the difference was within the margin of error and not statistically significant in ether test group.

  - Analysis of average contamination rates at the household level found that the average household contamination rate fell slightly (from 12.3% to 11.4%) in Group A ("Oops!" tags). The average household contamination rate increased (from 11.9% to 14.2%) in Group B (generic tags). As in the overall composition analysis, these household-level differences were not found to be statistically significant.

The Recycling Partnership has supported and tested cart-tagging campaigns with additional education (mailers and/or door-to-door engagement) that have reduced contamination in the short-term:

- In **Chicago**, a 16-week tagging campaign combined with mailings decreased contamination (which included bagged recyclables) from 28% to 19% based on cart-based waste sorting (The Recycling Partnership, 2018). Cart-based sorting was conducted in June and October 2017.

- In **Denver**, a 16-week campaign focused on improving of aluminum metal container recycling resulted in increased capture rates of 25% between May and October 2017 (The Recycling Partnership, 2018). The campaign involved direct mail, boosted social media, and general advertising promoting aluminum can recycling; two of the four routes also received 8 rounds of cart tags. In a follow-up survey in November 2017, 43% of respondents said they recalled the cart tag compared to 14-18% who recalled receiving a postcard, 11-13% who recalled seeing a recycling truck sign, and 1-2% who recalled a Facebook post.

Costs or Resource Requirements

- Cart tagging costs vary by jurisdiction. Estimates for a campaign including at least 5,000 homes range from $1.50 to $2.50 per household for direct engagement and mailings plus $5,000 for boosted social media and $20,000 for community signage (truck signs, bus signs, neighborhood banners).
- The Recycling Partnership offers a toolkit online with helpful tips on planning an anti-contamination campaign: https://recyclingpartnership.org/contamination-kit.

Benefits

- Available research shows that cart tagging without compliance efforts reduces contamination, at least in the short term, and particularly for the materials targeted by the campaigns.
- Field notes from outreach staff in Clackamas County noted that some residents appreciated the opportunity to learn about acceptable materials through the cart tags.

Drawbacks

- Implementing cart-tagging campaigns increases outreach costs; the cost-savings from reduced contamination may help offset these costs.
- Several reports noted that some residents felt uneasy or even hostile about their recycling being inspected; however, it is unclear how common this reaction is. In the Clackamas County study, a small number of residents reacted to the cart tags with defensiveness, although more residents reacted positively to the feedback.

Other Considerations

- Based on study findings, tagging every cart with a standard message may be more effective at reducing contamination of a contaminant that is widely placed in recycling containers while direct feedback may be more effective at reducing highly contaminated carts or contaminants that vary more across households.

Compliance Efforts: Refusal, Fines, Removal

Overview

Compliance efforts include refusal to collect contaminated carts, issuing a fine for contaminated containers or charging for extra garbage collection, removing recycling carts from customers who repeatedly contaminate them, or a combination of methods. Compliance efforts are commonly used in conjunction with direct feedback, such as through cart tags. For refusal to collect, when a cart is found to be contaminated, it is tagged and left uncollected at the curbside. Residents may be told that it will be collected on the following regularly scheduled recycling collection day if they remove the contamination.

In some cases, residents are fined for contamination or the material may be collected as an additional garbage set-out. After repeated offenses and notifications (the number of contamination occurrences differ by city), haulers may remove the recycling cart. Haulers may return the cart after a set number of months and/or for a fee paid by the customer.

Available Data

Cascadia obtained data from studies and interviews with several jurisdictions that used compliance efforts preceded by direct feedback:

- **Jackson County, Oregon** (through Rogue Disposal & Recycling)
- **Snohomish County, Washington** (through Waste Management)
- **Greensboro, North Carolina**
- **Albuquerque, New Mexico**
- **Minneapolis, Minnesota**
- **Several cities in Massachusetts** (through Massachusetts Department of Environmental Protection and The Recycling Partnership)
- **Atlanta, Georgia** (through The Recycling Partnership)

While no studies provided reliable long-term data for refusal to collect contaminated recycling, all studies showed improvements in contamination rates in the short term.

