



Can Packaging Help Divert Restaurant Food Waste?

Case Studies of Two Quick-Service Restaurant (QSR) Chains in Vermont & New York



**CASE
STUDY**



**PACKAGING
DESIGN**

GreenBlue is an environmental nonprofit dedicated to the sustainable use of materials in society. We bring together a diversity of stakeholders to encourage innovation and best practices to promote the creation of a more sustainable materials economy.

The Sustainable Packaging Coalition (SPC) is a membership-based collaborative that believes in the power of industry to make packaging more sustainable. We are the leading voice on sustainable packaging and we are passionate about the creation of packaging that is good for people + the environment. Our mission is to bring packaging sustainability stakeholders together to catalyze actionable improvements to packaging systems and lend an authoritative voice on issues related to packaging sustainability. The Sustainable Packaging Coalition is a trademark project of GreenBlue Org.

Can Packaging Help Divert Restaurant Food Waste?

Case Studies of Two Quick-Service Restaurant (QSR) Chains in Vermont and New York

March 2023

Version 1.0

PROJECT LEADS

*Paul Rechberger |
rechbep@clarkson.edu*

*Olga Kachook |
olga.kachook@greenblue.org*

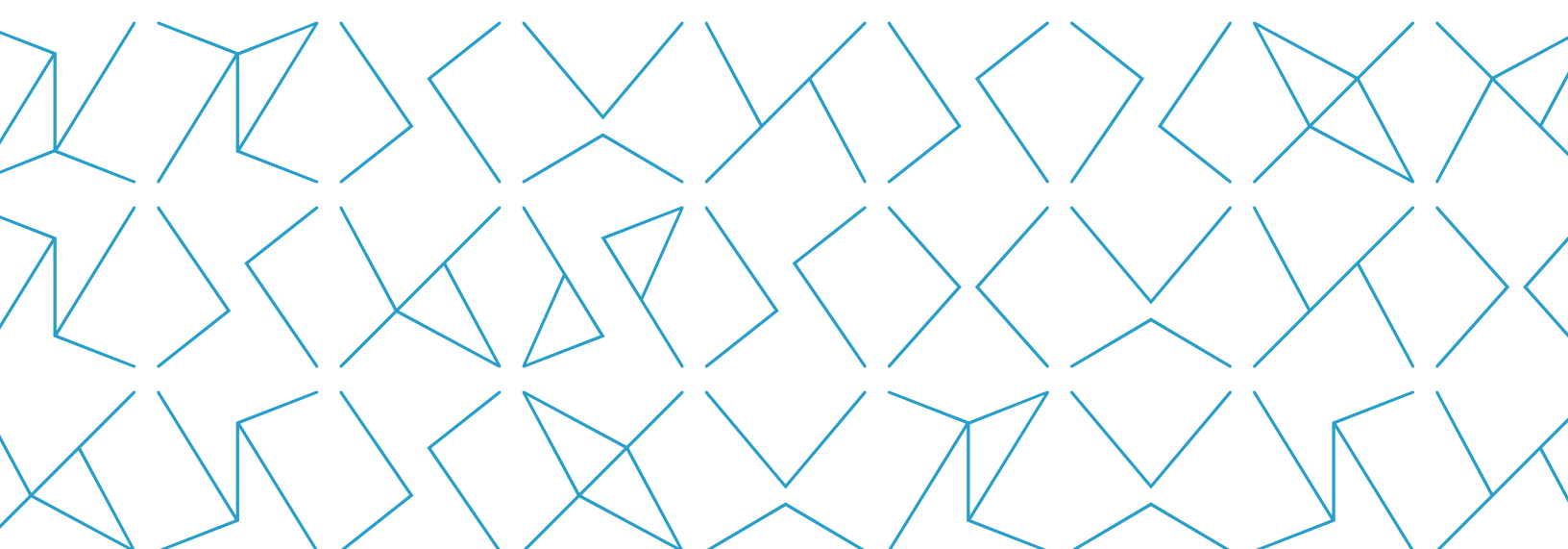
TABLE OF CONTENTS

INTRODUCTION	4
OUR RESEARCH	5
RESULTS FROM QSR 1	6
RESULTS FROM QSR 2	9
SUMMARY OF KEY DATA	12
RECOMMENDATIONS	12
FOR MORE INFORMATION	13

Can Packaging Help Divert Restaurant Food Waste?

