Oregon Wasted Food Study: Institutional and Commercial Sector Case Studies

Case 9
Potential savings of repurposing leftovers in a hotel

This report was prepared for
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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 institutional and commercial (IC) 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 IC portion of this study are to:

- Understand components of wasted food in IC 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 focused on understanding the major types and causes of wasted food associated with hotel food service operations and quantifying the benefits of cross-utilizing and repurposing unserved catering leftovers. Flow of leftovers, defined as overproduced but unserved food, generated by the hotel's many food service venues (catering, restaurant and cafeteria), was tracked and assessed as a means of identifying opportunities to reduce wasted food.

Business context

The business participant in this case study is large hotel in Portland, OR Metropolitan area. This hotel is also the subject of Case Study 10, and some of the same data is used across both case studies. The hotel has its own restaurant, which serves breakfast and lunch, its own catering service to support the hotel's large and varied event spaces, and a smaller buffet style breakfast and lunch buffet for small corporate events in its own space. Finally, the hotel's food service operation runs a buffet style staff cafeteria for all hotel staff.

Methods

Study design

The study was conducted over a seven month period from November 2017 to June 2018. It involved a range of data collection and analytic components including: employee interviews, waste assessments and overproduction tracking. The intent of these analyses was to (1) identify types of wasted food and key causes of waste, and (2) quantify the realized and unrealized potential for cross-utilization of leftover food across the hotel's disparate food service venues.

Interviews

A total of seven employees were interviewed for this study, including a banquet prep cook, a breakfast prep book, the purchasing manager, a dishwasher, a buffet server, the cold banquets manager, and the executive sous chef. The interviews were all conducted in November 2017.

Employees were asked by researchers to voluntarily participate in brief interviews. Interviews were conducted with willing employees individually - one employee interviewed at a time – on-site, but in a private location. Interviews were recorded and took between 10 and 20 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.

Waste assessments

Researchers conducted the on-site assessment in January 2018. Food scraps were retrieved from several 25-gallon food scrap compost receptacles that had been staged and marked with signage by an employee, indicating where the waste had come from (i.e. back-of-house, front-of-house, employee cafeteria, catering, etc.), and containing a full 24-hour's worth of waste (100% of which was assessed). Areas of waste within the business were comprised of buffet and production waste, by-product from prep (trim) and spoilage waste.

Cross-utilization analysis

Researchers were interested in quantifying the amount of food that was being cross-utilized across food service venues at the hotel. To better understand the actual cross-utilization of product, **researchers helped management create and deploy a tracking sheet for catering leftovers**. Event staff used these sheets on five separate days of normal business to record leftover catering waste. Two discreet samples were collected, the first two days in mid-January during a busier catering time, and 3 days during late June during a slower catering period. Staff recorded each item by its name, as well as the quantity of prepared and left over food at the end of the event. In addition, the end destination for each product was recorded, going either to compost, employee cafeteria, or business cafeteria. Event staff consulted with sous chefs and banquet managers about the destination of leftovers if it was not clear or had not been previously determined.

Records of the cross-utilization of food that were collected by staff were input into a database by researchers and the **frequency of leftover occurrence, composting and re-purposing was quantified**. Final location of re-purposing was also documented and analyzed. For example, **unserved catering items were served at the breakfast buffet, the business center buffet, and at the employee cafeteria**. Daily average amounts of leftover food and food that was repurposed (in number of pans of food), was calculated.

Another waste prevention strategy that was discussed was reducing planned overproduction, which is common practice in the catering industry. The business was hesitant to reduce this perceived safety net, and justified it through their repurposing strategy. This prompted researchers to determine how effective repurposing actually was at displacing the need for fresh ingredients.

Limitations

The waste assessment was a point in time to sort, and did not capture potential variability across days based on business volume, number of events, or menu. The flow of food analysis was also limited because it included only five days of operations, and was reported by business employees and could not be verified by researchers. The intended period of data recording was two weeks, but **management was only able to support five days of collection**.

Results

Waste assessments

Three different categories of wasted food were assessed through waste sorts: food from the employee cafeteria, front-of-house waste (from catering, the restaurant and business buffet), and back-of-house (e.g. trimmings or unserved but prepared food). Full results can be seen in Table A1 in the Appendix.