Cascadia reached out to several jurisdictions that have been reported to use fines but was not able to obtain effectiveness data from them.

Recycling Impacts

Studies identified consistently found cart tagging with compliance efforts to reduce recycling contamination in the short term, although results are not fully comparable across studies because of differences in intervention and measurement methods. One short-term study in Snohomish County compared cart tagging with and without compliance, finding largely similar results for the focus material (plastic bags/film and bagged recyclables). However, while not fully comparable, programs that include refusal to collect a contaminated cart appear to show a larger decrease in repeat contamination when comparing the number of first offence and second offence tags distributed. One case study (Rogue Disposal & Recycling) maintained improvements over at least one year, although the hauler also provided ongoing feedback and refusal to collect as customers cause contamination issues.

While no studies provided reliable long-term data, all studies showed improvements in contamination rates in the short term.

Case Study Highlights

Rogue Disposal & Recycling (Jackson County, Oregon) combined a reduced recycling list with direct mailers, new cart stickers, cart tagging, refusal to collect, and cart removal after three contamination violations. The hauler removed all materials from the accepted recycling list except corrugated cardboard, newspaper and inserts, aluminum and steel cans, and clear milk-jug-style bottles. Route drivers use a truck hopper camera to observe cart contents as they are collected. When driver see contamination, they leave an educational cart tag and document the issue using a tablet computer. On the next collection week, the tablet alerts the driver to households with prior contamination issues so the driver can inspect the cart before collecting and leave an "Oops!" tag on the uncollected cart. The driver also documents the contamination with a photo, and customer service representatives have immediate access to the driver's report to send a letter to customers and respond if customers call. Rogue Disposal removes the recycling cart for six months after the third instance of contamination. With this combination of strategies, Rogue reports the following results:

- Between March and December 2018, contamination in single-family carts decreased from 48% (of which 25% was garbage and 23% was materials previously accepted for recycling but that had been removed from the list) to 27% (13% garbage and 14% previously but no longer accepted materials), by weight (Deemer, 2019). In September 2019, contamination had decreased to 20% (7% garbage and 13% previously but no longer accepted materials) (Leebrick, 2020).

- Over one year, the number of compliance letters sent decreased from 6,693 in April-May 2018 to 1,036 in April-May 2019 (Leebrick, 2020).

- The recycling cart set-out rate has decreased potentially because carts fill more slowly due to the smaller recycling list, but overall participation has not changed (Leebrick, 2020).

Snohomish County, Washington: In 2018, Waste Management tested the effectiveness of two types of cart tagging (generic education versus feedback with refusal to collect) on reducing plastic bags and bagged recyclables (Cascadia Consulting Group prepared for Waste Management / Snohomish County Solid Waste / King County Solid Waste, 2018). As described above, both types of tags reduced contamination:

- In both test groups, the number of household samples that included clean plastic bags & film decreased at a statistically significant level, and the number of households with bagged materials decreased as well. The decrease in the occurrence of bagged materials was larger in Group B (generic tags). The decrease in occurrence of clean plastic bags & film was similar in both groups.

- Most residents that received an "Oops" tag (with refusal to collect the cart) in the first round of tagging and had a cart set out during the second round appeared to correct their behavior in the second round. Of the 278 households that received an "Oops" tag with refusal to collect during the first round and were also tagged again during the second round, only 100 households (36%) received a second "Oops" tag (the others received a "Thank You" tag).

- Study data also suggest that the generic tag may have had a greater impact on reducing the campaign-focused materials (plastic bags, film, and bagged recyclables). However, other study data indicates that the specific feedback tag may have had a greater impact on improving overall

household contamination behavior, such as household-specific contamination rates and contaminant materials beyond plastic bags and film.