Case Studies of Two Quick-Service Restaurant (QSR) Chains in Vermont and New York

March 2023



INTRODUCTION

*Food waste is an enormous, yet largely avoidable, social and environmental problem. According to ReFED, Americans wasted around 54.2 million tons of food in 2019 - **and the food service sector contributes to about 20% of this staggering amount.***

*In large part because food waste produces methane in landfills and contributes to climate change, policymakers have started to take action, particularly at the state and local levels. **Currently, nearly all organic waste recycling laws** focus on addressing the back-of-house food waste of large generators such as grocery stores, large restaurants, or food manufacturers. These laws are easier to implement and adhere to because the packaging and types of waste are familiar to employees, making it easier to be educated and trained on how to properly separate waste.*

*Front-of-house food waste is much harder to address, yet equally, if not more, **important: this “plate waste” contributes over 70% to all food waste in the food service sector.** Currently, only a handful of states (such as Vermont) and smaller municipalities in the US require restaurants to **offer front-of-house recycling.** As a result, most plate waste ends up in landfills. Efforts to establish more front-of-house food waste composting programs - also known as composting programs - can therefore have the biggest impact in capturing and properly disposing of food waste, reducing emissions.*

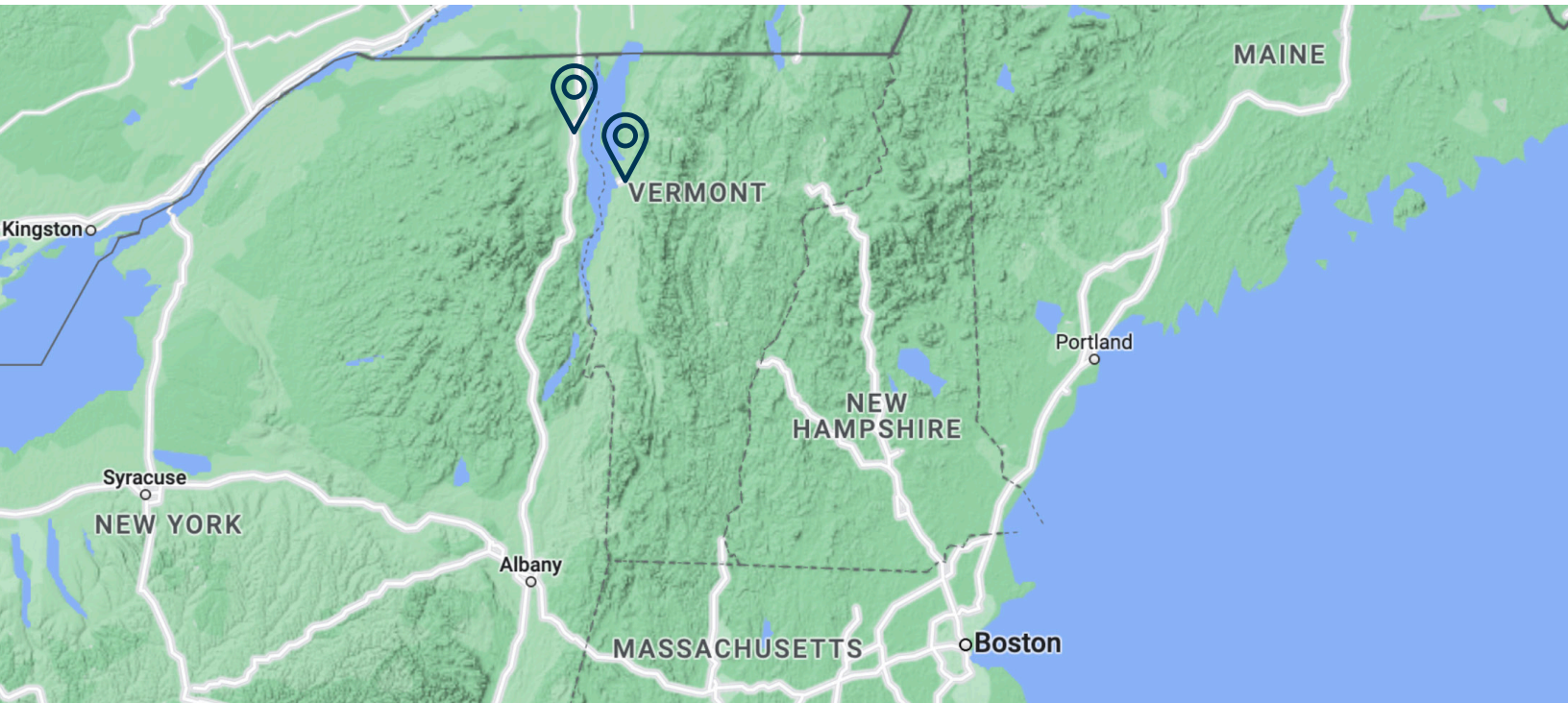
However, front-of-house composting initiatives face a notable obstacle: access to composting infrastructure and contamination. Contamination includes items that are not compostable and do not break down during the composting process, decreasing the quality of the finished compost. Currently, one of the biggest concerns of industrial composting facilities is high contamination rates from consumers placing the wrong items into composting bins. Unless this problem is adequately managed, composters may be unwilling to accept the material, and could lead to food waste continuing to be sent to landfills. Customer education, signage, packaging types, and proper waste bin placement are all key variables in the creation of a successful front-of-house composting program with low contamination rates.



