Assessing Mechanisms to Expand Composting in Ann Arbor

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Washtenaw Food Policy Council

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Executive Summary

Problem

Composting has been shown to benefit soil health, reduce greenhouse gas (GHG) emissions, and divert material from landfills. Ann Arbor's Climate Action Plan outlines zero waste initiatives to reduce GHG emissions and sets a waste diversion goal of 40%, with composting as a central way to meet these priorities. However, only 10% of Ann Arbor's households currently have composting carts. Of these households, only 30% compost food waste.[1] Furthermore, there is no comprehensive commercial composting, despite interest among businesses. The few businesses that do compost contract with a private hauler based out of Lansing. In order to meet Ann Arbor's climate action goals, diversion of commercial and residential organic waste must be increased.

Research Objective

This project set out to understand key barriers to expanding compost programs in Ann Arbor, and to identify best practices to support the city in expanding these programs most effectively.

Key Findings

Ann Arbor's composting facility, operated by WeCare Organics, has the capacity to expand composting to all current residents and businesses. However, if service were to be expanded to all households, the current mechanism for financing city composting programs is not sustainable. Under its current millage system, the city's financing structure for composting does not facilitate opportunities for increased revenues. Additionally, low landfill tipping fees, challenges with the city Material Recovery Facility (MRF), and funding restrictions have further hindered expansion of services. There are additionally many public and private stakeholders involved in Ann Arbor's solid waste system, which requires coordination and complex logistics management.

Implications

In order to expand composting, the city needs new or complementary funding mechanisms to expand composting service, or it must make trade-offs in the services it provides to its residents. Additionally, a comprehensive education campaign can help increase food waste collection and reduce contamination of compost. A Pay-As-You-Throw (PAYT) financing system has proven successful in many cities with progressive

[1] Ann Arbor Comprehensive Organics Management Plan. (April, 2017). CB&I Environmental & Infrastructure, Inc.

organic waste programs, and is recognized by AMERIPEN as the most promising strategy for increasing waste reduction and diversion in the United States.[2] Our group recommends that Ann Arbor implements this type of funding structure, as it creates a sustainable mechanism to fund its solid waste program and incentivizes waste diversion. The analysis of model cities that follows serves to illustrate successful ways by which PAYT can be implemented.

Though we think that a PAYT system could prove to be a successful model in Ann Arbor, we recognize that there are many political and logistical challenges to transitioning its financing system. Deciding whether or not to implement this type of transition would again require trade-offs between offering the progressive services that its residents and businesses want, and providing services at an acceptable cost. Despite these challenges, Ann Arbor must take action to maintain its reputation as a forward-thinking city, meet its zero waste goals, and improve the well-being of its residents.

[2] AMERIPEN Analysis of Strategies and Platforms to Increase the Recovery of Used Packaging. (2013). AMERIPEN. Retrieved from http://www.ameripen.org/wp-content/uploads/2017/07/AMERIPEN_Financial_Platforms_Summarypdf.pdf

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Introduction

Project Scope

This project seeks to support composting efforts in the City of Ann Arbor by understanding pain points within Ann Arbor's current composting system and identifying options to address them. Through analyzing current infrastructure capacity, providing research on funding mechanisms, and examining best practices for composting across the country, this project highlights opportunities and strategies to expand residential and commercial composting programs in Ann Arbor.

Our Story

We are a group of interdisciplinary Master's students at the University of Michigan and part of the Dow Sustainability Fellowship Program. This year-long fellowship supports students to work with a client on a sustainability issue of the group's choosing. The group is comprised of three students, Christina Carlson and Melissa Morton, both dual MS/MBA students with the School for Environment and Sustainability and the Ross School of Business, and Natalie Manitius, an MPH student with the School of Public Health in Nutritional Sciences. Our group coalesced around mutual interests in composting from a variety of angles: improving community and soil health, advancing closed-loop systems, and promoting economically viable business solutions to sustainability issues. Since February 2017, we have been working with the Washtenaw County Food Policy Council to support the expansion of composting in Ann Arbor.

Project Evolution

The scope of our project shifted considerably throughout the course of the year. Through initial conversations with the Ecology Center, we learned of the potential opportunity to design and implement a commercial composting pilot for the City of Ann Arbor. Following the publication of Ann Arbor's Comprehensive Organics Management Plan, a report providing program recommendations for composting expansion, it was recommended that we instead conduct a feasibility study to assess the capacity of the WeCare Organics composting facility, should full-scale expansion take place. Our feasibility study determined that WeCare Organics has the capacity to accept all organic waste generated in Ann Arbor. The next phase of the project guided us towards better understanding challenges the city faces with financing organics programs, pivoting our focus of the report to best practices for financing solid waste programs and recommendations to incentivize the diversion of organic waste.

