December 2021

ENCOURAGING BETTER CURBSIDE RECYCLING BEHAVIOR

#KnowWhattothrow — Recycle right, don't get bagged! © City of Ft. Worth, TX. Used with permission.

SWANA APPLIED RESEARCH FOUNDATION

Prepared for:
SWANA Applied Research Foundation
Sustainable Materials Management Group Subscribers

This page intentionally left blank

SWANA
APPLIED RESEARCH FOUNDATION

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

SWANA
APPLIED RESEARCH FOUNDATION

INTRODUCTION

Background

This report has been prepared by the SWANA Applied Research Foundation (ARF) to provide recycling and sustainability managers with up-to-date information and guidance on the costs and effectiveness of educational programs designed to reduce the contamination contained in residential curbside recycling programs.

This topic, which was submitted by the Medina County, OH Solid Waste District and Miami-Dade County, FL, was described as follows:

> *"What are the best ways to improve single-stream recycling through outreach and education? What is the best return on investment and results for methods of education, including social media? … Despite ongoing efforts to inform and re-educate the public about the impacts of contamination on recycling programs, a significant reduction in contamination rates has yet to be achieved. Research is needed to determine what the barriers are to effectively change contamination and improve recycling outcomes."*

It should be noted that the ARF recently published a report on *Reducing Contamination in Curbside Recycling Programs* in March 2021. This report documented that residents participating in curbside recycling programs can be divided into three groups: high-performers, learners, and under-performers, and that the majority of curbside recycling contamination in the programs analyzed was attributable to the under-performers group. It was concluded that, while education programs can positively impact the high-performers and learners groups, they are generally ineffective in changing the recycling behaviors of the under-performers group. The primary strategies that have been found to be effective in reducing recycling contamination from this group involve the non-servicing and/or pulling of contaminated carts and the issuance of cart contamination fines.

This report is being published as a companion to the report published in March 2021. The purpose of this report is to present the costs and effectiveness of educational program options that are designed to address and improve the recycling behaviors of high-performers and learners groups that want to participate correctly in curbside recycling programs.

The SWANA Applied Research Foundation (ARF)

This report was prepared by the SWANA ARF staff with input and guidance provided by the ARF Recycling Group Subscribers,[1] who are listed in Table 1-1.

[1] *The SWANA Applied Research Foundation was founded in 2001 with the purpose of conducting collectively-defined and funded applied research on pressing solid waste issues. It is funded by local governments and other organizations that contribute a "penny per ton" of waste managed to the Foundation on an annual basis. For more information on the SWANA Applied Research Foundation, please contact Jeremy O'Brien, Director of Applied Research, SWANA, (301) 585-2898.*

SWANA
APPLIED RESEARCH FOUNDATION

Table 1-1: SWANA ARF FY2022 Sustainable Materials Management Group Subscribers

Lisa Beursken
Solid Waste Coordinator,
Medina County Solid Waste District, OH

Brian Boerner
Director of Solid Waste and Recycling,
Denton, TX

Matt Evans, PE
Project Manager, Burns and McDonnell,
Minnesota SWANA Chapter

Eric Fasbender
Environmental Enforcement Officer,
Will County, IL
Illinois Land of Lincoln SWANA Chapter

Mike Fernandez
Director, Dept. of Solid Waste Management,
Miami-Dade County, FL

Eric Forbes
Chief, Recycling, Compliance and Planning, Solid Waste Management Program,
Fairfax County, VA

Joe Hack
Contracted Operations Core Process Manager.
Mecklenburg County, NC

Luann Meyer
Senior Project Manager, Barton and Loguidice, D.P.C.,
New York State SWANA Chapter

Guy Petraborg, PE, GE
Principal Engineer,
Monterey Regional Waste Management District, CA

Francis Veilleux
President,
Bluewater Recycling Association

Dave Van Vooren
Executive Director
Solid Waste Association of Northern Cook County, IL

Hamid Zaman, PhD, PEng
General Supervisor, Technical Services, Waste Services, City Operations
City of Edmonton, Alberta, CA

SWANA APPLIED RESEARCH FOUNDATION

CURBSIDE RECYCLING PUBLIC OUTREACH OPTIONS

Introduction

Public education and outreach campaigns are generally recognized as an essential component of successful curbside recycling programs. Two main purposes of these campaigns are increased residential participation and capture rates for the targeted materials and reduced contamination caused by non-targeted materials and discarded products.

The Recycling Partnership recommends that communities implement four strategies to reduce curbside recycling contamination:

- **Cart Inspection and Tagging** – using field personnel to inspect recycling carts on collection days and putting "oops" tags on carts that inform a resident what materials were found in their carts that are not recyclable in their curbside collection program
- **Contaminated Cart Rejection** – rejecting contaminated carts (not picking them up and leaving them on the curb)
- **Direct Mailing** – sending direct mailers or bill inserts to residents identifying what recyclables are and are not accepted
- **General Advertising** – using general advertising to promote what recyclables are and are not accepted[2]

A fifth strategy—**Social Media Outreach**—is also recommended and commonly utilized. Each of these five options are reviewed in this report.

Generally speaking, reliable data on the effectiveness of public outreach strategies are limited or non-existent. Since these strategies are often utilized by local governments and/or private haulers as part of their ongoing services, they are often implemented without the utilization of statistically valid methods that can measure and quantify the effectiveness of different strategies on customer behaviors.[3]

The Recycling Partnership has concluded that providing residents with direct feedback through cart tagging is a critical component of effective anti-contamination programs, and that programs that rely on education alone are not effective in addressing contamination.[4]

Effectiveness of Outreach Programs

The effectiveness of outreach programs is often difficult to quantify by recycling program administrators. Communities surveyed during The Recycling Partnership's *2019 West Coast Initiative Research* project reported they were already doing a lot of outreach but the message wasn't getting across to the residents.[5] Common outreach methods included periodic newsletters, service guides, bill inserts (harder to utilize as customers opt for electronic billing), mailers/postcards, social media, press releases, advertising, and tabling at events.

