

Reaching for the Top

An analysis of the City of Austin's organics diversion requirements
in the context of the EPA's Food Recovery Hierarchy

Naoko Susan Ward
The University of Texas at Austin
B.A Urban Studies, May 2019

Table of Contents

Executive Summary	2
Problem Statement	3
Background.....	4
Food Waste in America	4
City of Austin Universal Recycling Ordinance	5
Organics Diversion Ordinances	6
Source Reduction.....	8
Methods	9
Limitations	10
Results.....	11
Organics Diversion Plans by Year.....	11
Method Utilization by Year	12
Number of Methods Utilized	13
Correlation between Method Utilization	14
Waste Reduction 2019.....	15
Impact on Diversion Non-profits and Businesses.....	16
Discussion and Conclusion	18
Resources	22
Appendices	24

Executive Summary

The 2013 amendment to Austin's Universal Recycling Ordinance added organics diversion requirements for food-permitted businesses. While organics diversion targets both food and other plant-based materials, this paper focuses on edible food. While many alternatives to landfill exist for edible food, some diversion methods are more beneficial for society, the environment, and the economy. One purpose of the organics diversion requirements is to reduce food waste and for that which is not eliminated, to put it to the highest and best use as dictated by the EPA's Food Recovery Hierarchy (Fig 1).



Fig 1: EPA Food Recovery Hierarchy

The order is source reduction, feed people, feed animals, use for energy, then compost. While the organics diversion requirements can result in increased attention on organic waste from food-permitted businesses, through increased emphasis on source reduction, it is possible to shift utilization of these methods up the hierarchy. Methods include the promotion of best practices, financial support, and education. As each business is unique, the applicability of certain best practices can be determined through a waste audit. Waste audits are already provided for free by

Austin Resource Recovery as a zero waste business service. The zero waste business rebate can also be used for a waste composition study or waste stream audit by a 3rd party. Although currently categorized as an innovation, it can be re-categorized as source reduction, to remove the feeling of novelty, and instead, be promoted as a main use for this rebate. In addition, in outreach efforts and on the plan itself, source reduction can be better promoted as the best option, and best practices and feasibility shared.

Problem Statement

In 2010, Austin City Council adopted the Universal Recycling Ordinance (URO) in order to influence commercial and industrial waste (City of Austin). In 2013, it was amended to include a section on organic material, as it comprises a large portion of the waste stream. Organic material refers to food and other animal or plant-based materials of which a substantial portion will decompose in a managed compost operation. The organic materials section includes multiple requirements. While most of these requirements are fixed- signage, education, and convenient access to composting containers when applicable- the Organics Diversion Plan (ODP) works slightly differently. The ODP allows for a food permitted business to reduce or divert their organic materials in a variety of ways. While many alternatives to landfill exist, some diversion methods are more beneficial for society, environment, and the economy. One purpose of the ODP is to reduce food waste and for that which is not eliminated, to put it to the highest and best use as dictated by the EPA's Food Recovery Hierarchy (Fig 1). This paper will seek to determine whether the organics diversion requirements influence food permitted businesses to utilize the methods in this order.

Background

Food Waste in America

Although different studies find different numbers, with estimates ranging from 30-50%, a large proportion of food in America is wasted. This has social, environmental, and economic consequences. When resources and land are used to produce food that is ultimately wasted, they are being diverted from being used to provide food for those who do not have access to it, or cannot afford it (Stuart, 2009). The global food system is the cause for up to 1/3 of anthropogenic greenhouse-gas emissions (CGIAR 2012). In addition, pesticides and fertilizers can have negative effects on the environment. One study by Venkat (2011), found that avoidable food waste in the US exceeded 55 million metric tonnes a year, an economic cost of \$198 billion. Losses occur at all aspects of the food supply chain, which include farming, harvesting, processing, transportation, retail, food establishment, and households (National Resources Defence Council) (Fig 2). While different factors are responsible for the loss at different parts of the food supply chain, storage conditions, excess purchasing, food safety regulations, and behavior toward food are the primary culprits for loss at the retail and food establishment levels (Cowley, 2013).