Washtenaw Food Policy Council

The Washtenaw County Food Policy Council (WFPC) has served as the client and sponsor of this project. The WFPC's mission is to increase and preserve "access to safe, local and healthy food for all residents of Washtenaw County." The group consists of local council representatives with diverse experience in food policy, and is comprised of five policy action teams (PATs): Farmers & Institutional Purchasing, Food Access & Nutrition, Food Waste & Packaging, Planning & Zoning, and Pollinators. Our project preceptors include Nicole Chardoul, Chair of WFPC and VP of Resource Recycling Systems (RRS), and Noelle Bowman, Food Waste PAT Member and Washtenaw County Solid Waste Program Specialist.

Methods

Our research was conducted through a combination of a literature review, interviews with local stakeholders and representatives from model cities, a review of model city websites, attending city council meetings, conducting site visits, and analyzing capacity of the WeCare Organics site. We first conducted a literature review to gain background information on best practices for municipal solid waste services, including zero-waste goals, financing structures, and educational campaigns. We additionally reviewed the current literature and reports on composting to understand the various methods and processes used for commercial composting, and the environmental and public health benefits of food waste diversion. One of the main reports that informed our work was the Ann Arbor Comprehensive Organics Management Plan, which was compiled by the consulting firm Chicago Bridge & Iron Environmental & Infrastructure, Inc. (CB&I), and was presented to the city on April 27th, 2017.

Understanding the current state of solid waste in Ann Arbor was key to informing our analysis. We conducted interviews with local stakeholders to learn about the history of solid waste management in Ann Arbor, the current composting operations, and the city's solid waste financing mechanisms. We spoke with WeCare Organics to learn about the operations at the city's composting site. Discussions with representatives from the City of Ann Arbor, former City of Ann Arbor staff, Ann Arbor's Environmental Commission, Recycle Ann Arbor, and the Washtenaw Food and Policy Council, informed our understanding of historical and current solid waste operations and financing mechanisms, as well as relevant local policies. These conversations additionally helped to illustrate the recent solid waste management challenges that Ann Arbor has faced. Additionally, we spoke with representatives from local businesses to better understand interest in a commercial composting program, along with the barriers to participation facing businesses. The list of interviews with local stakeholders is seen in Table 1.

Table 1: List of Interviews with Local Stakeholders

STAKEHOLDER	POSITION	ORGANIZATION
Matthew Naud	Environmental Coordinator	City of Ann Arbor
Nancy Stone	Former Communications Liaison	City of Ann Arbor
Nicole Berg	Former MRF Education Center and Special Projects Coordinator	City of Ann Arbor
Mike Nicholson	Senior VP	WeCare Organics
Nicole Chardoul	Chair, Waste Management and VP of Resource Recycling Systems	Washtenaw Food Policy Council and Resource Recycling Systems (RRS)
Noelle Bowman	Chair, Policy Action Team (PAT) for Food & Food Packaging Waste	Washtenaw Food Policy Council
Miriam Flagler	Staff	Zingerman's
Brian Weinert	Zero Waste Advocate	Recycle Ann Arbor
Anya Dale	Sustainability Program Manager	University of Michigan Office of Campus Sustainability
Allison Skinner	Environmental Commissioner	City of Ann Arbor Environmental Commission
John Mirsky	Executive Policy Advisor for Sustainability to City Administrator	City of Ann Arbor Environmental Commission
Lee Hammond	CEO	My Green Michigan

We also interviewed representatives from model cities and counties, along with other cities currently developing composting programs, to learn about best practices for financing models, educational campaigns, and operations. The list of city and county representatives that we interviewed is seen in Table 2. Additionally, we surveyed city websites, news articles, and other public information to gather further data about various solid waste programs in cities such as Seattle, New York, and Austin.

