

Oregon Wasted Food Study: Institutional and
Commercial Sector Case Studies

Case 13

High quality standards reduce wasted food in a restaurant



This report was prepared for
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Submitted
November 20, 2018

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Introduction

This is a report on the methods and results of one of 15 food service business case studies, as part of the commercial sector portion of the Oregon Wasted Food Study. This study is funded by the Oregon Department of Environmental Quality and conducted by Community Environmental Services (CES) at Portland State University.

The research objectives for the commercial portion of this study are to:

- Understand components of wasted food in commercial sector
- Highlight causes of commercial wasted food and key opportunities for waste prevention
- Test wasted food reduction best practices and quantify their effectiveness
- Promote wasted food reduction best practices for application at commercial food service institutions

Focus of study

This study examines major types and causes of wasted food associated with high-end restaurants, and the benefits of repurposing meat trimmings, quality standard application across the supply chain, and full food utilization practices. These were selected as a focus because the interviews and waste assessment suggested these practices could be effective at preventing wasted edible food and represented a substantial cost savings to the business. The study focused on quantifying the outcomes of existing repurposing practices, rather than testing a newly implemented practice. Quality standard application was further explored to assess whether waste was reduced or shifted upstream. Cost savings and greenhouse gas emissions reductions associated with the repurposing of meat and seafood trim scraps for two popular dishes at the restaurant were calculated. This business saves up to \$67,330 annually in food costs alone by using trim product rather than purchasing additional meat and seafood. They reduce greenhouse gas emissions by 44.27 metric tons of carbon dioxide equivalents per year, approximately equivalent to the emissions of nine passenger vehicles. High quality standards kept throughout the restaurant, from ordering to preparation, reduces food loss by encouraging suppliers to find other uses for food that does not meet quality standards, and creating meals of an appropriate size that customers finish.

Participating business

This case study is of a large, high-end restaurant in the Portland, OR metropolitan region. The restaurant serves an average of 3,000 meals a week, and also provides event hosting space with catering options.

Methods

Study design

The study was conducted over a six month period from January to June 2018. It included employee interviews, waste assessments, cost savings calculations and a greenhouse gas emissions analysis. The intent of these analyses was to (1) identify types of wasted food and key causes of waste, (2) quantify the impact of repurposing practices and (3) document the impacts of high quality standards on wasted food at the restaurant and upstream.

Interviews

A total of three employees were interviewed for this study, including the executive chef, the operations manager and a prep cook. The interviews were all conducted in early February 2018.

Employees voluntarily participated in one-on-one interviews on-site, but in a private location. Interviews were recorded and took between 15 and 25 minutes each. The interviews were semi-structured; standard interview questions were asked of each employee with additional questions asked that either responded to employee answers or pertained to their specific role

Supplier interviews

The restaurant's **high quality standards** and **strict rejection of lower-quality product** upon delivery meant little food was wasted on-site from spoilage or quality concerns.

To assess whether or not these policies pushed waste upstream, researchers conducted phone interviews with the primary account representative for the restaurant's meat and fish suppliers. Representatives were asked by researchers to voluntarily participate in brief interviews. Interviews were conducted with the two willing employees individually, over the phone. These interviews also were semi-structured: standard interview questions were asked of each employee with additional questions asked that either responded to employee answers or pertained to their specific role.

Waste assessments

Researchers conducted the on-site sort in February 2018 and retrieved all bags that contained food waste from the business' only 4-yard landfill dumpster that had accumulated during a 24-hour period. Food scraps found were sorted and weighed according to the case study categories. The sorting process was the standard approach used for other sorts conducted by researchers; see details in the Appendix of this report.

Repurposing

Researchers sought to quantify the impacts of the repurposing of meat products used in two of the restaurants' popular dishes. This was done using estimates, provided by the restaurant's executive chef, of menu item composition, food cost and annual sales. Annual food cost savings were calculated accordingly.

Greenhouse gas emissions and energy use reduction

Greenhouse gas emissions and energy use reductions were calculated using version 14 of the EPA's Waste Reduction Model (WARM)¹. For this analysis it was assumed that repurposed beef and seafood represented 100% source reduction, and compared that to the current practice of the business, landfilling waste. As the WARM tool does not include estimates for seafood, chicken was used as a proxy, since general consensus suggests wild caught seafood as being less greenhouse gas and energy intensive than red meats.