Greensboro, North Carolina conducted cart tagging with refusal to collect contaminated carts in 2018 due to a contamination rate of 22% (Staub, 2019). The City used feedback tags in the form of stickers on the lids of contaminated recycling bins, an app (Mobile 311 by Facility Dude) to document the issue, and a postcard automatically mailed to affected households. The cart was removed if three violations occurred. The City measured results based on the number of violations but was not able to provide a post-intervention contamination rate.

- Between January 2018 and March 2019, first violations were issued to 6,743 households, second violations to 880 households, and third violations to 164 households, indicating the campaign was effective (Staub, 2019).

Albuquerque, New Mexico used a cart-tagging campaign in combination with refusal to collect to reduce a contamination rate that had risen to 21% (Gorgone, 2018). On the first occurrence, the City left a tag on the bin and mailed a postcard to the household, although without an app, the driver had to call dispatch directly. On second occurrence, a code inspector visited the site to engage the resident or leave a door hanger. On the third occurrence, the household's cart was removed. The City measured results based on the number of violations but was not able to provide a post-intervention contamination rate.

- Albuquerque reported 882 first-occurrence letters and tags, 138 second-occurrence notices with site visits, and 35 third-occurrence notices with cart removal between July and December 2016 (Gorgone, 2018).
- Due to a change in administration, the City no longer refuses to collect contaminated carts (Hobert, 2020).

Minneapolis, Minnesota has used a wide variety of strategies including cart tagging, refusal to collect contaminated recycling, door-to-door education, and additional education through social media and a website (Kish, 2018). The City investigated the impact of its campaign over six weeks in 2018 across 131 blocks representing approximately 2,750 households, which included a control group (Gohl, Lindell, Llapa, Horner, & Kish, 2018).

- Between the first and third visit, the contamination rate decreased more in the group receiving cart tagging with door-to-door education than the group receiving only door-to-door education (see Table 1).
- After the first 6 weeks, contamination rates had reduced by 9.6% in the group receiving cart tagging and door-to-door engagement, compared to 3% in the group receiving door-to-door engagement only and 3.4% in the control group. Households that received cart tags and face-to-face conversation (instead of a door hanger) showed the strongest effect: 13.2% reduction compared to 8.5% reduction with cart tag and a door hanger.
- Three months later, the researchers tested half the carts for retention, and found that some, but not all, of the effects of the intervention had lasted:

- Among these carts, households that received the combined approach had reduced contamination by 8.4% at the end of the campaign. However, a follow-up study found that the relative reduction had decreased over time, with contamination only 2.8% below the first visit contamination rate three months later.

- Most of the retained effect occurred with the group that received a cart tag and face-to-face conversation (reduced by 16.7% compared to the first visit contamination rate at the end of the campaign and was 10.2% below the first visit contamination rate three months later).

- Practically the entire effect of the cart tag with a door hanger disappeared three months later.

Table 1. Change in Percentage of Carts by Contamination Level Between Visit 1 and Visit 3

Contamination level	Cart tag plus door-to-door	Door-to-door only	Control
Not present	+14.1%	+3.8%	+10.9%
1 to 3 pieces	+11.3%	-2.9%	-24.1%
More than 3 pieces but less than half the cart	-44.1%	-14.6%	+22.2%
More than half the cart	-55.6%	-28.6%	0%

The Recycling Partnership and the Massachusetts Department of Environmental Protection (MassDEP) have supported several cart-tagging campaigns with refusal to collect contaminated carts and developed the Recycling IQ Kit supported cart-tagging campaigns (Nash, 2018). MassDEP makes the kit available to cities for free along with up to $40,000 in grant funding for public-facing campaigns. The Recycling IQ Kit recommends conducting cart-tagging and refusal to collect campaigns for eight weeks combined with additional education including direct mailer; social, earned, and purchased media; local signage; and community events. According to MassDEP, in practice most jurisdictions use social media due to its low cost (Pare, 2020).

