

Improving Oregon Recycling Systems Infrastructure Research

Customer Engagement Research Summary (Phase 2 Task 3)

June 15, 2020

Overview

Research Focus

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. 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 available research will inform customer engagement strategies included in scenario analysis.

Research 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 container 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 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 with a population of 4,000 or more have chosen to implement the “expanded education and promotion” element 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, many jurisdictions lack sufficient funding for data collection and analysis that would help to provide more robust assessments of the selected strategies. 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 readily 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 and on 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 (described 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

The studies that Cascadia 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 strategies of 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 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 administrators 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 determined 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 either 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 initiatives (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% per the results of 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 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 that were examined also received eight 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 the prevalence 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 the refusal to collect option, 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

The identified studies 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 the refusal to collect a contaminated cart component 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 caused 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 reported 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 six weeks, contamination rates decreased 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, 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 the refusal to collect compliance option 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 prevalence 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 of the states that Cascadia contacted that utilize standardized statewide recycling lists do not have data on contamination results. One jurisdiction 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 simplified list alone.

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, and food cartons, among other materials. This list was developed by five MRFs serving several Connecticut cities. There is also 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 affected 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 container 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 sources 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 can in fact reduce contamination when used in conjunction with education campaigns and other techniques.

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 eight 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 lower than neighboring towns, but no details were given.

Pilot studies of every-other-week garbage 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 more significant 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 about three 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)

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Appendix — Case Studies

Clackamas County, Oregon

Alternative Studied

Cart tagging

Bibliographical Information

Resource Type	Presentation slides Interview Project report
Organization	Clackamas County
Contact information	(503) 742-4463 sludington@clackamas.us
Full Citation	<p>Ludington, S. (2019). <i>Clackamas County Recycle Right Pilot Project</i>. Retrieved from https://www.oregon.gov/deq/recycling/Documents/ClackCorec.pdf</p> <p>Ludington, S. (2020) Interview with Patty Liu.</p> <p>Tomolla Consulting. (2018). <i>Single-Family Residential Recycling Cart Tagging Project: Clackamas County</i>. Retrieved from https://www.dropbox.com/s/nqts6kyjlaot8qc/FINAL%20Clackamas%20Single%20Family%20Residential%20Recycling%20Cart%20Tagging%20Project%207.24.18.pdf</p>

Abstract/Summary

The Recycle Right campaign was used to study the effect of cart tags on the recycling contamination rate in Clackamas County. Compared to the baseline, 64% of routes showed statistically significant improvement.

Education, Incentive, or Compliance Elements

Category	Subcategory
<input type="checkbox"/> Simplified materials list	<input type="checkbox"/> Simplified list of accepted materials
<input checked="" type="checkbox"/> Direct feedback	<input checked="" type="checkbox"/> Cart tagging <input type="checkbox"/> Compliance calls or letters <input type="checkbox"/> Compliance visits <input type="checkbox"/> Other direct feedback
<input type="checkbox"/> Compliance actions or disincentives for contaminating	<input type="checkbox"/> Contamination fines, fees, or surcharges <input type="checkbox"/> Refusal to collect contaminated recycling <input type="checkbox"/> Removal of recycling containers/service <input type="checkbox"/> Other disincentives
<input type="checkbox"/> Audience-tailored outreach campaigns/tools	<input type="checkbox"/> Commercial technical assistance <input type="checkbox"/> Customized materials/signage <input type="checkbox"/> Multi-lingual, image-based, or transcreated campaigns <input type="checkbox"/> Property manager engagement <input type="checkbox"/> School-based education <input type="checkbox"/> Other tailored campaigns/tools
<input type="checkbox"/> Broad media and outreach campaigns/tools	<input type="checkbox"/> Canvassing/door-to-door campaigns <input type="checkbox"/> Direct mail <input type="checkbox"/> Municipal/hauler website <input type="checkbox"/> Mobile apps <input type="checkbox"/> Online games <input type="checkbox"/> Social media campaigns <input type="checkbox"/> Other broad campaigns/tools
<input type="checkbox"/> Incentives for minimizing contamination	<input type="checkbox"/> Financial incentives <input type="checkbox"/> Other incentives
<input type="checkbox"/> Container size and pricing effects (do they increase contamination?)	<input type="checkbox"/> Container size <input type="checkbox"/> PAYT (pay as you throw), unit pricing, or variable pricing <input type="checkbox"/> Other

Details of Education, Incentive, or Compliance Elements

Key Points	Notes	Pages
Used “Oops” and “Nice Job” tags	Drivers leave either an “Oops” tag or a “Nice Job” tag; they issued “Oops” tags to 55% of households and “Nice Job” tags to 47% of households.	Tomolla Consulting. (2018): 5

Audience(s)

Geographic Scope (e.g., neighborhood, city, state)	Clackamas County
City/County/State	Clackamas County, Oregon
Community Type(s) — check all that apply	<input type="checkbox"/> Urban <input checked="" type="checkbox"/> Suburban <input type="checkbox"/> Rural <input checked="" type="checkbox"/> Other/Not Specified (ONS) <i>Comments if ONS:</i>
Generator Type(s) — check all that apply	<input checked="" type="checkbox"/> Single-family residential <input type="checkbox"/> Multifamily residential <input type="checkbox"/> Commercial <input type="checkbox"/> Drop-off
Population or Audience Size	Not specified
Other Audience(s) Addressed (if any)	

Relevance to Project Goals

<input checked="" type="checkbox"/> Highly relevant and useful <input type="checkbox"/> Somewhat relevant and useful <input type="checkbox"/> Not very relevant or useful	
Justification/Comments:	This was a high-priority strategy that was conducted in Oregon and includes numerous key lessons.

Confidence in Results / Justification

<input checked="" type="checkbox"/> Highly confident <input type="checkbox"/> Somewhat confident <input type="checkbox"/> Not very confident	
Justification/Comments:	The study organizers conducted 22,286 household visits and inspected 11,809 cart set-outs. The tagging was tested in isolation without other interventions. The study gathered data regarding visually observed contamination types.

Program Context

Collection Method(s) (e.g., single- vs. dual- vs. multi-stream)	Single stream with glass on the side
Special Equipment Used (e.g., split carts, hopper cameras, on-route apps)	None specified
Accepted Materials (group by bin, if not single stream)	<p>Recyclables with glass in a separate container (https://www.clackamas.us/recycling/recycleguide.html)</p> <ul style="list-style-type: none"> Paper — newspaper, flattened cardboard, magazines and phone books, mail and catalogs, scrap paper, paper bags, rinsed cartons, shredded paper in paper bag Plastics by shape and size instead of by numbers — bottles, jugs, and tubs (clean, 6 ounces or larger); buckets (clean, 5 gallons or smaller); rigid plant pots (clean, 4 inches across or larger) Metal not flattened — aluminum, tin, and steel food cans; metal paint cans (empty and dry); aerosol cans (empty); aluminum food and pie plates; scrap metals (smaller than 30" and less than 30 lbs.)
Other Companion Education and Outreach Programs	None specified
Companion Incentives	None specified, but PAYT is common
Companion Regulations	None specified

Program Effectiveness

Contamination Rates

Key Points	Notes	Pages
Measured % of carts contaminated	The study found 63% of carts were contaminated during the initial baseline evaluation compared to 46% of contaminated carts at the end of study.	Ludington, S. (2019): 28

Participation Rates

Key Points	Notes	Pages
	Not specified	

Capture Rates

Key Points	Notes	Pages
	Not applicable – study focused on contamination rate	

Retention of Behavior Change Over Time

Key Points	Notes	Pages
	Not applicable	

Other Metrics

Key Points	Notes	Pages
	Not specified	

Other Qualitative or Anecdotal Information

Key Points	Notes	Pages
	Not specified	

Consumer Acceptance

Key Points	Notes	Pages
Anecdotal data that residents appreciated learning about recycling	Field notes from crew members indicated that most people who commented were appreciative of the learning opportunity, with a smaller number of people reporting more defensive attitudes towards it.	Ludington, S. (2019): 14

Other Notable Insights

Key Points	Notes
Clackamas still working on next steps	Clackamas has not implemented cart tagging on regular basis, but conversations are ongoing. The county is working to see if methods can be applied to multifamily and commercial sites (interview, Stacy Ludington).

Resource Requirements

Staffing Requirements

Key Points	Notes	Pages
	Not specified	

Expenses

Key Points	Notes	Pages
Communication Tools	\$13,000	Ludington, S. (2019): 22
Consultant/Labor	\$40,000	Ludington, S. (2019): 22

Other Resource Requirements or Anecdotal Information

Key Points	Notes	Pages
	Not specified	

Other Referenced Documents or Programs for Possible Review

None identified

Snohomish County, Washington

Alternative Studied

Cart tagging

Bibliographical Information

Resource Type	Presentation slides
Organization	Waste Management
Contact information	Not relevant
File Name on SharePoint	WSRACartTagContaminationSession_2019
Full Citation	Kohlstedt, J. (2019). <i>Cart Tagging from East to West: A Tale of Two Tags</i> . Retrieved from https://www.wsra.net/assets/WSRA_Slides_%233b.pdf

Resource Type	Report
Organization	Cascadia Consulting Group for Waste Management, Snohomish County, and King County
Contact information	Not relevant
File Name on SharePoint	WM Contamination Study_Final Report_11302018
Full Citation	Cascadia Consulting Group prepared for Waste Management / Snohomish County Solid Waste / King County Solid Waste. (2018). <i>Contamination Reduction Tag Study</i> .

Abstract/Summary

The goal of the study was to reduce plastic film contamination specifically, and recycling contamination in general.

The study measured the efficacy of reducing plastic film contamination by assigning different routes with Tag A (specific contamination information, including plastic film, textiles, foam, soiled paper, etc.) or Tag B (only bagged recyclables and plastic film contamination notice).

Result: Both tags reduced the level of bagged recycling and plastic film contamination, but Tag B was more effective.

Education, Incentive, or Compliance Elements

Category	Subcategory
<input type="checkbox"/> Simplified materials list	<input type="checkbox"/> Simplified list of accepted materials
<input checked="" type="checkbox"/> Direct feedback	<input checked="" type="checkbox"/> Cart tagging <input type="checkbox"/> Compliance calls or letters <input type="checkbox"/> Compliance visits <input type="checkbox"/> Other direct feedback
<input checked="" type="checkbox"/> Compliance actions or disincentives for contaminating	<input type="checkbox"/> Contamination fines, fees, or surcharges <input checked="" type="checkbox"/> Refusal to collect contaminated recycling <input type="checkbox"/> Removal of recycling containers/service <input type="checkbox"/> Other disincentives
<input type="checkbox"/> Audience-tailored outreach campaigns/tools	<input type="checkbox"/> Commercial technical assistance <input type="checkbox"/> Customized materials/signage <input type="checkbox"/> Multi-lingual, image-based, or transcreated campaigns <input type="checkbox"/> Property manager engagement <input type="checkbox"/> School-based education <input type="checkbox"/> Other tailored campaigns/tools
<input type="checkbox"/> Broad media and outreach campaigns/tools	<input type="checkbox"/> Canvassing/door-to-door campaigns <input type="checkbox"/> Direct mail <input type="checkbox"/> Municipal/hauler website <input type="checkbox"/> Mobile apps <input type="checkbox"/> Online games <input type="checkbox"/> Social media campaigns <input type="checkbox"/> Other broad campaigns/tools
<input type="checkbox"/> Incentives for minimizing contamination	<input type="checkbox"/> Financial incentives <input type="checkbox"/> Other incentives
<input type="checkbox"/> Container size and pricing effects (do they increase contamination?)	<input type="checkbox"/> Container size <input type="checkbox"/> PAYT (pay as you throw), unit pricing, or variable pricing <input type="checkbox"/> Other

Details of Education, Incentive, or Compliance Elements

Key Points	Notes	Pages
Generic cart tag versus feedback cart tag with refusal to collect	<p>"In Snohomish County 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. Each group in the study included over 1,300 households, which received two rounds of tagging. Group A received a customized "Oops!" tag indicating the type of contamination present or a "Thank You for Recycling Right!" tag based on a visual inspection of their carts. Carts that did not have any visible contaminants received "Thank You for Recycling Right!" tags. 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 80 samples from each group before and 80 samples after. 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."</p>	Cascadia Consulting Group (2018): 6-7

Audience(s)

Geographic Scope (<i>e.g., neighborhood, city, state</i>)	Neighborhoods (four collection routes)
City/County/State	Snohomish County, Washington
Community Type(s) — check all that apply	<input type="checkbox"/> Urban <input checked="" type="checkbox"/> Suburban <input type="checkbox"/> Rural <input type="checkbox"/> Other/Not Specified (ONS) <i>Comments if ONS:</i>
Generator Type(s) — check all that apply	<input checked="" type="checkbox"/> Single-family residential <input type="checkbox"/> Multifamily residential <input type="checkbox"/> Commercial <input type="checkbox"/> Drop-off
Population or Audience Size	Two samples of 80 households per test group (160 households total); total population receiving intervention was approximately 1,300 households in each test group.
Other Audience(s) Addressed (<i>if any</i>)	

Relevance to Project Goals

- ☒ Highly relevant and useful
- ☐ Somewhat relevant and useful
- ☐ Not very relevant or useful

Justification/Comments: The study examined cart tagging only and tested the efficacy of the messaging on the cart tags.

Confidence in Results / Justification

- ☒ Highly confident
- ☐ Somewhat confident
- ☐ Not very confident

Justification/Comments: Households were given two opportunities for tagging, and the sample size for sorting was 80 households for each group before and after tagging interventions (160 households total). Results were measured in the short-term – about two months. One group received generic tags and the other group received direct-feedback tags and no control group was used.

Program Context

Collection Method(s) (e.g., single- vs. dual- vs. multi- stream)	Single stream																			
Special equipment Used (e.g., split carts, hopper cameras, on-route apps)	Cart-based waste not applicable																			
Accepted Materials (group by bin, if not single stream)	<table> <tr> <th>Recyclable Category</th><th>Material Type</th></tr> <tr> <td rowspan="3">Recyclable Paper</td><td>1. Cardboard</td></tr> <tr> <td>2. Mixed Paper</td></tr> <tr> <td>3. Aseptic & Gabletop</td></tr> <tr> <td rowspan="3">Recyclable Metal</td><td>4. Aluminum Cans</td></tr> <tr> <td>5. Tin/Steel Food Cans</td></tr> <tr> <td>6. Aerosol Cans</td></tr> <tr> <td>Recyclable Glass</td><td>7. Glass Containers</td></tr> <tr> <td rowspan="6">Recyclable Plastic</td><td>8. PET (#1) Bottles & Jars</td></tr> <tr> <td>9. PET (#1) Other Containers & Small Rigid</td></tr> <tr> <td>10. Clear/Natural HDPE (#2) Bottles, Jugs & Jars</td></tr> <tr> <td>11. Colored HDPE (#2) Bottles, Jugs & Jars</td></tr> <tr> <td>12. Other Rigid Packaging</td></tr> <tr> <td>13. Bulky Rigid Plastics</td></tr> </table>	Recyclable Category	Material Type	Recyclable Paper	1. Cardboard	2. Mixed Paper	3. Aseptic & Gabletop	Recyclable Metal	4. Aluminum Cans	5. Tin/Steel Food Cans	6. Aerosol Cans	Recyclable Glass	7. Glass Containers	Recyclable Plastic	8. PET (#1) Bottles & Jars	9. PET (#1) Other Containers & Small Rigid	10. Clear/Natural HDPE (#2) Bottles, Jugs & Jars	11. Colored HDPE (#2) Bottles, Jugs & Jars	12. Other Rigid Packaging	13. Bulky Rigid Plastics
Recyclable Category	Material Type																			
Recyclable Paper	1. Cardboard																			
	2. Mixed Paper																			
	3. Aseptic & Gabletop																			
Recyclable Metal	4. Aluminum Cans																			
	5. Tin/Steel Food Cans																			
	6. Aerosol Cans																			
Recyclable Glass	7. Glass Containers																			
Recyclable Plastic	8. PET (#1) Bottles & Jars																			
	9. PET (#1) Other Containers & Small Rigid																			
	10. Clear/Natural HDPE (#2) Bottles, Jugs & Jars																			
	11. Colored HDPE (#2) Bottles, Jugs & Jars																			
	12. Other Rigid Packaging																			
	13. Bulky Rigid Plastics																			
Other Companion Education and Outreach Programs	Not specified																			
Companion Incentives	Not specified																			
Companion Regulations	Not specified																			

Program Effectiveness

Contamination Rates

Overall contamination was calculated by summing the weight of contaminants across all samples and dividing by the sum of the weight of total recycling across all samples. Using this method, a household

that contributes heavier material has a greater influence over the contamination rate than a household that contributes lighter material.

Household-level contamination was determined by first calculating contamination rates individually for each household and then averaging those rates. Using this method, all households have the same level of influence over the resulting rate.