OUR RESEARCH

In the summer of 2022, the Sustainable Packaging Coalition set out to gather more data around front-of-house food waste composting programs and best practices. It evaluated two different quick-service restaurants (QSR) in two states with differing requirements around collection of food waste (Vermont and New York, Figure 1). The work was conducted by Paul Rechberger, a summer intern working with GreenBlue while currently pursuing a MS in Environmental Policy at Clarkson University.

Figure 1: Map of QSR Locations



The goals of this project were to collect and analyze front-of-house waste, evaluate the impacts of packaging on food waste diversion and compost contamination rates, and provide feedback on best practices. Based on this, several questions were posed:

1. *Does the use of reusable dishware and/or compostable packaging increase food waste diversion rates?*
2. *Does the use of reusable dishware and compostable packaging decrease front-of-house contamination rates?*
3. *Can clean front-of-house food waste composting programs be achieved?*

The project first identified suitable locations for conducting this research. The locations needed to generate a sufficient amount of front-of-house food waste while also using different types of packaging for customers. Second, relationships with the QSRs' store managers were formed, and waste handling and pick-up procedures were discussed to ensure quality data. Third, samples from each QSR were collected and hauled back to an auditing site. The weight, quantity, and composition for each waste stream (compostable waste, recyclable waste, and landfill-bound waste/garbage) at each location were measured.

Below are key findings and conclusions from the data collected.

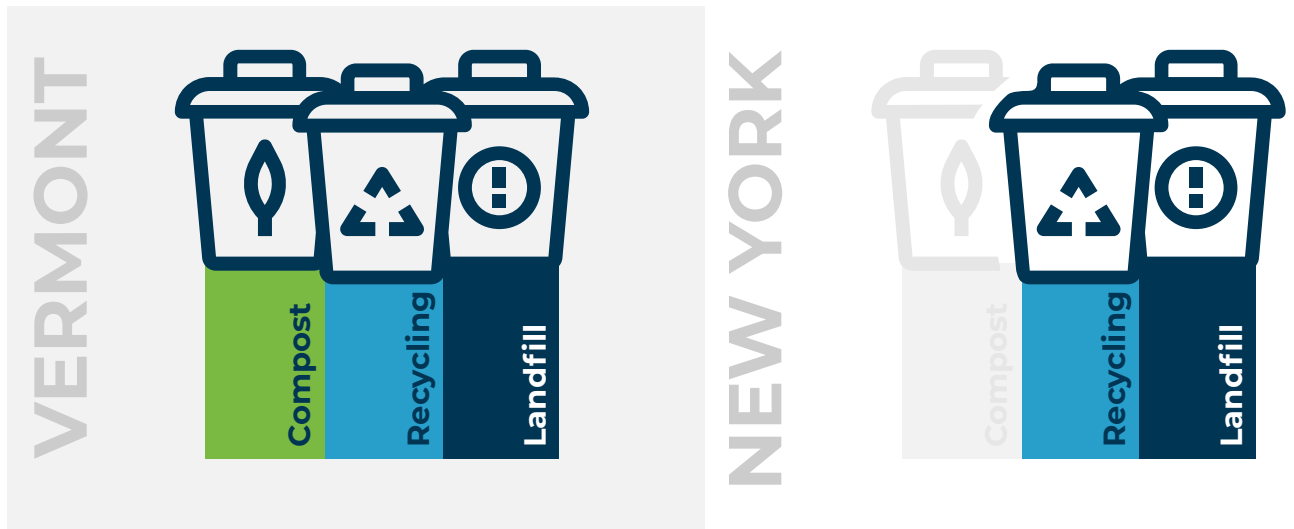


RESULTS FROM QSR 1

“SALSA STREET GRILL”

“Salsa Street Grill” is a national restaurant chain serving Mexican food. It uses a variety of packaging, including compostable and recyclable packaging, for dine-in customers. The mix is consistent throughout all locations. According to their CSR report, at the end of 2020, approximately 92% of “Salsa Street Grill” restaurants recycled and 29% composted.