Staff cafeteria

86.2% (43.39 pounds) of the cafeteria waste was edible food. **Baked goods** (e.g., breakfast pastries, muffins and bagels), and **prepared foods** (e.g., pasta, mixed rice and vegetables and cheese blintzes) constituted 73.4% of the edible foods. The results indicate that most of the cafeteria waste is the result of **over-production** and **last minute over-firing** in order to provide enough meal items for all staff.

Front-of-house

Edible foods made up 90.4% of total front-of-house food waste. A comparison of results, by category, can be seen in Figure 1, below. The top category of wasted edible food was **prepared foods**, primarily potato, mixed vegetables and pasta salads, which made up 35.3% (69.79 pounds) of wasted edible food. **Baked goods** were a mix of coffee cake, muffins, croissants and bagels, and were 25.7% (50.85 pounds) of wasted edible foods. **Dairy and eggs** were 12.9% (25.45 pounds) of wasted edible foods and were mainly comprised of scrambled eggs.

Back-of-house

Back-of-house waste weighed a total of 164.1 pounds. One of the top three wasted foods was the **inedible parts category**, which weighed 108.71 pounds (66.2% of total wasted foods) and was largely comprised of fruit and vegetable peels, cores, and ends. The second highest category was **prepared foods**, mainly consisting of potato, mixed vegetables and pasta salads weighing 21.65 pounds (39.1% of total wasted edible foods). The third highest category was fruit and vegetables weighing 16.47 pounds (29.7% of total wasted edible foods) and consisted of a large quantity of prepped vegetables that included red peppers, portabella mushrooms, zucchini, onions and cabbage that were all identified as usable quality ingredients for preparing entrees. The last food category with a substantial amount of waste was dry foods, weighing 14.43 lbs (26.1% of total wasted edible food).

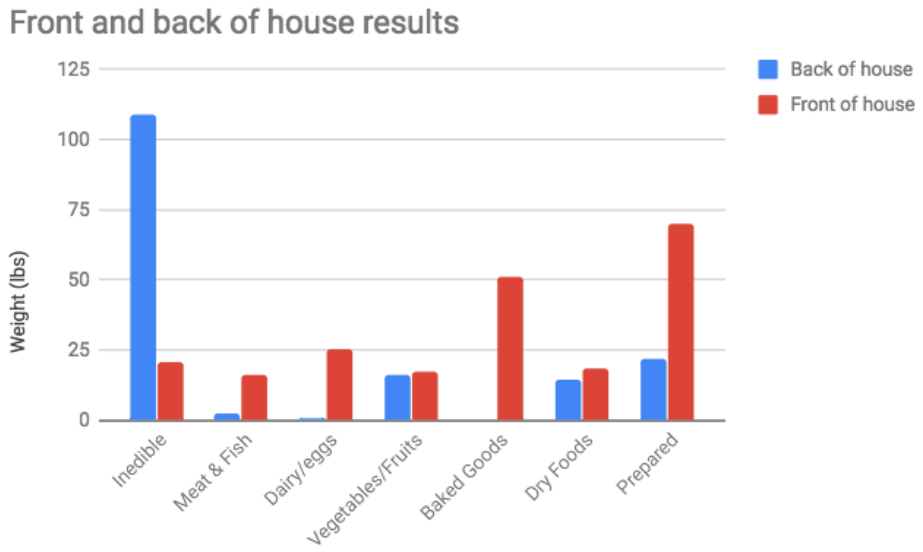

Figure 1: Waste assessment results the front and back-of-house, in pounds.

Interviews

Sources and causes of waste and barriers to prevention

Both the purchasing manager and the cold banquets manager thought that overproduction was not much of an issue. Most of what was left over, they said, went to feed employees at the staff cafeteria. "We run a pretty tight ship," the cold banquets manager said. While many caterers set generous over estimates for production, the cold banquets manager said that **they produce no more than 5% extra for each event** (meaning they produce for 5% more guests than anticipated).

Staff indicated that trim product comprised most of the food waste generated by the institution. One staff member, a banquet prep cook, estimated that **vegetable and fruit trim** made up 90% of what they composted.

A preparation cook said that waste is especially prevalent as the season slows down because it takes time for the purchasing manager to acclimate to lower demand, often leading to **over-ordering and consistent spoilage problems**. While during the busy season the hotel hosts many events per day, this staff member said that as events begin to space out over a few days, items that previously could be reused end up going to waste. The purchasing manager, too, indicated that spoilage due to over ordering or canceled events was a problem. They highlighted situations where event clients request expensive or unique items and then are either cancelled or under-attended leaving difficult to re-utilize food to prevent waste. The cold banquets manager supported this claim, saying he "felt like a loser" for throwing out these items, "but that's just part of the game."