---

[2] *Mouw, Scott, 2020 State of Curbside Recycling Report,* The Recycling Partnership, *February 13, 2020.* https://recyclingpartnership.org/wp-content/uploads/dlm_uploads/2020/02/2020-State-of-Curbside-Recycling.pdf.

[3] *Cascadia Consulting Group.* Improving Oregon Recycling Systems Infrastructure: Research Customer Engagement Research Summary *(Phase 2 Task 3), June 15, 2020.* https://www.oregon.gov/deq/recycling/Documents/rscCustomerEngage.pdf.

[4] *Mouw, Scott,* 2020 State of Curbside Recycling Report, *February 2020.*

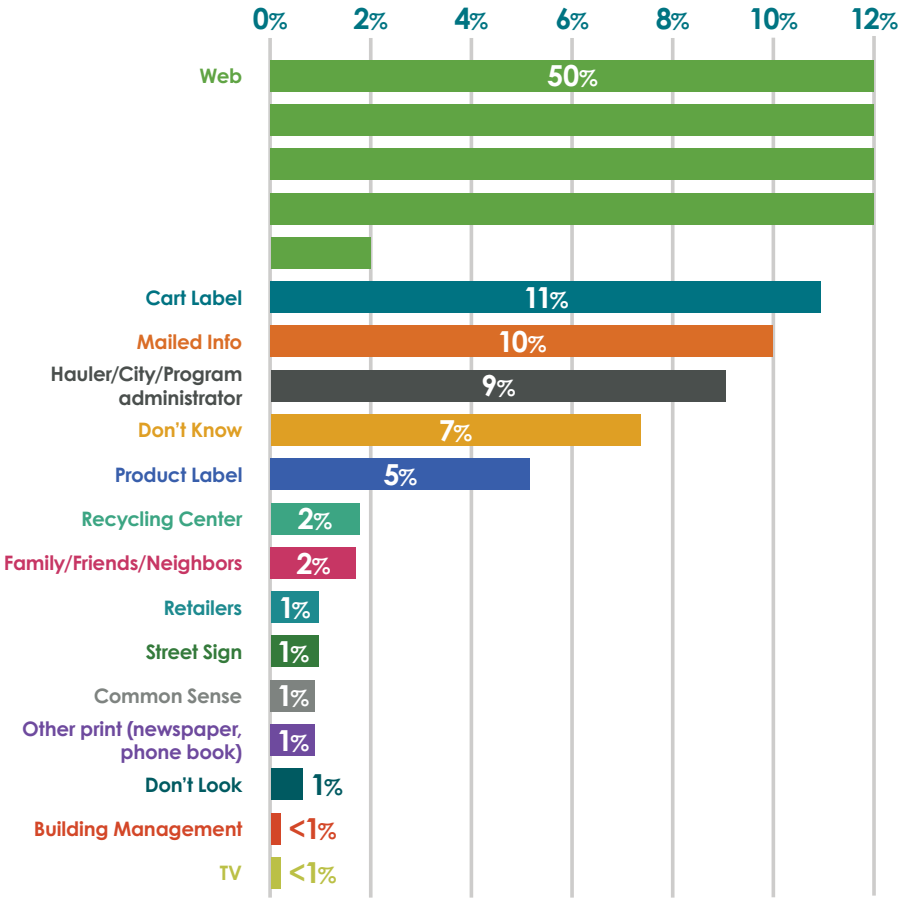
[5] *Tanimoto, Asami,* Addendum: 2019 West Coast Contamination Initiative Research Report, *The Recycling Partnership, April 2020.* https://recyclingpartnership.org/wp-content/uploads/2020/04/The-Recycling-Partnership_WCCI-Report_April-2020_Final.pdf.

Cart tagging experience in the surveyed West Coast communities ranged from never done, barely done, done regularly with or without cart rejection, to provided so frequently that there's "tag fatigue." Some communities are legally prohibited from inspecting their residents' recycling carts for contamination.

Many programs are developing a website or app with search tools so residents can find out what is and is not accepted in their curbside program. Some local programs have fees for contamination, but the potential to charge a fee is mainly used as an opportunity to talk to residents and is typically waived.

A graphic from The Recycling Partnership's *West Coast Contamination Initiative Research Report Addendum* is provided in Figure 2-1, and displays the effectiveness of outreach strategies on customer behavior based on responses from a survey of three states (CA, OR, and WA) involved in the project. As indicated, 50 percent of customers in these states rely on the web to access recycling program information, while about 10 percent of customers utilize the cart label, mailings, or the program administrator (or hauler) for their recycling information. Only one percent or less of customers use billboards/street signs, newspaper ads and other print media, or television for their information on recycling.[6]

Figure 2-1: Customer Information Sources for Recycling Program Information



Note: Answers were aggregated for all three states.

SOURCE: Tanimoto, Asami, Addendum: 2019 West Coast Contamination Initiative Research Report, *The Recycling Partnership, April 2020, Figure 64.*

[6] *Ibid.*

Based on governmental and MRF surveys, plastic bags and film were identified as one of the top contaminants in West Coast communities. To gain a better understanding of attitudes, behaviors, perceptions, and motivations around proper disposal of plastic bags and film, additional surveys and focus groups were conducted.[7]

For example, in November 2019, a survey was conducted by OpinionWorks of 481 Asian or Latino residents in Los Angeles County. The survey findings regarding information preferences of Asian and Latino populations are presented in Figure 2-2.

As indicated, the Refrigerator magnet was the most popular information source for the Asian group, while videos on recycling were the most preferred source for the Latino group. The city website (accessed through the web) was the preferred information resource for 47 percent of the Asian group and 50 percent of the Latino group. This finding is in agreement with that of the three-state survey presented in Figure 2-1 that found the Web was the most popular information source (50 percent) for recycling customers in CA, OR, and WA.