- Results from 22 communities found that the number of cart tags distributed over the eight weeks decreased by between 21.4% and 85.8% (Pare, 2020). Anecdotally, MassDEP mentioned that rejecting carts is more effective than providing "Oops" tags alone.

In **Atlanta, Georgia**, a campaign funded in part by The Recycling Partnership focused especially on plastic bags and not bagging recyclables and included cart rejection (The Recycling Partnership, 2018). Overall contamination decreased from 37% to 16% (a 57% difference), and bagged materials in particular decreased from 17% to 6% (a 62% difference). Tagging did not discourage recycling, and effective capture rates for loose materials increased by 27%. The study included four routes across the city, representing two areas with high contamination and two with average contamination (Morrigan, 2020).

Costs

- Cost data were not available beyond cost estimates for general cart-tagging campaigns.
- Rogue Disposal and Recycling reported anecdotally that the additional costs are mostly associated with additional staff time but said these costs have not been large (Leebrick, 2020). Rogue estimated

that the additional time for drivers to leave tags and inspect carts may be up to 1.5 minutes per cart. Labor costs increased initially, but Rogue moderates these increases by asking drivers to focus on the most important contamination and to leave no more than 30 tags per day, which also moderates additional customer service calls. The hauler did not need to make additional capital investments because it already had onboard computers and cameras. Rogue reported saving money by reducing processing and transport costs.

- For ongoing compliance efforts, additional equipment is helpful. Truck hopper cameras allow drivers to observe materials as all carts are collected (Leebrick, 2020). On-board computers or tablets with mobile data and route mapping allow drivers to document contamination issues with photos, report refusals to collect immediately so customer service staff can respond when customers call, and be notified to inspect a cart before collection at customer locations that have had prior contamination issues.

Benefits

- Available research shows that cart tagging with compliance efforts reduces contamination, at least in the short term for time-limited campaigns, or when using as part of an ongoing effort conducted by route drivers.

Drawbacks

- As with direct feedback alone, conducting cart-tagging campaigns increases outreach costs.

- Ongoing contamination inspection and feedback efforts by drivers may increase the time to service a given route, although that time should be reduced as contamination decreases.

- Some haulers reported public opposition to compliance efforts. Casella, the hauler for Portland and Sanford, Maine, no longer use cart tags and refusal to collect because of public backlash. Albuquerque, New Mexico, stopped refusing to collect contaminated carts after a change in City administration.

Other Considerations

- Based on study findings, tagging every cart with a standard message may be more effective at reducing contamination of a contaminant that is widely placed in recycling containers while direct feedback with refusal to collect may be more effective at reducing highly contaminated carts or contaminants that vary more across households.

- Clear communication and education in the customers' preferred languages is important before implementing any compliance actions. The hauler in Richmond, California, implemented fines, then stopped due to public objections that they had not been adequately notified or educated about them. Richmond has begun using fines again only for severely contaminated containers and only after giving the customer easy-to-read bilingual notices that clearly state the contamination issue.

Standardized or Simplified Materials List

Overview

A standardized recycling list establishes the same accepted recycling list across all jurisdictions within a state, county, or other geographic region. A simplified recycling list reduces the number and complexity of materials accepted for recycling and may be adopted to focus on materials with reliable markets and positive economics or to reduce customer confusion. A standardized list may also be simplified.

Available Data

Two states contacted that standardized the statewide recycling list have not do not have data on contamination results. One jurisdiction contacted that uses a highly simplified recycling list had contamination data, but it also used other customer engagement strategies (such as additional education or refusal to collect) at the same time, meaning no data are available on the effect of the simplifying the list.

Cascadia interviewed two states that currently use a standardized recyclable materials list statewide:

- The **Massachusetts** Department of Environmental Protection (MassDEP) established a statewide, standardized curbside recycling list that includes metal food and beverage cans; plastic bottles, jars, jugs, and tubs; glass bottles and jars; mixed paper; newspaper; magazines; and boxes. Massachusetts has a statewide website (https://recyclesmartma.org/) with the list and customizable digital and print resources for local jurisdictions.