One staff member, a dishwasher who sees much of the restaurant and catering waste come back to the kitchen, thought that the hotel was serving **too large portions** and **overfilling banquet and buffets** for guests at both events and at the **breakfast and lunch buffets** in the restaurant. A banquet server supported

this claim, suggesting that banquets should have smaller portions. **She also claimed that plated events caused less waste than buffet-style events**[1].

While some staff members indicated that the **staff cafeteria** was a critical source for the re-utilization of food, one banquet chef indicated that he thought it might encourage waste because since there was no budget specifically for the cafeteria, it had to rely on the leftovers from catering and over ordering to be fully stocked.

Catering staff did indicate a **belief that the majority of the food wasted in the catering service was caused by guests either under-attending or under-eating**. One staff said that food waste was "the client's problem".

One staff member expressed worry about tackling the wasted food issue when they said, "if food costs go down, you see labor go away." **They thought a more efficient operation could reduce the need for staff, reducing hours and endangering his and others' job security and that a lower bill to clients would mean less revenue for labor**. Management also expressed concerns about labor, though has a different view of its relationship to wasted food. They said that a shortage of labor was consistently a barrier to preventing wasted food. For example, the cold banquets manager said they had considered the idea of using smaller serving trays to reduce buffet waste, but that **transferring product into smaller pans and restocking them more often was too labor-intensive**[2].

When asked about policies related to preventing wasted food, staff at all levels indicated no relevant policies were in place. Rather, **management said, waste prevention was a continuous and iterative process, "coaching and checking compost bins regularly."**

Event serving practices both prevented and contributed to wasted food. Depending on the location of the event, staff would try to serve only what was necessary, leaving unneeded food in the refrigerator for utilization later. However, this practice was generally deployed, staff say, only if the event was on the first or second floor. If the event was on the upper floors of the hotel, staff brought up all of the food necessary for the event, with the leftovers needing to be composted after having sat out for more than a few hours. Another problem, identified by the executive chef, is that event staff do not always bring food back to the kitchen for re-utilization, even if it were still safe to re-serve, though they could not cite a reason for this behavior. Instead, event staff will occasionally empty buffet trays into compost bins at the event location.

Existing prevention strategies

Both cooking staff and management indicated that they used a dynamic process for PARs[3] setting, claiming that key information about an event's attendance, like whether guests would likely have large appetites, was generally shared in preparation for the event. Here, **dynamic PARs setting means adapting pre-set production amounts given unique, event-specific information**. Event staff also used **assumptions about attendance** to set PARs. For example, staff believed that different types of events cause different amounts of waste, claiming that **nonprofit or corporate events had higher amounts of waste because**

[1] This claim is supported by Flood et al who suggested plated events produce less food waste than buffet-style serving (2014).
Source: Flood, E., Kapoor, S., & de Villa-Lopez, B. (2014). The Sustainability of Food Served at Wedding Banquets. *Journal of culinary science & technology*, *12*(2), 137-152.

[2] A manager at another catering business, through personal correspondence, refuted this claim suggesting "we did not see an issue with labor… the labor is the same…" and also suggested that "…the food is better presented and fresher as a result."
Source: Coffey, B. (2018, September 14). Labor requirements related to serving practices [E-mail].

[3] PARs, or periodic automatic renewals, are set production amounts that are generally set by management and followed by preparation staff. Some businesses have standard PARs across days or menu items, while others adjust their PARs according to anticipated customer demand.

of chronic under attendance compared to weddings which have more reliable numbers and less leftovers. Managers also indicated that they adapt production estimates based on the **timing of the event**. For example, meals served on the **last day of a multi-day conference were consistently under-attended**, which staff accounted for in production.

Staff at all levels of the institution applauded the consistent use of **cross utilization of leftover food** as a critical strategy for waste prevention. Many specifically called-out the **use of catering and breakfast buffet leftovers for use in the staff cafeteria and then the corporate banquet area.** A few staff, however, suggested that these outlets for leftovers institutionalized and justified planned overproduction, not all of which could be used. Researchers take a closer look at this prevention strategy in the following section, but were unable to test this hypothesis.