Table 2: List of Interviews with Model Cities and Counties

REPRESENTATIVE	POSITION	CITY/COUNTY/ ORGANIZATION
Sego Jackson	Strategic Advisor, Waste Prevention and Product Stewardship	Seattle, WA
Jack Macy	Commercial Zero Waste Senior Coordinator	San Francisco, CA
Bridget Anderson	Deputy Commissioner, Recycling and Sustainability, NYC Department of Sanitation	New York, NY
Bob Gedert	Former Director of Austin Resource Recovery	Austin, TX
Heather Adelman	Assistant Director	The Oberlin Project, Oberlin, OH
Angel Arroyo-Rodriguez	Program Leader (Organics Recycling and Infectious Waste) & Environmental Planner	Ohio Environmental Protection Agency (EPA)
Blair Pollock	Solid Waste Planner	Orange County, NC (Raleigh-Durham-Chapel Hill Area)
Elisa Seltzer	Public Works Director	Emmet County, MI
Frank Hammer	City Council Member Former Chair of the Board for Washtenaw County Solid Waste Management Planning Committee	Chelsea, MI Washtenaw County, MI

Our team attended an Environmental Commission meeting on April 27th, 2017, in which the consulting firm CB&I presented the Ann Arbor Organics Management Plan. At this meeting, City staff also shared information with Ann Arbor's Environmental Commission about the past, current, and projected finances of the city's Solid Waste Fund.

Figure 1: Team visit to the city compost site, operated by WeCare Organics

The team visited the city's composting site, operated by WeCare Organics, the city- owned landfill, and the transfer station. This visit allowed the team to both better visualize solid waste operations and processes, and collect initial data about the composting site operations. It also assisted in better contextualizing the various solid waste sites located nearby.

Using data collected from conversations with WeCare Organics and from CB&I's Ann Arbor Comprehensive Organics Management plan, our team performed an analysis of the city-owned composting site (operated by WeCare Organics) to determine whether it has the capacity to process all of the organic material generated in Ann Arbor by both residential and commercial sites. We also sought to determine if the City of Ann Arbor would need to invest in new infrastructure in order to expand its residential and commercial composting programs. Once infrastructural capacity was assessed, we transitioned to examining the financial components of Ann Arbor's current solid waste management.

Composting Background

What is Composting?

Composting refers to the biochemical process of transforming organic materials into an end-product similar to soil. To accomplish this, organic materials such as food and yard waste are collected, sorted, shredded, and mixed in an aerobic environment (with access to oxygen). Unlike many landfills, compost yards are open-air, utilizing the oxygen in the atmosphere to assist in decomposing the materials. Once the product has been initially broken down, microorganisms produce a dynamic microbial ecosystem that decompose the organic waste product. Through a high carbon to nitrogen ratio, proper acidity conditions, and specific moisture levels, the mixture rises in temperature, enabling microorganisms to proliferate while destroying pathogens.[3] This process decomposes materials into an organic soil component called humus, ultimately reducing waste volume and providing a valuable end-product.[4]

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[3] Schaub SM, Leonard JJ. Composting: An alternative waste management option for food processing industries. *Trends Food Sci Technol.* 1996;7(8):263-268. doi:https://doi.org/10.1016/0924-2244(96)10029-7.
[4] Ibid

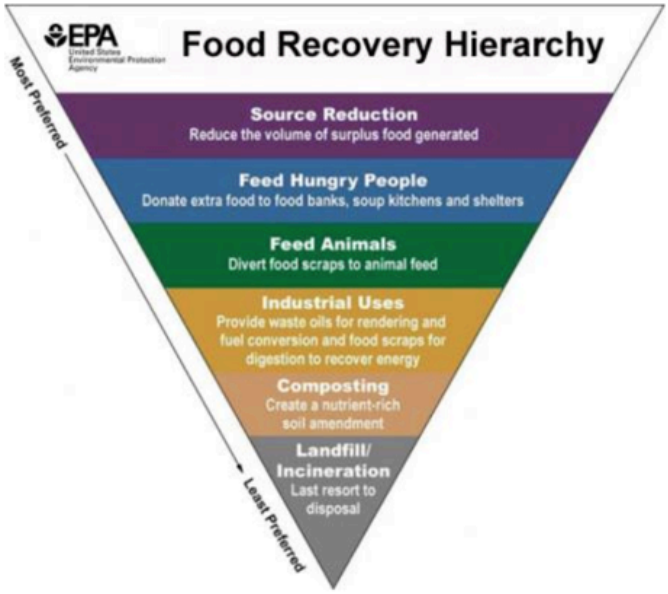
Given the complexity of composting's biochemistry, temperature management is critical to its success. There are three phases of composting: mesophilic, thermophilic, and a second mesophilic phase. In the first phase, bacteria and fungi that thrive under moderate temperature conditions proliferate rapidly, consuming readily soluble sugars and starches held within the plants. Through metabolizing these compounds, the bacteria generate heat, elevating the compost temperature to 40-50° C (over 104°F).[5] The mixture then enters the thermophilic phase, at which point the solution's high temperature begins to break down proteins, fats, complex carbohydrates, and plant fiber matrices such as cellulose and hemicellulose.[6] Once the bacteria have consumed the bulk of these constituents, the mixture temperature begins returning to its mesophilic "curing" state, in which plant components are still broken down, but at a much lower rate.[7] Maintaining temperature within a specific range is therefore essential to the microbial process, as temperatures of 65°C destroy beneficial microorganisms, while temperatures under 55°C enable harmful pathogens to proliferate.[8] Turning the compost facilitates a reduction in its temperature, enabling oxygen to permeate the mixture and benefiting thermophilic bacteria.[9] Understanding these processes is central to responsible compost management.