¹ U.S. Environmental Protection Agency. (2016, March). Waste Reduction Model (WARM) version 14. Retrieved from <https://www.epa.gov/warm>

Limitations

Researchers could not confirm that all of the dishes sold repurposed trim product and had to rely on the executive chef's estimates. All of the repurposing data was provided by restaurant employees.

Results

Waste assessments

Wasted food scraps were determined to be from both front-of-house and back-of-house and weighed a total of 180.14 pounds.

The top three items found in front of house waste were **prepared food, inedible food** and **fruit and vegetable** and together represented 87.9% of total front-of-house wasted foods, edible and inedible combined. The prepared category weighed 13.34 pounds (59.2% of total front of house edible wasted foods) and contained plate leftovers from patrons that included rice and quinoa with vegetables, stew, and other entrée components. The inedible category (front of house) weighed 16.58 pounds (42.4% of total front of house wasted foods, edible and inedible combined) and was largely comprised of corn cobs, corn husks, mussel shells, and variety of meat bones. The fruit and vegetable category weighed 4.46 pounds (19.8% of total front-of-house edible wasted foods) and was mostly potatoes and a variety of prepared vegetables and leafy greens.

Edible foods made up 51.5% (72.57 pounds) of back-of-house waste. The top two categories of wasted edible food were **dry foods** and **fruit and vegetables**. Dry foods were mainly cooked rice and pasta, and flour remaining from dredging onions (some onions were still present), and weighed 38.06 pounds (52.4% of total back-of-house edible waste). The fruit and vegetable category weighed 19.69 pounds (27.1% of total back-of-house edible wasted foods) and was mostly quarter slices of unused limes with a small amount of prepped cucumbers, tomatoes and onions.

Overproduction of grains and starches appeared to cause some edible food waste. When discussed with the business, **management declined to pursue actions because these foods were low in cost and had long cook times**, limiting the business' ability to prepare small batches as needed.

Interviews

Causes of waste and barriers to prevention

Inedible waste was a primary component of the restaurant's waste stream, according to employees. Specifically, lime peels and onion skins were common, they said. Lime peels were particularly prevalent, the executive chef said, because the restaurant used fresh squeezed lime juice for a few particular dishes. In fact, he said, they have an employee whose only job is to squeeze limes.

Staff also suggested front-of-house waste was prevalent, with customers often leaving with food left on their plates. **Misfires, according to the executive chef, were rare.**

High quality standards played an interesting role at the business. These meant that products, specifically produce, were turned back upon delivery if they did not meet standards. The executive chef said this happened fairly often. He did say, however, that **suppliers were very accustomed to the restaurant's standards and generally only brought them the best product.** These suppliers accommodated in other ways, as well, according to the chef: "they even have a machine to test our avocados so they know they are only delivering exactly what we need".

Supplier interviews

The meat supplier interviewed has been operating in the Portland, OR area for many decades, and the representative interviewed has worked there for many years. The supplier was asked how, if at all, the restaurants' high quality standards affected the supplier's own standards, practices, and wasting of food. The employee interviewed said that this particular restaurant was well known to have high quality standards, and that the supplier set its own standards for suppliers to ensure that they provided only what this restaurant would accept. **The supplier not only set its product standards to align with the restaurant's standards, but also altered what they offered to meet this restaurant's needs.** They said, "we offer lamb shanks only because [the restaurant] orders so much of it. During some parts of the year we even trim down the lamb shanks to meet their standards and sell the trim to other restaurants." This particular supplier does not butcher meat on site, and rarely re-packages and recuts meat.

When asked how frequently product gets rejected upon delivery the representative said: "hardly ever... I can't remember anything being turned back in months." He said he **does not ship anything he knows they will not take.** He also goes out of his way to maintain a positive relationship with the restaurant. "There are times I'll do one or two emergency deliveries on a Saturday because they didn't order enough to get through the day... I don't even work Saturdays."

The fish supplier also said their business' quality standards were set by this restaurant. When asked what happens to fish that is not of high enough quality for this restaurant, the supplier said that fish was either sold to a different business at a lower price or smoked in-house and then sold. Trim product, as well, was either sold to other businesses for use in soup stock or to a cat food maker. **"I can't think of anything that goes to waste here... it's in our best interest to find a market for everything that we can,"** the representative said.