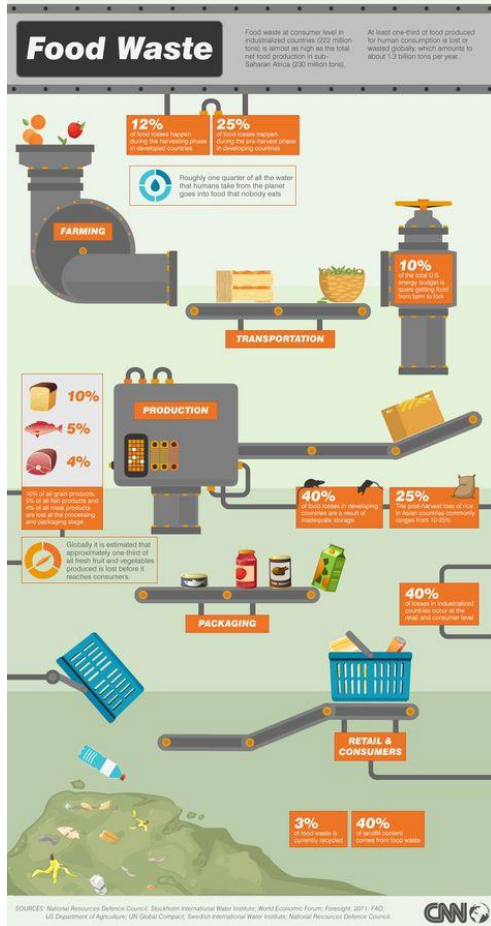


Fig 2: Food waste at different points of the global food system (Eastaugh, 2016)

City of Austin Universal Recycling Ordinance

Austin City Council adopted the Austin Resource Recovery Master Plan in 2011, which set goals to reduce the amount of solid waste destined for landfills or incinerators. One of these goals is zero waste by 2040, which requires 90% diversion.

Multi-family residential and commercial properties generate approximately 68% of citywide waste in Austin. However, collection is handled by the private sector. As the City of Austin does not have direct control over these properties, they utilize ordinances and programs to influence waste (Perdue, Curbside Organics Collection Analysis). In November 2010, the Universal Recycling Ordinance (URO) was adopted by City Council. In April 2013 it was

amended to include an organics diversion section to address organic material, which makes up over 47% of material in landfills (CACOG Regional Solid Waste Management Plan, 2005). In 2014, this organics diversion section was updated, providing more time for food permitted businesses to comply, and changing the requirement from “recycling of compostable materials” to “diversion of organic material” (20140612-010, Ordinance). The current organics diversion section requires food permitted businesses to reduce or divert organic material from the landfill. This rolled out in phases by square footage, and as of October 1, 2018, all food-permitted businesses are required to meet the minimum organics diversion requirements. These are convenient on-site access to organics diversion by employees, signs and labels, annual education, and an annual Organics Diversion Plan. In its implementation, the URO seeks to assist businesses in achieving compliance, rather than punish them for the lack of doing so. This helps maintain positive relationships and also requires less resources for enforcement. As of now, there is no process for checking that each business is in compliance. Rather, if a code violation is reported, a lengthy process ensues that potentially leads to a fine. This process provides multiple opportunities to achieve compliance (Shaw-Meadow, 2018). No penalties have been issued as of now, although potential fines range from \$100 to \$2000 per day per violation (Universal Recycling Ordinance).

Organics Diversion Ordinances

Organics diversion ordinances target food and other plant-based materials. They can vary in scope, responsible party, implementation, and reporting. Organics diversion ordinances are primarily implemented at the state and municipal levels in the United States. Currently, six states and five cities in the U.S. have an organics diversion ordinance in place (Fig 3). They vary in who is affected, with thresholds commonly being weight of food or size of business. In addition,

they can affect either single-family, multi-family, or commercial establishments. Those responsible for compliance can be property owners, business managers, tenants, or service providers (Beck 2009). To better provide the infrastructure necessary to accomplish its goals, it is often accompanied by service provider, or hauler, ordinances. They often include education and signage as well as the process of diversion (Perdue 2015). Across these factors, two primary types of organics diversion ordinances exist- waste ban and mandatory recycling. A waste ban prohibits covered entities from disposing of organic waste or food waste, while mandatory recycling requires them to take specific actions to reduce it (Leib et al., 2018).