Hierarchy of Recovery

The Environmental Protection Agency defines a food recovery hierarchy with action-items in the following order of priority: source reduction, feeding hungry people, feeding animals, industrial uses, composting, and landfill/incineration. This hierarchy is seen in Figure 2.

[5] The Science of Composting. Cornell Waste Management Institute. 1996. http://cwmi.css.cornell.edu/chapter1.pdf
[6] Ibid
[7] Ibid
[8] Ibid
[9] Ibid

Figure 2: The Environmental Protection Agency's Food Recovery Hierarchy, Source: EPA[10]



While composting represents a later-stage intervention in the food recovery hierarchy, it is nonetheless critical in generating a regenerative circular economy for food. Through a robust organics management program, composting can capture downstream waste and transform it into a value-added product, with benefits as highlighted below.

Benefits of Composting

In a rank-order of solutions for reversing climate change, Project Drawdown, a worldwide group of diverse researchers, indicates that food waste represents the #3 solution for both mitigating climate change and sequestering carbon back into soils.[11] In evaluating the food supply chain, an intervention at the consumer level represents the area of greatest opportunity to reduce climate impacts, as it encompasses 37% of the total food climate impacts.[12] With each item of food that is discarded, not only is the food item itself wasted, but losses are also generated in terms of energy inputs throughout the supply chain: the natural resources required to cultivate the food item, the fuel to distribute it, and the infrastructure to then collect the waste.[13] Both source reduction and diverting food waste to composting is critical, as food waste is currently 21.6% of the landfilled municipal solid waste stream, as seen in Figure 3 from the EPA.

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[10] Food Recovery Hierarchy. (2017). United States Environmental Protection Agency. Retrieved from https://www.epa.gov/sustainable-management-food/food-recovery-hierarchy
[11] Project Drawdown. "Solutions by Rank." http://www.drawdown.org/solutions
[12] Food wastage footprint & Climate Change. Food and Agriculture Organization of the United Nations. http://www.fao.org/fileadmin/templates/nr/sustainability_pathways/docs/FWF_and_climate_change.pdf
[13] Food wastage footprint & Climate Change. Food and Agriculture Organization of the United Nations.http://www.fao.org/fileadmin/templates/nr/sustainability_pathways/docs/FWF_and_climate_change.pdf

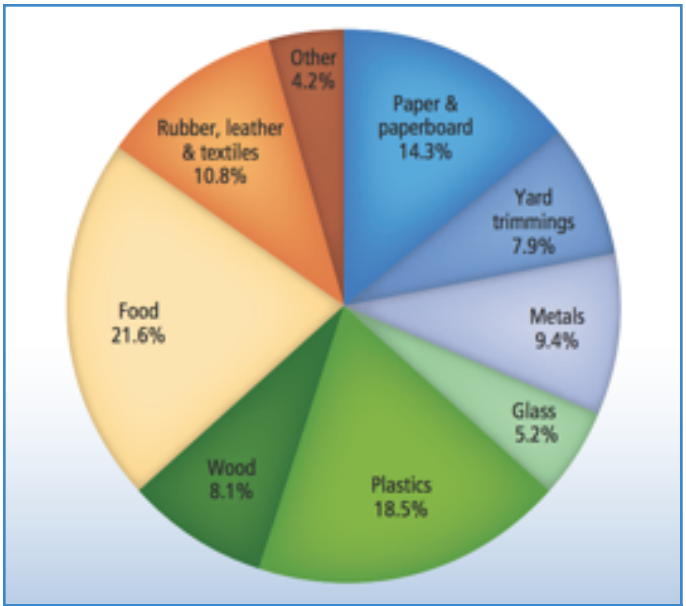

Figure 3: Municipal Solid Waste Landfilled (by material), 2014, Source: EPA[14]

As a primary means of addressing food waste, composting serves a number of benefits: reduction of landfilled waste, production of a beneficial soil amendment, greenhouse gas emissions reductions, and benefits to human health.

