

# MAXIMIZING FOOD SCRAP COMPOSTING THROUGH FRONT-OF-HOUSE COLLECTIONS AT FOOD ESTABLISHMENTS

## DEVELOPING BEST PRACTICES FOR CUSTOMER-FACING BINS

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With support from



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Eco-Cycle is one of the nation's oldest and largest nonprofit recyclers. The organization's mission is to identify, explore, and demonstrate the emerging frontiers of sustainable resource management through the concepts and practices of Zero Waste. We believe in personal and community action to transform society's throw-away ethic into environmentally-responsible stewardship.

For more information visit [www.ecocycle.org](http://www.ecocycle.org)

## WITH SUPPORT FROM ECO-PRODUCTS

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### TABLE OF CONTENTS

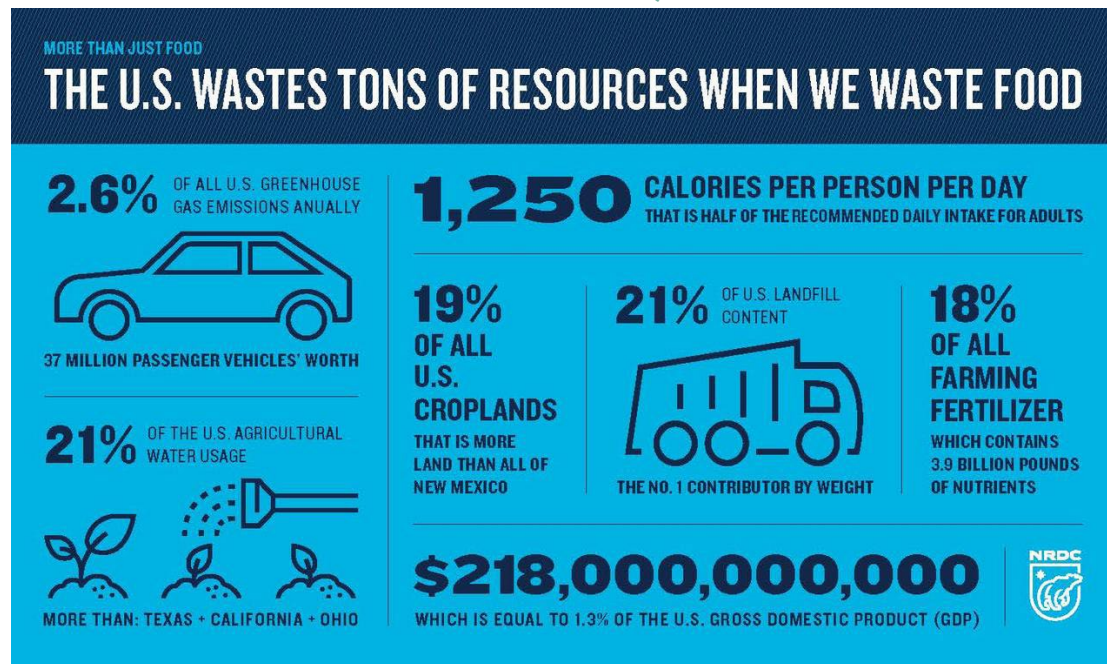
- Executive summary .....
- Key findings.....
- Background.....
- Overall diversion and contamination .....
- Composting bin findings and food scrap capture rates.....
- Composting bin contamination .....
- Recycling findings.....
- Recycling contamination .....
- Impacts of changes to bins and signage .....
- Observations of customer behavior .....
- Effects of packaging .....
- Conclusion.....
- Appendix .....
- Types of restaurants surveyed .....
- Timeline .....
- What is recyclable vs compostable .....

### EXECUTIVE SUMMARY

Food waste is an epidemic in America—nearly 40% of food goes uneaten. This makes wasted food a strong underlying contributor to many of our environmental crises. Food waste alone is responsible for at least 2.6 percent of all U.S. greenhouse gas emissions. Food and agriculture consume up to 16 percent of U.S. energy, almost half of all U.S. land and account for 67 percent of the nation’s freshwater use.<sup>1</sup>

Restaurants generate over 11.2 billion tons of food waste annually and play a critical role in reducing and recovering food scraps.<sup>2</sup> Less than 15% of restaurant food waste is collected for composting, and these efforts have primarily focused on collecting food scraps from the kitchen.<sup>3</sup> However, on average, diners leave 17 percent of meals uneaten, and 55 percent of these potential leftovers are not taken home.<sup>4</sup> This means there is a large, untapped potential to recover food waste generated by diners through front-of-house composting programs.