Figure 2-2: Information Preferences for Asians and Latinos in Los Angeles County

Information preferences	Asian in Los Angeles County	Latino in Los Angeles County
Refrigerator magnet	59%	47%
Videos (tips on recycling)	41%	54%
City website	47%	50%
Email	41%	50%
In person	35%	49%
Text reminders	32%	37%
Cart label sticker	15%	19%
Infocard	9%	18%
No preference	13%	11%
Would not use it	4%	6%

*multiple answers possible

OpinionWorks

Outreach Program Costs

For recycling outreach programs to be conducted, their costs must be included as part of a community's recycling budget. Combined data from The Recycling Partnership's *2019 State of Curbside Survey*, the Municipal Membership Program (MMP), and The Recycling Partnership's West Coast Contamination Initiative provides insights into how programs are faring on this issue.[8]

Of the verified data community reports for MMP, a healthy 75 percent of communities indicated having an outreach budget for recycling, with the average recycling outreach fund budgeted at $0.95 per curbside household served per year. Of 262 The Recycling Partnership's *2019 State of Curbside Survey* respondents answering optional questions, 56 percent reported an outreach budget averaging $1.06 per curbside household served per year. In *West Coast* research, 44 percent of Washington and Oregon communities reported having a dedicated recycling outreach

[7] *Tanimoto, Asami,* Addendum: 2019.

[8] *Mouw, Scott,* 2020 State of Curbside Recycling Report*, February 2020. The Municipal Membership Program (MMP™) is a free program assessment and planning tool that delivers insights and actionable recommendations to municipal, county, and other regional waste management agencies. The tool was designed by the Recycling Partnership and Re-TRAC Connect™ to create a centralized database of local government program information that state, county, and regional agencies can use to improve recycling in the United States.* https://www.municipalmeasurement.com/.

budget at an average of $1.29 per household while the 17 percent of California communities reporting a dedicated budget are spending $0.64 per household per year. Across all of the communities from all sources of data for this analysis, 51 percent reported having a dedicated budget spending $1.16 per household per year. (See Table 2-1).

Table 2-1: Average Annual Budgets for Community Recycling Outreach Programs

Data Source	States	Percentage of Programs	Average Annual Budget ($/Household/Year)
Municipal Measurement Program		75%	$0.95
The Recycling Partnership		56%	$1.06
West Coast Contamination Initiative	Washington and Oregon	44%	$1.29
	California	17%	$0.64
All Communities		51%	$1.16

The Recycling Partnership indicated these outreach budget data are not likely to be representative of outreach budgets for all U.S. curbside programs as communities that are generally higher performing are the ones likely to respond to data requests from The Recycling Partnership. Taking this perspective into account, it is likely that well less than half of communities have dedicated outreach budgets to help optimize program performance.[9]

Finally, it is likely that the outreach program cost data presented in Table 2-1 do not include the cost of cart inspection and tagging programs. As will be discussed below, these programs are estimated to cost $1.50–$2.50 per household per year.

[9] *Mouw, Scott,* 2020 State of Curbside Recycling Report, *February 2020.*

CART INSPECTION AND TAGGING

Introduction

Cart inspection and tagging involves the periodic visual inspection of the contents of recycling carts set out for collection, leaving written information (e.g., tags) that identify the contaminants found in the cart, and provide instructions on how these contaminants should be otherwise managed or disposed.[10] In some cases, contaminated carts are not emptied but are left unloaded at the curb with instructions provided to the resident on what contaminants must be removed before the cart is serviced.

The Recycling Partnership has concluded that providing residents with direct feedback through cart tagging is a critical component of effective anti-contamination programs, and that programs relying on education alone are not effective in addressing contamination. In a recent report, The Recycling Partnership states that:

> *"In 2016, we deployed only the education component in one community and saw no significant changes to overall contamination or the specifically targeted issue (bagged recyclables) in that community. This supports our belief that combining education and direct feedback at the curb is a best practice and will more likely achieve the best outcomes."*[11]

Cart tagging is one of the most commonly used methods of direct feedback and is often combined with educational outreach and/or enforcement action related to non-compliance. The Recycling Partnership recommends that municipalities implement outreach programs—specifically direct mail and community signage—to educate customers about what materials are accepted in curbside recycling before using cart tagging.

Cart tagging studies generally report data on the number of tags placed during each inspection cycle, noting changes between the first round of "Oops" and/or "Nice Job" cart tagging and subsequent rounds. Some measure actual contamination rates using a cart-based waste characterization study conducted before and after the tagging campaigns.[12]

In a *Customer Engagement Research* project conducted for the state of Oregon's Department of Environment and Partners in 2019–2020, the Cascadia Consulting Group prepared several case studies where the impact of cart tagging was evaluated separately from compliance actions such as cart removal or issuance of fines. Cart tagging case studies were provided for the following options:

- Cart tagging without inspection
- Cart tagging with inspection
- Cart tagging with inspection and non-servicing of contaminated carts

While none of the reviewed studies provided reliable data on the long-term impacts of cart tagging on cart contamination, all of them documented reduction in contamination rates in the short term due to cart tagging feedback.[13]

[10] *This section on cart tagging applies equally to bin-based recycling.*
[11] *The Recycling Partnership,* Anti-Contamination Recycling Kit, *June 2018. (Developed in collaboration with Massachusetts Department of Environmental Protection).* https://recyclingpartnership.org/wp-content/uploads/2018/06/Anti-Contamination-Toolkit.pdf.
[12] *Cascadia,* Improving Oregon*, June 15, 2020.*
[13] *Ibid. The Cascadia report is referenced repeatedly in this section. SWANA would like to acknowledge and thank Cascadia for its contributions to this field of research.*

Cart Tagging Without Inspection

Overview

In its simplest form, cart tagging involves the conduct of an outreach campaign in which tags are placed on every set-out recycling cart with the same generic message regarding what can and cannot be placed in the recycling cart. This campaign option is conducted without the inspection of cart contents.