Key Points	Notes	Pages
Overall contamination (see definition above) calculated across all contaminants did not change significantly in either test group	Changes to overall contamination rates (across all contaminant materials) in the baseline and post-treatment audits for each group were not statistically significant.	Cascadia Consulting Group (2018) Executive summary
Household-level contamination across all contaminants did not change significantly in either 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. The average household contamination rate increased (from 11.9% to 14.2%) in Group B. As in the overall composition analysis, these household-level differences were not found to be statistically significant.”	Cascadia Consulting Group (2018) Executive summary
Bagged materials and contamination from plastic bags and film decreased in both groups (A and B) and was statistically significant	“In both test groups, the number of household samples that included clean plastic bags and 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. The decrease in occurrence of clean plastic bags and film was similar in both groups. The reduction in the average amount of clean plastic bags and film present in each sample was found to be statistically significant in both groups. The lightweight nature of this material means that a statistically significant reduction in this category may not correlate with a reduction in overall contamination from a weight-based standpoint.”	Cascadia Consulting Group (2018) Executive summary
Levels of high contamination decreased in both groups	“Looking at household-specific behavior, we observed that more households had low contamination (<5% by weight) in their carts and fewer households had high contamination rates (20% or more) after the tagging campaign. Distribution analysis of samples showed that the number of household samples with less than 5% contamination increased between baseline and post-treatment audits in both test groups, while	Cascadia Consulting Group (2018) Executive summary

Key Points	Notes	Pages
	the number of household samples with more than 20% contamination fell.”	
The generic tag had a bigger impact on the target material while the specific tag may have had a greater impact on overall contamination	“The results of the analysis do not conclusively demonstrate that either tagging approach had significant effect on overall recycling contamination rates from a weight-based standpoint. However, the focus of the campaigns in both test groups was on reducing bagged recyclables, plastic bags, and film, which do not represent a large component of contamination by weight but are nonetheless a major issue for recycling processing and therefore considered a major contaminant. On this front, both tested approaches were correlated with significant reductions in the occurrence of clean plastic bags & film. Study data suggest that the generic tag may have had a greater impact on the reduction in bagged materials and the presence of plastic bags & film, while the specific feedback tag may have had a greater impact on improving overall household contamination behavior, such as household-specific contamination rates and occurrence of contaminant material.”	Cascadia Consulting Group (2018) Executive summary
Most residents who received “Oops” tags corrected behavior	“Most residents that received an “Oops” tag 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. In Group A, of the 278 households that received an “Oops” tag during the first round and then were tagged again during the second round, only 100 households (36%) received a second “Oops” tag (the others received a “Thank You” tag). In both rounds, the most common issue noted on “Oops” tags was the presence of plastic bags, and the second most common issue was bagged materials. In the first round, 69 percent of “Oops” tags distributed included feedback about plastic bags and 45 percent included feedback about bagged materials. In the second round, 54 percent of “Oops” tags distributed included feedback about plastic bags and 21 percent included feedback about bagged materials.”	Cascadia Consulting Group (2018) Executive summary

Summary of effects from prior cart-tagging pilots	<p>The study included a literature review of impacts from other programs.</p> <ul style="list-style-type: none"> • “WM King County 2012-13 Curbside Recycling Behavior Study. In 2012-2013, WM piloted a specific feedback cart-tagging initiative with 146 residential customers in WUTC-regulated areas of King County and conducted visual audits of tagged carts to assess whether household behavior related to contamination improved in response to the tags. The study found that the incidence of specific materials identified on the feedback tag declined at more than half of the households that received “Oops” tags (58 of 105 households). The most frequent issue cited on the feedback tags was “loose plastic bags” and the second most frequent issue was “bagged recyclables.” • “WM Recycle Often. Recycle Right.® campaign, Elgin, Illinois. In 2015, WM launched a pilot in Elgin, Illinois to reduce the city’s residential recycling contamination rate, which was at 40% at the start of the campaign. The campaign deployed messaging and material developed as part of WM’s national Recycle Often. Recycle Right.® program across multiple communication channels, including a targeted cart-tagging program, as well as the city’s recycling webpage, a video from the mayor, a 311 message and several community events. WM reports that pilot efforts in Elgin are working, with contamination rates decreasing by 10 to 20 percent.” • “The Recycling Partnership and MassDEP Recycling IQ pilot. In 2016, MassDEP and The Recycling Partnership collaborated on a pilot to test a contamination reduction campaign including a specific-feedback approach to cart tagging in communities across the Commonwealth of Massachusetts. Results from the pilot, reported in the toolkit developed for the pilot and now available for customization by communities nationwide, showed that overall contamination trended downward, the most problematic contaminant, which was specifically targeted in each community (most commonly plastic bags), trended downward, and the number of contaminated carts notably decreased over the life of the program.” 	Cascadia Consulting Group. (2018): 4-5
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Key Points	Notes	Pages
	<ul style="list-style-type: none"> • “The Recycling Partnership More. Better. Campaigns in Atlanta and Chicago. In 2017, The Recycling Partnership applied the contamination reduction approach it developed in Massachusetts to select routes in Atlanta and Chicago, and studied the effects using cart audits. In Atlanta, where lid-flip audits and specific-feedback tags were combined with cart rejections and implemented over seven collection cycles, the overall contamination rate dropped by nearly half (from 19.4% to 10.1%) and the percentage of households with bagged recyclables dropped from 52 percent to 22 percent. In Chicago, the same cart tagging approach was used but carts were not rejected. Cart audits there indicated that the overall contamination rate dropped by more than one-third (from 24.2% to 15.7%).” 	

Participation Rates

Key Points	Notes	Pages
	Not specified	

Capture Rates

Key Points	Notes	Pages
	Not specified	

Retention of Behavior Change Over Time

Key Points	Notes	Pages
	Not specified	

Other Metrics

Key Points	Notes	Pages
Report is worth reviewing for many	The report contains substantial additional data in tables regarding tagging counts (by type of feedback), recycling	Cascadia Consulting Group

Key Points	Notes	Pages
additional data tables	stream composition, incidence of bagged recyclables and plastic bags, and route demographics.	(2018) Pages 9-15

Other Qualitative or Anecdotal Information

Key Points	Notes	Pages
	Not specified	

Consumer Acceptance

Key Points	Notes	Pages
	Not specified	

Other Notable Insights

Key Points	Notes
Both approaches worked but have different recommended uses	<ul style="list-style-type: none"> “Both approaches tested demonstrated similar effects on the decrease in plastic bags placed in the recycling by households sampled for this study. Based on study findings, WM may want to evaluate the relative costs of each approach to inform the decision on which approach to choose for reducing the presence of plastic bags in recycling carts from households in Snohomish County.” “Although it did not lead to a statistically significant change in the overall contamination rate, the results indicated that the specific feedback approach tested in Group A may be effective for reducing contamination from highly contaminated carts (with >20% contamination). WM may consider implementing a specific-feedback approach for correcting the behavior of these households.”

Resource Requirements

Staffing Requirements

Key Points	Notes	Pages
	Not specified	

Expenses

Key Points	Notes	Pages
	Not specified	

Other Resource Requirements or Anecdotal Information

Key Points	Notes	Pages
	Not specified	

Chicago, Denver, Atlanta, Lowell, and West Springfield (through The Recycling Partnership and Massachusetts Department of Environmental Protection)

Alternative Studied

Cart tagging with refusal to collect, direct mailers, and signage

Bibliographical Information

Resource Type	Presentation slides
Organization	Massachusetts Department of Environmental Protection
Contact information	Not relevant
File Name on SharePoint	TRP_BeatResidentialRecyclingContamination+Q&A_2018.pdf
Full Citation	The Recycling Partnership, & Nash, B. (2018). <i>How to Beat Residential Recycling Contamination</i> . Retrieved from https://nerc.org/documents/recycling/How%20to%20Beat%20Residential%20Recycling%20Contamination%20PowerPoint%20Presentation.pdf

Abstract/Summary

This information was compiled from a presentation by The Recycling Partnership and the Massachusetts Department of Environmental Protection (MassDEP) on several cart-tagging campaigns. Several programs in Massachusetts used cart tagging with refusal to collect contaminated carts and the Recycling IQ Kit. 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).

Education, Incentive, or Compliance Elements

Category	Subcategory
<input type="checkbox"/> Simplified materials list	<input type="checkbox"/> Simplified list of accepted materials
<input checked="" type="checkbox"/> Direct feedback	<input checked="" type="checkbox"/> Cart tagging <input type="checkbox"/> Compliance calls or letters <input type="checkbox"/> Compliance visits <input type="checkbox"/> Other direct feedback
<input checked="" type="checkbox"/> Compliance actions or disincentives for contaminating	<input type="checkbox"/> Contamination fines, fees, or surcharges <input checked="" type="checkbox"/> Refusal to collect contaminated recycling <input type="checkbox"/> Removal of recycling containers/service <input type="checkbox"/> Other disincentives
<input checked="" type="checkbox"/> Audience-tailored outreach campaigns/tools	<input type="checkbox"/> Commercial technical assistance <input checked="" type="checkbox"/> Customized materials/signage <input type="checkbox"/> Multi-lingual, image-based, or transcreated campaigns <input type="checkbox"/> Property manager engagement <input type="checkbox"/> School-based education <input type="checkbox"/> Other tailored campaigns/tools
<input checked="" type="checkbox"/> Broad media and outreach campaigns/tools	<input type="checkbox"/> Canvassing/door-to-door campaigns <input checked="" type="checkbox"/> Direct mail <input type="checkbox"/> Municipal/hauler website <input type="checkbox"/> Mobile apps <input type="checkbox"/> Online games <input type="checkbox"/> Social media campaigns <input type="checkbox"/> Other broad campaigns/tools
<input type="checkbox"/> Incentives for minimizing contamination	<input type="checkbox"/> Financial incentives <input type="checkbox"/> Other incentives
<input type="checkbox"/> Container size and pricing effects (do they increase contamination?)	<input type="checkbox"/> Container size <input type="checkbox"/> PAYT (pay as you throw), unit pricing, or variable pricing <input type="checkbox"/> Embedded ("free") recycling <input type="checkbox"/> Other

Details of Education, Incentive, or Compliance Elements

Key Points	Notes	Pages
Four-Pronged Approach	<ul style="list-style-type: none"> • Send out General Info Mailer • Cart Tags • Send out Top Issue Mailer (e.g., Do Not Bag Recyclables) • Send out Top Issue Signs throughout community (yard signs, bus stop signs, etc.) 	Interview
Implementation	<ul style="list-style-type: none"> • Gather info from MRFs and haulers about biggest issues • Train staff (checking carts, communicating with public) • Deploy—start tagging carts • Track results, evaluate, adjust 	Interview

Audience(s)

Geographic Scope (e.g., neighborhood, city, state)	Neighborhoods in cities
City/County/State	Atlanta, GA / Chicago, IL / Lowell and West Springfield, MA
Community Type(s) — check all that apply	<input checked="" type="checkbox"/> Urban <input checked="" type="checkbox"/> Suburban <input type="checkbox"/> Rural <input type="checkbox"/> Other/Not Specified (ONS) <i>Comments if ONS:</i>
Generator Type(s) — check all that apply	<input checked="" type="checkbox"/> Single-family residential <input type="checkbox"/> Multifamily residential <input type="checkbox"/> Commercial <input type="checkbox"/> Drop-off
Population or Audience Size	Study results were taken from 22 communities.
Other Audience(s) Addressed (if any)	

Relevance to Project Goals

<input checked="" type="checkbox"/> Highly relevant and useful <input type="checkbox"/> Somewhat relevant and useful <input type="checkbox"/> Not very relevant or useful	
Justification/Comments:	These studies present evidence of efficacy from Chicago, Atlanta, and throughout Massachusetts and include step-by-step implementation plans and pre-and post-intervention data.

Confidence in Results / Justification

☒ Highly confident

☐ Somewhat confident

☐ Not very confident

Justification/Comments: The Recycling Partnership measured results using control neighborhoods and before-and-after cart sampling, but studies are short term.

Twenty-two cities in Massachusetts using the Recycling IQ Kit conduct short-term campaigns (8-week periods) but reported only the number of cart tags distributed.

Program Context

Collection Method(s) (e.g., single- vs. dual- vs. multi- stream)	Not specified, but likely varied by city
Special Equipment Used (e.g., split carts, hopper cameras, on-route apps)	Not specified
Accepted Materials (group by bin, if not single stream)	Not specified
Other Companion Education and Outreach Programs	None mentioned outside of TRP recommendations
Companion Incentives	Not specified
Companion Regulations	Not specified

Program Effectiveness

Contamination Rates

Key Points	Notes	Pages
Contamination down	Lowell & West Springfield: 37% down to 26%	26
	Atlanta: 37% down to 16%	65
Rejection rate down	City of Lynn, Massachusetts: negative correlation between cart rejections and number of inspections	40

Participation Rates

Key Points	Notes	Pages
	Not specified	

Capture Rates

Key Points	Notes	Pages
Denver saw increase capture rate	25% increase for aluminum and steel cans	61
Atlanta	Overall rates increased from 52% to 62%	69

Retention of Behavior Change Over Time

Key Points	Notes	Pages
	Not specified	

Other Metrics

Key Points	Notes	Pages
Number of carts tagged decreased	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, J. (2020).

Other Qualitative or Anecdotal Information

Key Points	Notes	Pages
Cart refusal anecdotally more effective	Anecdotally, MassDEP mentioned that rejecting carts is more effective than providing “Oops” tags alone.	Interview

Consumer Acceptance

Key Points	Notes	Pages
	Not specified	

Other Notable Insights

Key Points	Notes
	Not specified

Resource Requirements

Staffing Requirements

Key Points	Notes	Pages
	Not specified	

Expenses

Key Points	Notes	Pages
	Not specified	

Other Resource Requirements or Anecdotal Information

Key Points	Notes	Pages
	Not specified	

Other Referenced Documents or Programs for Possible Review

Not specified

Rogue Disposal & Recycling (Jackson County, Oregon)

Alternative Studied

Simplified recycling list, cart tagging with refusal to collect, direct mailers, and multiple outreach methods

Bibliographical Information

Resource Type	Presentation slides Interview with Laura Leebrick on January 15, 2020 by JBZ
Organization	Rogue Disposal and Recycling
Contact information	RogueDisposal.com
File Name on SharePoint	Kicking Contamination to the Curb.pdf
Full Citation	Deemer, H. (2018). <i>Cleaning up the Stream: "Going Rogue."</i> Leebrick, L. (2020). <i>Phone interview by Jessica Branom-Zwick.</i>

Abstract/Summary

To address recycling contamination, Rogue updated its list of acceptable items and contacted customers about this change, including information on their cart auditing process. Customers were given three chances to address contamination in their carts. If contamination was still found on the fourth audit, Rogue removed the cart. Rogue found that contamination decreased from 48% to 29% by volume.