FIGURE 1: IMPACTS OF FOOD WASTE IN U.S. (GRAPHIC COURTESY OF NRDC).



Front-of-house (FOH) composting collection has always been viewed with skepticism by composters because of the perception that it comes along with high levels of contamination and a large ratio of packaging to food scraps. However, customer-facing composting bins are strongly desirable for cities pursuing aggressive recycling or Zero Waste goals—they represent a highly visible commitment to Zero Waste and can be a valuable tool for educating customers.

Boulder, Colorado is one of those cities pursuing a Zero Waste goal and targeting front-of-house recycling and composting collections at businesses, both as a way to increase diversion and as a tool to educate the community about how and why to participate in the Zero Waste programs.

In 2015, Boulder required all businesses to provide recycling and composting collections for both front- and back-of-house operations. From the onset of the city's program, there was concern about the quality and quantity of organic material collected in front-of-house, customer-facing bins. Eco-Cycle, the local non-profit recycler and a leading Zero Waste advocate, with support from Boulder-based Eco-Products, a leading manufacturer of compostable foodservice items, set out to learn how bin set-up, signage and packaging can influence how much food waste is collected through front-of-house systems, and how to minimize contamination while maximizing diversion.

**CITY OF BOULDER'S UNIVERSAL ZERO WASTE ORDINANCE**  
 In 2014, the city of Boulder hit a record-high 55 percent diversion for single-family homes. However, the city's commercial sector was lagging far behind, diverting only 25 percent of discarded materials. To reach its Zero Waste and climate goals, the City decided it needed to regulate recycling in the commercial sector. In 2015, Boulder approved its Universal Zero Waste Ordinance (UZWO), which requires that every home, business and apartment have recycling and composting services, including FOH composting bins at most food service businesses.

Waste audits were conducted at 18 businesses across five types of foodservice establishments--corporate cafeterias, grocery store delis, quick service restaurants, coffee shops and full service restaurants. Improvements were then made to the collection bins and signage

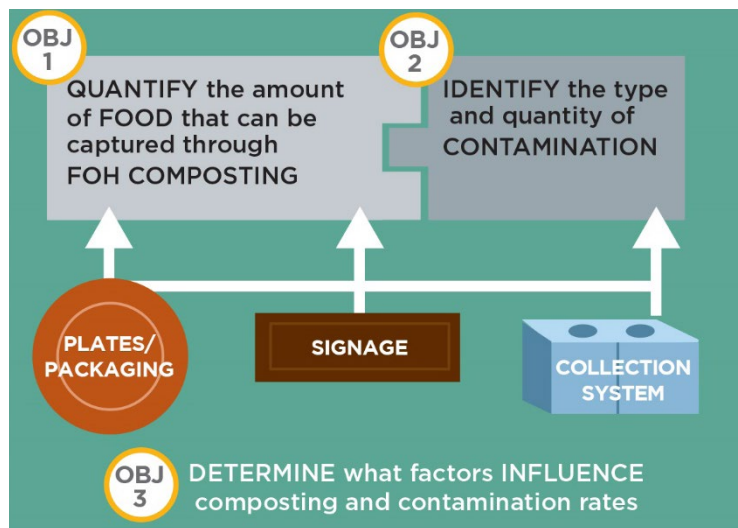
at 10 of the 18 locations and a second round of waste audits was conducted to observe any improvements in diversion and contamination (no changes were made at full service restaurants and some restaurants were unable to make changes during the project timeline).

The study demonstrates that food establishments of all types can achieve very high diversion rates and capture significant amounts of food scraps through front-of-house collections. While diversion rates, food capture rates and contamination rates varied widely between and within sectors, there was at least one high performing business in every sector. The majority of the compostable materials collected was food scraps and napkins, rather than packaging, with quick service and delis having the highest percentage of packaging in the composting bins compared to food scraps. This suggests that FOH composting collection could be a valuable new source of food scraps for commercial composting facilities.