- **Connecticut** mandates a "harmonized list" of accepted curbside recyclables. While standardized statewide, the list is not simplified: it includes single-use cups, thermoform food containers, aerosol cans, aluminum foil, mixed paper, food cartons, among other materials. This list was developed by five MRFs serving several Connecticut cities. The state has a statewide website (http://www.recyclect.com/) available in English and Spanish and downloadable templates for municipalities and organizations to brand with their own logos. No data has been collected regarding the impact of the harmonized list on recycling contamination rates (Nelson, 2020).

Rogue Disposal & Recycling in Jackson County, Oregon, uses a highly simplified list combined with direct feedback and compliance; this case study is described in the previous section. The hauler accepts only corrugated cardboard (no pizza boxes), newspaper and inserts, milk-jug-style containers, and tin and aluminum cans.

Several jurisdictions around the United States have removed #3-7 plastics, non-bottle plastics, all plastics, mixed paper, and/or glass, but we were not able to obtain data from these jurisdictions (Rosengren, et al., n.d.).

Recycling Impacts

- Neither Massachusetts nor Connecticut have gathered data to measure the effect of their standardized lists on contamination. Massachusetts has collected data on cart-tagging efforts that use the standardized list but does not have data isolating the effect of the standardized list.

Costs

- Data were not available.

Benefits

- Standardized lists allow jurisdictions and haulers to use the same messages across the entire region. Anecdotally, they are thought to simplify recycling for people who live and work in different cities.
- Rogue Disposal & Recycling reported that simplifying the list made it easier for drivers to observe contamination on hopper cameras when collecting material.
- In news reports, jurisdictions that simplified their lists removed materials that no longer had markets and/or had negative economics, primarily plastics #3-7 and glass.

Drawbacks

- Standardized lists reduce the ability of local jurisdictions and haulers to customize their lists: some jurisdictions may want to expand their list with additional materials while others may want to simplify to the most economical materials.
- Anecdotally, some people expressed concern that simplifying a material list may make it more difficult to add materials later.
- When Rogue Disposal & Recycling simplified its list, some customers complained that they could not recycle all the materials that people in other nearby areas could, particularly non-beverage containers made from #1 and #2 plastic. Rogue addressed these complaints by providing messaging around the marine plastics debris crisis and the importance of ensuring materials are sent to verifiable markets.

Other Considerations

- Material Recovery Facilities (MRFs) are key stakeholders who should be consulted when developing a standardized list.
- Standardization can be done at a sub-state level considering waste-sheds, MRF-sheds, and/or media-sheds.

Container Size Pricing Effects (Pay-As-You-Throw)

Overview

Pay-as-you-throw (PAYT), also called variable pricing, is a fee system for waste disposal in which customers are charged more for disposing of more garbage or having a larger garbage container capacity. This system was designed to financially incentivize households to recycle more and create less non-recyclable garbage. Variable pricing is common for commercial waste customers and for large multifamily property customers that use dumpsters or compactors. Jurisdictions and haulers are increasingly using PAYT for single-family residential customers, as is the case for most of Oregon. For single-family residential customers, variable disposal involves either different containers sizes (such as 20-gallon to 95-gallon carts) or a bag- or tag-based system in which the collection provider picks up garbage only when the customer uses approved bags or tags purchased from the collection provider.

Unlike other topics discussed here, PAYT is not a contamination reduction strategy. Instead, Cascadia researched whether evidence exists that PAYT increases contamination. As a result, this summary focused on available data, recycling impacts, and other considerations.