Education, Incentive, or Compliance Elements

Category	Subcategory
<input checked="" type="checkbox"/> Simplified materials list	<input checked="" type="checkbox"/> Simplified list of accepted materials
<input checked="" type="checkbox"/> Direct feedback	<input checked="" type="checkbox"/> Cart tagging <input checked="" type="checkbox"/> Compliance calls or letters <input type="checkbox"/> Compliance visits <input type="checkbox"/> Other direct feedback
<input checked="" type="checkbox"/> Compliance actions or disincentives for contaminating	<input type="checkbox"/> Contamination fines, fees, or surcharges <input checked="" type="checkbox"/> Refusal to collect contaminated recycling <input checked="" type="checkbox"/> Removal of recycling containers/service <input type="checkbox"/> Other disincentives
<input checked="" type="checkbox"/> Audience-tailored outreach campaigns/tools	<input checked="" type="checkbox"/> Commercial technical assistance <input checked="" type="checkbox"/> Customized materials/signage <input checked="" type="checkbox"/> Multi-lingual, image-based, or transcreated campaigns <input checked="" type="checkbox"/> Property manager engagement <input checked="" type="checkbox"/> School-based education <input checked="" type="checkbox"/> Other tailored campaigns/tools
<input checked="" type="checkbox"/> Broad media and outreach campaigns/tools	<input type="checkbox"/> Canvassing/door-to-door campaigns <input checked="" type="checkbox"/> Direct mail <input checked="" type="checkbox"/> Municipal/hauler website <input checked="" type="checkbox"/> Mobile apps <input type="checkbox"/> Online games <input checked="" type="checkbox"/> Social media campaigns <input checked="" type="checkbox"/> Other broad campaigns/tools
<input type="checkbox"/> Incentives for minimizing contamination	<input type="checkbox"/> Financial incentives <input type="checkbox"/> Other incentives
<input type="checkbox"/> Container size and pricing effects (do they increase contamination?)	<input type="checkbox"/> Container size <input type="checkbox"/> PAYT (pay as you throw), unit pricing, or variable pricing <input type="checkbox"/> Other

Details of Education, Incentive, or Compliance Elements

Key Points	Notes	Pages
Cart tags, compliance letters, refusal to collect, removal of container	<ul style="list-style-type: none"> The driver observes each load during tipping using the truck's hopper camera. First strike: the driver leaves a tag for the customer and logs the issue for the account in the onboard computer. A customer service rep has the info for when the customer calls. Second strike: the driver has a work order to look in the cart before collecting on the next visit. If there are problems, the driver takes a photo with the onboard tablet, leaves another tag, logs issues, and leaves the cart unemptied. A customer service rep then sends a letter to the customer requesting they clean it out for collection or else they would empty the trash and charge the customer. Third strike: a customer service rep sends another letter and the driver removes the carts and does not return for six months. 	Interview
Direct Mailers	<ul style="list-style-type: none"> Rogue issued a letter to customers detailing changes (update to Materials Not Accepted and Cart Tagging) and the date the changes would come into effect. The letters were printed in English and Spanish. 	"Going Rogue" page 8
Simplified Materials List	<ul style="list-style-type: none"> The materials list was limited to four materials at curbside: cardboard, newspaper with inserts, plastic milk jug type containers, and tin/aluminum cans. 	Interview
Lid stickers	<ul style="list-style-type: none"> Rogue added stickers with the new materials list to container lids. 	Interview
Moved glass to drop-off at grocery stores	<ul style="list-style-type: none"> Rogue changed the collection process for glass bottles and jars — any color, up to 1 gallon with no lids — to be dropped at Rogue Disposal & Recycling glass depots in the parking lots of several area grocery stores. The Bottle Drop sites also accept deposit beverage containers. 	Interview
Moved some plastics to drop-off at transfer station only	<ul style="list-style-type: none"> Rogue required that plastic #1 and #2 bottles (neck smaller than base) be disposed of at Rogue Disposal & Recycling Transfer Station. The bottle should be rinsed clean, with no cap. Bottle Drop sites also accept deposit beverage containers. 	Interview

Key Points	Notes	Pages
Collected materials separately at transfer station depot	<ul style="list-style-type: none"> Rogue reconfigured the public recycling depot at the transfer station to collect materials in segregated streams. 	Interview
Created commercial paper route	<ul style="list-style-type: none"> Rogue created a new route for high-grade commercial mixed paper because they had a mill that would take it. 	Interview

Audience(s)

Geographic Scope (<i>e.g., neighborhood, city, state</i>)	Entire service area
City/County/State	Medford/Jackson/OR
Community Type(s) — check all that apply	<input type="checkbox"/> Urban <input checked="" type="checkbox"/> Suburban <input checked="" type="checkbox"/> Rural <input type="checkbox"/> Other/Not Specified (ONS) <i>Comments if ONS:</i>
Generator Type(s) — check all that apply	<input checked="" type="checkbox"/> Single-family residential <input checked="" type="checkbox"/> Multifamily residential <input checked="" type="checkbox"/> Commercial <input checked="" type="checkbox"/> Drop-off
Population or Audience Size	As of July 2019 Rogue Valley Total: 169,735 Medford: 81,465 Jacksonville: 3,015 https://www.qualityinfo.org/-/2019-rogue-valley-population-estimates-show-continued-but-slowing-growth
Other Audience(s) Addressed (<i>if any</i>)	Main focus was on single-family residential. Also did education and customer feedback for multifamily and commercial.

Relevance to Project Goals

<input checked="" type="checkbox"/> Highly relevant and useful <input type="checkbox"/> Somewhat relevant and useful <input type="checkbox"/> Not very relevant or useful	
Justification/Comments:	Simplified materials list, cart tagging, and educational outreach in Oregon.

Confidence in Results / Justification

☒ Highly confident

☐ Somewhat confident

☐ Not very confident

Justification/Comments: This strategy contains data from direct contamination measurements before and after intervention. However, multiple strategies (changing list, refusal to collect, additional education) were conducted at the same time, making it difficult to isolate the effect of individual strategies.

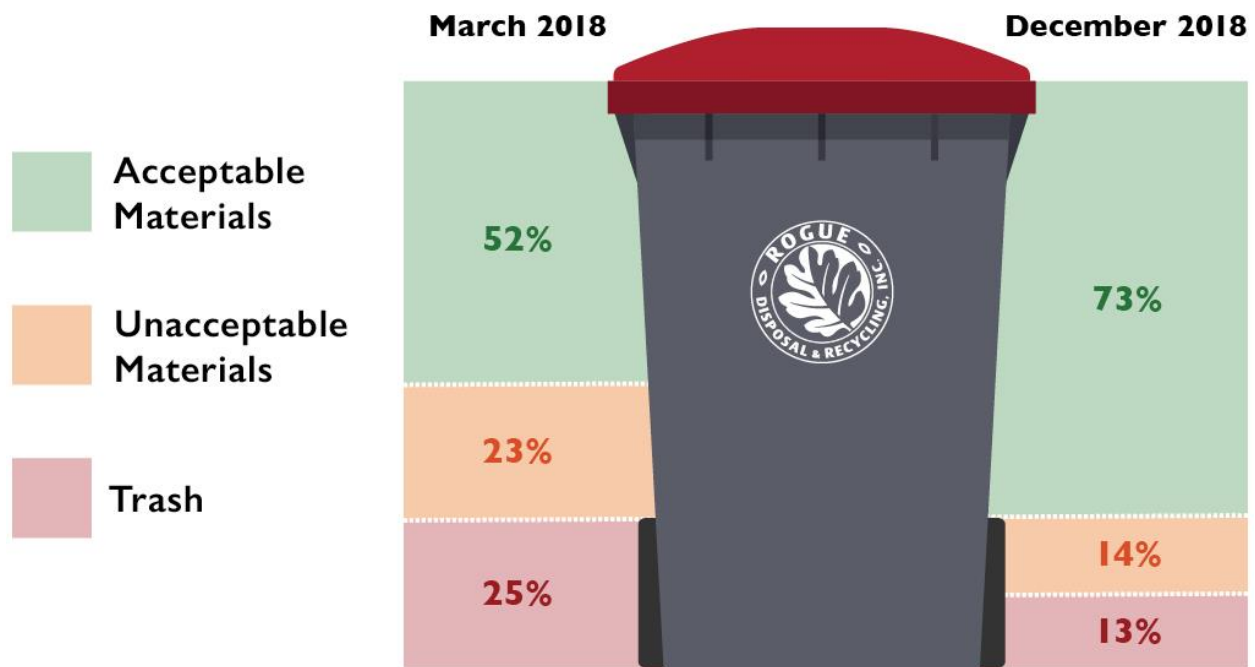
Program Context

Collection Method(s) (e.g., single- vs. dual- vs. multi- stream)	Single stream previously with glass in the commingled stream (now depot only). Prior to 2012, glass was on the side.
Special Equipment Used (e.g., split carts, hopper cameras, on-route apps)	Hopper cameras and on-board tablets allowed drivers to log issues, photograph contamination, and notify drivers of problem customers that should be inspected before collection.
Accepted Materials (group by bin, if not single stream)	Accepted curbside: cardboard, tin/aluminum, milk jugs, newspaper (Materials no longer accepted in curbside: glass, mixed paper, mixed plastics) Accepted in new grocery depots: glass containers
Other Companion Education and Outreach Programs	Direct mailers, informational handouts
Companion Incentives	Not specified
Companion Regulations	Not specified

Program Effectiveness

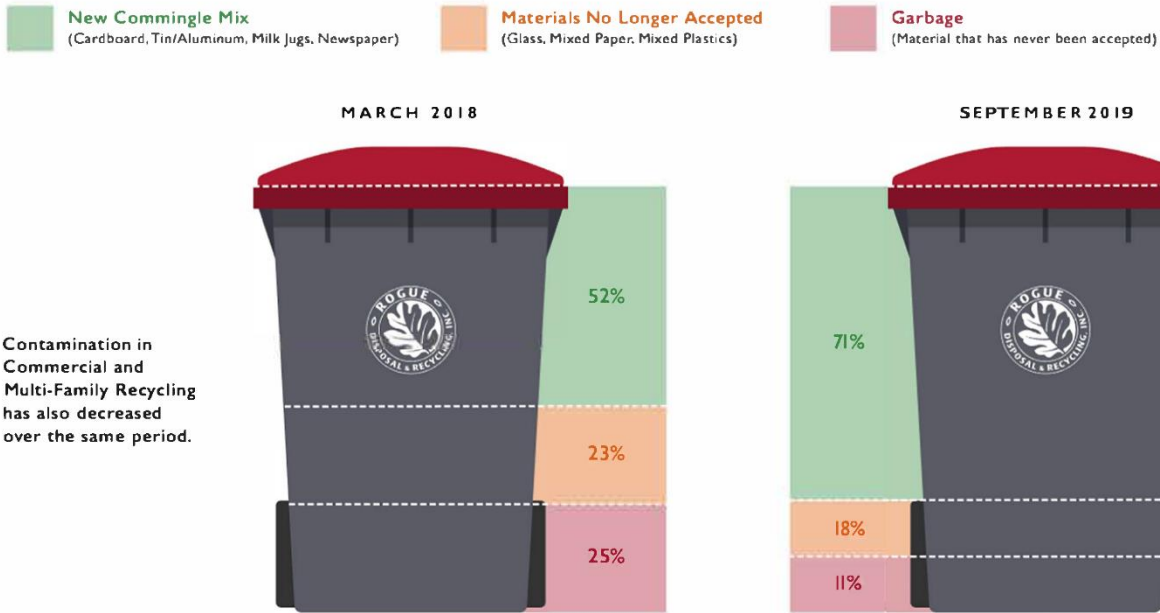
Contamination Rates

Key Points	Notes	Pages
Measured contamination down between 2018 and 2019	<ul style="list-style-type: none"> March 2018 – 48% contamination rate by volume September 2019 – 29% contamination rate by volume 	Graphic shared after interview (presented below)
Compliance letters down between 2018 and 2019	<ul style="list-style-type: none"> April & May 2018 – 6,693 compliance letters sent April & May 2019 – 1,036 compliance letters sent 	Pages 14, 20



Residential Commingle Recycling Composition Studies

March 2018–September 2019



Participation Rates

Key Points	Notes	Pages
Set-outs decreased but not participation	Anecdotally, Rogue did not see a significant decrease in participation but did see tonnage changes (because there was less garbage—including food, diapers, cat litter—and no glass or mixed paper, of which total weight was cut in half). However, service frequency (e.g. set-outs) has decreased because the cart doesn't fill up as much.	Interview

Capture Rates

Key Points	Notes	Pages
	Data not available	

Retention of Behavior Change Over Time

Key Points	Notes	Pages
Program is ongoing, reductions continue	Rogue Disposal & Recycling continues to use cart tags and general education. They regularly do joint campaigns with other haulers about top contaminants. Single-family residential contamination volumes were similar in December 2018 and September 2019.	Interview

Other Metrics

Key Points	Notes	Pages
	Not specified	

Other Qualitative or Anecdotal Information

Key Points	Notes	Pages
	Not specified	

Consumer Acceptance

Key Points	Notes	Pages
Customers complained about reduced material list	<ul style="list-style-type: none"> Customers asked why Rogue Disposal & Recycling had a more restrictive list than haulers in nearby areas. For plastics, the complaints are mainly about non-beverage PET and HDPE containers. 	Interview
Community seems to care about “real” recycling	<ul style="list-style-type: none"> Rogue Disposal & Recycling used messaging around marine debris and accepting materials with domestic, verifiable markets. 	Interview
Customers use glass depots	<ul style="list-style-type: none"> People are using the grocery store depots heavily. The tonnages for glass are unexpectedly high. 	Interview

Other Notable Insights

Key Points	Notes
Multifamily pilots with separated collection	Rogue is currently setting up mini-depots at large multifamily properties with four containers (cardboard, milk jugs, newspaper, tin/aluminum cans) and new signage. They are working with onsite property managers and providing flyers to tenants. To date, the pilots seem very successful.

Resource Requirements

Staffing Requirements

Key Points	Notes	Pages
Staff time increased initially but is not substantial	<ul style="list-style-type: none">• Staff time has increased but has not necessitated an increase in rates.• Rogue did see some spikes in labor costs with drivers leaving tags, but these have decreased over time. They estimate that each tag adds approximately 1.5 minutes per customer.• Customer support calls increased in 2018 from 2017.	Interview
Metered approach can make labor costs manageable	<ul style="list-style-type: none">• To manage labor costs:<ul style="list-style-type: none">○ Gave drivers a quota: approximately 30 tags a day.○ Rogue set priorities around specific materials and level of contamination. They focused first on items that were never accepted in commingled cart (trash, film plastics, glass).• Metering tags also reduced the customer service calls.	Interview

Expenses

Key Points	Notes	Pages
Hopper cameras and onboard computers	They have not tracked costs, but they haven't been extreme. Rogue Disposal & Recycling already had hopper cameras and onboard computers.	Interview

Other Resource Requirements or Anecdotal Information

Key Points	Notes	Pages
Reduced processing and transportation cost	Rogue experienced cost savings on processing costs and on transporting less garbage.	Interview

Other Referenced Documents or Programs for Possible Review

None specified

Greensboro, North Carolina

Alternative Studied

Cart tagging with refusal to collect, direct mail, removal, mobile app, other outreach

Bibliographical Information

Resource Type	Presentation slides, Published articles
Organization	City of Greensboro, Resource Recycling
Contact information	Not relevant
File Name on SharePoint	GreensboroNC_MobileToolsContamination_March2016-CRA conference_2016.pdf Cashwell_ReducingContaminationNorthCarolina_2016.pdf ResourceRecycling_GreensboroNC-Contamination_2019.pdf
Full Citation	<p>Arnett, A. (2016). Mobile Tools for Addressing Contamination. Retrieved from http://www.cra-recycle.org/wp-content/uploads/2016/03/CRA-B9-Alex-Arnett.pdf</p> <p>Cashwell, H. (2016). Getting the Good Stuff. Retrieved January 15, 2020, from https://resource-recycling.com/recycling/2016/09/12/getting-good-stuff/</p> <p>Cashwell, H. (2015). <i>CONFRONTING CONTAMINATION: Tactics from the Tarheel State</i>. Retrieved from https://www.epa.gov/sites/production/files/2015-12/documents/cashwell_.pdf</p> <p>City of Greensboro. (2014). City Begins “Recycle First. It Matters” Education Campaign. Retrieved from https://www.greensboro-nc.gov/Home/Components/News/News/6188/</p> <p>Staub, C. (2019). Community Spotlight: Customer interaction bolsters program performance. Retrieved January 16, 2020, from https://resource-recycling.com/recycling/2019/05/06/community-spotlight-customer-interaction-bolsters-program-performance/</p>

Abstract/Summary

This robust program has used multiple strategies of interest over time to reduce contamination and reported its efforts through presentations and articles. Efforts included cart tagging, refusal to collect, and broad education campaigns. The Recycling First education campaign reduced contamination by 2% while increasing participation from 63% to 68%.

Education, Incentive, or Compliance Elements

Category	Subcategory
<input type="checkbox"/> Simplified materials list	<input type="checkbox"/> Simplified list of accepted materials
<input checked="" type="checkbox"/> Direct feedback	<input checked="" type="checkbox"/> Cart tagging <input type="checkbox"/> Compliance calls or letters <input type="checkbox"/> Compliance visits <input type="checkbox"/> Other direct feedback
<input checked="" type="checkbox"/> Compliance actions or disincentives for contaminating	<input type="checkbox"/> Contamination fines, fees, or surcharges <input checked="" type="checkbox"/> Refusal to collect contaminated recycling <input checked="" type="checkbox"/> Removal of recycling containers/service <input type="checkbox"/> Other disincentives
<input type="checkbox"/> Audience-tailored outreach campaigns/tools	<input type="checkbox"/> Commercial technical assistance <input type="checkbox"/> Customized materials/signage <input type="checkbox"/> Multi-lingual, image-based, or transcreated campaigns <input type="checkbox"/> Property manager engagement <input type="checkbox"/> School-based education <input type="checkbox"/> Other tailored campaigns/tools
<input checked="" type="checkbox"/> Broad media and outreach campaigns/tools	<input type="checkbox"/> Canvassing/door-to-door campaigns <input checked="" type="checkbox"/> Direct mail <input checked="" type="checkbox"/> Municipal/hauler website <input checked="" type="checkbox"/> Mobile apps <input type="checkbox"/> Online games <input type="checkbox"/> Social media campaigns <input type="checkbox"/> Other broad campaigns/tools
<input type="checkbox"/> Incentives for minimizing contamination	<input type="checkbox"/> Financial incentives <input type="checkbox"/> Other incentives
<input type="checkbox"/> Container size and pricing effects (do they increase contamination?)	<input type="checkbox"/> Container size <input type="checkbox"/> PAYT (pay as you throw), unit pricing, or variable pricing <input type="checkbox"/> Embedded ("free") recycling <input type="checkbox"/> Other

Details of Education, Incentive, or Compliance Elements

Key Points	Notes	Pages
Robust program uses several strategies	Greensboro used a variety of strategies, including educational mailers, city-wide signage, branded van, cart tagging ("Oops" tags), cart refusal, cart removal, and a hauler app.	Multiple sources
Simplified an image-based recycling guide	Part of the Recycle First campaign aimed at reducing contamination and encouraging more recycling. The campaign tries to do this by simplifying its recycling guide with images to help residents better put the right materials in the right bins.	City of Greensboro (2014)

Audience(s)

Geographic Scope (e.g., neighborhood, city, state)	City
City/County/State	Greensboro, NC
Community Type(s) — check all that apply	<input checked="" type="checkbox"/> Urban <input type="checkbox"/> Suburban <input type="checkbox"/> Rural <input type="checkbox"/> Other/Not Specified (ONS) <i>Comments if ONS:</i>
Generator Type(s) — check all that apply	<input checked="" type="checkbox"/> Single-family residential <input type="checkbox"/> Multifamily residential <input type="checkbox"/> Commercial <input type="checkbox"/> Drop-off
Population or Audience Size	287,000
Other Audience(s) Addressed (if any)	

Relevance to Project Goals

<input type="checkbox"/> Highly relevant and useful <input checked="" type="checkbox"/> Somewhat relevant and useful <input type="checkbox"/> Not very relevant or useful	
Justification/Comments:	Greensboro instituted an extensive program using multiple strategies over time.