The results suggest that improving the signage and the set-up of collection bins are likely to increase diversion rates and capture rates, and to reduce contamination rates, but improvements were not consistent in all cases. Contamination rates were markedly lower for composting bins than in recycling bins, and four out of five sectors recorded less than 11% contamination rates in composting bins. Lastly, recommendations were made on how to focus outreach efforts to the restaurant community, identifying which sectors offer a greater opportunity to capture more food waste and which sectors offer a greater opportunity to reduce contamination levels.

This research represents a work in progress and the authors hope that it spurs other communities to conduct similar research and improve upon these findings. Our methodology and additional resources are available online at [www.ecocycle.org/specialreports/restaurant-composting](http://www.ecocycle.org/specialreports/restaurant-composting).

**FIGURE 2: REPORT OBJECTIVES**



## KEY FINDINGS:

*Note: all calculations and percentage rates are based on weights of materials collected during waste audits; no volume-based measurements were used in this report. See p. 7 for explanations on how rates were calculated for all data tables.*

### High diversion rates are possible across all restaurant sectors:

- Restaurants in every sector achieved high levels of diversion, demonstrating this is

possible across all business types.

- Diversion rates varied widely by individual businesses, ranging from 9% up to 100%.
- Full service restaurants generally had the highest diversion rates.
- By improved sorting and no other changes to packaging or otherwise, every business type could achieve over 80% diversion rate.

**TABLE 1: SUMMARY OF REPORT DATA FINDINGS**

Sector	Overall diversion rate	Overall contamination rate	Food waste capture rate	Composting bin contamination rate
Full service restaurants*	85%	1%	98%	<1%
Deli	77%	20%	76%	8%
Coffee shops	80%	19%	57%	22%
Quick service	75%	37%	57%	11%
Cafeteria	67%	6%	76%	3%

\* Staff bussed tables at full service restaurants while customers bussed tables at most other establishments. See p. 10 for more on why full service restaurants were included in the study and still considered to have FOH composting collections.

**The amount of food scraps available for composting can be increased through FOH collections.**

- Food scraps and napkins comprised more than half of the compostable material collected in every sector, with the remainder being packaging. Coffee shops and cafeterias had three times more food scraps than packaging while delis and quick service restaurants had a 3:2 ratio of food scraps to packaging.
- Food scraps are not the largest part of the FOH waste stream in most restaurants, aside from full service establishments. Food scraps were only 16-35% of the total FOH waste stream in limited service restaurants, with recyclable materials making up a significant part of the waste stream.

**At least half the food waste generated by diners was already being collected in every sector.**

- Full service restaurants in the study were already capturing nearly 100% of the food scraps through staff sorting. (It is not clear that this is representative of the entire sector and important to note that the city of Boulder requires all businesses to have composting collection service).
- Capture rates vary widely within cafeterias, coffee shops and quick service, which

## DATA CALCULATIONS

Several different calculation terms and formulas are used throughout this report. They are all based on weight of materials collected during the waste audits:

### Diversion rate:

*amount of material correctly recycled or composted, i.e.*

$$= \frac{\text{recycling} + \text{composting}}{\text{recycling} + \text{composting} + \text{trash}}$$

### Potential diversion:

*total amount of materials that could have been recycled or composted, i.e.*

$$= \frac{\text{recycling} + \text{composting} + \text{all materials that could have been recycled or composted}}{\text{recycling} + \text{composting} + \text{trash}}$$

### Capture rate:

*how well the material was correctly sorted, i.e.*

$$= \frac{\text{recycling in recycling bin}}{\text{recycling in all three bins}} \quad \text{OR} \quad = \frac{\text{food scraps in composting bin}}{\text{all food scraps in three bins}}$$

### Contamination rate:

*amount of material placed in the incorrect bin, i.e.*

$$= \frac{\text{trash in recycling bin} + \text{compostable materials in recycling bin}}{\text{all materials in recycling bin}}$$

Unless otherwise noted, all calculations represent an average of the data collected during the first and second waste audits, i.e. diversion rates by sector are the average of the diversion rates in the first waste audits combined with the diversion rates in the second waste audits.