Waste

Much of the current debate surrounding agriculture, sustainability, and the future of the planet is framed in terms of "feeding the future." This notion implies that in order to feed the burgeoning human population, more food will need to be produced. Yet recent estimates indicate that Americans waste roughly 40% of their food, amounting to 20 lbs. per person, per month.[15] Additionally, food waste accounts for approximately 22% of the overall U.S. waste stream.[16] On a global scale, one-third of the edible parts of food are lost, amounting to 1.3 billion tons per year.[17] While worldwide population growth is straining our current food production capacities, capturing food waste is a powerful means of addressing this challenge. Better managing food waste is therefore a critical component in maximizing the future of food production.

Greenhouse Gases

Reducing food waste is integral in addressing climate change, as it generates significant greenhouse gas emissions. If food waste were to be compared alongside the top twenty GHG emitting countries in the world, it would be ranked third, following China and the U.S, emitting 3.3 gigatons of CO2 annually.[18]

Food waste contributes to GHGs through its release of volatile organic compounds into the atmosphere. When organic materials are broken down in landfills, the methane

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[14] Advancing Sustainable Materials Management 2014 Fact Sheet. (2016). Environmental Protection Agency. Retrieved from https://www.epa.gov/sites/production/files/2016-11/documents/2014_smmfactsheet_508.pdf
[15] Wasted: How America is Losing Up to 40 Percent of Its Food from Farm to Fork to Land www.nrdc.org/sites/default/files/wasted-food-IP.pdf
[16] Ibid
[17] EPA Advancing Sustainable Materials Management: 2014 Fact Sheet Assessing Trends in Material Generation, Recycling, Composting, Combustion with Energy Recovery and Landfilling in the United States. 2016.
[18] Food wastage footprint & Climate Change. Food and Agriculture Organization of the United Nations.http://www.fao.org/fileadmin/templates/nr/sustainability_pathways/docs/FWF_and_climate_change.pdf

released is nearly 21 times more potent than carbon dioxide emissions.[19] Another byproduct of organic material breakdown in an anaerobic environment is nitrous oxide, whose global warming potential far exceeds methane alone, as shown in Figure 4.[20]

Figure 4: Global Warming Equivalencies of Primary GHGs, Source: The U.S. Composting Council [21]

Gas	Global Warming Potential (GWP) [a]	Atmospheric Lifetime
Carbon Dioxide	1	50-200
Methane	21	12±3
Nitrous Oxide	310	120

[a]GWP of CH4 and N2O were changed to 23 and 296 respectively in the Third Assessment done by the IPCC. The equivalencies from the second assessment, shown above, are still used by the EPA so that updated inventories can be compared with former inventories and trends can be tracked.

Redirecting food waste to compost not only reduces methane and nitrous oxide emissions from landfills, but also sequesters carbon back into the soil. Through its ability to both minimize and sequester emissions, composting is a powerful agent in addressing climate change.

Agricultural Benefits

Composting confers a number of benefits to agricultural systems. The U.S. Composting Council states that compost improves soil structure through its stability and adhesive properties, providing resistance to erosion.[22] Its ability to hold 3 to 5 times its weight in water assists in harnessing rainwater and reducing runoff rates.[23] By improving water holding capacity and reducing erosion, composting reduces losses of sediments, nutrients, and pesticides to streams by 75-95%.[24] These water retention properties also help increase resistance to drought and improve water management, resulting in lower irrigation needs, and therefore decreased dependence on water resources.[25] Given that water used in agriculture accounts for 65% of worldwide freshwater use, composting's ability to reduce dependence on this natural resource while also minimizing resource loss in run-off represents an enormous area of opportunity.[26]

Public Health

Properly managed composting processes can transform what otherwise would be waste and pathogenic material into a safe and beneficial soil amendment. By following