Cross-utilization analysis

Over the five days of catering leftover tracking, a total of 23 menu items were recorded to have at least one pan left over after catering service. Only menu items with one or more full, unserved pans remaining were recorded, partial pans or those remaining on the buffet table at the end of service (unable to be reutilized) were not recorded. Collectively, these 23 menu items included 39 catering pans of leftovers. **Of these 39 pans, 8.5 (or 21.8%) were composted, while 30.5 (78.2%) pans were reused or re-utilized at either the staff cafeteria (66.7% of the time) or the breakfast buffet (11.5% of the time)** (Table A2).

Records were also sorted by menu item type (e.g. beef, chicken, vegetable, etc.) to determine what types of items were being wasted and re-utilized more frequently (Table A3). **Proteins (pork, chicken, beef and fish) were the most likely to be reused, making up 59% of re-utilized pans and 44.9% of overproduced pans**.

Analysis and Conclusion

Key causes and barriers to full food utilization

Staff interviews and the waste assessment confirmed that trim, especially **fruit and vegetable trim**, was a major source of food waste. While most of this was inedible, the waste assessment did show there was a non-trivial amount of edible trim waste. Reducing edible trim waste thus became the focus of another case study at this business (see case study 10.)

The study did find that **overproduction** was also a significant problem. **The catering leftovers tracking practice did show that a substantial amount of overproduction was occurring, though most of these leftovers were utilized.** It is unclear whether the prepared food found in the waste assessment was overproduction that was served or unserved, as it may be primarily partial pans not suitable for serving. Either way, **the waste assessment does lend credibility to staff concerns that planned portion sizes and buffet serving amounts are too large**. Furthermore, the substantial amount of baked goods found in the waste assessment both suggest PARs are being set too high, and that cross-utilization of products are limited to some, but not all items. **The baked goods problem is an example of how over-generous PARs cause significant amounts of waste, over-production waste that for other items may be masked by repurposing.**

Planned overproduction for use in the cafeteria and breakfast bar, mentioned by some staff as a potential cause of wasted food, does not appear to be a significant source of waste, however. **The waste assessment showed that minimal catering leftovers, served in the staff cafeteria, were left uneaten**. It is possible that an incomplete reliance on leftovers to stock the staff cafeteria (the hotel also prepares fresh food for the staff cafeteria when leftovers are not abundant enough) ensures that most of this food gets eaten.

Researchers also suggest that a barrier to waste prevention lies in the institution's culture. It is possible that **a combination of a lack of policies promoting the prevention of wasted food, perceptions of client culpability in the wasting of food, and the fear of hours being cut could work together to weaken the institution's collective capacity to reduce wasted food**.

Cross-utilization analysis

The cross-utilization analysis, using data from the tracking of catering leftovers and reuse, suggests that the practice of cross utilization was effective at diverting wasted food and likely promoted significant source reduction. **The data suggests that almost 4 out of every 5 pans of catering leftovers were served at either the staff cafeteria or the breakfast buffet.** This cross-utilization was particularly important considering the significant amount of catering waste the waste tracking uncovered.

One concern researchers had about the effectiveness of reutilization and cross-utilization is whether or not the end product actually gets used or whether or not it mostly goes to waste anyway. That later case mirrors the concern expressed by one staff member, namely that the planned overproduction for the cafeteria may cause more waste than source reduction. It appears, however, that this is likely not the case. **The waste assessment suggests minimal waste was generated by the staff cafeteria that was sourced from catering leftovers. Rather, the majority of the waste from the staff cafeteria was actually from product specifically prepared for the cafeteria (namely, breakfast burritos).**

The cross-utilization of catering overproduction represents a significant savings in food costs and likely a savings in labor. A food cost savings analysis was conducted (using methodology outlined in the Appendix). **It found that the cross-utilization of catering overproduction reduces food costs by between $27,034.31 and $54,068.62 per year** (depending on the assumptions used). This represents a repurposing of between 11,132.5 and 22,265 pounds of food.