Case Study: Snohomish County, WA

In Snohomish County, WA, Waste Management (WM) employed the Cascadia Consulting Group to test the effectiveness of two types of cart tagging:

1. Generic Cart Tagging (without cart inspection)
2. Individualized Cart Tagging (following cart inspection)

The goal of the cart tagging program, which was conducted in 2018, was to reduce the quantities of plastic bags and bagged recyclables being placed in the recycling carts.[14]

During the study, two rounds of tagging were conducted for four residential recycling routes with two routes and over 1,300 households in each group.[15] Group A households received individualized cart tags following a visual inspection of their carts. These individualized tags provided feedback ("Oops" tags) on specific types of contamination observed in their carts, which were not serviced if found to be contaminated. Group B households received generic cart tags with simple recycling instructions that were attached to all recycling carts without inspection of the cart contents.

The assumption at the outset of study was that individualized cart tags would be more effective at reducing contamination while the generic tags would be less effective but would also result in some reduced film contamination. However, while both types of tagging significantly reduced the levels of plastic film and bagged recycling, the generic tag (without cart inspection) option was found to be more effective at reducing each type of contamination.[16]

Contamination rates were measured before and after tagging by collecting and sorting the contents of individual carts from 160 randomly-selected households (80 from each group) before and after the two rounds of tagging.[17] The households selected for post-tagging cart sorting were the same as the pre-tagging households (assuming recycling carts for these households were set out on their sampling day).

Following the two rounds of cart tagging, the number of carts that included plastic bags and film was found to decrease at a statistically significant level in both groups, and the number of carts with bagged materials also decreased. The decrease in the placement of bagged materials was larger in Group B households (generic cart tagging without inspection) while the decrease in clean plastic bags and film was similar for both groups.

While the overall contamination rate did not change after the tagging campaign, of the 278 households that were tagging during the first round of tagging, only 36 percent (100 households) received an "Oops" tag during the second round of tagging.[18]

[14] *Cascadia,* Improving Oregon, *June 15, 2020.*
[15] *Kohlstedt, J., Cart Tagging from East to West: A Tale of Two Tags,* Waste Management, *April 30, 2019.*
[16] *Ibid.*
[17] *The sample size was established to enable the determination of whether a change in contamination rates of at least 20 percent occurred with statistical significance at the 90 percent confidence level.*
[18] *Kohlstedt, Cart Tagging, April 30, 2019.*

The study found that the average household contamination rate fell slightly (from 12.3 to 11.4 percent) in Group A (individualized cart inspection and tagging), while it increased (from 11.9 to 14.2 percent) in Group B (generic cart tagging without inspection). However, these differences were not found to be statistically significant. (See Table 3-1). In summary, the study concluded generic cart tagging without cart inspection was found to be as effective in addressing contamination as individualized cart inspection and tagging.

Table 3-1: Results of Waste Management Cart-Tagging Tests (2018)

Cart Tagging Option	No. Households	No. Routes	No. Tagging Events	Overall Contamination Rate	Bagged Recyclables	Plastic Bags
Generic Cart Tagging without Inspection	1,300	2	2	Increased from 11.9 to 14.2 %	Larger Decrease	Significant Decrease
Individualized Cart Inspection and Tagging	1,300	2	2	Decreased from 12.3 to 11.4%	Decrease	Significant Decrease

Cart Tagging with Inspection

Overview

Cart tagging and inspection programs involve the inspection of all set-out carts on specific routes or areas during which direct feedback is provide to the residents by attaching an "Oops!" tag to carts found to have contamination. These campaigns may also use "Good job!" tags for carts without contamination and often provide additional education through signs on collection vehicles, direct mail, local or social media, or other community-based outreach options.

To implement this option, inspectors walk from cart to cart, open the lids of each cart, and visually inspect the cart for contaminants being targeted by the program. The inspector then checks the contaminants on the "Oops" tag, which is then tied to the cart. Once it's tagged with an "Oops" tag, the cart may or may not be serviced, depending on the local policy regarding contamination.

Case Study: Clackamas County, OR

Clackamas County, Oregon conducted a cart-tagging exercise in 2018 to test the efficacy of using cart tags to reduce the number of contaminated recycling carts.[19] Over the course of six weeks, the study administrators conducted 22,286 household visits and inspected 11,809 set-out carts, leaving either an "Oops!" tag or a "Nice job" tag. (See Figure 3-1.)[20]

During the first week, only 37 percent of homes across all neighborhoods received a "Nice job" tag. By the sixth and final week of the study, that number had risen to 54 percent. The most common items people mistakenly recycled included plastic bags, paper towels, to-go cups for hot and cold drinks, and plastic "clamshell" containers. None of these items were included for collection in the county's curbside recycling program.[21] The cart tagging option was conducted without utilizing other anti-contamination outreaches (such as direct mailing) to determine the degree of contamination reduction that could be expected from this single approach.

[19] *Tomolla Consulting,* Single-Family Residential Recycling Cart Tagging Project: Clackamas County, *2018.*
[20] *Clackamas County, "Recycle Right Project, https://www.clackamas.us/recycling/recycleright.html.*
[21] *Ibid.*

Figure 3-1: Clackamas County Recycle Right Cart Tags

SOURCE: Clackamas County Sustainability & Solid Waste Program, used with permission.