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[19] Platt B, Goldstein N, Coker C, Brown S. Composting in the U.S. Institute for Local Self-Reliance. 2014. http://ilsr.org/wp-content/uploads/2014/07/state-of-composting-in-us.pdf
[20] Field Guide to Compost Use. The US Composting Council. 2001. http://compostingcouncil.org/admin/wp-content/plugins/wp-pdfupload/pdf/1330/Field_Guide_to_Compost_Use.pdf
[21] Ibid
[22] Ibid
[23] Platt B, Bell, B. Building Healthy Soils with Compost to Protect Watersheds. Institute for Local Self-Reliance. June 2014. https://ilsr.org/wp-content/uploads/2016/02/Compost-Builds-Healthy-Soils-June-2014.pdf
[24] "Recycling." *USDA OCE U.S. Food Waste Challenge | Recycling*, USDA, www.usda.gov/oce/foodwaste/resources/recycle.htm.
[25] Platt B, Bell, B. Building Healthy Soils with Compost to Protect Watersheds. Institute for Local Self-Reliance. June 2014. https://ilsr.org/wp-content/uploads/2016/02/Compost-Builds-Healthy-Soils-June-2014.pdf
[26] Centers for Disease Control and Prevention. "Agricultural Water." Oct. 11 2016. https://www.cdc.gov/healthywater/other/agricultural/index.html

appropriate guidelines for time and heat, commercial-scale operations are able to eliminate most plant pathogens, fungi, and nematodes.[27] Research demonstrates compost's potency through its ability to destroy pathogens and degrade avian flu and foot and mouth disease.[28,29] Given the increasingly concentrated agricultural operations that enable rapid transmission of pathogens, the ability of compost to destroy these pathogens represents an immense contribution to public health efforts.
Composting has also been utilized in bioremediation, as it can remove contaminants from soil and water. Through bioremediation, compost can effectively degrade pesticides, heavy metals, and petroleum products, thereby improving human health through natural resource remediation.[30] Given these properties, composting provides the additional benefit of not only reducing waste volume, but also volatility.

Solid Waste Management in Ann Arbor

Ann Arbor is home to 116,194 residents with 50,184 total housing units.[31] Between 2015-2016, the population grew by 1.7%.[32] The median age in Ann Arbor is 27.8, with the 20-34 age group making up roughly 38% of the total population.[33] With the University of Michigan as a core attractor of this age bracket, the residential space consists largely of rental properties. The transient nature of the student population drives some of the current challenges that the city faces in terms of educating the population on solid waste management programs and proper use of solid waste systems.

The Ann Arbor solid waste website describes the city as "leading the nation in reducing waste by utilizing an extensive recycling and compost program."[34] Ann Arbor has been celebrated as a progressive community with environmental consciousness as part of its core, and its solid waste infrastructure reflects these values. Over the past several decades, Ann Arbor has invested considerably in waste diversion and infrastructure, at one point having seven full time staff members working in the solid waste division; currently, due to retirements and budget issues, there is one dedicated staff member for solid waste management.[35] In recent years, exacerbated by issues with the Materials Recovery Facility (MRF), a shortage of full-time staff, and financial challenges, Ann Arbor's commitment to solid waste efforts and composting have been considerably