As previously mentioned, the business' produce supplier was not able to be interviewed so little is known about how that supplier deals with product that is rejected upon delivery. **Employee interviews suggest produce is the most likely food category to be rejected.**

Existing prevention strategies

The restaurant incorporates many practices to ensure **full utilization of ingredients.** The executive chef said **"with the rising cost of food, you can't afford to not use all of your product"**. Examples of these practices include:

- **Meat and fish trimmings** are used as primary ingredients for other menu items (discussed more below).
- **Onions:** The outermost layers are used for fish dishes, the middle layers are used for stocks and the innermost layers are used for sauces.
- **Tomato cores** are used for salsas and sauces
- **Cilantro ends** are used for salsa or to finish stocks

- **Pepper tops** and **mushroom stalks** are used for soup stock or family meals
- **Beet cores** are used for a one dish while the rest is diced and used in another dish. **Beet trimmings** are used for chef tastes (samples) or family meals.
- **Lime juice** used for menu items must be fresh, so **leftover juice** is sent to the bar to be used in drinks or made into refreshments for staff.

Similar to the full utilization practices, the executive chef discussed how **intentional menu planning worked to support full utilization and maximize profits**. While additional examples are explored in more detail in a later section, one example the chef gave was the **pairing of beef tenderloin with beef tartare**: “I know that with beef tenderloin on the menu, the ends of each steak will be trimmed off. So, I put beef tartare on the menu too. So, a menu item [tenderloin] with a 40% food cost will subsidize another menu item, whose food costs are almost nothing. The beef tenderloin gets the *oobhs* and *abhhs* but it’s the tartare that’s making the money for us.”

Another strategy to support full utilization and repurposing of ingredients is the **use of “family meals,”** twice daily meals for staff serving 60-90 people a day, to **repurpose leftover ingredients or over-prepared food**. The **walk-in refrigerator has its own dedicated shelf for ingredients needing to be used**, which is the first place employees go when preparing family meals or when crafting specials.

While high quality standards may have pushed waste upstream (discussed later), they did support **low levels of spoilage**, according to employees. Furthermore, the restaurant’s **daily produce deliveries**, as well as their **5 times per week meat deliveries** and **6 times per week fish deliveries** meant the restaurant had minimal extra product on hand. The executive chef said he did not have room to store extra, so they plan to only have a day and a half worth of most ingredients at any given time. “Let’s say I order 100 pounds of potatoes...” the executive chef said, “...most likely those will be gone by the end of the day.” The restaurant’s **high sales volume**, another employee said, means **they prep multiple times a day and any ingredients left over are the first to be used during the next shift**.

The restaurant also benefits from a rare low turnover rate, which helps maintain consistent application of the business’ source reduction practices. The executive chef said the **turnover rate is particularly low because his employees are paid well** (he gave them a 40% raise when he took over, he says) **and are treated well** (“I make sure they can take the shifts or time off they need,” the executive chef said). This low turnover also means the **chef is able to maintain a workforce that meets his high expectations**. When asked if misfires or burned meals were problems he said “if you burn something once you’re in trouble; if you burn something three times I’m going to fire you.”

Repurposing

The executive chef provided details for **two popular menu items that were constructed mostly or partly from repurposed meat and seafood trimmings: beef empanadas and rice with seafood**. The chef provided approximate sales data from menu items for 2017, the estimated ingredient proportions for these dishes, and the costs for repurposed ingredients (see, Table 1, below).

The results suggest the **repurposing practices for these two menu items alone reduce the need for beef and fish by 2,500 pounds and 4,000 pounds per year, respectively. This represents an annual food cost savings of \$67,330.**

Table 1. Repurposing analysis of two menu items, including cost savings estimates

	Amount repurposed per dish	Dishes per year	Repurposed ingredients	% repurposed	Food Weight per dish (lb)	Savings per lb	Weight saved per year (lb)	Cost savings per year
Rice with seafood	4 oz.	16,000	Octopus	50%	0.13	\$ 8.50	2000	\$ 17,000.00
			White fish (mahi)	50%	0.13	\$ 13.00	2000	\$ 26,000.00
Beef Empanadas	2 oz.	20,000	New York strip	80%	0.1	\$ 10.00	2000	\$ 20,000.00
			Tenderloin	10%	0.013	\$ 14.50	250	\$ 3,625.00
			Heart	10%	0.013	\$ 2.82	250	\$ 705.00
						Total cost savings		\$ 67,330.00

Greenhouse gas emissions and energy use analysis

The results suggest that the repurposing strategy used at this business reduces greenhouse gas emissions by 44.27 metric tons of carbon dioxide equivalent (MTCO₂e) emissions over a year, compared to landfilling that meat and seafood waste. This is the equivalent of approximately **nine passenger vehicles driven for one year²**. The source reduction observed also represents an avoided 132.73 million BTUs of energy use per year, approximately equivalent to **conserving 23 barrels of oil, the equivalent energy usage for an average US home³**.