Confidence in Results / Justification

- ☐ Highly confident
☐ Somewhat confident
☒ Not very confident

Justification/Comments: Data appear limited.

Program Context

Collection Method(s) (e.g., single- vs. dual- vs. multi- stream)	Single stream
Special Equipment Used (e.g., split carts, hopper cameras, on-route apps)	Hopper cameras, drivers equipped with mobile app [Arnett, A. (2016)]
Accepted Materials (group by bin, if not single stream)	Categories broken out by paper, plastic, and metal.
Other Companion Education and Outreach Programs	Not specified
Companion Incentives	Not specified
Companion Regulations	Not specified

Program Effectiveness

Contamination Rates

Key Points	Notes	Pages
Contamination reduced by 2%	The Recycle First campaign reduced contamination by 2%.	Cashwell, H. (2016): no pages
Able to identify households with contaminated carts	Within a six-month period, Greensboro observed 1,342 skipped carts, 1,669 contaminated carts hauled, and 6,248 carts with bagged recyclables.	Arnett, A. (2016): 14
22% starting contamination rate	The contamination rate was 22% before the tagging program was implemented; the subsequent contamination rate was not measured.	Staub, C. (2019): 1
Bagged recyclables 67% of violations	In the pilot, bagged recyclables accounted for 67% of the total recorded violations.	Cashwell, H. (2016): no pages

Participation Rates

Key Points	Notes	Pages
Participation increased from 63% to 68%	During Recycle First campaign, participation increased from 63% to 68% which was a jump not seen in many years.	Cashwell, H. (2016): no pages

Capture Rates

Key Points	Notes	Pages
	Not specified.	

Retention of Behavior Change Over Time

Key Points	Notes	Pages
	Not specified.	

Other Metrics

Key Points	Notes	Pages
23% recycling rate	The study does not describe whether the 23% recycling rate was for before or after the intervention.	Arnett, A. (2016): 2
24% diversion rate	This was a 2019 statistic.	Staub, C. (2019): 1
Number of tags	Tags for 6,743 first violations from January 2018 to March 2019. 880 tags for second violations and 164 for third violations.	Staub, C. (2019)

Other Qualitative or Anecdotal Information

Key Points	Notes	Pages
Use clear and consistent messaging with high-quality graphics	"We can already see commonalities in efforts that are leading to higher material quality. Clear and consistent messaging using cross-branded, high-quality graphics reduces public confusion about recycling."	Cashwell, H. (2016): no pages

Consumer Acceptance

Key Points	Notes	Pages
	Not specified	

Other Notable Insights

Key Points	Notes
Prioritize Contaminants	<ul style="list-style-type: none">Greensboro recommended prioritizing the top three or five contaminants at the MRF and to use images for education purposes.
Cater services to the sources of contamination	<ul style="list-style-type: none">Greensboro recommended applying positive explanations to wishful recyclers and enforcement strategies to the bin abusers.Greensboro recommended doing something about plastic bags. “All programs can make noteworthy progress on quality by doing something about plastic bags.”
Open-source content	<ul style="list-style-type: none">Several groups offer free, open-source content that can be customized and used, including Recycle More NC, The Recycling Partnership and ACC’s Recycle Your Plastics campaign.

Resource Requirements

Staffing Requirements

Key Points	Notes	Pages
Training	Training was needed for route drivers and inspectors, but costs were not specified.	Arnett, A. (2016): 16

Expenses

Key Points	Notes	Pages
Tablets and software	Tablets and software were needed, but costs were not specified.	Arnett, A. (2016): 16

Other Resource Requirements or Anecdotal Information

Key Points	Notes	Pages
Mobile app	Greensboro used a mobile app (Mobile 311 Workforce by Facility Dude) that automates the sending of enforcement postcards to the address of the violator.	Staub, C. (2019)

Other Referenced Documents or Programs for Possible Review

- Not specified

Albuquerque, New Mexico

Alternative Studied

Cart tagging with compliance letters and refusal to collect

Bibliographical Information

Resource Type	Published article
Organization	City of Albuquerque
Contact information	(505) 761-8100 https://www.cabq.gov/solidwaste/recycling
File Name on SharePoint	ResourceRecycling_ContaminationAlbuquerqueNM_2018.pdf
Full Citation	<p>Gorgone, L. (2018). Contamination in focus: Engaging in the daily battle. Retrieved January 8, 2020, from https://resource-recycling.com/recycling/2018/09/02/contamination-in-focus-engaging-in-the-daily-battle/</p> <p>Hobert, J. (2019). Phone interview by Patty Liu.</p>

Abstract/Summary

From the article:

“The Solid Waste Management Department uses several approaches to minimize contamination in the curbside recycling stream, including informational door hangers, letters, and site visits as needed. Processes are reviewed continuously to help improve service delivery.

The department has also developed and implemented a system to capture data and inform citizens of problem items in the cart. The current process looks something like this: the driver of a collection vehicle calls dispatch, states the type of contamination and leaves a hang tag. Dispatch then logs the location and type in a database and mails out a “first-occurrence” letter to the resident. Each day, dispatch staff generate a contamination address list for that date.

If a second occurrence is noted at a certain household, a code inspector visits the site and attempts to engage the resident (door hangers are left). When a third occurrence is logged, the household’s cart is removed.

From July 2016 to Dec 2016, the department sent out 882 first-occurrence letters to residents, 138 second-occurrence notices with site visits, and 35 third-occurrence notices with cart removal. The city has approximately 174,000 residential households, so the above data shows only .005 percent of households were affected. A review of the data for like months in 2017 shows an improvement in compliance after the first letter between 1 and 3 percent.”

Education, Incentive, or Compliance Elements

Category	Subcategory
<input type="checkbox"/> Simplified materials list	<input type="checkbox"/> Simplified list of accepted materials
<input checked="" type="checkbox"/> Direct feedback	<input checked="" type="checkbox"/> Cart tagging <input checked="" type="checkbox"/> Compliance calls or letters <input checked="" type="checkbox"/> Compliance visits <input type="checkbox"/> Other direct feedback
<input checked="" type="checkbox"/> Compliance actions or disincentives for contaminating	<input type="checkbox"/> Contamination fines, fees, or surcharges <input checked="" type="checkbox"/> Refusal to collect contaminated recycling <input checked="" type="checkbox"/> Removal of recycling containers/service <input type="checkbox"/> Other disincentives
<input type="checkbox"/> Audience-tailored outreach campaigns/tools	<input type="checkbox"/> Commercial technical assistance <input type="checkbox"/> Customized materials/signage <input type="checkbox"/> Multi-lingual, image-based, or transcreated campaigns <input type="checkbox"/> Property manager engagement <input type="checkbox"/> School-based education <input type="checkbox"/> Other tailored campaigns/tools
<input type="checkbox"/> Broad media and outreach campaigns/tools	<input type="checkbox"/> Canvassing/door-to-door campaigns <input type="checkbox"/> Direct mail <input type="checkbox"/> Municipal/hauler website <input type="checkbox"/> Mobile apps <input type="checkbox"/> Online games <input type="checkbox"/> Social media campaigns <input type="checkbox"/> Other broad campaigns/tools
<input type="checkbox"/> Incentives for minimizing contamination	<input type="checkbox"/> Financial incentives <input type="checkbox"/> Other incentives
<input type="checkbox"/> Container size and pricing effects (do they increase contamination?)	<input type="checkbox"/> Container size <input type="checkbox"/> PAYT (pay as you throw), unit pricing, or variable pricing <input type="checkbox"/> Other

Details of Education, Incentive, or Compliance Elements

Key Points	Notes	Pages
Cart tagging and refusal to collect	<ul style="list-style-type: none"> Albuquerque conducted a cart-tagging campaign with three strikes using The Recycling Partnership tagging and education method. On the first occurrence, the driver leaves a tag on the bin and mails a postcard to the household. On the second occurrence, a code inspector visits the site to engage the resident or leaves a door hanger. On the third occurrence, the carts used to be removed. The City no longer refuses to collect contaminated carts due to a change in administration. 	Gorgone, L. (2018) and Interview
Outreach at drop-off sites	<ul style="list-style-type: none"> The City also conducted outreach at 15 drop-off sites with sandwich boards and information postcards. They anecdotally received positive feedback but did not have a consistent presence or record any data. 	Interview

Audience(s)

Geographic Scope (e.g., neighborhood, city, state)	City
City/County/State	Albuquerque, NM
Community Type(s) — check all that apply	<input checked="" type="checkbox"/> Urban <input type="checkbox"/> Suburban <input type="checkbox"/> Rural <input type="checkbox"/> Other/Not Specified (ONS) <i>Comments if ONS:</i>
Generator Type(s) — check all that apply	<input checked="" type="checkbox"/> Single-family residential <input type="checkbox"/> Multifamily residential <input type="checkbox"/> Commercial <input type="checkbox"/> Drop-off
Population or Audience Size	174,000 residential households
Other Audience(s) Addressed (if any)	

Relevance to Project Goals

- ☐ Highly relevant and useful
☒ Somewhat relevant and useful
☐ Not very relevant or useful

Justification/Comments: This case study uses high priority strategies, and it appeared they may have data if we called the City.

Confidence in Results / Justification

- ☐ Highly confident
☒ Somewhat confident
☐ Not very confident

Justification/Comments: Used measurement but recorded only compliance letters. There was no control group or detailed scientific methodology. Although efforts began in 2016, long-term data does not appear to be available.

Program Context

Collection Method(s) (e.g., single- vs. dual- vs. multi- stream)	Single stream
Special Equipment Used (e.g., split carts, hopper cameras, on-route apps)	Rolled out FleetMind dispatch software in 2016, an information and tracking system for recycling compliance
Accepted Materials (group by bin, if not single stream)	Not specified
Other Companion Education and Outreach Programs	Not specified
Companion Incentives	Not specified
Companion Regulations	Cart tagging with cart refusal

Program Effectiveness

Contamination Rates

Key Points	Notes	Pages
Compliance improved between 1-3%	"From July 2016 to Dec 2016, the department sent out 882 first occurrence letters to residents, 138 second occurrence notices with site visits, and 35 third occurrence notices with cart removal. The city has approximately 174,000 residential households, so the above data shows only .005 percent of households affected."	2

Participation Rates

Key Points	Notes	Pages
	Not specified.	

Capture Rates

Key Points	Notes	Pages
	Not specified.	

Retention of Behavior Change Over Time

Key Points	Notes	Pages
	Not specified.	

Other Metrics

Key Points	Notes	Pages
No data beyond compliance letters	No other data was collected from cart tagging.	Interview

Other Qualitative or Anecdotal Information

Key Points	Notes	Pages
Uses Recycle Coach	The City partnered with Recycle Coach in 2016, a phone app to connect residents with recycling information.	4

Consumer Acceptance

Key Points	Notes	Pages
Received pushback from new administration	Due to an administration change, the City no longer refuses to collect contaminated carts.	Interview

Other Notable Insights

Key Points	Notes	Pages
	Not specified	

Resource Requirements

Staffing Requirements

Key Points	Notes	Pages
	Not specified	

Expenses

Key Points	Notes	Pages
	Not specified	

Other Resource Requirements or Anecdotal Information

Key Points	Notes	Pages
	Not specified.	

Other Referenced Documents or Programs for Possible Review

Not specified

Minneapolis, Minnesota

Alternative Studied

Cart tagging, door-to-door, outreach and broad education

Bibliographical Information

Resource Type	Presentation slides, case study
Organization	Minneapolis Solid Waste & Recycling, City of Minneapolis
Contact information	612-673-3536 minneapolismn.gov/solid-waste kellie.kish@minneapolismn.gov
File Name on SharePoint	ResourceRecycling2018_Minneapolis_D_Kish.pdf Minneapolis_RecyclingContaminationEvaluation_2018
Full Citation	<p>Gohl, M., Lindell, H. D., Llapa, J., Horner, L., & Kish, K. (2018). <i>2018 Recycling Contamination Evaluation: Effectiveness of cart checking and door knocking</i>. Retrieved from http://www.minneapolismn.gov/www/groups/public/@publicworks/documents/webcontent/wcmssp-219031.pdf</p> <p>Kish, K. (2018). <i>Minneapolis Solid Waste & Recycling: Outreach, education and minimizing contamination</i>. Retrieved from http://www.minneapolismn.gov/www/groups/public/@publicworks/documents/webcontent/wcmssp-208134.pdf</p>

Abstract/Summary

Minneapolis has used multiple outreach methods including broad education, door-to-door outreach, and direct feedback through cart tagging. The City updated its educational cart tag and piloted a picture-based tag, though these tags were not consistently left by collection crews. To evaluate the different methods, the City conducted an evaluation comparing 1) no intervention (the control group); 2) door-to-door education only; and 3) door-to-door education and cart tagging.

Education, Incentive, or Compliance Elements

Category	Subcategory
<input type="checkbox"/> Simplified materials list	<input type="checkbox"/> Simplified list of accepted materials
<input checked="" type="checkbox"/> Direct feedback	<input checked="" type="checkbox"/> Cart tagging <input checked="" type="checkbox"/> Compliance calls or letters <input type="checkbox"/> Compliance visits <input type="checkbox"/> Other direct feedback
<input checked="" type="checkbox"/> Compliance actions or disincentives for contaminating	<input checked="" type="checkbox"/> Contamination fines, fees, or surcharges <input checked="" type="checkbox"/> Refusal to collect contaminated recycling <input checked="" type="checkbox"/> Removal of recycling containers/service <input type="checkbox"/> Other disincentives
<input type="checkbox"/> Audience-tailored outreach campaigns/tools	<input type="checkbox"/> Commercial technical assistance <input type="checkbox"/> Customized materials/signage <input type="checkbox"/> Multi-lingual, image-based, or transcreated campaigns <input type="checkbox"/> Property manager engagement <input type="checkbox"/> School-based education <input type="checkbox"/> Other tailored campaigns/tools
<input checked="" type="checkbox"/> Broad media and outreach campaigns/tools	<input checked="" type="checkbox"/> Canvassing/door-to-door campaigns <input type="checkbox"/> Direct mail <input checked="" type="checkbox"/> Municipal/hauler website <input type="checkbox"/> Mobile apps <input type="checkbox"/> Online games <input checked="" type="checkbox"/> Social media campaigns <input type="checkbox"/> Other broad campaigns/tools
<input type="checkbox"/> Incentives for minimizing contamination	<input type="checkbox"/> Financial incentives <input type="checkbox"/> Other incentives
<input type="checkbox"/> Container size and pricing effects (do they increase contamination?)	<input type="checkbox"/> Container size <input type="checkbox"/> PAYT (pay as you throw), unit pricing, or variable pricing <input type="checkbox"/> Embedded ("free") recycling <input type="checkbox"/> Other

Details of Education, Incentive, or Compliance Elements

Key Points	Notes	Pages
Control vs door-to-door vs door-to-door + cart tagging (Evaluation)	<ul style="list-style-type: none"> The City conducted cart tagging with “Oops” tags and refusal to collect contaminated recycling for the two groups apart from the control group. If a cart was contaminated, an “Oops” tag was placed on the lid. Each cart load was ranked, and the owner of contaminated carts received door-to-door education. If residents were not present, a door hanger was left. The third group would receive both the tags and the door-to-door education, if their carts were contaminated. 	Gohl, M., Lindell, H. D., Llapa, J., Horner, L., & Kish, K. (2018): 4

Audience(s)

Geographic Scope (<i>e.g., neighborhood, city, state</i>)	Evaluation: Six neighborhoods
City/County/State	Minneapolis, MN
Community Type(s) — check all that apply	<input checked="" type="checkbox"/> Urban <input type="checkbox"/> Suburban <input type="checkbox"/> Rural <input type="checkbox"/> Other/Not Specified (ONS) <i>Comments if ONS:</i>
Generator Type(s) — check all that apply	<input checked="" type="checkbox"/> Single-family residential <input type="checkbox"/> Multifamily residential <input type="checkbox"/> Commercial <input type="checkbox"/> Drop-off
Population or Audience Size	131 blocks representing approximately 2,750 households
Other Audience(s) Addressed (<i>if any</i>)	

Relevance to Project Goals

<input checked="" type="checkbox"/> Highly relevant and useful <input type="checkbox"/> Somewhat relevant and useful <input type="checkbox"/> Not very relevant or useful	
Justification/Comments:	<p>The evaluation is highly relevant and provides data on the effectiveness of cart tagging, door-to-door outreach, and a combination of both. It also provides results on contamination rates.</p> <p>Additionally, the study participant carts were checked three months later to determine retention rates.</p>

Confidence in Results / Justification

☒ Highly confident

☐ Somewhat confident

☐ Not very confident

Justification/Comments: 12-week experiment (Evaluation)

- Control: Six blocks of residences
- Door-to-door: 22 blocks of residences
- Door-to-door + cart tagging: 103 blocks of residences

However, it is difficult to interpret the analysis of the three-month follow-up data based on how results are presented.