Available Data

Cascadia scanned approximately 45 academic articles, reports, news stories, and government websites regarding PAYT programs in the United States, and identified five case studies:

- Chicopee, Massachusetts
- Sanford, Maine
- Shrewsbury, Massachusetts
- Natick, Massachusetts
- New Windsor, Maryland

To date, while data show that PAYT can increase recycling rates, there is little data on the impact of recycling contamination rates. Anecdotally, some report concerns that this method could encourage households to save money by throwing garbage into recycling bins while others report that PAYT programs do not have contamination issues. Publicly available data on fully implemented programs that isolates the impact of PAYT alone on contamination rates were not found. Jurisdictions using PAYT that had data available also used education and outreach methods or dual-stream collection in tubs.

Cascadia also identified three pilot studies evaluating every-other-week garbage collection:

- Renton, Washington
- San Francisco, California
- Seattle, Washington

Recycling Impacts

The available data on contamination in PAYT, particularly from Chicopee, Massachusetts, and Sanford, Maine, show that PAYT when used in conjunction with education campaigns and other techniques, can in fact reduce contamination.

Overall, there is little data on contamination rates when considering PAYT alone; however selected PAYT programs have been able to achieve low contamination rates when using additional strategies. Shrewsbury, Massachusetts, has a contamination rate of approximately 2% and collects recycling in dual-stream tubs. Two cities using PAYT reported significant reductions in contamination when using other education and enforcement techniques. Chicopee, Massachusetts, reduced contamination by 3.8% while increasing recycling tonnage by 12.7% by using direct feedback and refusal to collect when implementing PAYT. Sanford, Maine, reduced its contamination rate from 15-20% to 0-3% over the course of several weeks through cart-tagging and refusal to collect. No data was available indicating how often these education and enforcement techniques need to be implemented to maintain low contamination rates.

Recycling rates have been shown to increase significantly after implementing PAYT. While case studies did not provide many details on how recycling rates changed over time, several case studies showed a long-term increase in recycling and/or decrease in garbage.

Case Study Highlights

Chicopee, Massachusetts (population 55,293) began a modified PAYT program in 2017 (Massachusetts Department of Environmental Protection, 2019). Residents receive a 35-gallon cart for weekly garbage and can purchase approved yellow bags for overflow trash. Single-stream recycling is collected every other week in 95-gallon carts using Massachusetts's standardized recycling list. When the program was rolled out, the City notified and engaged residents using public meetings, mailings, and information packets included with cart delivery. The City also used compliance techniques to prevent contamination including cart stickers, door hangers, and refusal to collect contamination. Overall, the city reported a 12.7% increase in recycling tonnage, 17.4% decrease in trash tonnage, and a 3.8% reduction of recycling contamination rates. Specific contamination rates were not provided.

Sanford, Maine (population 20,798) implemented PAYT in 2010 (repealed after four months) and again in 2013 using a bag-based system (Waste Zero, The Power of PAYT—Worth Coming Back To, 2014). After implementing the program, garbage tonnage decreased by 42% and the recycling rate nearly doubled. Customers must use approved orange bags for their trash. Recycling is collected weekly in single-stream containers. In 2018, after receiving large fees for contaminated recycling, the City implemented new enforcement techniques, including inspection, cart tagging, and refusal to collect contaminated recycling containers (Bryant, 2019). Within several weeks, this brought the contamination rates down from 15-20% to 0-3% (Bryant, 2019).

Shrewsbury, Massachusetts (population 37,387) implemented PAYT in 2008 using a bag-based system. Recycling is collected in dual-stream tubs using Massachusetts's standardized recycling list (Snowdon, 2019). The City reports that the recycling rate increased from 11.5% to 29.67% after implementing PAYT and reports a contamination rate of 1.55% for containers and 2.0% for fiber (Snowdon, 2019). However,

the City did not indicate whether the contamination rate changed with the implementation of PAYT or other programs. Shrewsbury also conducted a cart-tagging campaign using the Massachusetts's Recycle IQ Kit, tagging 1.9% of carts at the beginning of the campaign and 1.4% at the end of the campaign.

Natick, Massachusetts (population 34,000) implemented PAYT in 2004 using a bag-based system. Single-stream recycling is collected in carts using Massachusetts's standardized recycling list. Natick reports that between 2003 and 2016, the town's diversion rate increased from 23% to 37%. The city reports a contamination rate of 14% but did not provide details regarding whether it changed after PAYT.