Table 2. Results from the WARM analysis of repurposed beef and seafood.

	Tons source reduced	Change in MTCO ₂ E (from landfilling)	Change in Million BTU (from landfilling)
Beef	1.25	-38.24	-79.82
Seafood (calculated as poultry)	2	-6.03	-52.91
Total	3.25	-44.27	-132.73
Equivalencies			
Passenger vehicles	9		
Gallons of gasoline	4,982		
Household annual energy use	1		
Barrels of oil	23		

² U.S. Environmental Protection Agency. (September 2017). Greenhouse Gas Equivalencies Calculator. Retrieved from <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

³ U.S. Environmental Protection Agency. (February 2016). Documentation for Greenhouse Gas Emission and Energy Factors Used in the Waste Reduction Model (WARM) Organic Materials Chapters. Retrieved from https://www.epa.gov/sites/production/files/2016-03/documents/warm_v14_organic_materials.pdf

Conclusion and Future Directions

Key causes and barriers to full food utilization

Full utilization and repurposing practices are effective in reducing wasted edible food

Employees shared a variety of techniques the restaurant uses to fully utilize ingredients. **While some edible wasted food was found in the waste assessment, this included relatively little edible fruits and vegetables and almost no meat, supporting employee claims of full utilization.** Only three items made up a majority of the edible wasted food identified in the waste assessment: (1) over-prepared rice and quinoa, (2) pureed seasoned potato which is used in a variety of dishes and kept warm in preparation for serving (which is why extra must be thrown away at the end of each meal), and (3) lime cores from the bar (only the ends are cut and used as garnish). The first two commonly wasted food items occur because, according to the executive chef, they are time consuming to make, inexpensive and a staple for many dishes, so running out is not an option. The lime cores are not utilized because they are not the right limes used for juicing.

Planned repurposing of meat trim can support significant food cost savings

This case study quantified one practice of repurposing meat trim for two menu items in particular: beef empanadas and seafood with rice. **The results suggest the business is saving up to \$67,330 annually in food costs alone by using trim product rather than purchasing additional meat and seafood for the two dishes studied.** Repurposing practices were used for other ingredients across the restaurant's menu, the cost savings for which were not calculated.

High quality standards may reduce upstream waste

This case study suggests that, **at least in the case of meat and fish purchasing, setting and communicating high quality standards does not contribute to higher waste, and may even reduce waste, directly upstream.** Suppliers have adapted to these very clear, high standards and have established other markets for products they know would not be acceptable for this restaurant. The predictability and consistency of the standards means suppliers do not scramble to find other outlets for product but have concretized alternative markets or processes. **The first supplier studied here also benefited from having their own in-house smoker to utilize lower-quality fish.**

Fish supply chain

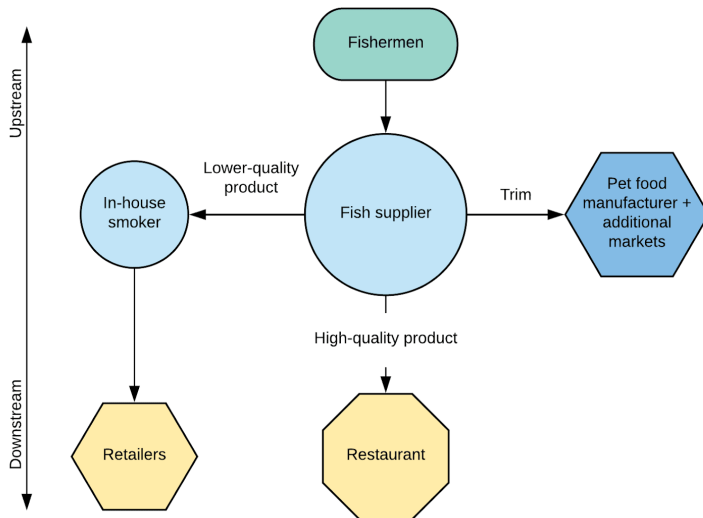


Figure 1: Fish supply chain diagram, indicating flow of product and byproducts.