This amount of avoided wasted food equates to 214 - 428 pounds per week, which would fill approximately **one to two 65-gallon rolls carts.** The reduction in required compost hauling service **equates to about $20.50 a month per roll cart[4] - a savings of about $246 - $492 per year.** This is noteworthy because it represents less than 1% of the cost savings associated with avoided food purchasing costs. **The financial benefits from preventing the wasting of food are largely a consequence of reduced food purchasing, not savings in waste removal.**

The environmental benefits of this cross-utilization are also significant. Using the EPA's WARM analysis tool (full methodology detailed in the Appendix), results suggest that **the practice prevents between 44.81 and 89.62 metric tons of carbon dioxide equivalent (MTCO2E) per year. This is equal to the emissions of between 9 and 18 passenger vehicles or the consumption of between 5,045 and 10,090 gallons of gasoline per year.**

[4] This cost estimate was obtained from a commercial waste hauler in the Portland Metro region who services the area the business operates in. The cost represents the marginal cost of adding one 65-gallon roll cart to an existing service.

While interviews indicated that catering leftovers were often used in the business buffet, the records from the five days studied did not suggest this was a common occurrence. It is unclear what caused this discrepancy, but it suggests that either the business buffet is a lower priority for the use of leftovers than the staff cafeteria, or the practice is not actually conducted as frequently as staff claimed.

Conclusion and additional opportunities

Cross-utilization of food across food service channels (catering, restaurants and staff meals) is effective at preventing wasted food and promoting source reduction. **This hotel re-utilized almost four out of every five unserved pans of catering leftovers, using the product as a significant contributor to both the staff cafeteria and their restaurant's breakfast buffet**.

However, **there remained potential for more cross-utilization. Almost 22% of unserved catering overproduction was composted instead of reutilized**. This practice could be improved by better meal planning across food service venues (restaurant, catering, and staff cafeteria), as well as preparation in serving practices that work to maximize a product's ability to be re-utilized.

This study could inform businesses with numerous channels of food service, like in the case of this hotel, on potential cost, labor and environmental benefits from cross-utilization of overproduction and over-ordered food. The hotel also saw similar benefits by coordinating inventorying and ordering across channels of food service to ensure ingredients got used and ordered in appropriate amounts. While this business had a unique opportunity to serve re-utilized food at the staff cafeteria and the business center, because menus were not set in advance, **other institutions could work to make their own menus more flexible to accommodate re-utilized product**.

This business could also reduce wasted food by setting in place **systems of feedback for employees to express food preferences for the employee cafeteria**. The waste assessment demonstrated that some items went uneaten (and perhaps, were overproduced). **Tailoring menus, both those made specifically for the cafeteria and those made for catering, to meet employee tastes may lead to less wasted food and more full utilization of catering leftovers**.

Appendix

Waste collection and sorting

Methods for this sort were typical to other sorts where a series of bins and buckets were used to gather the various categories of waste and weighed accordingly. Tare weights for the bins were recorded and subtracted to derive accurate amounts 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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Waste sort results

Table A1: Waste sorts results in pounds

	Back-of-house weight (lb)	Front-of-house weight (lb)	Employee Cafeteria weight (lb)	Total weight (lb)
Inedible	108.71	21.02	6.92	129.73
Meat & Fish	2.23	16.04	3.48	18.27
Dairy & eggs	0.61	25.45	0.62	26.06
Vegetables & Fruits	16.47	17.13	5.8	33.6
Baked Goods	<.01	50.85	8.47	50.85
Dry Foods (Grains, Pasta, Cereals)	14.43	18.53	1.63	32.96
Snacks, Condiments, Sauces	<.01	<.01	<.01	<.01
Liquids, Oils, Grease	<.01	<.01	<.01	<.01
Cooked, Prepared, Leftovers	21.65	69.79	23.39	91.44
Unidentifiable	<.01	<.01	<.01	<.01
Edible wasted food (pounds)	**55.39**	**197.79**	**43.39**	**296.57**
Edible wasted food (% of total food)	**33.75%**	**90.39%**	**86.25%**	**68.46%**
Total food scrap waste (pounds)	164.1	218.81	50.31	433.22

Table A2: Results from the analysis of catering leftovers and their final destination

Final Destination	# of pans	Percent of total
Composted	8.5	21.79%
Reused	30.5	78.21%
Cafeteria	26	66.67%
Breakfast	4.5	11.54%
Total pans leftover	**39**	