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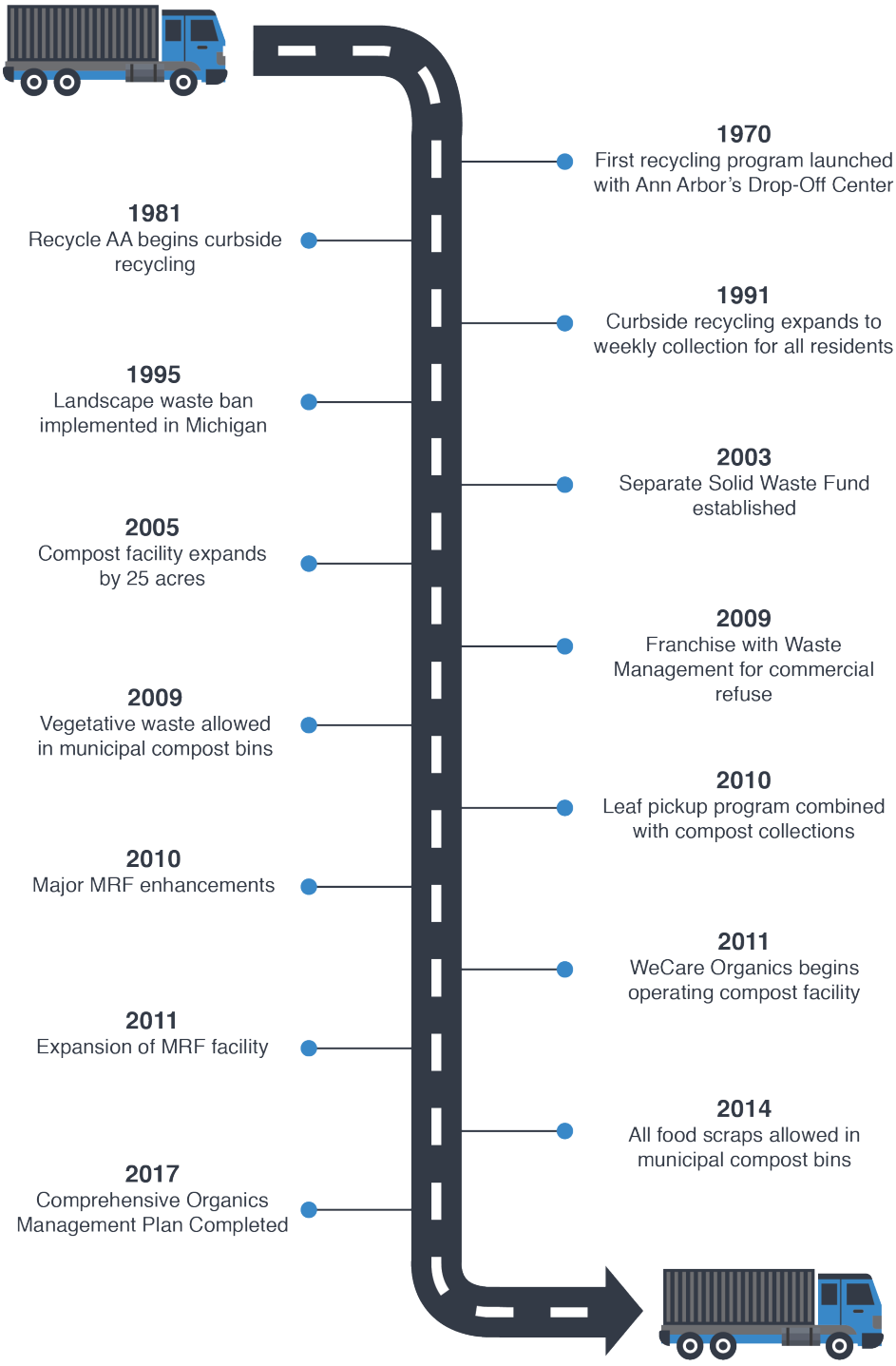
[27] Wichuk K, Jalpa P, McCartney T et al. Plant Pathogen Eradication During Composting: A Literature Review. Compost Science & Utilization Vol. 19 , Iss. 4,2011
[28] Benson E, Malone G, Alphin R, et al. lory Application of In-House Mortality Composting on Viral Inactivity of Newcastle Disease Virus. 2008. Poultry Science 87:627–635 doi:10.3382/ps.2007-00308
[29] Guan J, Chan M, Grenier C, et al. Degradation of foot-and-mouth disease virus during composting of infected pig carcasses. *Canadian Journal of Veterinary Research*. 2010;74(1):40-44.
[30] Guardabassi L, Dalsgaard A, Sobsey M. Occurrence and survival of viruses in composted human faeces. Danish Environmental Protection Agency. Sustainable Urban Renewal and Wastewater Treatment. Vol. 32. 2003.
[31] U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates
[32] Ibid
[33] Ibid
[34] "Trash, Recycling & Compost." *City of Ann Arbor*, www.a2gov.org/departments/trash-recycling/Pages/About.aspx
[35] Larose, Caroline. Waste Not: Strategies to Reduce Ann Arbor's MSW & Improve Diversion in the Commercial Sector. University of Michigan. April 2017

challenged. A timeline history of the city's solid waste efforts is seen in Figure 5.

Figure 5: Timeline of Ann Arbor's Solid Waste Initiatives, Source: Waste Not: Strategies to Reduce Ann Arbor's MSW & Improve Diversion in the Commercial Sector[36]



[36] Larose, Caroline. Waste Not: Strategies to Reduce Ann Arbor's MSW & Improve Diversion in the Commercial Sector. University of Michigan. April 2017

Ann Arbor Solid Waste Landscape: Who Does What?

The city provides a majority of solid waste services in Ann Arbor, either directly or through third-party operators, and also operates a scale house that keeps track of waste stream weights. See Figure 6 for a detailed breakdown of entities providing each service.

Residential: The city provides collection of residential trash, recycling, and yard waste. Residential compost collection of food scraps is also provided by the city to residents with compost carts. Compost is collected seasonally and taken to a city-owned facility that is operated by a third-party, WeCare Organics. (See "Composting Efforts to Date"). Recyclables are collected using city owned equipment operated by a third-party, Recycle Ann Arbor, and are taken to a city-owned Material Recovery Facility (MRF) which is currenty operated by Recycle Ann Arbor. Due to recent safety issues at the MRF, the facility is not fully operational at this time, acting primarily as a transfer station.[37] Rather, recyclables are shipped to other facilities for processing (see "Complications at the MRF"). Trash is taken to a city-owned transfer station where it is consolidated into larger trucks and taken to a landfill by a third-party, Advanced Disposal. Solid waste services are financed through a property tax millage (see "Solid Waste Financing in Ann Arbor").