Program Context

Collection Method(s) (e.g., single- vs. dual- vs. multi- stream)	Single stream.
Special Equipment Used (e.g., split carts, hopper cameras, on-route apps)	Not specified
Accepted Materials (group by bin, if not single stream)	Not specified
Other Companion Education and Outreach Programs	Not specified
Companion Incentives	Not specified
Companion Regulations	Not specified

Program Effectiveness

Contamination Rates

Key Points	Notes	Pages
Both door-to-door and cart tagging reduced contamination	The contamination rates for both groups with only the door-to-door education and the group with the combined door-to-door and cart tagging approach were lower than control.	24-27
The combined approach of door-to-door education and cart tagging resulted in the lowest rates of contamination	Households that received the combined approach had reduced contamination by 8.4% at the end of the campaign. 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.	28

Participation Rates

Key Points	Notes	Pages
Carts checked three months post experiment	"In total, 1,252 carts (45.6% of all carts included in the project) were checked for retention; 1,076 of these were carts in which an intervention occurred and 176 were control carts."	40
Contamination rates lower than pre-intervention, but higher than when outreach ended	"Intervention Group 1 (cart tagging and door-to-door education) resulted in a higher retention in behavior change over time."	30, 40

Capture Rates

Key Points	Notes	Pages
	Not specified	

Retention of Behavior Change Over Time

Key Points	Notes	Pages
Some but not all the effect was retained over time.	Three months post-study, contamination rates were lower than the baseline, but higher than at the end of the study.	30

Other Metrics

Key Points	Notes	Pages
	Not specified	

Other Qualitative or Anecdotal Information

Key Points	Notes	Pages
	Not specified	

Consumer Acceptance

Key Points	Notes	Pages
	Not specified	

Other Notable Insights

Challenges, successes, lessons learned, opportunities, recommendations, and other insights

Key Points	Notes
	Not specified

Resource Requirements

Staffing Requirements

Key Points	Notes	Pages
	Not specified	

Expenses

Key Points	Notes	Pages
	Not specified	

Other Resource Requirements or Anecdotal Information

Key Points	Notes	Pages
	Not specified	

Other Referenced Documents or Programs for Possible Review

- Not specified

Commonwealth of Massachusetts

Alternative Studied

Standardized list, cart tagging, direct mail, door-to-door outreach

Bibliographical Information

Resource Type	<i>Webinar slides and Interview with Janice Pare and Chris Haley</i>
Organization	The Recycling Partnership and MassDEP
Contact information	<i>None</i>
File Name on SharePoint	TRP_ContaminationStudy_EPA_Webinar_20160818
Full Citation	<p>The Recycling Partnership. (2016). <i>Turning up the Quality</i>. Retrieved from https://recyclingpartnership.org/epa-webinar-turning-up-the-quality/</p> <p>Haley, C. (2020). Phone interview by Patty Liu.</p> <p>Paré, J. (2020). Phone interview by Patty Liu.</p>

Abstract/Summary

Two case studies were conducted in Massachusetts for behavior change campaigns, including baseline data and rejection rates. Interviewees recommend coupling awareness messaging and triggers with very specific resident feedback at the curb. Convenience, relevance, and positive perception must outweigh any barriers to recycling. Key elements of a recycling behavior change campaign: behavior trigger (e.g. curbside feedback, info card, mailer), personalized feedback (cart tagging), issue-specific materials (e.g. no bags mailer), general materials (e.g. posters in public spaces), standing resource (website).

Education, Incentive, or Compliance Elements

Category	Subcategory
<input checked="" type="checkbox"/> Simplified materials list	<input checked="" type="checkbox"/> Simplified list of accepted materials
<input checked="" type="checkbox"/> Direct feedback	<input checked="" type="checkbox"/> Cart tagging <input type="checkbox"/> Compliance calls or letters <input type="checkbox"/> Compliance visits <input type="checkbox"/> Other direct feedback
<input checked="" type="checkbox"/> Compliance actions or disincentives for contaminating	<input checked="" type="checkbox"/> Contamination fines, fees, or surcharges <input checked="" type="checkbox"/> Refusal to collect contaminated recycling <input checked="" type="checkbox"/> Removal of recycling containers/service <input type="checkbox"/> Other disincentives
<input type="checkbox"/> Audience-tailored outreach campaigns/tools	<input type="checkbox"/> Commercial technical assistance <input type="checkbox"/> Customized materials/signage <input type="checkbox"/> Multi-lingual, image-based, or transcreated campaigns <input type="checkbox"/> Property manager engagement <input type="checkbox"/> School-based education <input type="checkbox"/> Other tailored campaigns/tools
<input checked="" type="checkbox"/> Broad media and outreach campaigns/tools	<input checked="" type="checkbox"/> Canvassing/door-to-door campaigns <input checked="" type="checkbox"/> Direct mail <input type="checkbox"/> Municipal/hauler website <input type="checkbox"/> Mobile apps <input type="checkbox"/> Online games <input type="checkbox"/> Social media campaigns <input type="checkbox"/> Other broad campaigns/tools
<input type="checkbox"/> Incentives for minimizing contamination	<input type="checkbox"/> Financial incentives <input type="checkbox"/> Other incentives
<input type="checkbox"/> Container size and pricing effects (do they increase contamination?)	<input type="checkbox"/> Container size <input type="checkbox"/> PAYT (pay as you throw), unit pricing, or variable pricing <input type="checkbox"/> Embedded ("free") recycling <input type="checkbox"/> Other

Details of Education, Incentive, or Compliance Elements

Key Points	Notes	Pages
Recycling IQ Kit contains The Recycling Partnership's recommended steps to reduce contamination	<ul style="list-style-type: none"> The kit is made available to cities for free along with up to \$40,000 in grant funding for public-facing campaigns. No studies have been done specifically on the kit's efficacy. Efforts include <ul style="list-style-type: none"> Step 1: Education Step 2: Enforcement <ul style="list-style-type: none"> Auditing, cart tag, and refusal First two violations One staff, many volunteers will pick a random street to audit Step 3: Ticketing <ul style="list-style-type: none"> Mostly multifamily dwellings at this step Only 10% of MF sites will fix issue The rest will either pay or appeal Rarely will a single-family dwelling make it to this step Ticket amounts range from \$25-300 Third, fourth, fifth violations Step 4: Cart removal <ul style="list-style-type: none"> Sixth violation 	<p>Pare, J. (2020).</p> <p>Haley, C. (2020).</p>
A simplified list can be more effective.	<ul style="list-style-type: none"> Massachusetts uses a standardized list statewide that focuses on the top things that can and cannot go into curbside recycling. 	Pare, J. (2020).
Online outreach methods are used because they are low cost.	<ul style="list-style-type: none"> Outreach campaigns were mostly done with social media (Facebook, Instagram, Twitter) due to its low cost. The website RecyclesmartMA.org provides recycling information for residents statewide. 	Pare, J. (2020).

Audience(s)

Geographic Scope (<i>e.g., neighborhood, city, state</i>)	Cities and state
City/County/State	Multiple cities and towns in Massachusetts, including Lowell and West Springfield. The Recycling IQ Kit was used in 22 communities in Massachusetts.
Community Type(s) — check all that apply	<input checked="" type="checkbox"/> Urban <input checked="" type="checkbox"/> Suburban <input type="checkbox"/> Rural <input checked="" type="checkbox"/> Other/Not Specified (ONS) <i>Comments if ONS:</i>
Generator Type(s) — check all that apply	<input checked="" type="checkbox"/> Single-family residential <input type="checkbox"/> Multifamily residential <input type="checkbox"/> Commercial <input type="checkbox"/> Drop-off
Population or Audience Size	Varies.
Other Audience(s) Addressed (<i>if any</i>)	

Relevance to Project Goals

<input type="checkbox"/> Highly relevant and useful <input checked="" type="checkbox"/> Somewhat relevant and useful <input type="checkbox"/> Not very relevant or useful	
Justification/Comments:	This case study provides a broad overview of recycling campaign strategies and outreach methods supported by two detailed case study cities that implemented these strategies. There was limited data available from multiple other cities/towns that also used it; however, some cities/towns use tub-based recycling collection and bag-based PAYT.

Confidence in Results / Justification

<input type="checkbox"/> Highly confident <input checked="" type="checkbox"/> Somewhat confident <input type="checkbox"/> Not very confident	
Justification/Comments:	The case study provides some data findings in terms of contamination rates and others in terms of number of tags distributed. Cart tagging data represents short-term outcomes. There was no data available on the efficacy of the standardized list specifically.

Program Context

Collection Method(s) (e.g., single- vs. dual- vs. multi- stream)	Single-stream, every-other-week collection for Lowell and West Springfield. Varies in other cities/towns.
Special Equipment Used (e.g., split carts, hopper cameras, on-route apps)	Not specified
Accepted Materials (group by bin, if not single stream)	Massachusetts uses standardized list statewide, broken out into categories: metal, plastic, glass, and paper & cardboard.
Other Companion Education and Outreach Programs	Varies, up to individual towns/cities.
Companion Incentives	Not specified
Companion Regulations	Massachusetts requires recycling in the state.

Program Effectiveness

Contamination Rates

Key Points	Notes	Pages
Contamination decreased	Contamination progressively decreased over the span of eight interventions.	The Recycling Partnership. (2016): 36

Participation Rates

Key Points	Notes	Pages
Participation rate remained stable	The participation rate remained stable.	The Recycling Partnership. (2016): 36

Capture Rates

Key Points	Notes	Pages
	Not specified	

Retention of Behavior Change Over Time

Key Points	Notes	Pages
	Not specified	

Other Metrics

Key Points	Notes	Pages																																																																																								
Number of carts that received tags throughout the eight weeks decreased	<p>The Recycling IQ Kit includes cart tagging efforts. Only MRFs have contamination numbers and they typically decline to provide data. MassDEP only has data on the number of carts that received tags throughout eight weeks for each campaign.</p> <table><tr><th>Municipality</th><th>Avg Tag Rate Week 1</th><th>Avg Tag Rate Week 8</th><th>Avg Reduction over 8 interventions</th></tr><tr><td>Abington</td><td>14.0%</td><td>3.0%</td><td>-78.6%</td></tr><tr><td>Dartmouth</td><td>33.0%</td><td>18.0%</td><td>-45.5%</td></tr><tr><td>Lynn</td><td>43.0%</td><td>11.0%</td><td>-74.4%</td></tr><tr><td>Newburyport</td><td>45.0%</td><td>23.0%</td><td>-48.9%</td></tr><tr><td>Dartmouth</td><td>23.0%</td><td>4.0%</td><td>-82.6%</td></tr><tr><td>Everett</td><td>35.2%</td><td>16.0%</td><td>-54.5%</td></tr><tr><td>Fairhaven</td><td>34.4%</td><td>6.2%</td><td>-82.1%</td></tr><tr><td>Fitchburg</td><td>24.7%</td><td>7.9%</td><td>-68.0%</td></tr><tr><td>Halifax</td><td>6.8%</td><td>4.6%</td><td>-32.9%</td></tr><tr><td>Lynn</td><td>44.0%</td><td>10.0%</td><td>-77.3%</td></tr><tr><td>Newburyport</td><td>78.0%</td><td>12.5%</td><td>-84.0%</td></tr><tr><td>Stoneham</td><td>22.6%</td><td>6.6%</td><td>-70.8%</td></tr><tr><td>Tewksbury</td><td>17.1%</td><td>2.4%</td><td>-85.8%</td></tr><tr><td>Billerica</td><td>6.6%</td><td>1.2%</td><td>-81.8%</td></tr><tr><td>Lawrence</td><td>5.0%</td><td>1.1%</td><td>-78.2%</td></tr><tr><td>Lunenburg</td><td>10.0%</td><td>4.0%</td><td>-60.0%</td></tr><tr><td>Lynn</td><td>14.0%</td><td>11.0%</td><td>-21.4%</td></tr><tr><td>Mattapoisett</td><td>8.8%</td><td>1.5%</td><td>-83.0%</td></tr><tr><td>Revere</td><td>31.3%</td><td>16.2%</td><td>-48.2%</td></tr><tr><td>Shrewsbury</td><td>1.9%</td><td>1.4%</td><td>-23.0%</td></tr><tr><td>Southbridge</td><td>27.0%</td><td>8.8%</td><td>-67.3%</td></tr></table>	Municipality	Avg Tag Rate Week 1	Avg Tag Rate Week 8	Avg Reduction over 8 interventions	Abington	14.0%	3.0%	-78.6%	Dartmouth	33.0%	18.0%	-45.5%	Lynn	43.0%	11.0%	-74.4%	Newburyport	45.0%	23.0%	-48.9%	Dartmouth	23.0%	4.0%	-82.6%	Everett	35.2%	16.0%	-54.5%	Fairhaven	34.4%	6.2%	-82.1%	Fitchburg	24.7%	7.9%	-68.0%	Halifax	6.8%	4.6%	-32.9%	Lynn	44.0%	10.0%	-77.3%	Newburyport	78.0%	12.5%	-84.0%	Stoneham	22.6%	6.6%	-70.8%	Tewksbury	17.1%	2.4%	-85.8%	Billerica	6.6%	1.2%	-81.8%	Lawrence	5.0%	1.1%	-78.2%	Lunenburg	10.0%	4.0%	-60.0%	Lynn	14.0%	11.0%	-21.4%	Mattapoisett	8.8%	1.5%	-83.0%	Revere	31.3%	16.2%	-48.2%	Shrewsbury	1.9%	1.4%	-23.0%	Southbridge	27.0%	8.8%	-67.3%	Pare, J (2020).
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Other Qualitative or Anecdotal Information

Key Points	Notes	Pages
	Not specified	

Consumer Acceptance

Key Points	Notes	Pages
	Not specified	

Other Notable Insights

Challenges, successes, lessons learned, opportunities, recommendations, and other insights

Key Points	Notes
	Not specified

Resource Requirements

Staffing Requirements

Key Points	Notes	Pages
Staffing requirements vary	Staffing requirements were not specified, but it varied by city/town. All recycling contamination reduction efforts were through a grant program to use the Recycling IQ Kit (a MassDEP program). Grants are open to any community to apply and award communities up to \$40,000 that could be used towards public-facing campaigns.	Pare, J. (2020).

Expenses

Key Points	Notes	Pages
	Not specified	

Other Resource Requirements or Anecdotal Information

Key Points	Notes	Pages
	Not specified	

Other Referenced Documents or Programs for Possible Review

Not specified

State of Connecticut

Alternative Studied

Standardized list

Bibliographical Information

Resource Type	Interview with Chris Nelson
Organization	Connecticut Department of Energy and Environmental Protection (DEEP)
Contact information	Not shared
File Name on SharePoint	N/A. Interview notes below.
Full Citation	<i>Nelson, C. (2020). Interview with Patty Liu.</i>

Abstract/Summary

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, and food cartons, among other materials. This list was developed by five MRFs serving several Connecticut cities. Connecticut’s statewide website (<http://www.recyclect.com/>) is available in English and Spanish and has 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.