For this research, waste samples were taken from three different locations, two of which are in Vermont and one in upstate New York. The two Vermont locations had three waste streams,



including front-of-house composting, while the New York location had only two streams (garbage and recycling, consistent with local requirements). Based on store manager feedback it was determined that the recycling stream was typically highly contaminated with non-recyclable items, and in practice employees disposed of it as part of the garbage stream.

The New York location acted as a baseline and helped evaluate the importance of a recycling and compost bin for dine-in customers. Additionally, it provided the data needed to calculate the expected contamination rate for all “Salsa Street Grill” locations. In total, 311 pounds of waste were audited across three locations on six separate days during late June / early July 2022.

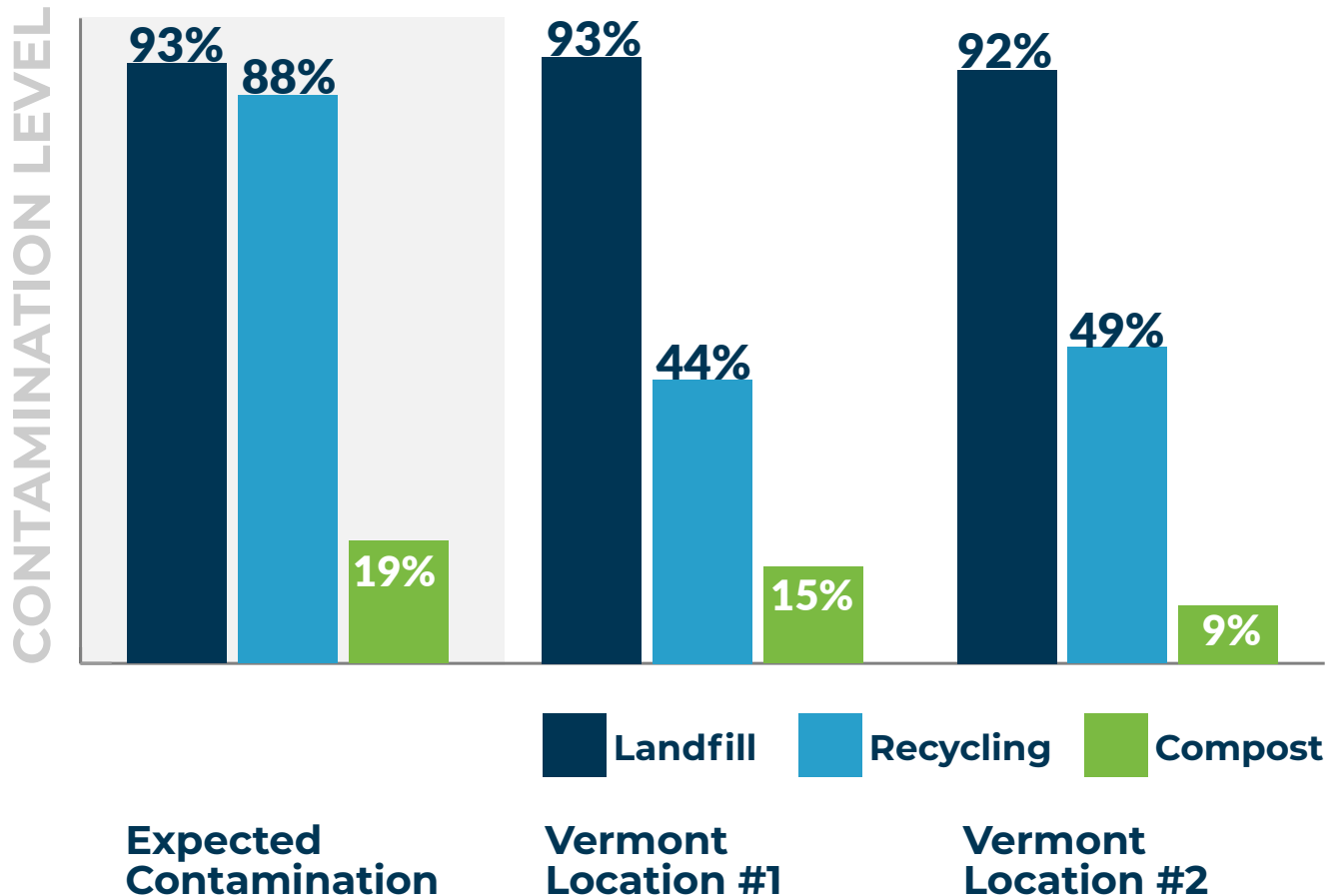


KEY FINDINGS

First, the findings show that **the majority of all the front-of-house waste is compostable**. Across the three locations, the percentage of compostable waste ranged from 70 to 76%, meaning that most of the waste created could be composted. The biggest contributors to these amounts were food waste and soaked food napkins, in that order.

Second, **most of the food waste generated ended up in either the compost or the landfill bins**; customers did not appear to associate compostable waste with the recycling bin. About 55% of all compostables at one Vermont location landed in the compost bin, 33% in the landfill bin, and only 10% in the recycling bin. The second Vermont location did not accumulate enough quantities to make a significant comparison.

Figure 2 Salsa Street Grill - Expected vs. Actual Contamination



Third, **customers separated items better than expected**. This project considered “expected contamination”, which is a concept that looks at what contamination rates would be if all customers disposed of their waste randomly, without any kind of sorting effort or behavior. In practice, customers seemed to divert recyclable and compostable wastes better than if they were sorting at-random (*Figure 2*).

Interestingly, neither location that offered a compost bin managed to achieve a high food waste capture rate - the percent of total food waste that ends up in the compost bin. One Vermont location (VTL#1) managed to capture around 54% of total food waste, whereas the other location (VTL#2) captured 38%. Even though the goal is to collect all food waste in the compost bin, **almost half of food waste still ended up in the landfill or recycling streams**.

Most of the contamination in the recycling stream came from food waste and liquids.

For example, food waste made up 37% and 39% of the two Vermont restaurants’ landfill and recycling streams, respectively. On the other hand, liquids caused 30% and 29% contamination by weight.