## DATA QUALITY

This report represents an initial baseline study on FOH composting and recycling collections, and hopes to serve as a guide for future research in other cities. It should not be construed as statistically relevant because of several limitations:

- The sample size was too small to represent the entire business community, with only 18 restaurants participating in the first round of waste audits and only 10 of those businesses receiving second audits.
- While there was a lot of variety between business types, including locally owned businesses, regional chains and national chains, as well as strong sustainability supporters and less enthusiastic participants, these businesses were not reflective of demographics of the entire food service community.
- There were challenges in securing sufficient quantities of trash, recycling and composting from several of the businesses. In some cases, the volumes sorted were quite low. However, the percentage of materials in each stream were relatively consistent among business types and within a reasonable range, which suggests the limited volumes were still accurate.
- More information is provided online as part of the methodology for how to improve collection volumes and data accuracy in future studies.



implies that high rates of success are possible based on best practices in collection systems.

- Food scraps that were not properly sorted overwhelmingly ended up in the trash can and not in the recycling bin.

### **Restaurants were generally using high amounts of recyclable or compostable packaging already.**

- The majority of food establishments were using at least 80% recyclable or compostable packaging. (See appendix for a full breakdown of what was considered recyclable or compostable based on local guidelines.)
- The total amount of recyclable and compostable packaging was a strong indicator of the overall diversion rate--businesses with a very high percentage of recyclable and compostable packaging also had very high diversion rates. As the percentage of recyclable/compostable packaging declined, diversion rate also declined.

### **The use of durable food serviceware or all compostable food serviceware were both strategies for success.**

- Both the quick service restaurant with all compostable food serviceware and the quick service restaurant with mostly durable food serviceware were top performers across all the categories measured, having high overall diversion rates, high rates of food waste capture and low contamination rates. This suggests that both approaches may be used to achieve these goals.
- The prevalent use of durable food serviceware in cafeterias was correlated to lower contamination rates.

### **Contamination rates were lower than 8% in three restaurant sectors**

- Full service restaurants, cafeterias and delis all had less than 8% contamination in the composting bins at all locations. This suggests that FOH collection at these locations can be done with a fairly clean stream of materials for the composting facility.
- The most common contaminants in composting bins were plastic lids, non-compostable boats, glass bottles and plastic utensils. Cardboard and paper were also commonly found in this bin, rather than the recycling bin.
- Contamination rates on average were higher in the recycling bins than the composting bins.

### **Changes to bins and signage were likely to increase capture rates and diversion.**

- Capture rates, overall diversion rates and overall contamination rates improved at most locations following changes to the signs and bins. However, results were mixed for composting bin contamination rates, which only improved 50% of the time after changes were made to bins and signage.
- This suggests that changes to signs and bins cannot be the only approaches used to address contamination, and changes to the type and quantity of packaging used should also be considered. (No packaging changes were made in this study.)

### **Targeted outreach to specific restaurant types might be more effective than working with all food businesses.**

- Full service restaurants are the best candidates for starting FOH composting programs. They are capturing nearly all their food scraps with next to no contamination, and they have the highest percentage of food scraps in their overall waste stream.
- Coffee shops had low amounts of food waste in the waste stream and the highest rates of contamination in the composting bins. This suggests they are a lower priority sector for increasing food waste recovery.



**TABLE 2: SUMMARY OF HOW EACH SECTOR PERFORMED ACROSS STUDY CATEGORIES**

<b>Sector</b>	<b>Reasons to Target FOH</b>	<b>Challenges</b>
Full service restaurants	<p>High food waste capture rates</p> <p>High amount of food waste discarded</p> <p>Low contamination rates</p> <p>Higher ratio of food scraps to packaging</p>	<p>May already be performing well and not need any intervention</p> <p>Requires staff training and participation</p>
Corporate cafeterias	<p>Low contamination rates in both recycling and composting bins</p> <p>Higher ratio of food scraps to packaging</p>	<p>Staff may take meals to other areas of building so collection stations are needed in multiple areas</p>
Grocery store delis	<p>Highest capture rate for compostable packaging</p>	<p>High percentage of packaging in composting stream</p>
Quick service restaurants	<p>High levels of diversion and low contamination rates were possible in some establishments</p>	<p>Highest contamination rates</p> <p>High percentage of packaging in composting stream</p>
Coffee shops	<p>High-traffic locations with strong potential for consumer education</p>	<p>Low amounts of food scraps discarded</p> <p>High levels of contamination overall and in composting bins</p>