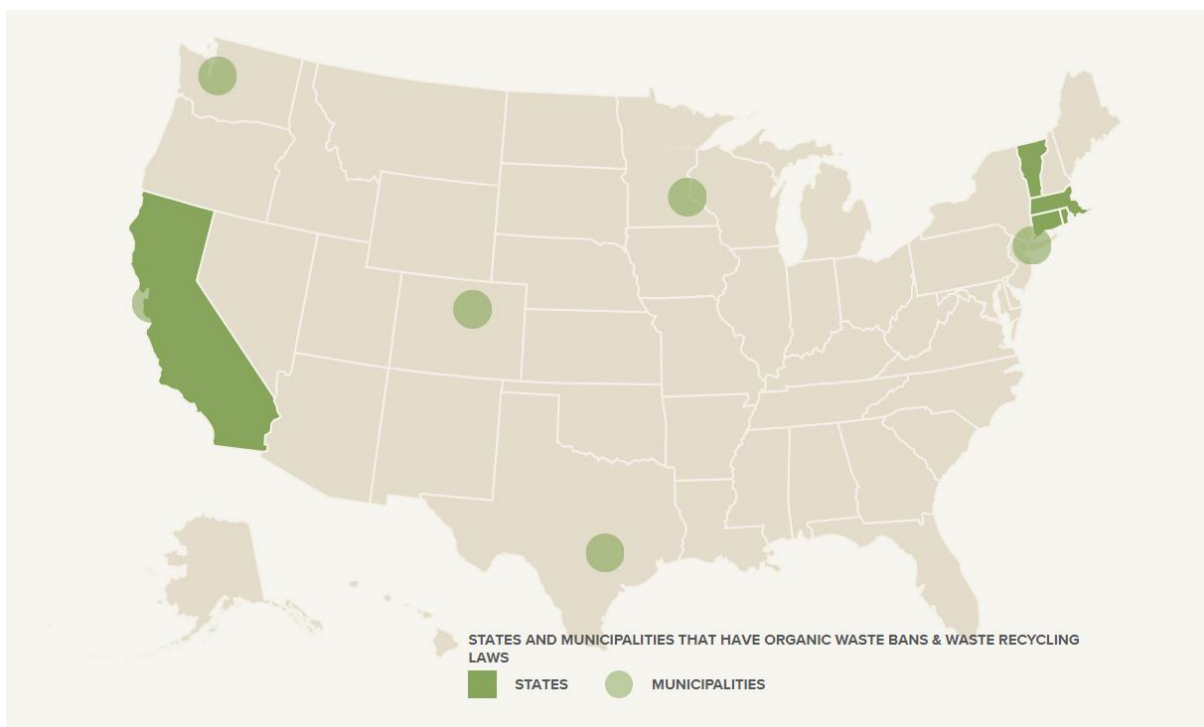


Fig 3 – Source: ReFed US Food Waste Policy Finder

Source Reduction

Source reduction decreases the amount of food waste generated (McKinney, 2017).

Different methods for this exist. Shakman et al. (2018) found that a detailed system, such as a weight-based one, was highly effective. Manual food waste accounting tools based on purchase and inventory sheets can also be utilized (Sakaguchi et al. 2018). ReFED, a national organization that takes a “data-driven approach .. to solve our national food waste problem” also offers a variety of ways that food service industry personnel can take, including food planning operations, staff and customer education, and business operator’s incentives. They quantify the impact of source reduction methods using different metrics, including financial benefit, waste diverted, emissions reduced, water saved, jobs created, and meals recovered.

Methods

To determine whether the organics diversion requirements influence food permitted businesses to utilize the methods in this order, the FY2017 – 2019 organics diversion plans were reviewed. First, the yearly organics diversion plan templates were reviewed to note differences in the questions asked. All FY2017-2019 organics diversion plans that had been submitted were obtained from the City of Austin’s Resource Recovery, and an analysis was run to find correlations between diversion methods. A breakdown of methods by percent utilization was also conducted. Each method could be answered yes or no, and if the answer was yes, further detail was solicited in the form of checkboxes for specific methods or an open ended text box. The description of diversion methods was also analyzed. This provided information on where the food was being diverted to, or what specific methods of source reduction were utilized.

A more qualitative analysis was conducted through interviews with organics diversion service providers over the phone (Appendix A). The goal of these was to determine the change in customer base, both in type and quantity, as well as other impacts on their program. In addition, obstacles to these businesses in terms of logistics was evaluated. For further understanding of impact on organics diversion service providers, a review of compost hauler websites was done to identify reference to the City of Austin’s Universal Recycling Ordinance and to its organics diversion requirements. Interviews were also conducted with non-profits with a food recovery program (Appendix B). The goal of these was to determine the change in donors, and whether they had the organizational structure and resources in place to maximize benefit.

Limitations

A major limitation of this study is its inability to determine the extent to which one diversion method can be substituted for another. Without knowing what type of food, and what quality of food, is being composted, it is difficult to say that one diversion method could be replaced with another. However, food that is wasted in the sense that it was prepped, then thrown away, can almost always have been prevented, as well as food that was wasted prior to being prepped.

In addition, existing information on current organics diversion rates are on a very large scale (Austin's 2015 Community Diversion Study). This makes it difficult to determine whether food diversion methods were implemented due to the organics diversion requirements, or had already existed, and are merely being logged as a result. A higher- level waste audit of Austin's waste streams in which composition of waste streams are evaluated could help inform this. Looking at the change in best practices of food-permitted businesses that submitted organics diversion plans over multiple years can also help provide insight into this. 437 businesses submitted an ODP in two different fiscal years, and 135 businesses submitted an ODP in three different fiscal years. Although the change in template does not allow for a direct comparison, analysis could be done. Another place where this study could be extended is in cross-analysis of method by type of business. Umlas' study did this for the 2017 and 2018 ODPs, and found statistical significance in the utilized methods based on business type.