Table A3: Menu item type frequency for full pans re-utilized

Menu item	Number of pans overproduced	Percent of pans overproduced	Number of pans reused	Percent of item reused	Percent of reused total
Pork	10.5	26.9%	10.5	100.0%	34.4%
Mixed	9	21.8%	6	70.6%	19.7%
Vegetable	7	17.9%	6	85.7%	19.7%
Chicken	4	10.3%	4	100.0%	13.1%
Fish	2	5.1%	2	100.0%	6.6%
Grain	4	10.3%	1	25.0%	3.3%
Beef	1	2.6%	1	100.0%	3.3%
Eggs	2	5.1%	0	0.0%	0.0%
Total	**39.5**		**30.5**		

Cost savings estimate methodology

Recommendation analysis

Cost savings estimates were calculated using ReFED's value estimates for wholesale food costs, as outlined in their *Technical Appendix* to the *Roadmap to Reduce US Food Waste by 20%*.[5] The food cost assumptions are seen in Table A4.

Table A4: Costs per pound of retail and wholesale food groups, drawn from ReFED's Technical Appendix to the Roadmap to Reduce US Food Waste by 20%.

	Grain products	Meat	Fruit and vegetables	Seafood	Milk and dairy
Retail	$1.21	$5.73	$1.51	$8.04	$1.21
Wholesale	$0.97	$3.24	$0.74	$4.88	$1.17

To calculate costs, records from the repurposing tracking practice were converted from pans to weight (using both 5 pounds/pan and 10 pounds /pan estimates). Once weights were determined, the amount of each food category (grain, meat, fruit and vegetable, seafood, or milk and dairy) in each recorded item was estimated and totaled. Repurposed product for the five-day sample period was totaled, and costs per pound were determined using the wholesale cost standards outlined above. Yearly total weights and costs were extrapolated from the daily average of the five-day period. Results can be seen in Table A5 below.

[5] ReFed. (2016). **A Roadmap to Reduce US Food Waste by 20%: Technical Appendix.** Retrieved from https://www.refed.com/downloads/ReFED_Technical_Appendix.pdf

Table A5: Food weight and food cost estimates extrapolated from the repurposing tracking results

	Five day sample period				Yearly estimate			
	5 lbs/pan		10 lbs/pan		5 lbs/pan		10 lbs/pan	
	Pounds	*Costs*	*Pounds*	*Costs*	*Pounds*	*Costs*	*Pounds*	*Costs*
Grain	13.30	$12.90	26.60	$25.80	970.90	$941.77	1941.80	$1,883.55
Meat	78.30	$253.69	156.60	$507.38	5715.90	$18,519.52	11431.80	$37,039.03
Fruit & Veg	39.20	$29.01	78.40	$58.02	2861.60	$2,117.58	5723.20	$4,235.17
Seafood	13.30	$64.90	26.60	$129.81	970.90	$4,737.99	1941.80	$9,475.98
Milk & Dairy	8.40	$9.83	16.80	$19.66	613.20	$717.44	1226.40	$1,434.89
Total	**152.50**	**$370.33**	**305.00**	**$740.67**	**11132.50**	**$27,034.31**	**22265.00**	**$54,068.62**
Per Day	**30.5**	**$74.07**	**61**	**$148.13**				

Carbon emissions analysis methodology

Carbon emissions and energy use reductions were calculated using version 14 of the EPA's Waste Reduction Model (WARM). Cross-utilization was considered source reduction and calculated using the same researcher estimates of meal composition used for the cost savings analysis based on the data provided by the business. The full results of the WARM analysis can be seen in Table A6 below.

Table A6: Results from the WARM analysis of cross-utilized food, reported by category, with total reductions and their equivalents included

	Tons source reduced		Change in MTCO2E (compared to composting)		Change in Million BTU (compared to composting)	
	5lbs/pan	**10lbs/pan**	**5lbs/pan**	**10lbs/pan**	**5lbs/pan**	**10lbs/pan**
Grain	0.49	0.97	-0.21	-0.42	-3.02	-6.04
Meat	2.86	5.72	-42.64	-85.28	-126.28	-252.56
Fruit & Veg	1.43	2.86	-0.38	-0.76	-8.09	-16.18
Seafood	0.49	0.97	-1.12	-2.24	-13.14	-26.28
Milk & Dairy	0.31	0.61	-0.46	-0.92	-4.55	-9.1
Total	**5.57**	**11.13**	**-44.81**	**-89.62**	**-155.08**	**-310.16**

Equivalencies	**5lbs/pan**	**10lbs/pan**
Passenger vehicles	9	18
Gallons of gasoline	5,045	10,090
Household annual energy use	1	2
Barrels of oil	27	54

Conformance to Food Loss and Waste Reporting Standard

The Food Loss & Waste Protocol[6] 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 9 of the institutional and commercial sector assessment of the Oregon Wasted Food Study using the FLW Standard.