Education, Incentive, or Compliance Elements

Category	Subcategory
<input type="checkbox"/> Simplified or standardized materials list	<input type="checkbox"/> Simplified list of accepted materials <input checked="" type="checkbox"/> Standardized list of accepted materials
<input type="checkbox"/> Direct feedback	<input type="checkbox"/> Cart tagging <input type="checkbox"/> Compliance calls or letters <input type="checkbox"/> Compliance visits <input type="checkbox"/> Other direct feedback
<input type="checkbox"/> Compliance actions or disincentives for contaminating	<input type="checkbox"/> Contamination fines, fees, or surcharges <input type="checkbox"/> Refusal to collect contaminated recycling <input type="checkbox"/> Removal of recycling containers/service <input type="checkbox"/> Other disincentives
<input type="checkbox"/> Audience-tailored outreach campaigns/tools	<input type="checkbox"/> Commercial technical assistance <input type="checkbox"/> Customized materials/signage <input type="checkbox"/> Multi-lingual, image-based, or transcreated campaigns <input type="checkbox"/> Property manager engagement <input type="checkbox"/> School-based education <input type="checkbox"/> Other tailored campaigns/tools
<input type="checkbox"/> Broad media and outreach campaigns/tools	<input type="checkbox"/> Canvassing/door-to-door campaigns <input type="checkbox"/> Direct mail <input type="checkbox"/> Municipal/hauler website <input type="checkbox"/> Mobile apps <input type="checkbox"/> Online games <input type="checkbox"/> Social media campaigns <input type="checkbox"/> Other broad campaigns/tools
<input type="checkbox"/> Incentives for minimizing contamination	<input type="checkbox"/> Financial incentives <input type="checkbox"/> Other incentives
<input type="checkbox"/> Container size and pricing effects (do they increase contamination?)	<input type="checkbox"/> Container size <input type="checkbox"/> PAYT (pay as you throw), unit pricing, or variable pricing <input type="checkbox"/> Embedded ("free") recycling <input type="checkbox"/> Other

Details of Education, Incentive, or Compliance Elements

Key Points	Notes	Pages
Recycling required	<ul style="list-style-type: none"> Recycling is required by law and applies to every person within the state, but enforcement lies with individual towns. By law: “Make provisions for the collection of recyclables” required by haulers, but this is hard to enforce. 	Interview
Standardized list	<ul style="list-style-type: none"> The standardized list is required by law and is available on RecycleCT.com. Five MRFs are used to collect different items. They were invited by DEEP to discuss with each other and determine one harmonized list to be used statewide. 	Interview

Audience(s)

Geographic Scope (e.g., neighborhood, city, state)	State
City/County/State	State of Connecticut
Community Type(s) — check all that apply	<input checked="" type="checkbox"/> Urban <input checked="" type="checkbox"/> Suburban <input checked="" type="checkbox"/> Rural <input type="checkbox"/> Other/Not Specified (ONS) <i>Comments if ONS:</i>
Generator Type(s) — check all that apply	<input checked="" type="checkbox"/> Single-family residential <input checked="" type="checkbox"/> Multifamily residential <input checked="" type="checkbox"/> Commercial <input type="checkbox"/> Drop-off
Population or Audience Size	3.5 million
Other Audience(s) Addressed (if any)	

Relevance to Project Goals

<input type="checkbox"/> Highly relevant and useful <input checked="" type="checkbox"/> Somewhat relevant and useful <input type="checkbox"/> Not very relevant or useful	
Justification/Comments:	<p>This case study provides limited relevance due to the lack of data. However, it could be an interesting case study to see how a municipality can improve recycling through regulation if data were available.</p>

Confidence in Results / Justification

☐ Highly confident

☐ Somewhat confident

☒ Not very confident

Justification/Comments: When contacted, DEEP program staff reported that no studies or data are available.

Program Context

Collection Method(s) (e.g., single- vs. dual- vs. multi- stream)	Not specified
Special Equipment Used (e.g., split carts, hopper cameras, on-route apps)	Not specified
Accepted Materials (group by bin, if not single stream)	<p>Glass & Metal Food & Beverage Containers</p> <p>Plastic Containers (PET or PETE #1)</p> <p>Plastic Containers (HDPE #2)</p> <p>Corrugated Cardboard</p> <p>Boxboard</p> <p>Newspaper</p> <p>Magazines</p> <p>White & Colored Office Paper (residences and businesses)</p> <p>Scrap Metal, including appliances</p> <p>Ni-Cd Rechargeable Batteries (from consumer products)</p> <p>Waste Oil (crankcase oil from internal combustion engines)</p> <p>Leaves (must be composted)</p> <p>Lead Acid Battery or Motor Vehicle Batteries</p> <p>Grass Clippings (should be left on the lawn or, if necessary, composted)</p> <p>Commercially Generated Source Separated Organic Materials (Only applies to those businesses compelled to do so per CGS Section 22a-226e.)</p>
Other Companion Education and Outreach Programs	Not specified, varies by city/town
Companion Incentives	Not specified
Companion Regulations	Disposal ban on accepted recyclable and organic materials

Program Effectiveness

Contamination Rates

Key Points	Notes	Pages
	No measurements available	

Participation Rates

Key Points	Notes	Pages
	Not specified.	

Capture Rates

Key Points	Notes	Pages
	Not specified	

Retention of Behavior Change Over Time

Key Points	Notes	Pages
	Not specified	

Other Metrics

Key Points	Notes	Pages
	Not specified	

Other Qualitative or Anecdotal Information

Key Points	Notes	Pages
	Not specified	

Consumer Acceptance

Key Points	Notes	Pages
	Not specified, but reported enforcement is up to individual cities/towns.	Interview

Other Notable Insights

Key Points	Notes
Variations of enforcement within municipalities	<ul style="list-style-type: none">• Of the 169 towns in the state, a vast majority do not use compliance methods for recycling.• Some towns have recycling coordinators, but the extent of their involvement varies.

Resource Requirements

Staffing Requirements

Key Points	Notes	Pages
MRF involvement is important	DEEP facilitated an effort to develop the harmonized list determined by five MRFs across the state.	Interview

Expenses

Key Points	Notes	Pages
Social media	The state has limited budget available, so most PR is done through social media, specifically Facebook and Spotify ads.	Interview

Other Resource Requirements or Anecdotal Information

Key Points	Notes	Pages
	Not specified	

Other Referenced Documents or Programs for Possible Review

Not specified

Chicopee, Massachusetts

Alternative Studied

Pay-as-you-throw with cart tagging, refusal to collect, and other strategies

Bibliographical Information

Resource Type	Government report
Organization	Massachusetts Department of Environmental Protection
Contact information	413-594-4356 http://chicopeema.gov/815/Trash-and-Recycling bbrouillard@chicopeema.gov
File Name on SharePoint	MassDEP_PAYTCaseStudy-Chicopee_2019.pdf
Full Citation	Massachusetts Department of Environmental Protection. (2019). <i>City of Chicopee Pay-As-You-Throw (PAYT) Program</i> . Retrieved from https://www.mass.gov/doc/case-study-city-of-chicopee/download

Abstract/Summary

Chicopee uses pay-as-you-throw (PAYT) and previously used refusal to collect contaminated recycling to reduce contamination rates. Limited data are available.

Education, Incentive, or Compliance Elements

Category	Subcategory
<input type="checkbox"/> Simplified materials list	<input type="checkbox"/> Simplified list of accepted materials
<input checked="" type="checkbox"/> Direct feedback	<input checked="" type="checkbox"/> Cart tagging <input type="checkbox"/> Compliance calls or letters <input type="checkbox"/> Compliance visits <input checked="" type="checkbox"/> Other direct feedback
<input checked="" type="checkbox"/> Compliance actions or disincentives for contaminating	<input type="checkbox"/> Contamination fines, fees, or surcharges <input checked="" type="checkbox"/> Refusal to collect contaminated recycling <input type="checkbox"/> Removal of recycling containers/service <input type="checkbox"/> Other disincentives
<input type="checkbox"/> Audience-tailored outreach campaigns/tools	<input type="checkbox"/> Commercial technical assistance <input type="checkbox"/> Customized materials/signage <input type="checkbox"/> Multi-lingual, image-based, or transcreated campaigns <input type="checkbox"/> Property manager engagement <input type="checkbox"/> School-based education <input type="checkbox"/> Other tailored campaigns/tools
<input checked="" type="checkbox"/> Broad media and outreach campaigns/tools	<input type="checkbox"/> Canvassing/door-to-door campaigns <input checked="" type="checkbox"/> Direct mail <input type="checkbox"/> Municipal/hauler website <input type="checkbox"/> Mobile apps <input type="checkbox"/> Online games <input type="checkbox"/> Social media campaigns <input checked="" type="checkbox"/> Other broad campaigns/tools
<input type="checkbox"/> Incentives for minimizing contamination	<input type="checkbox"/> Financial incentives <input type="checkbox"/> Other incentives
<input checked="" type="checkbox"/> Container size and pricing effects (do they increase contamination?)	<input type="checkbox"/> Container size <input checked="" type="checkbox"/> PAYT (pay as you throw), unit pricing, or variable pricing <input type="checkbox"/> Other

Details of Education, Incentive, or Compliance Elements

Key Points	Notes	Pages
Education at start of PAYT program	<ul style="list-style-type: none"> “The City notified residents of this Program through public meetings and hearings, as well as outreach materials including postcard and calendar mailings, handouts to residents visiting the landfill, and information packets included with cart delivery.” Chicopee allowed a 30-day grace period at the program launch. 	Page 1
Enforcement once program launched	<ul style="list-style-type: none"> Enforcement completed through the Waste Reduction Enforcement Coordinator (WREC): “Chicopee received \$38,000 in grant funding from MassDEP for a WREC. The WREC spent three mornings per week “on the ground” focused on recycling contamination and compliance with the PAYT program.” Stickers were used during the 30-day grace period, door hangers were left at properties with mild contamination, and pink rejection stickers were left for major contamination, with the 	Page 2

Key Points	Notes	Pages
	hauler refusing to pick up the cart.	

Audience(s)

Geographic Scope (<i>e.g., neighborhood, city, state</i>)	City
City/County/State	Chicopee, Massachusetts
Community Type(s) — check all that apply	<input checked="" type="checkbox"/> Urban <input type="checkbox"/> Suburban <input type="checkbox"/> Rural <input type="checkbox"/> Other/Not Specified (ONS) <i>Comments if ONS:</i>
Generator Type(s) — check all that apply	<input checked="" type="checkbox"/> Single-family residential <input checked="" type="checkbox"/> Multifamily residential <input type="checkbox"/> Commercial <input type="checkbox"/> Drop-off
Population or Audience Size	55,293
Other Audience(s) Addressed (<i>if any</i>)	

Relevance to Project Goals

<input type="checkbox"/> Highly relevant and useful <input checked="" type="checkbox"/> Somewhat relevant and useful <input type="checkbox"/> Not very relevant or useful	
Justification/Comments:	This case study provided a helpful description of how Chicopee's program was implemented and sustained, and included useful metrics.

Confidence in Results / Justification

<input type="checkbox"/> Highly confident <input type="checkbox"/> Somewhat confident <input checked="" type="checkbox"/> Not very confident	
Justification/Comments:	While the report lists a decrease in contamination rates, it does not provide the exact amount of contamination or the measurement method.

Program Context

Collection Method(s) (e.g., single- vs. dual- vs. multi- stream)	Single stream
Special Equipment Used (e.g., split carts, hopper cameras, on-route apps)	New recycling carts at launch of PAYT program, plus new overflow bags for trash that does not fit in 35-gallon trash bin.
Accepted Materials (group by bin, if not single stream)	Massachusetts uses a standardized list statewide, broken out into categories: Metal, Plastic, Glass, and Paper & Cardboard
Other Companion Education and Outreach Programs	<p>“The City notified residents of this Program through public meetings and hearings, as well as outreach materials including postcard and calendar mailings, handouts to residents visiting the landfill, and information packets included with cart delivery.” (page 1)</p> <p>30-day grace period at program launch</p>
Companion Incentives	Not specified
Companion Regulations	Massachusetts requires recycling in the state.

Program Effectiveness

Contamination Rates

Key Points	Notes	Pages
3.8% decrease in contamination	While the report does not give exact contamination rates, they do report an overall decrease of 3.8% since the PAYT program began.	Page 2

Participation Rates

Key Points	Notes	Pages
	Not specified	

Capture Rates

Key Points	Notes	Pages
	Not specified	

Retention of Behavior Change Over Time

Key Points	Notes	Pages
	Not specified	

Other Metrics

Key Points	Notes	Pages
17.4% decrease in trash tonnage	This decrease in trash tonnage was measured during the first two years of PAYT, compared to the previous two years.	Page 2
The City of Chicopee saved more than \$113,000 in disposal costs over two years	It is unclear whether these reported savings account for the costs of education and enforcement.	Page 2
12.7% increase in recycling tonnage	This increase in recycling tonnage was measured during the first two years of PAYT, compared to previous two years.	Page 2

Figure 1: Trash & Recycling Tonnage

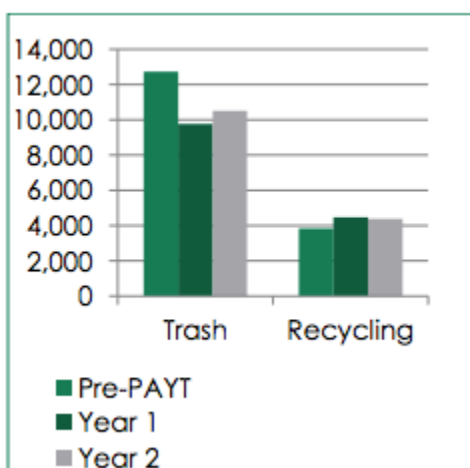


Image: page 2

Other Qualitative or Anecdotal Information

Key Points	Notes	Pages
Anecdotally no increase in dumping	Residents did not report an increase in dumping or littering.	Page 2

Key Points	Notes	Pages
Local government support helpful	“Strong support from the Mayor and City Council has attributed to the program’s success.”	Page 2

Consumer Acceptance

Key Points	Notes	Pages
	Not specified	

Other Notable Insights

Key Points	Notes
On-the-ground enforcement	Chicopee attributes the lower contamination rate to its on-the-ground enforcement team, including cart tagging, door hangers, and pickup refusal.

Resource Requirements

Staffing Requirements

Key Points	Notes	Pages
	Not specified	

Expenses

Key Points	Notes	Pages
Enforcement team	The enforcement team started its activities utilizing the state’s initial grant of \$38,000. Chicopee continued funding the enforcement team after the grant expired, because they were so successful at reducing contamination. However, additional spending was not quantified.	Page 2
New recycling bins	Chicopee was awarded a PAYT grant from the MassDEP in 2017, totaling \$300,000. The City provided an additional \$400,000 in matching funds in order to fully finance the purchase price, hot stamping, assembly, and delivery of the 35-gallon trash carts.	Page 1

Other Resource Requirements or Anecdotal Information

Key Points	Notes	Pages
	Not specified	

Other Referenced Documents or Programs for Possible Review

Not specified

Sanford, Maine

Alternative Studied

Pay-as-you-throw with cart tagging and pick-up refusal

Bibliographical Information

Resource Type	Report
Organization	Waste Zero
Contact information	Not shared
File Name on SharePoint	None
Full Citation	<p>Case Bryant, C. (2019). China gets tough on US recyclables. How one Maine town is fighting back. <i>The Christian Science Monitor</i>. Retrieved from https://www.csmonitor.com/Environment/2019/0103/China-gets-tough-on-US-recyclables.-How-one-Maine-town-is-fighting-back</p> <p>Blanton, M. (2020). Interview with Patty Liu.</p> <p>Waste Zero. (2019). Sanford, Me: PAYT Helps One City in the Fight Against Recycling Contamination. Retrieved February 12, 2020, from http://wastezero.com/success-stories/payt-helps-one-city-in-the-fight-against-recycling-contamination/</p> <p>Waste Zero. (2014). The Power of PAYT—Worth Coming Back to. Retrieved February 12, 2020, from http://wastezero.com/success-stories/sanford-me/</p>

Abstract/Summary

After receiving a notice from their recycling facility that they had amassed thousands of dollars in fees over just 15 days for excessive recycling contamination, the City of Sanford, Maine decided to ramp up their enforcement efforts for recycling rules. Thanks to their pay-as-you-throw program, their efforts were a resounding success.