Results

Organics Diversion Plans by Year

The organics diversion plans for FY2017, FY2018, and FY2019, have slightly different formats and content. While the 2017 and 2018 plans included examples and further notes about each method, the 2019 plan simply states the question, with a hyperlink to the EPA's webpage for the method (Fig 4, Fig 5).

2. Food Waste Prevention: Has your business implemented a system with documentation to track and utilize food/beverage(s) to avoid unintended expiration? (See examples below) *

☒ Yes ☐ No

Examples could include:

- Offer specials based on surplus inventory
- Offer free sides (based on inventory) with entrée purchase
- Downsize to smaller plates
- Remove self-service trays from cafeterias
- Offer smaller portions on menus

3. Food Donation for People: Does your business donate food for human consumption? *

☒ Yes ☐ No

Note: Keep documentation. Food donations may be tax deductible.

Businesses and individuals donating food in good faith are protected by the [Bill Emerson Good Samaritan Food Act](#)

Understand [regulations and requirements for donating food](#)

Please provide the total monetary value of donations, if available. \$

Where did the food go? Please list three or more recipient organizations. *

Complete the tables for sections 3 and 4 to document the quantity of food donated or use the links to learn more about food donation resources.

Fig 4: FY2017 Organics diversion plan template

Organics Diversion Options

Do you divert organic material by instituting organic [waste reduction practices](#)? *

☐ Yes ☐ No

Fig 5: FY2019 Organics diversion plan template

This reflects the incorporation of feedback from participants that the form was lengthy. In addition, the 2017 plan asks about documented reduction, food waste prevention, and food recovery, while 2018 asks about food waste prevention and food recovery, and 2019 asks about

waste reduction. Although they all allude to source reduction, different language leads to varied interpretations, as will be discussed in waste reduction 2019. The number of additional questions also varies, with 2019 having fewer than 2017 and 2018 (Appendix B). While the 2017 and 2018 questions give checkboxes and radio flyer options as follow up, the 2019 ODP is more open ended.

437 food- permitted businesses submitted an organics diversion plan in two of the three years. 135 food- permitted businesses submitted an organics diversion plan for three out of the three years. Although the template changed throughout the years, by looking at the submission, it should be possible to see the change in waste diversion methods, if any. The optimal result would be an increase in the extent to which waste diversion methods are implemented, although that is harder to analyze as the description is open ended.

Method Utilization by Year

Across all three years, food waste prevention (referred to as such in 2017 and 2018, but referred to as waste reduction in 2019), was reported most frequently (Fig 6). 59% of food permitted businesses reported it in 2017, 76% in 2018, and 62% in 2019.

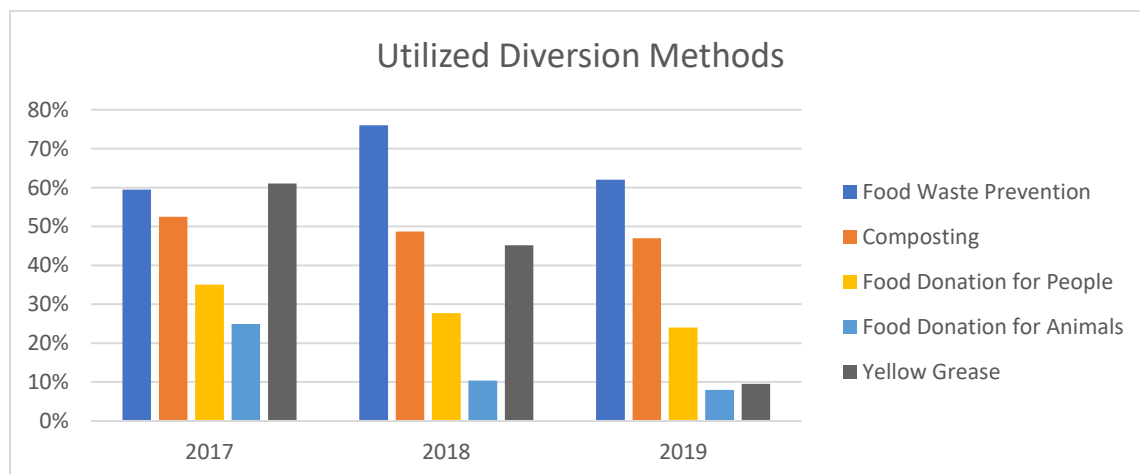


Fig 6: Utilized diversion methods by year

Yellow grease collection was high in 2017 at 61%, then dropped to 45% in 2018, and again to 10% in 2019. This is likely a reflection of the scale of production, as the threshold for size in whether or not a business was affected was lowered over the years. While this difference in population groups is especially true for yellow grease collection, it is also a key factor for other methods. FY2017 has only food-permitted businesses greater than 15,000 square feet, while FY2018 includes those between 5,000 and 15,000 square feet, and FY2019 includes all food-permitted businesses.