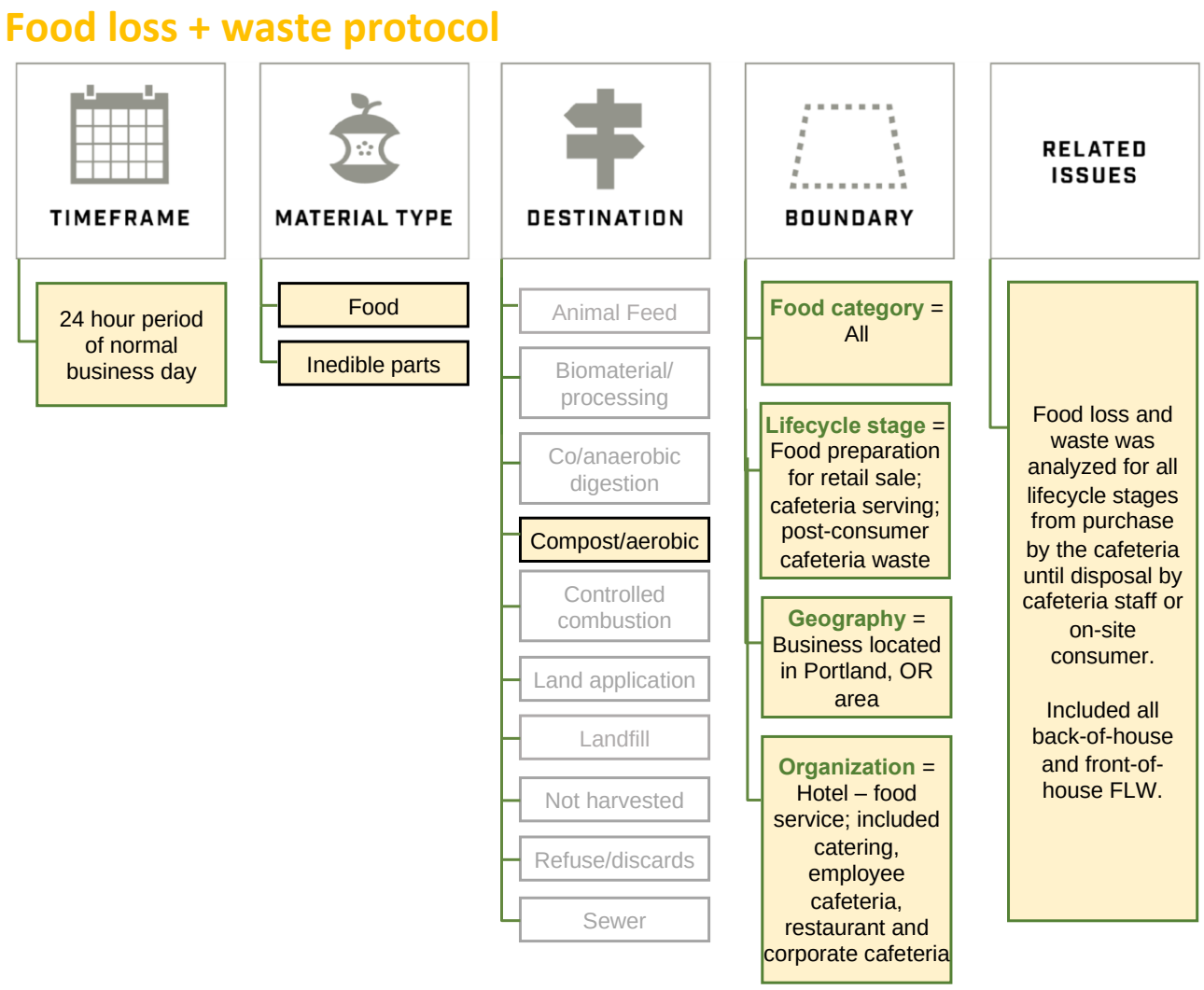

Figure A1: Scope of Case Study 9 as it relates to the Food Loss and Waste Reporting Standard

[6] See, http://flwprotocol.org