Cart Tagging and Non-Servicing of Contaminated Carts

Overview

The inspection and tagging of carts, coupled with the non-servicing of contaminated carts, is another cart-tagging outreach campaign option. The Recycling Partnership's *Anti-Contamination Recycling Kit* recommends communities implement this cart-tagging option for eight collection service cycles and combine this effort with additional education options including direct mailers; social, earned, and purchased media; local signage; and community events.[22]

These campaigns are generally time-limited and typically focus on specific routes known to have high cart contamination rates. During the campaign, all carts on a route are visually inspected and "Oops" tags are attached to the carts found to have contaminants. 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.

[22] *The Recycling Partnership,* Anti-Contamination Recycling Kit, *June 2018.*

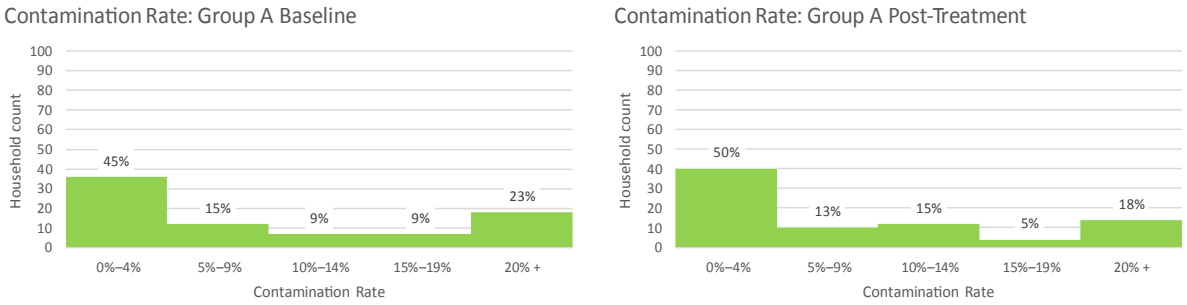
Case Study: Snohomish County, WA

The Snohomish County case study presented previously also included testing of the "cart tagging and the non-servicing of contaminated carts" approach. During the study, two rounds of tagging were conducted for four residential recycling routes with two routes and over 1,300 households in each group.[23] Group A households received individualized cart tags following a visual inspection of their carts. These individualized tags provided feedback ("Oops" tags) on specific types of contamination observed in their carts, which were not serviced if found to be contaminated. Group B households received generic cart tags with simple recycling instructions that were attached to all recycling carts without inspection of the cart contents. Importantly, the study results were based on the actual sorting and weighing of contaminants found in 160 randomly selected households (80 from each group) before and after the two rounds of tagging.[24]

The study found that the average household contamination rate fell slightly (from 12.3 to 11.4 percent) in Group A carts. Following two rounds of cart tagging, the number of carts that included plastic bags and film was found to decrease at a statistically significant level in both groups. The number of carts with bagged materials also decreased. The decrease in placement of bagged materials was larger in Group B households (generic cart tagging without inspection), while the decrease in plastic bags and film was similar for both groups.

As indicated in Figure 3-2, more Group A households were found to have low levels of contamination (less than five percent of the cart contents by weight) and fewer households had high contamination levels (20 percent or more of cart contents by weight) after the cart-tagging campaign.[25] As stated above, the study concluded generic cart tagging without cart inspection is equally effective in addressing contamination as individualized cart inspection, tagging and no-servicing of contaminated carts.

Figure 3-2: Snohomish County, WA Cart Tagging Study: Cart Contamination Rates before and after Individualized Cart Inspection and Tagging



Cart Tagging Program Costs and Financing

Introduction

Cart tagging has been found to be one of the most effective methods of reducing curbside recycling contamination. However, it is labor-intensive and therefore relatively expensive. 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).[26]

[23] *Kohlstedt,* Cart Tagging, *April 30, 2019.*
[24] *Sample size was established to determine whether a change in contamination rates of at least 20 percent occurred with statistical significance at the 90 percent confidence level.*
[25] *Kohlstedt,* Cart Tagging, *April 30, 2019.*
[26] *The Recycling Partnership,* Anti-Contamination Recycling Kit, *June 2018.*

Case Study: Fort Worth, TX

The city of Fort Worth, TX employs a "Blue Crew" of six cart inspectors who inspect their residents' carts on collection days. An estimate is provided in Table 3-2 of the costs of this cart tagging program, which covers 291,739 single-family households who receive weekly curbside collection of recyclables. The cost of the cart inspection program in Fort Worth is estimated at $1.71 per household per year, or $0.14 per household per month.[27]

This program cost can be compared to an estimate of the savings associated with reduced recycling contamination in Fort Worth, which is provided in Table 3-3. This estimate is based on a MRF processing cost of $90.36 per ton, a contamination hauling cost of $10.52 per ton, and a recyclables (including contaminants) set-out rate of 0.23 tons per household per year.[28]

Table 3-2: Cart Tagging Program Costs: Fort Worth, TX

Single-Family Households	291,739
Persons/HH	2.88
Recyclables Collection Frequency	Weekly
No. of Blue Crew Inspectors	6
Annual Program Cost Estimate	$500,000
Cost Per Household	
Annual	$1.71
Per Month	$0.14

Table 3-3: Fort Worth, TX: Estimate of Annual Savings Due to Reduced Contamination

	Units	Value
Single-stream recyclables/contamination collected per household	Tons/household/year	0.23
Households served	Households	291,739
Single-stream recycling mix collected and processed	Tons/year	67,100
Assumed MRF processing costs	Per ton	$90.36
Hauling of contamination to landfill	Per ton	10.52
Original contamination rate		28%
New contamination rate		21%
Reduced contamination	Tons/yr	4,697
Annual Savings		$473,833

As the table indicates, the city can expect to save about $475,000 per year by reducing its contamination rate from 28 to 21 percent through its cart inspection and tagging program. These savings would cover about 95 percent of the city's cart tagging programming annual costs of $500,000.