Number of Methods Utilized

The 2017 and 2018 organics diversion plans had much higher numbers of utilized best practices (Fig 7).

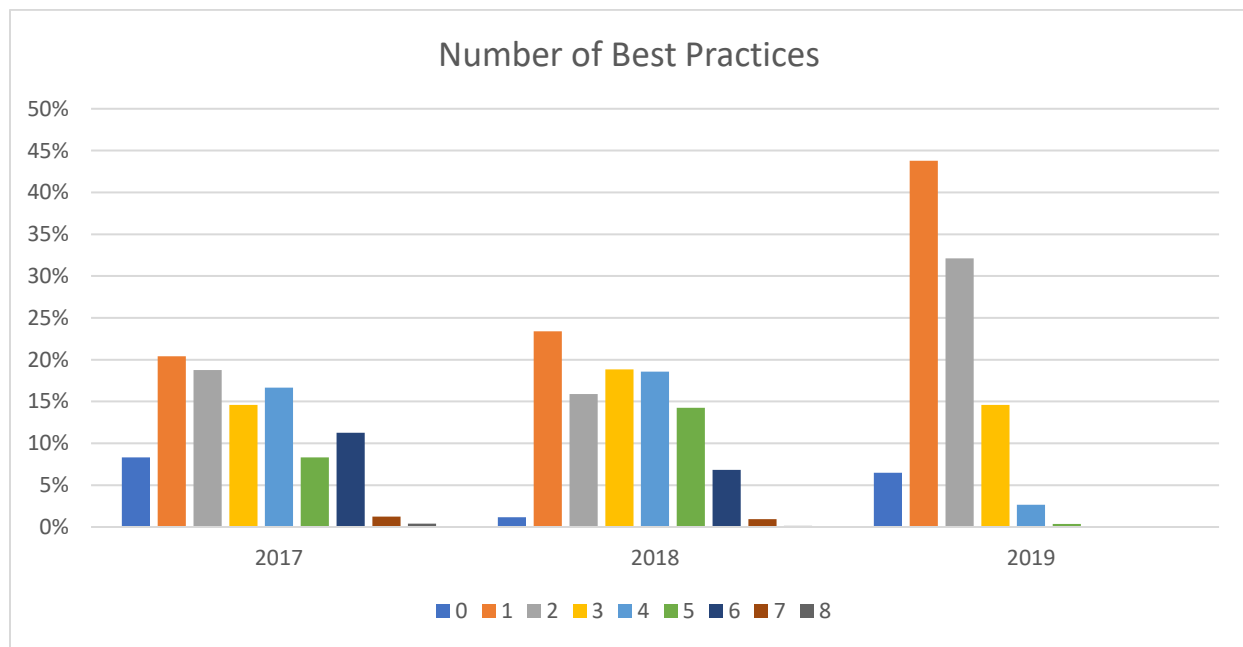


Fig 7: Percent of the number of best practices

However, this is partially due to the different options available in terms of methods. 2017 has 8 potential best practices, 2018 has 7, and 2019 has 6 (Appendix C). In addition, differences in the language makes it difficult to compare across the years. In 2019, there is a clear

demarcation between methods. However, in 2017 and 2018, it is harder to discern whether something would be considered, for example “documented reduction”, “single-use materials”, or both.

Correlation between Method Utilization

Correlations were calculated between each diversion method for each year (Fig 8). Most methods were positively correlated with each other, meaning that those who diverted via one method were more likely to divert via another method. However, in 2019, composting was negatively correlated with waste reduction (-3%), people donation (-10%), and animal donation (-8%).

2017					
	People Donation	Animal Donation	Food Recovery	Composting	
People Donation		52%	38%	7%	
Animal Donation	52%		41%	6%	
Food Recovery	38%	41%		19%	
Composting	7%	6%	19%		

2018					
	Food Waste Prevention	Food Recovery	People Donation	Animal Donation	Composting
Food Waste Prevention		32%	12%	3%	9%
Food Recovery	32%		39%	24%	21%
People Donation	12%	39%		33%	10%
Animal Donation	3%	24%	33%		10%
Composting	9%	21%	10%	10%	

2019				
	Waste Reduction	People Donation	Animal Donation	Composting
Waste Reduction		15%	5%	-3%
People Donation	15%		3%	-10%
Animal Donation	5%	3%		-8%
Composting	-3%	-10%	-8%	

Fig 8: Correlations between diversion methods

Waste Reduction 2019

Rather broad rules for what constitutes as waste reduction leads to some misinterpretation. Each description for waste reduction was read and marked with whether it contained methods of source reduction, feeding people, feeding animals, industrial use, compost, reusable/recyclable, or none (Fig 9).