Highly skilled and valued employees support source prevention practices

The restaurant benefits from a stable, long-term and skilled workforce. The executive chef suggested that staff turnover is much lower than normal because staff are better paid, given more choices in scheduling and work in a relaxed environment. **It is likely that the longevity and highly skilled nature of the employees support consistent application of the restaurants' many source reduction practices.**

Plate waste was minimal

Unlike many food service institutions studied as part of this project, this particular restaurant saw very little plate waste. **Only 22.5 pounds of edible plate waste was generated during a normal business day, averaging an estimated 0.05 pounds (0.84 ounces) per person served.** The reason for this cannot be firmly established, but it may stem from a variety of factors including: (1) the quality of the food was high so customers were less likely to leave food uneaten, (2) customers may be more likely to eat or take home the food because it is fairly expensive and (3) the restaurant had relatively small portion sizes. More research should be done to explore these potential relationships.

Repurposing of meat trimming, made possible by intentional menu planning, can lead to a significant cost savings and environmental benefits. Specifically, the restaurant in this case study is achieving an estimated **\$67,330 in annual cost savings associated with the repurposing of meat trim.**

High quality standards, communicated clearly to suppliers, can prevent wasted food by reducing spoilage or rejection on-site, by allowing suppliers with larger economies of scale to find a market for by products, repurpose them or find a buyer for lesser quality product. This appears to be true, at least, for large restaurants with relatively high buying power.

Appendix

Waste sort methods

Methods for this sort were typical to other sorts, where a series of bins and buckets were used for collecting the wasted foods and weighed accordingly. Tare weights for the bins were recorded and subtracted to derive accurate weights of wasted foods. No follow-up sort was conducted for this site.

Table A1: Waste sort categories and definitions

Categories		Definitions	Examples
1	Inedible	Items not intended for human consumption (small amounts of edible material associated with the inedible material are permitted to be included)	Egg shells, banana peels, pits/seeds, bones
2	Meat & Fish	Uncooked or cooked meat (with mostly edible components) unmixed with other types of food	Chicken drumstick, salmon fillet
3	Dairy	Solid dairy products unmixed with other food types or in original form	Cheese, yogurt
4	Eggs	Egg products unmixed with other food types or in original form	Fried egg, whole eggs, liquid egg whites
5	Fruits & Vegetables	Solid uncooked or cooked vegetables and fruits (with mostly edible components) unmixed with other types of food	Potatoes, spinach, berries, salad with only vegetables
6	Baked Goods	Baked goods and bread-like products unmixed with other food types or in original form, including pastries	Bread, tortillas, pastries
7	Dry Foods	Cooked or uncooked grains, pastas, legumes, nuts, or cereals unmixed with other food types or in original form	Rice, cereal, pasta
8	Snacks, Condiments, Sauces	Includes confections, processed snacks, condiments, and other miscellaneous items	Condiments, candy, granola bars, sauces, jellies
9	Liquids, Oils, Grease	Items that are liquid, including beverages	Sodas, milk, oil, juice
10	Cooked or Prepared Food	Items that have many food types mixed together as part of cooking or preparation	Lasagna, sandwiches, burritos
11	Unidentifiable	Used only if necessary	

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Results

Table A2: Waste assessment of back of house and front of house food scraps

	Back-of-House (lb)	Front-of-House (lb)	Total (lb)
Inedible	68.47	16.58	85.05
Meat & Fish	0.36	0.9	1.26
Dairy	<.01	<.01	<.01
Vegetables & Fruits	19.69	4.46	24.15
Baked Goods	2.36	3.28	5.64
Dry Foods (Grains, Pasta, Cereals)	38.06	0.54	38.6
Snacks, Condiments, Sauces	<.01	<.01	<.01
Liquids, Oils, Grease	<.01	<.01	<.01
Cooked, Prepared, Leftovers	12.1	13.34	25.44
Unidentifiable	<.01	<.01	<.01
Total food scrap waste (lb)	141.04	39.1	180.14
Total food scrap waste (% of total waste)	78.29%	21.7%	100.00%
Edible wasted food (lb)	72.57	22.52	95.09
Edible wasted food (% of total food)	51.45%	57.60%	52.79%

Conformance to Food Loss and Waste Reporting Standard

[The Food Loss & Waste Protocol](#)⁴ is a multi-stakeholder partnership, which has developed the global Food Loss and Waste Accounting and Reporting Standard – also known simply as the FLW Standard. Launched in 2013, the Food Loss & Waste Protocol’s mission is to ensure wide adoption of the FLW Standard so companies, governments, cities and others are better informed about food loss and waste and motivated to curb this inefficiency.