Even though organic and liquid waste are more dense, packaging contributes significantly to the front-of-house waste accumulation at “Salsa Street Grill” locations. The share of packaging of the total waste ranged from 37% to 41% across all three locations.

In-person observations indicated that many individuals are willing and interested in separating their waste. However, they lack the knowledge to do so properly, in part because **a mix of recyclable and compostable packaging appeared to confuse many customers**. Whether an item is recyclable, compostable, or garbage was hard to identify. For example, some plastics offered at the locations can be recycled, while others may not. Some paper is recyclable, while some is compostable. Without consistency in how compostability and recyclability is chosen for packaging and then communicated to consumers, disposal at the bin is likely to be haphazard and lead to contamination in both the recycling and composting streams.

Most of the food waste generated ended up in either the compost or the landfill bins.





RESULTS FROM QSR 2

“THE BREAD BOX”

“The Bread Box” is a national restaurant chain serving baked items, salads, and soups. It primarily uses reusable dishware for dine-in customers, but also offers paper-based wrappers for baked items and plastic-based containers for salads and other prepared foods. Throughout the study, waste samples were taken from two locations, one in Vermont and one in New York. The Vermont location offered front-of-house composting bins, while the New York one offered only landfill and recycling bins.

In addition to back-of-house and front-of-house composting programs, the restaurant chain’s locations engage in daily charitable donations of unsold bakery items. This project involved a collaboration between GreenBlue and the restaurant to analyze and evaluate the waste streams and packaging mix. In total, 297 pounds of waste were audited across three locations on four separate days during early - mid July 2022.



KEY FINDINGS

Similar to findings from the “Salsa Street Grill” locations, **most of the front-of-house waste at “The Bread Box” locations is compostable.** Between 67% and 72% of all waste is compostable (including food waste and napkins), 10% is recyclable (including plastic bottles), and 17% to 21% of the waste is intended for the landfill (including miscellaneous items brought into the location by customers).

Moreover, the chain’s use of reusable dishware seems to help get more food waste into the compost bin. On average, around 80% of all compostable waste was captured and thrown into the right bin, while around 15% ended up in the garbage and less than 5% ended up in the recycling bin. These numbers show that high capture rates can be achieved and that food waste as a contaminant in the recycling bin can be reduced.