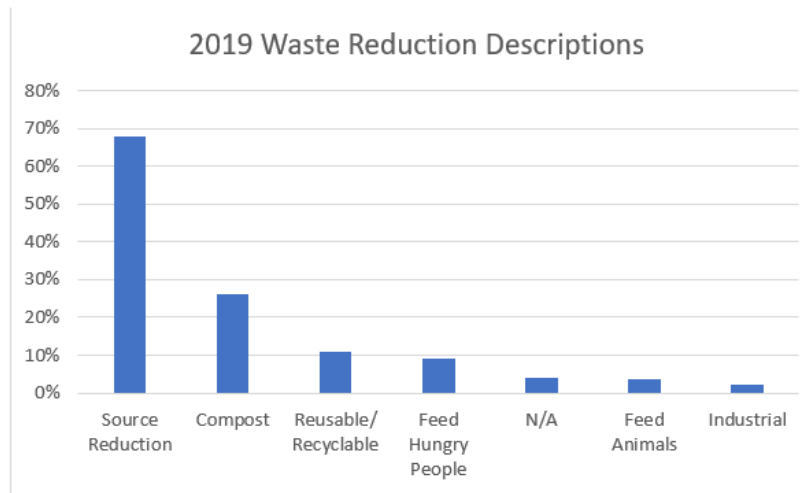


Fig 9: 2019 waste reduction descriptions

When looking at 2019 plans for which businesses indicated that they practiced waste reduction, only 68% had actual source reduction practices, which include plate waste reduction, food forecasting, FIFO, food waste audits, reuse of food for other dishes, and the use of uncommonly used parts of produce/ meat. The effectiveness and scope of source reduction was not considered, just whether or not it was stated that it was practiced. In addition, a review of the descriptions revealed a wide range in source reduction best practices. For example, the frequency with which they ordered from wholesalers varied from a day to a week; yet, both could be listed as best practices. 26% of waste reduction was compost. 9% was feeding hungry people. 4% was not applicable. 11% was reusable or recyclable. The percentages do not add up to 100% because some businesses stated more than one source reduction method which they practiced.

Impact on Diversion Non-profits and Businesses

All interviewed diversion non-profits and businesses stated that the Universal Recycling Ordinance, which includes the organics diversion requirements, had impacted their business. Two businesses stated that the implementation of the Universal Recycling Ordinance had created the market necessary for their business to exist, with one business relocating upon its implementation. Different businesses had different customer bases, even though they were providing similar services. Some catered to larger businesses which produced high volumes of organic waste, while others served primarily food preparation businesses, mostly restaurants. All businesses stated that since the implementation of the ordinance, the number of customers had increased. One had hired more people since February 2019, when all food-permitted businesses were required to submit an organics diversion plan, as a response to this increase in customers. One compost service provider, which provides highly customizable services, stated that the diversity of their customers had also increased. Two waste management companies which had previously offered landfill and recycling stated that they had begun offering commercial composting in 2019 so that their customers could meet the ordinance's requirements. In addition, an analysis of diversion service provider websites showed that for those more local providers, the organics diversion methods were mentioned (Fig 10, Fig 11).

ID	Geographic Scope	Count	Percent Total	Effect on Business
1	Municipal	31	3.37%	Moved to Austin from Hawaii in 2017, knowing that organics diversion would be mandated by the city

Fig 10: Utilized organics diversion

ID	Geographic Scope	Count	Percent Total	Effect on Business
1	Municipal	33	3.59%	N/A
2	Municipal	300	32.64%	Huge influx of customers since Feb 2019
3	Municipal	177	19.26%	Stated on website
4	Greater Austin area	18	1.96%	Increased customer base and diversity of customers
5	Municipal	18	1.96%	Organics diversion created a new market for compost services
6	Regional	10	1.09%	Not on website
7	Regional	139	15.13%	Listed on website
8	US and Canada	19	2.07%	Listed on website (2 clicks from wasteconnections.com/austin)
9	Greater Austin area	21	2.29%	Added composting services in beginning of 2019; not listed on website
10	U.S. and Canada	16	1.74%	Not on website
Total		919	81.73%	

Fig 11: Utilized Compost Haulers in 2019

The two nonprofits that were interviewed also stated that the number of donors had increased. More smaller businesses requested their services as a free way to meet the requirements. However, a certain threshold of recoverable food has to be met for this partnership to be worthwhile, as resources, including time of volunteers or employees, and vehicles, are limited. Another consideration was whether the greenhouse gasses emitted from the pickup were offset by the savings through food waste recovery. In addition, although one nonprofit had increased the number of pickups, the total volume of food had decreased (Fig 12). With this comes both of the concerns mentioned above.