[27] *Email from Robert Smouse, Assistant Director, Solid Waste Services, City of Fort Worth, TX to Jeremy O'Brien, Director of Applied Research, SWANA, May 28, 2021. Mr. Smouse estimated the costs of the Fort Worth cart tagging program to be $450–550k per year, and stated that contamination declined from 28 percent down to 20–22 percent.*

[28] *Mouw, Scott,* 2020 State of Curbside Recycling Report, *February 2020.*

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 commented that some residents appreciated the opportunity to learn about acceptable materials through the cart tags.[29]

Drawbacks

Implementing cart tagging campaigns increases outreach costs; the cost savings from reduced contamination may help offset these costs. Several reports noted 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.[30]

Conclusions

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.

[29] *Cascadia Consulting Group.* Improving Oregon Recycling Systems Infrastructure, *June 15, 2020.*
[30] *Ibid.*

CART REMOVAL AND/OR FINE ISSUANCE

Introduction

As described in the companion report to this publication, residents participating in curbside recycling programs can be divided into three groups: high-performers, learners, and under-performers.[31] Furthermore, it is likely that a significant percentage of residents in any given community belong to the under-performers group. Research has shown that this group is often not motivated to recycle properly and may not be impacted by increased or improved recycling education programs. Research has also shown that this group is responsible for over 50 percent of contamination in curbside recycling programs.

Two strategies have been found to have an impact on reducing the contamination caused by this group. The first is the removal of their recycling carts with the stipulation that carts will only be returned if they demonstrate a good faith effort to comply with the recycling program's rules. The second strategy is to impose fines if recycling carts are found to be highly contaminated, and to remove the carts until the fines have been paid.

The rationale behind the adoption of these strategies is that participation in curbside recycling programs must be considered a privilege that is earned by commitments from residents to comply with applicable rules. Furthermore, this privilege can be revoked from those residents whose improper behavior is adding significant costs and safety problems at the MRF and detracting from the community's ability to achieve the program's goals.

In implementing these types of enforcement options, recycling and sustainability program managers must have the support of their local elected officials as there is likely to be pushback from under-performing residents.

Figure 4-1: Clackamas County, OR "Nice Job" Ticket

© Clackamas Sustainability & Solid Waste Program, used with permission.

[31] *SWANA Applied Research Foundation.* Reducing Contamination in Curbside Recycling Programs*, March 2021.*

Case Study: Jackson County, OR

A family-owned hauler in Jackson County, OR combined a reduced recycling list, an enhanced educational outreach campaign, and a cart tagging and removal policy to address the community's recycling contamination issue.[32]

Following the China National Sword policy that took effect in 2018, the hauler, Rogue Disposal & Recycling, reduced its list of targeted recyclables to corrugated cardboard, newspaper and inserts, aluminum and steel cans, and clear milk-jug-style bottles.

Rogue's collection trucks are equipped with truck hopper cameras that enable its drivers to view a cart's contents as it is emptied into the truck hopper. When a driver sees contamination, the cart is tagged, and the incident is documented with the driver's tablet computer. During the next collection service, the tablet alerts the driver to those households that had contamination issues the previous week so that the driver can inspect the cart before servicing it, and leave an "Oops!" tag on the uncollected cart if it is found to have contaminants. The driver also documents the contamination with a photo that is provided to customer service representatives, along with the driver's report so they can send letters to the affected customers and respond properly to customer calls regarding the non-servicing of their carts. Following the third finding of contamination, Rogue removes the recycling cart from the household for six months.

From March to December 2018, the cart inspection, tagging, and removal program resulted in a reduction in single-family cart contamination from 48 percent (of which 25 percent was garbage, and 23 percent was material previously accepted for recycling but removed from the list) to 27 percent (13 percent garbage and 14 percent previously but no longer accepted materials) on a weight basis. By September 2019, contamination had decreased to 20 percent (seven percent garbage and 13 percent previously but no longer accepted materials). The number of compliance letters sent decreased from 6,693 in April–May 2018 to 1,036 in April–May 2019: an 85 percent decrease. The recycling cart set-out rate also decreased, possibly due to a smaller list of targeted recyclables causing carts to fill more slowly. However, overall participation by residents in the curbside recycling program did not change.[33]

[32] *Cascadia Consulting Group.* Improving Oregon Recycling Systems Infrastructure, *June 15, 2020.*
[33] *Ibid*

DIRECT MAILING

Introduction

Direct mail is considered an inexpensive option when compared with other marketing strategies.[34] The Recycling Partnership recommends two types of direct mailing to provide information to residents regarding curbside recycling contamination:

- **Annual Curbside Information Card** – An information card should be prepared and mailed out each year to provide residents with updated information on their curbside recycling program. The purpose of the card is to provide residents with an easy reference guide identifying what products and materials are targeted for recycling and what are considered contaminants. These cards should be mailed to every household on the service provider's most contaminated routes. The local Geographic Information System (GIS) or planning department should be able to provide mailing addresses and the local post office, or a local printer might be able to help with the identification specific mail carrier routes that serve the contaminated routes.
- **Top issue mailer** – Curbside recycling service providers should also target their most problematic contaminant by preparing an issue-specific card to be mailed two collection cycles after the annual information card is mailed.[35]

Why use direct mail? Research suggests direct mail recipients bought 28 percent more products and spent 28 percent more compared to people who didn't receive direct mail. Hence, the return on investment (ROI) is apparently positive and much better than the ROI generated through digital marketing.[36]

Direct mail marketing costs depend on various items including graphics, copy, type of collateral, printing, personalization, number of mailings, and postage. Direct mail pieces can cost anywhere from $0.30 to more than $10 per household, depending on how much is spent on design, marketing copy, mailing lists, printing, and distribution costs. Some organizations and companies do much of this work in-house and only pay for printing and mailing.