Education, Incentive, or Compliance Elements

Category	Subcategory
<input type="checkbox"/> Simplified materials list	<input type="checkbox"/> Simplified list of accepted materials
<input checked="" type="checkbox"/> Direct feedback	<input checked="" type="checkbox"/> Cart tagging <input type="checkbox"/> Compliance calls or letters <input type="checkbox"/> Compliance visits <input type="checkbox"/> Other direct feedback
<input checked="" type="checkbox"/> Compliance actions or disincentives for contaminating	<input type="checkbox"/> Contamination fines, fees, or surcharges <input checked="" type="checkbox"/> Refusal to collect contaminated recycling <input type="checkbox"/> Removal of recycling containers/service <input type="checkbox"/> Other disincentives
<input checked="" type="checkbox"/> Audience-tailored outreach campaigns/tools	<input type="checkbox"/> Commercial technical assistance <input type="checkbox"/> Customized materials/signage <input type="checkbox"/> Multi-lingual, image-based, or transcreated campaigns <input type="checkbox"/> Property manager engagement <input checked="" type="checkbox"/> School-based education <input type="checkbox"/> Other tailored campaigns/tools
<input type="checkbox"/> Broad media and outreach campaigns/tools	<input type="checkbox"/> Canvassing/door-to-door campaigns <input type="checkbox"/> Direct mail <input type="checkbox"/> Municipal/hauler website <input type="checkbox"/> Mobile apps <input type="checkbox"/> Online games <input type="checkbox"/> Social media campaigns <input type="checkbox"/> Other broad campaigns/tools
<input type="checkbox"/> Incentives for minimizing contamination	<input type="checkbox"/> Financial incentives <input type="checkbox"/> Other incentives
<input checked="" type="checkbox"/> Container size and pricing effects (do they increase contamination?)	<input type="checkbox"/> Container size <input checked="" type="checkbox"/> PAYT (pay-as-you-throw), unit pricing, or variable pricing <input type="checkbox"/> Other

Details of Education, Incentive, or Compliance Elements

Key Points	Notes	Pages
July 2010 implemented PAYT	The City implemented PAYT for the first time in July 2010—after implementation, trash volume dropped by half. PAYT was then repealed four months later.	Waste Zero. (2014).
September 2013 implemented PAYT again	PAYT was implemented a second time with similar results—trash volume decreased by 42%, while the recycling rate nearly doubled. The City, “saved more than \$28,000 in solid waste tipping fees” in the first two months.	Waste Zero. (2014).
2018 implemented enforcement mechanisms to accompany PAYT	Using inspection, cart tagging, and pickup refusal for highly contaminated carts, the City reduced contamination rates from 15-20% to 0-3%. There is also mention of school-based education, though no details are given.	Waste Zero. (2019).

Audience(s)

Geographic Scope (e.g., neighborhood, city, state)	City
City/County/State	Sanford, Maine
Community Type(s) — check all that apply	<input type="checkbox"/> Urban <input type="checkbox"/> Suburban <input type="checkbox"/> Rural <input checked="" type="checkbox"/> Other/Not Specified (ONS) <i>Comments if ONS:</i>
Generator Type(s) — check all that apply	<input checked="" type="checkbox"/> Single-family residential <input type="checkbox"/> Multifamily residential <input type="checkbox"/> Commercial <input type="checkbox"/> Drop-off
Population or Audience Size	20,798
Other Audience(s) Addressed (if any)	

- ☒ Highly relevant and useful
☐ Somewhat relevant and useful
☐ Not very relevant or useful

Justification/Comments: This case study provides three sources that show the results of PAYT when implemented alone, and when education and enforcement techniques are used.

Confidence in Results / Justification

☐ Highly confident

☐ Somewhat confident

☒ Not very confident

Justification/Comments: Though data is shared across several years, it is not consistently reported, but shown as snapshots in time. This makes it more difficult to track linear progress. Also, there are no details given regarding measurement method or other education techniques (such as school-based recycling education).

Program Context

Collection Method(s) (e.g., single- vs. dual- vs. multi- stream)	Single stream
Special Equipment Used (e.g., split carts, hopper cameras, on-route apps)	Bag-based PAYT
Accepted Materials (group by bin, if not single stream)	Not specified
Other Companion Education and Outreach Programs	School-based education mentioned
Companion Incentives	Not specified
Companion Regulations	Inspection, tagging, and pickup refusal implemented in 2018, five years after PAYT implemented permanently

Program Effectiveness

Contamination Rates

Key Points	Notes	Pages
Reduced contamination rates from 15-20% to 0-3%	This reduction was reported when Sanford implemented enforcement techniques in 2018, after PAYT had been implemented for five years.	Waste Zero. (2019).

Participation Rates

Key Points	Notes	Pages
	Not specified	

Capture Rates

Key Points	Notes	Pages
	Not specified	

SANFORD, MAINE, SOLID WASTE VOLUME, 2010 - 2014

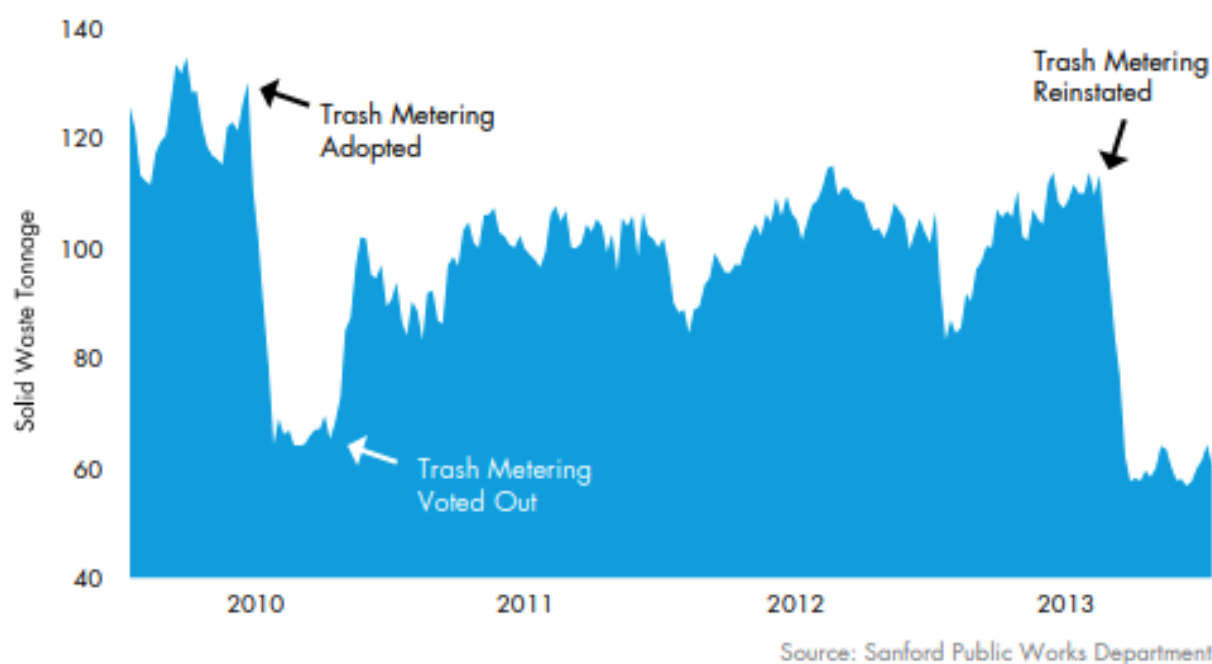


Image: *The Power of PAYT*

Retention of Behavior Change Over Time

Key Points	Notes	Pages
	Not specified	

Other Metrics

Key Points	Notes	Pages
Doubled recycling rates when implemented PAYT in 2010 and 2013	In each case (2010 and 2013), recycling rates were measured two months after implementation, although further data is unavailable, so it is unclear if these numbers were sustained.	Waste Zero. (2014)

Key Points	Notes	Pages
Cut municipal solid waste by 42%	As reported in 2014 Waste Zero report, solid waste tonnage decreased two months after implementing PAYT for the second time in 2013.	Waste Zero. (2014).

Other Qualitative or Anecdotal Information

Key Points	Notes	Pages
Responses in commercial sector vary by industry	<ul style="list-style-type: none"> Hotels and hospitality sector have been the most receptive. Restaurants, legal firms, and doctor's offices were hard to sway. 	Interview

Consumer Acceptance

Key Points	Notes	Pages
Some resident backlash at pickup refusal and cart tagging	<ul style="list-style-type: none"> A news article reported several residents who were unhappy that their recycling was not picked up due to contamination. However, the same article reports the overall success at reduced contamination rates. Casella no longer tags carts either because of backlash. 	Case Bryant, C. (2019). Interview
Community vote to remove PAYT after implemented in 2010	<ul style="list-style-type: none"> PAYT was rejected by vote after its first attempt at implementation in 2010 but was reinstated in 2013. 	Waste Zero. (2014).

Other Notable Insights

Key Points	Notes
Schools are a good starting point	Schools are a big leverage point. Kids will shame parents into recycling.

Resource Requirements

Staffing Requirements

Key Points	Notes	Pages
	Not specified	

Expenses

Key Points	Notes	Pages
Tipping fee savings	The City reported savings of \$28,000 in tipping fees in the first two months of PAYT in 2013.	Waste Zero. (2014).
Avoidance of contamination fees	In 2018, the City reported potential fees of \$100,000 for contaminated recycling.	Waste Zero. (2019).

Other Resource Requirements or Anecdotal Information

Key Points	Notes	Pages
	Not specified	

Other Referenced Documents or Programs for Possible Review

Not specified

Shrewsbury, Massachusetts

Alternative Studied

Pay-as-you-throw

Bibliographical Information

Resource Type	Report
Organization	Town of Shrewsbury
Contact information	508-841-8508 shrewsburyma.gov dsnowdon@shrewsburyma.gov
File Name on SharePoint	None
Full Citation	Snowdon, D. (2019). <i>Town of Shrewsbury: PAY-T Fee Analysis & Recommendation</i> . Retrieved from https://shrewsburyma.gov/DocumentCenter/View/6442/2019-PAY-T-Fee-Analysis_DRAFT?bidId=

Abstract/Summary

Shrewsbury implemented PAYT in 2008 using a bag-based system. Recycling is collected in dual-stream tubs using Massachusetts's standardized recycling list. The Town 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. 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.

Education, Incentive, or Compliance Elements

Category	Subcategory
<input type="checkbox"/> Simplified materials list	<input type="checkbox"/> Simplified list of accepted materials
<input type="checkbox"/> Direct feedback	<input type="checkbox"/> Cart tagging <input type="checkbox"/> Compliance calls or letters <input type="checkbox"/> Compliance visits <input type="checkbox"/> Other direct feedback
<input type="checkbox"/> Compliance actions or disincentives for contaminating	<input type="checkbox"/> Contamination fines, fees, or surcharges <input type="checkbox"/> Refusal to collect contaminated recycling <input type="checkbox"/> Removal of recycling containers/service <input type="checkbox"/> Other disincentives
<input type="checkbox"/> Audience-tailored outreach campaigns/tools	<input type="checkbox"/> Commercial technical assistance <input type="checkbox"/> Customized materials/signage <input type="checkbox"/> Multi-lingual, image-based, or transcreated campaigns <input type="checkbox"/> Property manager engagement <input type="checkbox"/> School-based education <input type="checkbox"/> Other tailored campaigns/tools
<input type="checkbox"/> Broad media and outreach campaigns/tools	<input type="checkbox"/> Canvassing/door-to-door campaigns <input type="checkbox"/> Direct mail <input type="checkbox"/> Municipal/hauler website <input type="checkbox"/> Mobile apps <input type="checkbox"/> Online games <input type="checkbox"/> Social media campaigns <input type="checkbox"/> Other broad campaigns/tools
<input type="checkbox"/> Incentives for minimizing contamination	<input type="checkbox"/> Financial incentives <input type="checkbox"/> Other incentives
<input checked="" type="checkbox"/> Container size and pricing effects (do they increase contamination?)	<input type="checkbox"/> Container size <input checked="" type="checkbox"/> PAYT (pay as you throw), unit pricing, or variable pricing <input type="checkbox"/> Other

Details of Education, Incentive, or Compliance Elements

Key Points	Notes	Pages
PAYT launched in 2008	Inspired by the success of PAYT in neighboring cities, Shrewsbury launched PAYT in 2008 and recycling rates increased substantially.	Page 6
Unknown enforcement	While the report details very low contamination rates, it does not share details on education or enforcement techniques used to achieve such low rates	

Audience(s)

Geographic Scope (e.g., neighborhood, city, state)	City
City/County/State	Shrewsbury, Massachusetts
Community Type(s) — check all that apply	<input checked="" type="checkbox"/> Urban <input type="checkbox"/> Suburban <input type="checkbox"/> Rural <input type="checkbox"/> Other/Not Specified (ONS) <i>Comments if ONS:</i>
Generator Type(s) — check all that apply	<input checked="" type="checkbox"/> Single-family residential <input checked="" type="checkbox"/> Multifamily residential <input type="checkbox"/> Commercial <input type="checkbox"/> Drop-off
Population or Audience Size	37,387
Other Audience(s) Addressed (if any)	

Relevance to Project Goals

<input type="checkbox"/> Highly relevant and useful <input type="checkbox"/> Somewhat relevant and useful <input checked="" type="checkbox"/> Not very relevant or useful	
Justification/Comments:	Shrewsbury uses PAYT and has some data, including at least one data point on contamination rates. The town uses dual-stream recycling in tubs instead of carts.

Confidence in Results / Justification

☐ Highly confident

☒ Somewhat confident

☐ Not very confident

Justification/Comments: Recycling rates were measured over 11 years, but contamination rates are only shared for 2019. The report does not clarify whether other education or enforcement techniques were utilized.

Program Context

Collection Method(s) (e.g., single- vs. dual- vs. multi- stream)	Dual stream in tubs
Special Equipment Used (e.g., split carts, hopper cameras, on-route apps)	PAYT bags for garbage
Accepted Materials (group by bin, if not single stream)	Massachusetts uses standardized list statewide, broken out into categories: Metal, Plastic, Glass, and Paper & Cardboard
Other Companion Education and Outreach Programs	Not specified
Companion Incentives	Not specified
Companion Regulations	Massachusetts requires recycling in the state.

Program Effectiveness

Contamination Rates

Key Points	Notes	Pages
Very low contamination	<ul style="list-style-type: none"> “An August 2019 audit of the Town’s recycling materials revealed a 1.55% and 2% contamination rate for the Co-mingled and Fiber stream respectively” There were no details provided on strategies to achieve such low contamination rates 	6

Participation Rates

Key Points	Notes	Pages
	Not specified	

Capture Rates

Key Points	Notes	Pages
	Not specified	

Retention of Behavior Change Over Time

Key Points	Notes	Pages
Stable recycling rate of around 30%	The town's recycling rate was measured consistently between 2008-2019, with a steady rate of 29.6% since 2012.	6
Unknown historical contamination rates	There was no reporting on whether the low contamination rates are a recent occurrence, or whether this is a new change.	6

Other Metrics

Key Points	Notes	Pages
Increased significantly over first three years	"Over the first three years, the Town witnessed an 11.5% increase in recycling tonnages to a total of 33.74% of the Town's total collected curbside tonnage."	6
Stabilized in following years	"From 2012 forward, recycling has slowly trended downward to approximately 29.67% of the total collected curbside tonnage. This variance may best be explained by the transitioning from 'wish recycling' that may have been more evident in the first years of the PAYT program to a cleaner more marketable recycling stream"	6

Other Qualitative or Anecdotal Information

Key Points	Notes	Pages
	Not specified	

Consumer Acceptance

Key Points	Notes	Pages
	Not specified	

Other Notable Insights

Challenges, successes, lessons learned, opportunities, recommendations, and other insights

Key Points	Notes
	Not specified

Resource Requirements

Staffing Requirements

Staffing hours, FTE, and/or costs by staff type

Key Points	Notes	Pages
	Not specified	

Expenses

Key Points	Notes	Pages
Cost of PAYT bags	"The PAYT program was designed to reduce budget expenses by incentivizing residents to recycle more, and the Town's revenue generated from the sale of PAYT bags would pay for services and offset the Tax Levy impact"	5
New recycling costs	"Until very recently, simply increasing recycling would reduce the tonnage of trash at the curb, resulting in less spending for waste disposal. While this model inherently is still valid, it is imperative that the correct curbside recyclable materials are collected as the Town now is required to pay for the processing of recyclable materials."	5
Potential operating costs	The report offers a detailed breakdown of potential operating costs, beginning on page 13. Since this report is a prediction of potential future costs, rather than current costs, we did not include these details.	13

Other Resource Requirements or Anecdotal Information

Key Points	Notes	Pages
	Not specified	

Other Referenced Documents or Programs for Possible Review

The report did not provide details on contamination rate changes. However, there is reference to a document called "Casella Recycling, Town of Shrewsbury Residue Audit, August 5 – 16," which may provide more details. This document is not publicly available. Cascadia called and emailed Casella Recycling, but received no reply.

Natick, Massachusetts

Alternative Studied

Pay-as-you-throw

Bibliographical Information

Resource Type	Presentation slides Article in Resource Recycling Magazine (by Colin Staub)
Organization	Natick, MA
Contact information	None
File Name on SharePoint	ResourceRecycling_NatickMA-PAYT_2018.pdf
Full Citation	<p>Kamenides, C. (2018). <i>Pay as You Throw</i>. Retrieved from https://www.epa.gov/sites/production/files/2018-07/documents/kamenides_slides_0.pdf</p> <p>Staub, C. (2018). Community Spotlight: Pay-as-you-throw builds foundation in Boston suburb. Retrieved February 11, 2019, from https://resource-recycling.com/recycling/2018/10/01/community-spotlight-pay-as-you-throw-builds-foundation-in-boston-suburb/</p>

Abstract/Summary

“PAYT implemented in 2004, resulted in 20% increase in recycling and lower waste collection costs. As of July 2018, Natick’s recycling stream has a 14% contamination rate.”