New Windsor, Maryland (population 27,770) implemented PAYT in 2018, and after 8 months reported that garbage tonnage decreased by 43% and the recycling rate nearly doubled, from 19% to 36%. The contamination rate is reported to be as lower than neighboring towns, but no details were given.

Pilot studies of every-other-week collection found the following:

- **Renton, Washington** found comparative contamination rates between routes in a 2008 pilot (King County Solid Waste Division, 2008).
- **San Francisco, California** found no statistically significant change in contamination between the control group, a group receiving 10-gallon garbage bins for weekly collection, and a group receiving every-other-week garbage collection with weekly recycling and composting collection in a 2015 pilot (Recology San Francisco, 2015).
- **Seattle, Washington** found increased contamination in organics and only minor contamination in recycling based on lid lift inspections in 2012 (Seattle Public Utilities, 2013).

Other Considerations

- Surveys conducted in 2009 and 2010 by Skumatz Economic Research Associates (SERA) found that communities with PAYT did not rate illegal dumping as a large or huge problem than communities without PAYT (Skumatz, 2012). In a survey of 1,000 communities, SERA found that 20% reported illegal dumping was an issue after adopting PAYT, but that the issue was resolved after three about months. However, these surveys may not have addressed illegal usage of private containers belonging to other residents or businesses by individuals unwilling to pay for sufficient garbage service in a PAYT system.
- Based on the limited data available, it appears PAYT may perform best when implemented with education and enforcement campaigns such as mailings, brochures, inspection, tagging, and refusal to collect contaminated containers.

Recommendations

Cascadia recommends that at least some of the alternative scenarios include the following education, outreach, and compliance strategies:

- **Direct feedback using cart-tagging** campaigns and/or ongoing inspections by drivers.
- **Refusal to collect** contaminated containers.
- **Standardize list within groupings** (primarily to facilitate modeling of alternative scenarios)

References

Bryant, C. (2019). China gets tough on US recyclables. How one Maine town is fighting back. *The Christian Science Monitor*. Retrieved from https://www.csmonitor.com/Environment/2019/0103/China-gets-tough-on-US-recyclables.-How-one-Maine-town-is-fighting-back

Cascadia Consulting Group prepared for Waste Management / Snohomish County Solid Waste / King County Solid Waste. (2018). *Contamination Reduction Tag Study.*

Deemer, H. (2019). Cleaning up the Stream: "Going Rogue". *Association of Oregon Recyclers Conference.* Bend.

Gohl, M., Lindell, H., Llapa, J., Horner, L., & Kish, K. (2018). *2018 Recycling Contamination Evaluation: Effectiveness of cart checking and door knocking.* Minneapolis Department of Public Works Division of Solid Waste & Recycling. Retrieved from http://www.minneapolismn.gov/www/groups/public/@publicworks/documents/webcontent/wcmsp-219031.pdf

Gorgone, L. (2018). *Contamination in focus: Engaging in the daily battle*. Retrieved from Resource Recycling: https://resource-recycling.com/recycling/2018/09/02/contamination-in-focus-engaging-in-the-daily-battle/

Hobert, J. (2020). City of Albuquerque. (P. Liu, Interviewer)

Keller, M. (2020, January 15). Caroll Recycling Contamination Down 11%, Saving County More than $100k, Officials Say. *Caroll County Times*. Retrieved from Caroll County Times: https://www.baltimoresun.com/maryland/carroll/news/cc-recycling-contamination-dollars-20200115-yaqfvrdxmrcbhk77qwqjsi2pdq-story.html

King County Solid Waste Division. (2008). *Sustainable Curbside Collection Pilot.* Retrieved from https://kingcounty.gov/~/media/depts/dnrp/solid-waste/garbage-recycling/documents/Renton_Residential_Pilot_Report.ashx?la=en