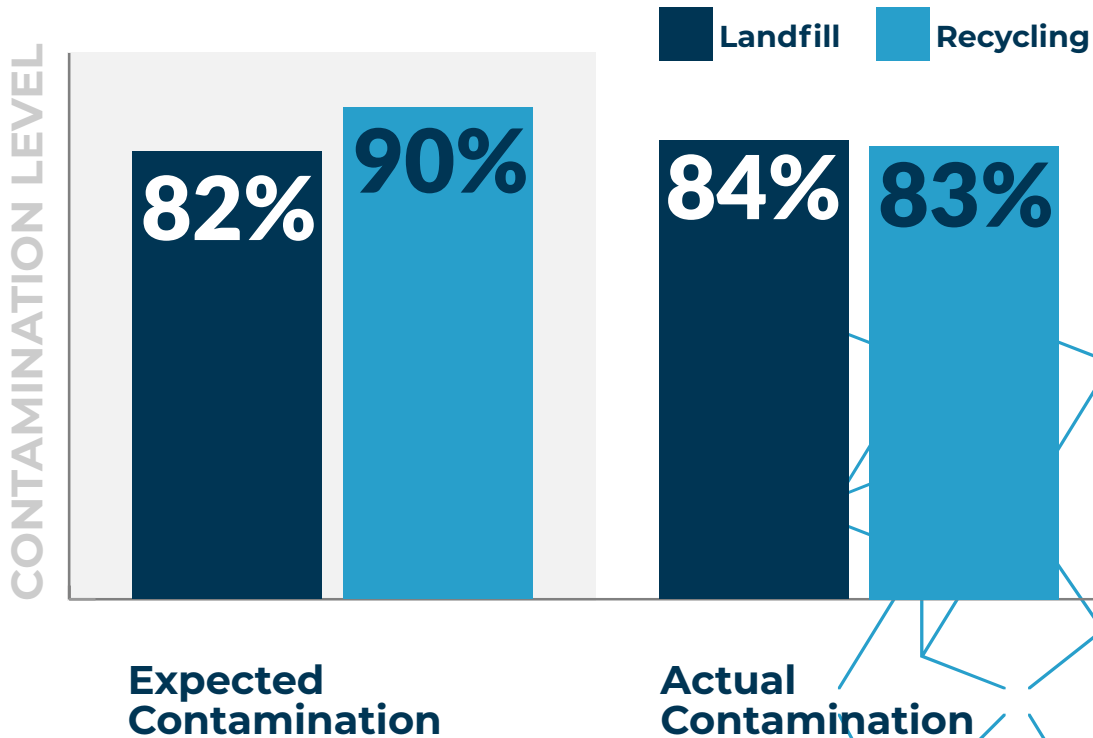
Even though a majority of organic waste is captured, **the remaining waste still contributes to the contamination of the two non-organic waste streams.** For example, food waste constituted about 27% of all the contamination in the landfill stream and 6.5% of the recycling stream. The largest sources of contamination were liquids and soaked napkins - they contributed about 48% and 63% contamination to the landfill and recycling stream, respectively.

Anecdotally, it was observed that customers at both QSR chains did not empty their cups before disposal, and the liquids soaked all the items in that waste stream, drastically increasing the waste’s weight. Hence, capturing liquids in a separate bin could be an effective way to decrease the weight and contamination of the other waste streams.

At “The Bread Box”, **customers tended to do a better job sorting waste than if their disposal was at-random, especially when they used reusable dishware and a compost bin was available.** For example, the VT location, which offered a compost bin, had substantially lower-than-expected contamination rates (*Figure 3 and Figure 4*).