	2014	2015	2016	2017	2018
Total pounds of food	391,803	626,902	620,788	698,622	745,667
Regular donors	37	26	20	37	42
Food Runs	2361	2770	2578	3118	3437
Average pounds/run	166	226	241	224	217

Fig 12: Food recovery non-profit statistics

Discussion and Conclusion

The organics diversion requirements of the URO has started conversation and implementation of various forms of food recovery, diverting organics from the landfill in favor for the better methods in the EPA's food recovery hierarchy. However, with the acknowledgement that methods of food waste diversion are not always interchangeable, it is worth looking into where the highest methods can be supported more vigorously. Though the City of Austin states that the organics diversion requirements are not a composting ordinance, the data suggests that it has boosted composting more than other methods of food waste diversion.

This can be seen in the creation and supplementation of the market for organics diversion service providers, including compost haulers and animal-feeders. The major players in this, as identified by frequency count, stated that the Universal Recycling Ordinance either created the market for their service, or greatly expanded it (Fig 10, Fig 11). In 2019, 919 food permitted businesses composted. 11 haulers had at least 1% of that population. Of those 11 businesses, 8 cited the organics diversion requirements as having an impact on their business. The two businesses that were interviewed stated that the organics diversion requirements had had huge impacts on their customer base. The former stated that the requirements created a new market for compost services, allowing for the establishment of their business, while the latter stated that they had experienced a huge influx of customers since February 2019, when all food-permitted businesses were required to comply with the organics requirements. Yet, a similar effect has yet to be seen for food waste prevention. In addition, correlations between businesses that utilized composting and those that practiced waste reduction, feeding people, and feeding animals were negative (Fig 8). Interviews done in 2018 also showed that the organics diversion requirements

affected the practices of only a small percentage of food-permitted businesses, and those that did report a change stated that they had implemented composting (Umlas 2018).

There was also confusion among food-permitted businesses as to what waste reduction was, with only 68% of businesses who indicated that they practice waste reduction, actually talking about source reduction in their description of waste reduction methods, and 26% including compost (Fig 9).

While landfill diversion is a positive thing, if the effect that this data alludes to – that composting may be taking the place of higher methods of food waste diversion- is true, steps should be taken to counteract this. This can be done in the framework of existing policy through a number of methods.

By emphasizing that things such as composting and feeding hungry animals and people are not the same as waste reduction in outreach done for the organics diversion requirements, and on the organics diversion plan itself, it should be possible to shift the majority of diversion methods up the food waste hierarchy. In addition, even among those who correctly stated that they had implemented waste reduction methods, there was a high variance in those methods. Some businesses stated that they reduced waste through daily ordering, while others wrote down weekly. Although it is a case-by-case basis, there are certainly best practices that can be modified to each business. While the city does provide consulting services, if more businesses were to take advantage of this, it would be possible to further waste reduction. These ideas need not originate from the city, but instead, emulate best practices that were stated in the waste reduction methods. Some food- permitted businesses exemplified best practices, such as holding “a company-wide monthly & yearly contest for the store with the least waste.. pay out bonuses to the top ranking managers & top crew members. For the store with the least food waste in a

quarter, that crew gets taken out to dinner. This really incentivizes the whole team to control waste. We have created spreadsheets that we & our managers use on a bi-monthly bases to look for improvement in waste. We break our food into 7 categories to help analyze which items a store could improve on in food waste.” Others focused on food forecasting and waste audits. Still others spoke to utilizing uncommonly used parts of produce and animals, or reuse of items for different dishes. Marking down prices at the end of the day was also a common technique. Behavioral change of customers through education and smaller plates/ servings was also utilized. These are consistent with the EPA’s case studies, which speak to daily waste tracking, daily deliveries, computer-assisted ordering based on inventory and sales predictions, and behavioral change through education (EPA Sustainable Management of Food).

The city can also promote waste audits. Austin already has programs in place for this, with Austin Resource Recovery providing onsite waste assessments as a free zero waste business service. In addition, the Zero Waste Business Rebate can be used for a waste composition study or waste stream audit by a 3rd party (City of Austin). Although listed under innovation, and less clearly marketed, by shifting it to source reduction, it can be utilized to the same extent as the compensation for recycling and composting services that this rebate is traditionally marketed as. Through outreach, more businesses would utilize these programs, allowing them to receive an objective view on their waste stream.

As the EPA Food Recovery Hierarchy states, source reduction is the most optimal method of food recovery for a number of reasons. It reduces the need for resources that go into food production. It is most cost efficient for the city, as trucks create strain on the road system, although it is in part mitigated by the solid waste vehicle license fee (Austin Code Department). In addition, providing composting services is expensive, while source reduction measures have

the greatest amount of financial benefit per ton (ReFED). Nonprofits which feed hungry people also face obstacles, with a limited number of resources. Since the organics requirements became applicable to small food-permitted businesses (less than 5,000 square feet), one of Austin's primary providers of food recovery has increased number of pickups, but decreased total weight of food picked up. This decrease in efficiency is a result of smaller businesses contacting them for food recovery services. Because this non-profit provides this service of transporting food for free, it is a relatively inexpensive way for businesses to divert food waste. However, because the non-profit is powered primarily through volunteers, there is a limit as to how many pickups they can provide. In addition, they must balance greenhouse gas emissions not released from food recovery with greenhouse gas emissions from transportation. Larger organizations also face this same constraint of resources.