Kish, K. (2018). *Minneapolis Solid Waste & Recycling: Outreach, education and minimizing contamination.* City of Minnepolis, City of Minnepolis. Retrieved from http://www.minneapolismn.gov/www/groups/public/@publicworks/documents/webcontent/wcmsp-208134.pdf

Leebrick, L. (2020). Rogue Disposal and Recycling. (J. Branom-Zwick, Interviewer)

Ludington, S. (2019). *Clackamas County Recycle Right Pilot Project.* Clackamas County. Retrieved from https://www.oregon.gov/deq/recycling/Documents/ClackCorec.pdf

Massachusetts Department of Environmental Protection. (2019). *City of Chicopee Pay-As-You-Throw (PAYT) Program.* Retrieved from https://www.mass.gov/doc/case-study-city-of-chicopee/download

Morrigan, M. (2020). Cascadia Consulting Group. (J. Branom-Zwick, Interviewer)

Nash, B. (2018). *Reducing Contamination in Recycling Programs.* Massachusetts Department of Environmental Protection. Retrieved from https://nerc.org/documents/recycling/How%20to%20Beat%20Residential%20Recycling%20Contamination%20PowerPoint%20Presentation.pdf

Nelson, C. (2020). Connecticut Department of Energy and Environmental Protection. (P. Liu, Interviewer)

Pare, J. (2020). Massachusetts Department of Environmental Protection. (P. Liu, Interviewer)

Recology San Francisco. (2015). *Zero Waste Collection Tests Summary Results.* Retrieved from https://sfpublicworks.org/sites/default/files/Ex.%2018%20-%20Zero%20Waste%20Collection%20Tests%20Summary%20Results%20%28Final%29.pdf

Rosengren, C., Witynski, M., Li, R., Crunden, E., Boteler, C., & Pyzyk, K. (n.d.). *How recycling has changed in all 50 states*. Retrieved from Waste Dive: https://www.wastedive.com/news/what-chinese-import-policies-mean-for-all-50-states/510751/

Seattle Public Utilities. (2013). *One Less Truck Project Report.* Retrieved from https://www.seattle.gov/Documents/Departments/SPU//OneLessTruckFinalReport.pdf

Skumatz, L. (2012). *FACT SHEET: Pay-As-You-Throw and Illegal Dumping.* Econservation Institute. Retrieved from http://www.paytnow.org/PAYT_FactSheet_IllegalDumping.pdf

Snowdon, D. (2019). *Town Of Shrewsbury: PAY-T Fee Analysis & Recommendation.* Town of Shrewsbury. Retrieved from https://shrewsburyma.gov/DocumentCenter/View/6442/2019-PAY-T-Fee-Analysis_DRAFT?bidId=

Staub, C. (2019). *Community Spotlight: Customer interaction bolsters program performance*. Retrieved from Resource Recycling: https://resource-recycling.com/recycling/2019/05/06/community-spotlight-customer-interaction-bolsters-program-performance/

The Recycling Partnership. (2018). *How to Beat Residential Recycling Contamination.* The Recycling Partnership. Retrieved from https://nerc.org/documents/recycling/How%20to%20Beat%20Residential%20Recycling%20Contamination%20PowerPoint%20Presentation.pdf

Tomolla Consulting, for Clackamas County. (2018). *Single-Family Residential Recycling Cart Tagging Project: Clackamas County.* Retrieved from https://www.oregon.gov/deq/recycling/Documents/ClackCorec.pdf

Waste Zero. (2014). *The Power of PAYT—Worth Coming Back To*. Retrieved from http://wastezero.com/success-stories/sanford-me/

Waste Zero. (2019). *Sanford, ME: PAYT Helps One City in the FIght Against Recycling Contamination*. Retrieved from Waste Zero: http://wastezero.com/success-stories/payt-helps-one-city-in-the-fight-against-recycling-contamination/

Appendix — Case Studies

Detailed cased studies are forthcoming