Postcards are the most common type of direct mail. Simple ideas can be easily communicated through postcards, and they are also a very cost-effective choice. Standard postcard postage rates start at $0.36, whereas letters can cost $0.55 per piece. However, substantial discounts are available for bulk mailing. Marketers use the standard mail option to cut down direct mail advertising costs. The rates for sending through this mail option start at $0.19 per item and depend on format and size.

Case Study: Napa, CA

Residents in the City of Napa, California have had access to single-stream recycling and green waste collection for many years. Napa Recycling & Waste Services (NRWS) is under contract with the City of Napa to provide weekly collection service of recyclables, organics, and trash. NRWS offers pay-as-you-throw pricing for trash collection to help incentivize separation of recyclables and organics. Weekly recycling and organics collection service is free (up to two carts for recycling and two for organics).

Like many municipal curbside programs, the City of Napa and NRWS must deal with contamination from non-recyclable and non-compostable items placed in residential recycling and organics carts. They have utilized stickers

[34] *"Direct Mail Marketing: How Much Does Direct Mail Cost?"* PostGrid, *https://www.postgrid.com/direct-mail-marketing-costs/.*
[35] *The Recycling Partnership,* Anti-Contamination Recycling Kit, *June 2018.*
[36] *"Direct Mail Marketing,"* PostGrid.

on carts, hung "Oops" tags, and used other messaging tools to educate households about proper separation and what materials are allowed in recycling and organics carts.

In 2019, the City of Napa Recycling Division ran three different pilots to test the effectiveness of two community-based social marketing (CBSM) tools targeted at the recycling stream: postcards and cart stickers. In January 2019, the Recycling Division mailed two postcards to households, each with a different message. One postcard had the headline, "No Plastic Bags or Wrap In Your Blue Recycling Cart," with photos of the various bags; the other had the headline, "Landfill Soft Plastics" with photos identifying soft plastic items such as chip bags, film plastic, and sandwich bags that should be placed in the mixed waste cart.

Figure 5-1: No Plastic Bags or Wrap Postcard used in Napa, CA

© City of Napa Recycling Division, used with permission.

The *No Plastic Bags or Wrap* postcard was mailed to homes with Monday, Wednesday, and Thursday recycling collection. The *Landfill Soft Plastics* postcard was mailed to homes with Tuesday and Friday recycling collection. All data were collected using the Program Tracker digital recycling contamination tracking app. Thursday and Friday neighborhoods were then audited.

With both postcards, the percent of film/soft plastic contamination in the recycling carts was found to increase by seven percent with the *No Plastic Bags or Wrap* postcard, and 15 percent with the *Landfill Soft Plastics* postcard. Interestingly, the amount of soiled paper in the *No Plastic Bags or Wrap* postcard route increased by 13 percent, whereas it did not change in the other. All in all, there was not a statistical difference between the postcard messages, or a change in recycling behavior regarding contamination.[37]

[37] *Goldstein, Nora, "Reducing Contamination In Residential Curbside Carts,"* Biocycle*, (Sept 14, 2020).* https://www.biocycle.net/reducing-contamination-in-residential-curbside-carts/.

GENERAL ADVERTISING

Introduction

In its *Anti-Contamination Recycling Kit*, The Recycling Partnership recommends the use of general advertising tools such as A-Frame signs, billboards, bus ads, and posters at local stores, along with social media posts and newspaper/magazine ads, to address top contamination issues identified in curbside recycling programs. However, although The Recycling Partnership recommends the use of these tools, it does not believe they will have a significant impact. In 2016, The Recycling Partnership reported it deployed only the education component in one community and saw no significant changes to overall contamination or the specifically targeted issue (bagged recyclables) in that community.[38]

In Denver, a 16-week The Recycling Partnership-supported campaign focused on improving aluminum metal container recycling resulted in increased capture rates of 25 percent between May and October 2017. The campaign involved direct mail, 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 conducted in November 2017, 43 percent of respondents said they remembered the cart tag compared to 14–18 percent who remembered receiving a postcard. Some 11–13 percent of the respondents recalled seeing a recycling truck sign while only one–two percent remembered a Facebook post.[39]

Figure 6-1: OOPS! Tag: City of Gainesville, FL

© City of Gainesville, FL, used with permission.

[38] *The Recycling Partnership,* Anti-Contamination Recycling Kit, *June 2018.*
[39] *Cascadia Consulting Group.* Improving Oregon Recycling Systems Infrastructure, *June 15, 2020.*

Case Study: Mecklenburg County, NC

Mecklenburg County is a county located in the southwestern region of the state of North Carolina in the United States. As of the 2010 census, the population was 919,618 which increased to 1,110,356 as of the 2019 estimate, making it the second-most populous county in North Carolina (after Wake County). Its county seat is Charlotte, which is the state's largest city.[40]

Mecklenburg County operates a large MRF that separates recyclables into their various commodity types, such as cardboard, ferrous metal, and aluminum. The MRF serves unincorporated areas of the county as well as the city of Charlotte and the towns of Huntersville, Matthews, Mint-Hill, Pineville, Gastonia, Cornelius, Weddington, Davidson, and Stallings.

The county's FY2021 budget for recycling outreach is presented in Table 6-1. The annual cost equates to $0.78 per household per year, which is in line with the outreach budgets reported in Table 2-1. It should be noted these costs do not include costs associated with the recycling education and outreach efforts conducted by the collection service provider for the city of Charlotte's curbside recycling program.[41]

Table 6-1: Mecklenburg County, NC Recycling Outreach Budget

Outreach Method	Annual Cost	Percent
Television	$77,520	21%
Digital	$39,000	11%
Billboards	$24,000	7%
Utility Bill Inserts	$20,000	5%
Print	$45,400	12%
Radio	$58,000	16%
	$263,920	73%
Content Development	$100,000	27%
Total	**$363,920**	**100%**
Total per household	**$0.78**	
Total per person	**$0.36**	

SOURCE: 465 single-family households.