The graphic below describes the scope of Case Study 13 of the institutional and commercial sector assessment of the Oregon Wasted Food Study using the FLW Standard.

Food loss + waste protocol

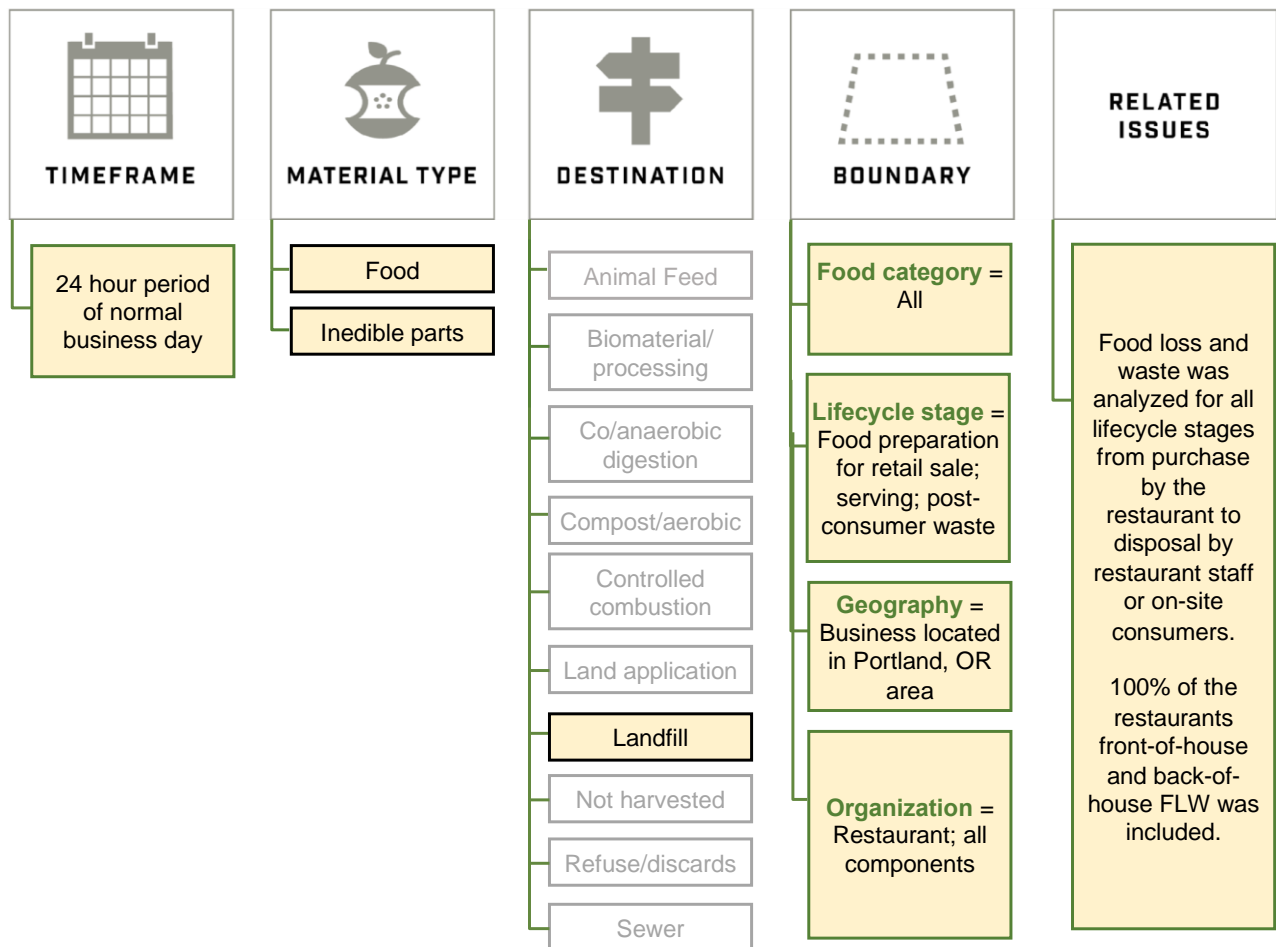


Figure A1: Scope of Case Study 13 as it relates to the Food Loss and Waste Reporting Standard

⁴ See, <http://flwprotocol.org>