Education, Incentive, or Compliance Elements

Category	Subcategory
<input type="checkbox"/> Simplified materials list	<input type="checkbox"/> Simplified list of accepted materials
<input type="checkbox"/> Direct feedback	<input type="checkbox"/> Cart tagging <input type="checkbox"/> Compliance calls or letters <input type="checkbox"/> Compliance visits <input type="checkbox"/> Other direct feedback
<input type="checkbox"/> Compliance actions or disincentives for contaminating	<input type="checkbox"/> Contamination fines, fees, or surcharges <input type="checkbox"/> Refusal to collect contaminated recycling <input type="checkbox"/> Removal of recycling containers/service <input type="checkbox"/> Other disincentives
<input type="checkbox"/> Audience-tailored outreach campaigns/tools	<input type="checkbox"/> Commercial technical assistance <input type="checkbox"/> Customized materials/signage <input type="checkbox"/> Multi-lingual, image-based, or transcreated campaigns <input type="checkbox"/> Property manager engagement <input type="checkbox"/> School-based education <input type="checkbox"/> Other tailored campaigns/tools
<input type="checkbox"/> Broad media and outreach campaigns/tools	<input type="checkbox"/> Canvassing/door-to-door campaigns <input type="checkbox"/> Direct mail <input type="checkbox"/> Municipal/hauler website <input type="checkbox"/> Mobile apps <input type="checkbox"/> Online games <input type="checkbox"/> Social media campaigns <input type="checkbox"/> Other broad campaigns/tools
<input type="checkbox"/> Incentives for minimizing contamination	<input type="checkbox"/> Financial incentives <input type="checkbox"/> Other incentives
<input checked="" type="checkbox"/> Container size and pricing effects (do they increase contamination?)	<input type="checkbox"/> Container size <input checked="" type="checkbox"/> PAYT (pay as you throw), unit pricing, or variable pricing <input type="checkbox"/> Other

Details of Education, Incentive, or Compliance Elements

Key Points	Notes	Pages
PAYT launched 2004	PAYT was first implemented by the town, then put to a vote and approved by residents.	Staub, C. (2018)
Single stream launched 2006	Single stream recycling was launched in 2006 (no further details given).	Staub, C. (2018)
2017 added other curbside recycling	"Since 2017, the town has contracted with Simple Recycling to provide curbside collection of clothing and other household goods."	Staub, C. (2018)

Audience(s)

Geographic Scope (e.g., neighborhood, city, state)	City
City/County/State	Natick, Massachusetts
Community Type(s) — check all that apply	<input type="checkbox"/> Urban <input type="checkbox"/> Suburban <input type="checkbox"/> Rural <input checked="" type="checkbox"/> Other/Not Specified (ONS) <i>Comments if ONS: Not specified</i>
Generator Type(s) — check all that apply	<input checked="" type="checkbox"/> Single-family residential <input type="checkbox"/> Multifamily residential <input type="checkbox"/> Commercial <input type="checkbox"/> Drop-off
Population or Audience Size	34,000 population and approximately 11,000 households
Other Audience(s) Addressed (if any)	

Relevance to Project Goals

<input type="checkbox"/> Highly relevant and useful <input type="checkbox"/> Somewhat relevant and useful <input checked="" type="checkbox"/> Not very relevant or useful	
Justification/Comments:	PAYT was implemented in 2004 and was considered a success at the time. There was no data available on contamination rate improvements.

Confidence in Results / Justification

☐ Highly confident

☐ Somewhat confident

☒ Not very confident

Justification/Comments: While the article discloses recycling rates over 13 years, it does not do the same for contamination rates. It also does not provide the measurement method. There is a large sample size (as the change applied to all customers in municipality), but it's an old example that does not address needed changes as dictated by National Sword.

Program Context

Collection Method(s) (e.g., single- vs. dual- vs. multi- stream)	Single stream, implemented 2 years after PAYT.
Special Equipment Used (e.g., split carts, hopper cameras, on-route apps)	Not applicable
Accepted Materials (group by bin, if not single stream)	Massachusetts uses standardized list statewide, broken out into categories: Metal, Plastic, Glass, and Paper & Cardboard
Other Companion Education and Outreach Programs	Not specified
Companion Incentives	Not specified
Companion Regulations	Massachusetts requires recycling in the state.

Program Effectiveness

Contamination Rates

Key Points	Notes	Pages
14%	The article does not report changes in contamination rates, with 14% being the most recent contamination rate listed.	Staub, C. (2018)

Participation Rates

Key Points	Notes	Pages
	Not specified	

Capture Rates

Key Points	Notes	Pages
Increase in recycling	There was an increase from “23% diversion in 2003 to 37% in 2016.” “After performing a recent waste audit, the program calculated preliminary figures showing it captures 84% of recyclable materials.”	Staub, C. (2018)
Decrease in trash	The town observed a 40% decrease in trash volumes since PAYT began.	Staub, C. (2018)

Retention of Behavior Change Over Time

Key Points	Notes	Pages
13-year measurement	<ul style="list-style-type: none">Natick has tracked their recycling rates consistently since switching to PAYT and reports a steady recycling rate. However, they do not publicly provide this data regarding contamination.“In the time since PAYT was implemented, Natick’s garbage generation dropped substantially, from 9,800 tons the year before PAYT to 6,100 tons in 2016.”	Staub, C. (2018)

Other Metrics

Key Points	Notes	Pages
	Not reported	

Other Qualitative or Anecdotal Information

Key Points	Notes	Pages
	Not specified	

Consumer Acceptance

Key Points	Notes	Pages
Backlash	Town residents protested PAYT and put PAYT on the ballot. However, 72% of voters approved it.	Staub, C. (2018)

Other Notable Insights

Key Points	Notes
	Not specified

Resource Requirements

Staffing Requirements

Key Points	Notes	Pages
	Not specified	

Expenses

Key Points	Notes	Pages
Reported savings of \$4M	"The town estimates the program has saved more than \$4 million in disposal fees since it began." That calculates to an average of around \$285,700 per year. In fact, PAYT was initially implemented due to a budget shortfall, and the program has proven financially successful.	Staub, C. (2018)
Reduced collection costs	"Cutting costs on garbage collection service: Prior to PAYT, collection trucks went out every weekday, but since PAYT, the program has been able to cut collection to four days per week."	Staub, C. (2018)

Other Resource Requirements or Anecdotal Information

Key Points	Notes	Pages
	Not specified	

Other Referenced Documents or Programs for Possible Review

Not specified

New Windsor, Maryland

Alternative Studied

Pay-as-you-throw

Bibliographical Information

Resource Type	Report
Organization	City of College Park
Contact information	https://www.collegeparkmd.gov/
File Name on SharePoint	None
Full Citation	College Park Committee for a Better Environment (CBE). (2019). <i>A SMART Program for College Park</i> . Retrieved from https://www.collegeparkmd.gov/AgendaCenter/ViewFile/Agenda/_09172019-857

Abstract/Summary

While the reference document was written for and by residents of College Park, the case study will focus on the city of New Windsor, Maryland, mentioned in the College Park report on pages 17-20 and 63-65.

New Windsor's PAYT pilot program, also known as a Fair Trash Reduction, or FuTuRe program, is a usage-based trash system. The program ran for eight months, at the end of which trash output decreased by 41.5% and recycling nearly doubled. Despite having widely been considered a success, for unknown reasons, the pilot came to an end with no clear plans for what is next for the city.

Education, Incentive, or Compliance Elements

Category	Subcategory
<input type="checkbox"/> Simplified materials list	<input type="checkbox"/> Simplified list of accepted materials
<input type="checkbox"/> Direct feedback	<input type="checkbox"/> Cart tagging <input type="checkbox"/> Compliance calls or letters <input type="checkbox"/> Compliance visits <input type="checkbox"/> Other direct feedback
<input type="checkbox"/> Compliance actions or disincentives for contaminating	<input type="checkbox"/> Contamination fines, fees, or surcharges <input type="checkbox"/> Refusal to collect contaminated recycling <input type="checkbox"/> Removal of recycling containers/service <input type="checkbox"/> Other disincentives
<input type="checkbox"/> Audience-tailored outreach campaigns/tools	<input type="checkbox"/> Commercial technical assistance <input type="checkbox"/> Customized materials/signage <input type="checkbox"/> Multi-lingual, image-based, or transcreated campaigns <input type="checkbox"/> Property manager engagement <input type="checkbox"/> School-based education <input type="checkbox"/> Other tailored campaigns/tools
<input type="checkbox"/> Broad media and outreach campaigns/tools	<input type="checkbox"/> Canvassing/door-to-door campaigns <input type="checkbox"/> Direct mail <input type="checkbox"/> Municipal/hauler website <input type="checkbox"/> Mobile apps <input type="checkbox"/> Online games <input type="checkbox"/> Social media campaigns <input type="checkbox"/> Other broad campaigns/tools
<input type="checkbox"/> Incentives for minimizing contamination	<input type="checkbox"/> Financial incentives <input type="checkbox"/> Other incentives
<input checked="" type="checkbox"/> Container size and pricing effects (do they increase contamination?)	<input type="checkbox"/> Container size <input checked="" type="checkbox"/> PAYT (pay as you throw), unit pricing, or variable pricing <input type="checkbox"/> Other

Details of Education, Incentive, or Compliance Elements

Key Points	Notes	Pages
PAYT	PAYT is a volume-based trash pricing system to incentivize residents to recycle and to reduce what goes in their trash.	3

Audience(s)

Geographic Scope (<i>e.g., neighborhood, city, state</i>)	City
City/County/State	New Windsor, Maryland
Community Type(s) — check all that apply	<input type="checkbox"/> Urban <input type="checkbox"/> Suburban <input type="checkbox"/> Rural <input checked="" type="checkbox"/> Other/Not Specified (ONS) <i>Comments if ONS:</i>
Generator Type(s) — check all that apply	<input checked="" type="checkbox"/> Single-family residential <input type="checkbox"/> Multifamily residential <input type="checkbox"/> Commercial <input type="checkbox"/> Drop-off
Population or Audience Size	27,770
Other Audience(s) Addressed (<i>if any</i>)	

Relevance to Project Goals

<input type="checkbox"/> Highly relevant and useful <input checked="" type="checkbox"/> Somewhat relevant and useful <input type="checkbox"/> Not very relevant or useful	
Justification/Comments:	This case study was helpful to understand the impact of PAYT on recycling and trash rates over eight months in New Windsor— data on contamination rates are not available.

Confidence in Results / Justification

<input type="checkbox"/> Highly confident <input type="checkbox"/> Somewhat confident <input checked="" type="checkbox"/> Not very confident	
Justification/Comments:	While this report provides detailed information over time, it is a case study within a case study, so the information is less reliable than other sources. Also, critical details are unknown (such as single stream v. multi stream)

Program Context

Collection Method(s) (e.g., single- vs. dual- vs. multi- stream)	Not specified
Special Equipment Used (e.g., split carts, hopper cameras, on-route apps)	Not specified
Accepted Materials (group by bin, if not single stream)	Not specified
Other Companion Education and Outreach Programs	Not specified
Companion Incentives	Not specified
Companion Regulations	Not specified

Program Effectiveness

Contamination Rates

Key Points	Notes	Pages
Low contamination	The report explains that recycling contamination is lower than other towns in the county but does not give exact statistics.	65

Participation Rates

Key Points	Notes	Pages
	Not specified	

Capture Rates

Key Points	Notes	Pages
	Not specified	

Retention of Behavior Change Over Time

Key Points	Notes	Pages
Eight month sustained behavior	The report provides a chart detailing trash and recycling tonnage before and after implementing PAYT, and the results show sustained behavior change.	17, 63

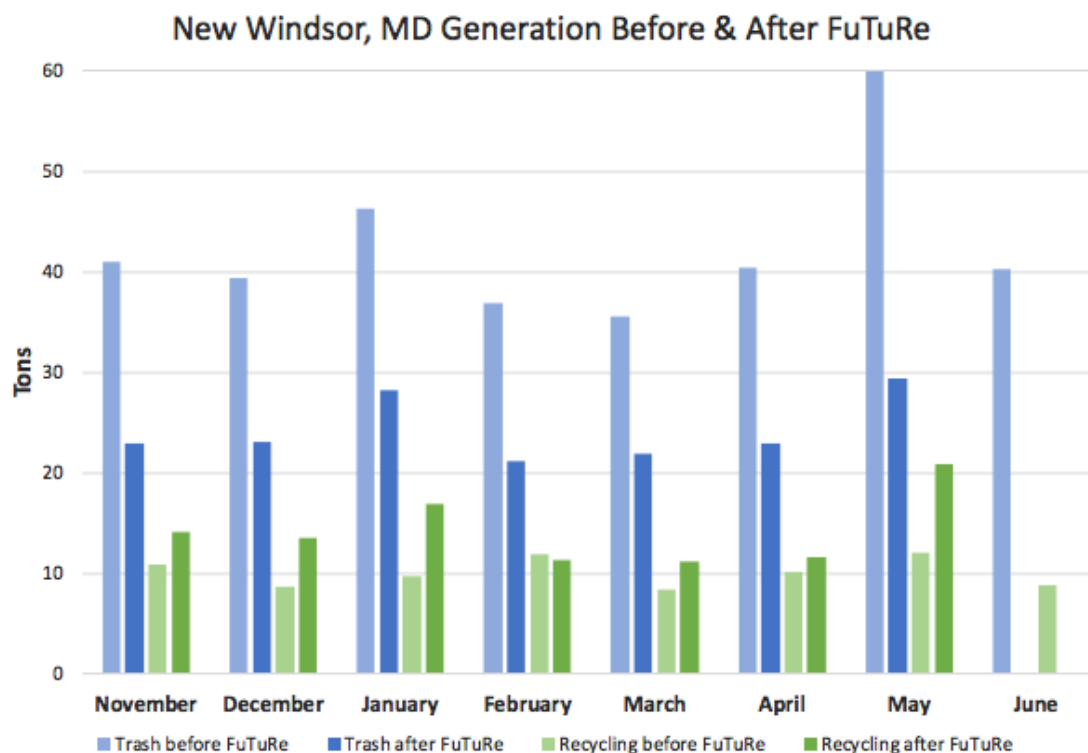


Image: Page 18

Other Metrics

Key Points	Notes	Pages
Overall waste production (trash and recycling) down 26%	While trash was reduced and recycling increased, overall curbside waste was significantly reduced. The report hypothesizes this is caused by more households donating, composting, or finding other ways to reduce waste.	16, 64
Recycling output increased	Recycling nearly doubled, as measured in tons. Before PAYT, recycling was only 19% of all curbside waste. After PAYT, it was 36%.	12, 14

Key Points	Notes	Pages
Trash output decreased	Trash output decreased by 41.5% as measured in tons. Before PAYT, trash was 81% of curbside waste. After PAYT, it was only 64%.	12,14

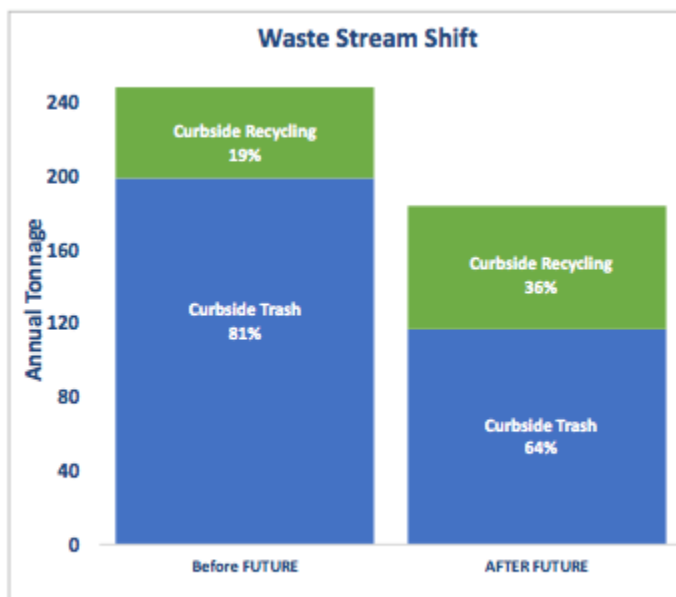


Image: page 19

Other Qualitative or Anecdotal Information

Key Points	Notes	Pages
	Not specified	

Consumer Acceptance

Key Points	Notes	Pages
Positive reception	"The mayor, council members and residents of New Windsor largely viewed the pilot program in a very positive light as reported by the Carroll County Times"	17

Other Notable Insights

Key Points	Notes
	Not specified

Resource Requirements

Staffing Requirements

Key Points	Notes	Pages
	Not specified	

Expenses

Key Points	Notes	Pages
Reduced tip fee	"The tip fee dropped by 43%" over the 8-month pilot program, meaning the city saves around \$13,300 annually.	12, 65

Other Resource Requirements or Anecdotal Information

Key Points	Notes	Pages
	Not specified	

Other Referenced Documents or Programs for Possible Review

Not specified