[40] *Wikipedia. https://en.wikipedia.org/wiki/Mecklenburg_County,_North_Carolina.*

[41] *Recyclables are collected in Charlotte every-other-week on the same day as garbage and yard waste collection. Waste Management (WM) is the service provider for recycling collection services. The recyclables are collected in a "single-stream" format, being commingled together and set out in 96-gallon roll-out carts by the residents for collection.*

SOCIAL MEDIA CAMPAIGNS

Introduction

In its *Anti-Contamination Recycling Kit*, The Recycling Partnership recommends communities make use of social media and the local government/authority's website to remind residents how to recycle better. The Recycling Partnership provides a social media kit on its website for ideas on how to conduct social media campaigns that address recycling contamination.[42] According to MassDEP, many jurisdictions use social media due to its low cost.[43]

Figure 7-1: The Recycling Partnership Social Media Campaign: 12 Days of Posts

© 2019 The Recycling Partnership, used with permission. More social media resources are available to recycling and sustainability managers at https://recyclingpartnership.org/.

Case Study: Washington State

Washington state's recycling programs have a long history of encouraging people to recycle more, but when China stopped importing discarded paper and plastic with elevated contamination levels as part of National Sword in 2018, the emphasis switched to encouraging residents to recycle right.

C+C (the PR firm contracted by the state) conducted a survey to identify the behaviors and attitudes driving recycling contamination, and then worked with the Washington Department of Ecology, King County, and a regional group of industry stakeholders to create the Recycle Right/Recicla bien brand. Through an eight-week statewide awareness campaign in English and Spanish on the importance of keeping recyclables empty, clean, and dry, the campaign earned 32 million impressions, 4.5 million video views and more than 10,000 social engagements. C+C also created an outreach toolkit for municipalities as well as a social marketing plan for addressing the problem long term.[44]

[42] *The Recycling Partnership,* Anti-Contamination Recycling Kit, *June 2018.*
[43] *Cascadia Consulting Group.* Improving Oregon Recycling Systems Infrastructure, *June 15, 2020.*
[44] *C+C. https://ecology.wa.gov/Waste-Toxics/Reducing-recycling-waste/How-to-recycle/Recycle-Right.*

FINDINGS AND CONCLUSIONS

The SWANA ARF recently published a report, *Reducing Contamination in Curbside Recycling Programs* in March 2021. The report documented the fact that residents participating in curbside recycling programs can be divided into three groups: high-performers, learners, and under-performers. Over 50 percent of curbside recycling contamination in the programs analyzed was attributable to the under-performers group. It concluded that while education programs can positively impact the high-performers and learners groups, they have been found to be ineffective in changing the recycling behaviors of the under-performers group. The primary strategies that have been found to be effective in reducing recycling contamination from this group involve the non-servicing and/or pulling of contaminated carts, and the issuance of cart contamination fines.

This report is being published as a companion to the ARF report published in March 2021. The purpose of this report is to present the costs and effectiveness of educational program options that are designed to address and improve the recycling behaviors of the high-performers and learners groups that want to participate correctly in curbside recycling programs. The findings and conclusions of this study regarding the costs and effectiveness of curbside recycling public outreach campaign options include the following:

- Residents participating in curbside recycling programs can be divided into three groups: high-performers, learners, and under-performers. To be effective, anti-contamination programs must be designed to address the perspectives and motivations of each of these three groups.
- The Recycling Partnership recommends communities implement four strategies to reduce curbside recycling contamination: cart inspection and tagging, contaminated cart rejection, direct mailing, and general advertising. A fifth strategy, social media outreach, is also recommended and commonly utilized.
- A research study published in 2020 by the Cascadia Consulting Group found reliable data on the effectiveness of public outreach strategies is limited or non-existent.
- The Recycling Partnership has concluded providing residents with direct feedback through cart tagging is a critical component of effective anti-contamination programs and programs that rely on education alone are not effective in addressing contamination.
- Communities surveyed during The Recycling Partnership's 2019 *West Coast Initiative Research* project reported they were already doing a lot of outreach but the message wasn't getting across to the residents.
- Cascadia also found that, for all of the communities in its study for which data was available, 51 percent reported having a dedicated recycling outreach budget and spent an average of $1.16 per household per year. These costs do not include the costs of cart inspection and tagging programs, which are estimated to cost $1.50–$2.50 per household per year.
- In 2021, Mecklenburg County spent about $364,000 on its public outreach program to address contamination of single-stream recyclables being processed at the County's MRF. This equated to $0.78 per household.
- In Snohomish County, WA, WM employed the Cascadia Consulting Group in 2018 to test the effectiveness of two types of cart tagging:
    1. Generic cart tagging (without cart inspection)
    2. Individualized cart tagging (following cart inspection)
- The study concluded generic cart tagging without cart inspection was as effective in addressing contamination as individualized cart inspection and tagging.

- A cart inspection and removal program implemented in 2019 in Jackson County, OR resulted in a 21 percent decrease in contamination.
- The costs of a cart inspection program in Fort Worth, TX, which utilized six cart inspection personnel, was estimated to be $500,000 in 2021 by the City's Assistant Director for Public Services. In comparison, savings from reduced contamination were estimated to be about $475,000 per year. As a result of the cart tagging program, contamination was reduced from 28 to 21 percent.
- Direct mailing of contamination-related postcards to residents is recommended by The Recycling Partnership. This option is considered to be relatively inexpensive when compared to other outreach options and can cost less than $0.50 per postcard mailed.
- The city of Napa, CA tested the effectiveness of using postcards to address recycling contamination issues in 2019. However, it found that the postcard outreach did not result in a measurable change in recycling contamination rates.

This page intentionally left blank

SWANA
APPLIED RESEARCH FOUNDATION

SWANA Applied Research Foundation
1100 Wayne Ave
Suite 650
Silver Spring, MD 20910
SWANA.org