Figure 3 The Bread Box - New York - Expected vs. Actual Contamination



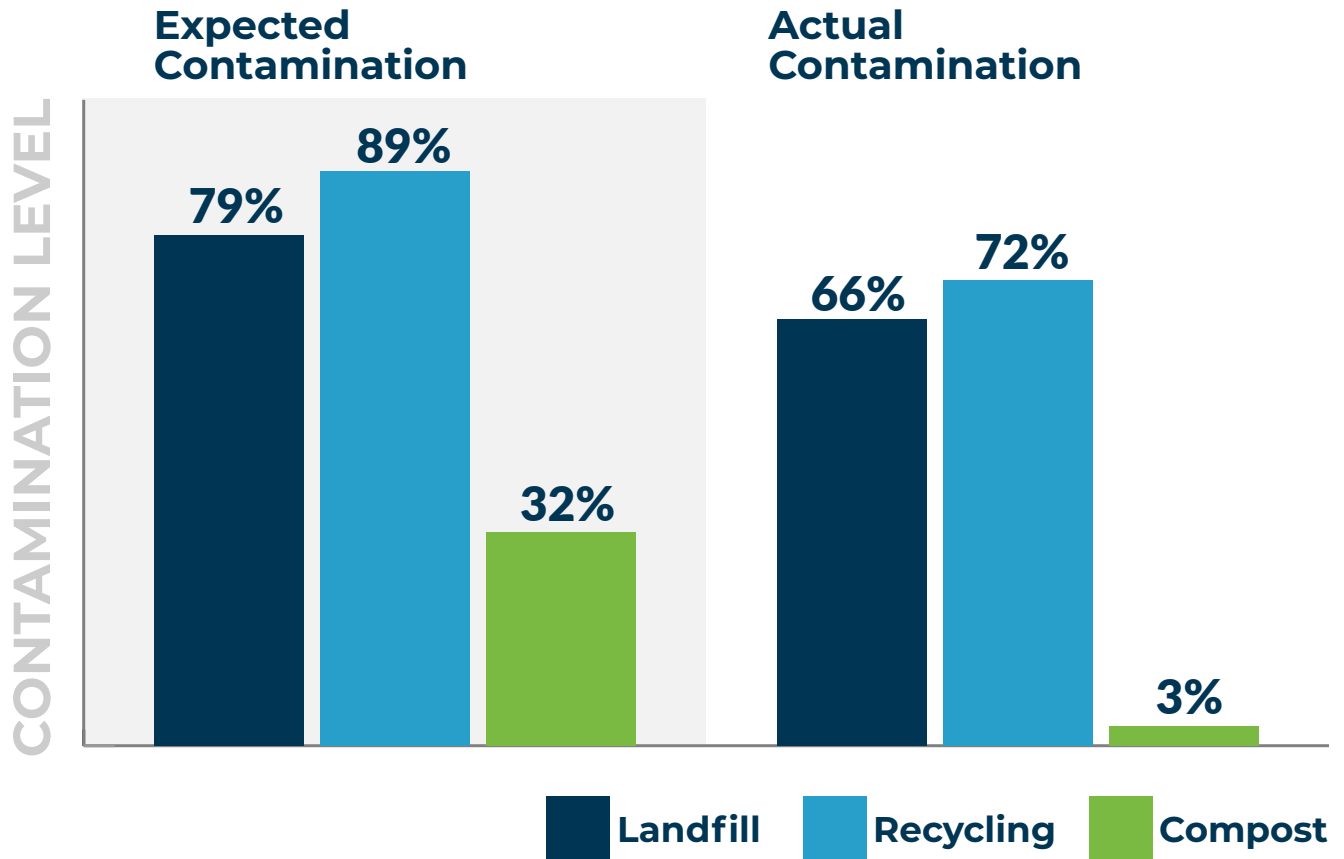
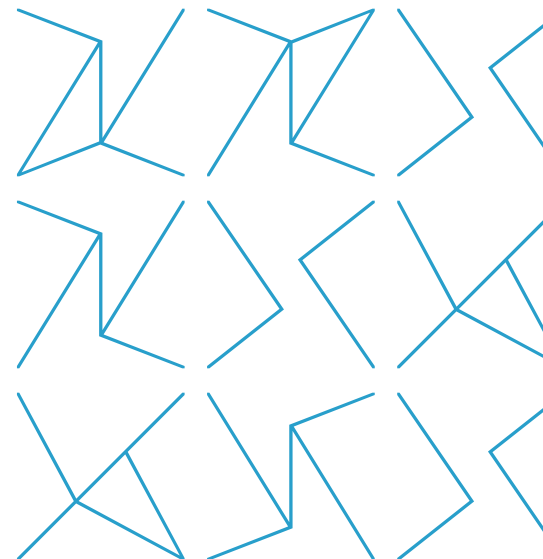


Figure 4 The Bread Box - Vermont - Expected vs. Actual Contamination

Customers tended to do a better job sorting waste than if their disposal was at-random, especially when they used reusable dishware and a compost bin was available.

Across both locations, the contributions of packaging to the total waste were similar- **packaging was around 18% to 21% of total front-of-house waste.** Because reusable dishware was offered for dine-in, “The Bread Box” locations had less single-use packaging waste than “Salsa Street Grill” locations, although they do serve a large proportion of to-go and delivery orders with a full set of single-use packaging.