With these reasons to favor source reduction, it is promising that it is the most utilized method of food recovery, with 59% using it in 2017, 76% in 2018, and 62% in 2019. Individual businesses show exemplary best practices, with some stating a concrete reduction in food waste. The organics diversion plans have had a positive effect on source reduction and are capable of even more. Using the aforementioned techniques of providing waste audits and emphasizing source reduction in outreach efforts and in the actual plan, this objective can be progressed, resulting in positive environmental and economic impact for both the city and businesses.

Resources

USA, CACOG. (2005). *CACOG Regional Solid Waste Management Plan*.

Evans-Cowley, J., & Arroyo-Rodríguez, A. A. (2013). Integrating Food Waste Diversion into Food Systems Planning: A Case Study of the Mississippi Gulf Coast. *Journal of Agriculture, Food Systems, and Community Development*, 1-19. doi:10.5304/jafscd.2013.033.003

Food Recovery Hierarchy. (2017, February 19). Retrieved from <https://www.epa.gov/reducefoodwaste/food-recovery-hierarchy>

Gunders, D., & Bloom, J. (2017, August). *Wasted: How America is Losing up to 40% of Its Food from Farm to Fork to Landfill*.

Hauler for Hire Licensing. (n.d.). Retrieved from <http://www.austintexas.gov/department/austin-private-waste-hauler-licensing>

How to Prevent Wasted Food Through Source Reduction. (2016, August 25). Retrieved from <https://www.epa.gov/reducefoodwaste/how-prevent-wasted-food-through-source-reduction>

Leib, E. B., Sanderson, K., Macaluso, L., & Mansell, C. (2018, September 11). Organic Waste Bans And Recycling Laws To Tackle Food Waste. Retrieved from <https://www.biocycle.net/2018/09/11/organic-waste-bans-recycling-laws-tackle-food-waste/>

McKinney, Emmett, et al. "FOOD WASTE: City and State Strategies for Source Reduction." *FOOD WASTE: City and State Strategies for Source Reduction* / *Environmental Law Institute*, 17 Feb. 2017, www.eli.org/vibrant-environment-blog/food-waste-city-and-state-strategies-source-reduction.

- “Paris Chef Serves up Junk Food Feast.” *CNN*, Cable News Network, 2 Nov. 2016,
www.cnn.com/travel/article/freegan-pony-paris-food-waste-environment/index.html.
- Purdue, B. W. (2015). *City of Austin Landfill Diversion Ordinances Policy Analysis*(Rep.).
- Rethink Food Waste. (n.d.). Retrieved from <https://www.refed.com/solutions?sort=economic-value-per-ton>
- Shaw-Meadow, Nathan. 17 Dec. 2018.
- Stuart, T. (2009). *Waste: Uncovering the global food scandal*. W.W. Norton & Company.
- United States, Austin City Council. (n.d.). *ORDINANCE NO. 20140612-010*.
- United States, “Austin’s 2015 Community Diversion Study.” *Austin’s 2015 Community Diversion Study*.
- Umlas, J. (2018). *Food waste diversion in food service enterprises: An analysis of organics diversion plans in Austin, Texas*(Rep.).

Appendices

Appendix A: Interview questions for for-profit organics diversion service providers

- 1) What contextual factors played a role in the foundation of your business?
- 2) How has your customer base changed over time, both in type and number of businesses?
- 3) What has been your ability to handle the change in customers, if any?

Appendix B: Interview questions for non-profits which have a food recovery program

- 1) What are some challenges that you face as a food recovery program, in regards to donors, recipients, and resources in connecting the two?
- 2) How has 1) changed over time?
- 3) What role, if any, do you believe the URO has had on this?

Appendix C: Potential best practices

2019:

- a) Divert via Waste Reduction?
- b) Divert via Hungry People?
- c) Divert via Feed Animals?
- d) Divert via Industrial Uses?
- e) Divert via Compost?
- f) Divert via alternative means?

2018:

- a) Food Waste Prevention
- b) Food Recovery
- c) Food Donation for People
- d) Food Donation for Animals
- e) Packaging and Purchasing
- f) Composting
- g) Yellow Grease Collection

2017:

- a) Documented Reduction
- b) Food Waste Prevention
- c) Food Donation for People
- d) Food Donation for Animals
- e) Food Recovery
- f) Single-Use Materials
- g) Composting
- h) Other best practices