Finally, food waste separation seemed to work well at the Vermont location. Dine-in customers scraped their plate waste into the designated bin before stacking their plates. In part because a compost bin was available and the bin labeling was clear, **a clean compost stream was achieved, with less than 4% contamination.**



SUMMARY OF KEY DATA

	Salsa Street Grill	The Bread Box
<i>Total waste audited (lbs)</i>	311	297
<i>% of waste that is food waste</i>	34%	35%
<i>% of waste that is compostable</i>	70 - 76%	67 - 72%
<i>Food Waste Capture Rate</i> <i>(% of food waste that is captured by the composting program)</i>	38 - 54%	80%
<i>Contamination Rates</i> <i>(ie waste that was incorrectly sorted and should have been placed into another bin)</i>	Landfill: 93% Recycling: 46% Compost: 12%	Landfill: 66% Recycling: 72% Compost: 3%
<i>% of total waste that is packaging</i>	39%	18 - 21%

RECOMMENDATIONS

Based on the data collected, we can make the following recommendations to restaurants looking to increase their diversion of front-of-house food waste and to reduce contamination rates:

Reusable dishware achieves the best outcomes in almost every category analyzed. It captures a high percentage of food scraps, leads to cleaner compost bins, and decreases the amount of packaging waste. It may also improve the customer experience at the restaurant by enhancing the meal's presentation and perceived value.

If reusable dishware is not feasible, compostable packaging can help divert more food waste from landfills and achieve cleaner waste streams. This is because **customers do not need to perform complex separation of different items at the waste station; rather, they are able to put both the packaging and the food waste into one bin.** By increasing the overall share of compostable packaging, the compost stream is expected to become less contaminated.



To make both packaging strategies work, **QSRs should focus on standardizing packaging** across all locations in the United States. This would decrease ambiguity in proper waste management practices and help customers make better decisions at the waste station. Additionally, clear labeling and disposal instructions would also enhance results.

Another key finding from this project is the composition of waste at both QSRs - **food waste and liquids made up the majority of the total waste stream**. Hence, addressing both of these materials should be the priority to achieve better waste management outcomes. Liquids in particular add a substantial amount of weight and also contaminate the recycling stream. To tackle this, QSRs may consider offering a “dump spot” for liquids at the waste station, similar to stations found at airport security checkpoints.

To aid in proper disposal, it is important that front-of-house waste stations use **clear, prominent signage and labeling** to differentiate the recycling, compost, and landfill bins. The QSRs in this audit used color-coding of streams, large signage, and images or iconography of products and packaging that belonged in each bin. Packaging should also be clearly labeled with third-party certification logos (such as BPI), recyclability instructions (such as How2Recycle), and corresponding colors (e.g. green for compostability, blue for recyclability).

By offering front-of-house composting programs, using a simplified mix of durable and/or compostable packaging, and implementing contamination reduction strategies, quick-serve restaurants can make meaningful inroads in diverting their front-of-house food waste.

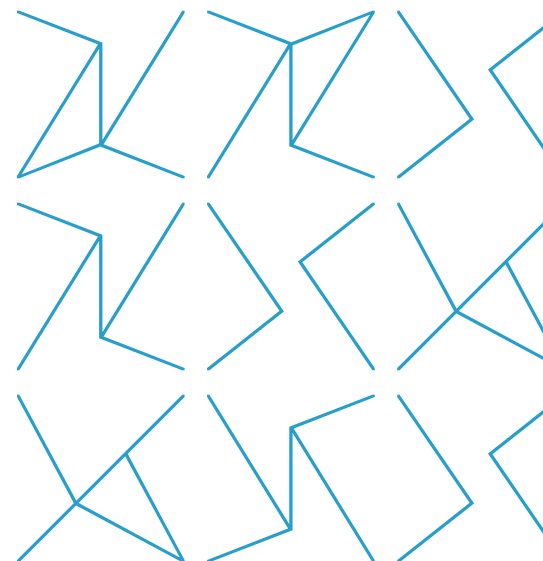
FOR MORE INFORMATION

GreenBlue's mission is to advance sustainable practices through education and collaboration, providing the necessary tools and resources for our stakeholders to take action.

PROJECT LEADS:

Paul Rechberger | rechbep@clarkson.edu

Olga Kachook | olga.kachook@greenblue.org





A Project of



See what else
we're working on