Commercial: The city collects trash from small business residential carts in the downtown commercial district for a monthly fee of $51.[38] Most commercial entities must procure their own solid waste disposal through a franchise agreement with Waste Management. A city ordinance limits commercial trash collection to one hauler in order to reduce traffic, pollution, and impact to city infrastructure. This franchise is periodically put out to bid, and the city acts as a pass-through to collect fees for trash collection. Commercial recyclables in the downtown commercial district are collected by city staff. All other commercial entities' recyclables are collected by Recycle Ann Arbor. Commercial composting is currently small scale and provided by a third-party hauler, My Green Michigan (see "Composting Efforts to Date" and "My Green Michigan").

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[37] Bertram, Erica. "Recycle Ann Arbor Awarded Contract to Process Ann Arbors Recyclables." *Recycle Ann Arbor*, recycleannarbor.org/news/416-recycle-ann-arbor-awarded-contract-to-process-ann-arbor-s-recyclables
[38] "Trash, Recycling, and Compost" *City of Ann Arbor.* https://www.a2gov.org/departments/trash-recycling/Pages/Trash.aspx

Figure 6: Ann Arbor Solid Waste Program Area Operators/Roles, Source: City staff presentation to the Ann Arbor Environmental Commission on 12/1/16.

Solid Waste Program Area Operators/Roles

Solid Waste Service/Item	Provider
Landfil Tipping	Waste Management
TS Operations	tbd
Single-Family Residential Collection	City Staff
Multi-Family Residential	City of Ann Arbor (Primary) Waste Management
Commercial Waste Collection	Waste Management City of Ann Arbor (Carts and some dumpsters)
Landfil Gas Recovery	ARIA
Landfil Monitoring & Maintenance	TetraTech

Recycling Service/Item	Provider
MRF Operations	tbd
Residential Recyclables Collection	Recycle Ann Arbor
Commercial Recyclables Collection	City of Ann Arbor staff (Downtown and all dumpsters) Recycle Ann Arbor (carts & 300-gallon totes)
Glass Residual Re-Use	Waste Management
Student Move-Out	Recycle Ann Arbor
Drop-Off Station Operations	Recycle Ann Arbor
In-School Education Services	Ecology Center
MRF Tours	Ecology Center

Compost Service/Item	Provider
Compost Center Operations	WeCare
Residential Compost/Organics Collection	City of Ann Arbor staff
Commercial Compost/Organics Collection	***tbd***

Overarching Service/Item	Provider
Customer Service	City of Ann Arbor staff
Scalehouse	City of Ann Arbor staff
Compost Sales	City of Ann Arbor staff using WeCare equipment

Note: Since this slide was presented the following operator changes have occurred: Landfill tipping is now through Advanced Disposal and the MRF Operations is now contracted to Recycle Ann Arbor. Text in black indicates services performed by the city of Ann Arbor

Solid Waste Financing in Ann Arbor

Ann Arbor's solid waste services are funded by a property millage. A mill is $1 for every $1,000 of taxable property value. The revenues from the millage are deposited into the city's Solid Waste Fund, which is a fund dedicated to providing solid waste services. Under the Garbage Disposal Plants Public Act 298 of 1917, the city is allowed to levy a tax of up to 3 mills for solid waste services.[39] In 1978, the Headlee Amendment was enacted in order to prevent residents from inflation of their property taxes. The amendment requires that if a resident's property value increases by more than the inflation rate, the millage must be reduced so that the taxes paid by the resident are equal to if the property value only increased by the inflation rate.[40] As a result, although the city has levied a 3 mill tax to raise revenue for solid waste services, the effective rate

[39] Garbage Disposal Plants Public Act 298 of 1917. Retrieved from http://www.legislature.mi.gov/(S(s0hxd5kcsowt-fkkh2ss5ythk))/mileg.aspx?page=getObject&objectName=mcl-123-261
[40] Walcott, Erik. (2016, July 25). What is the Headlee Amendment and How Does It Affect Local Taxes? Michigan State University Extension. Retrieved from http://msue.anr.msu.edu/news/what_is_the_headlee_amendment_and_how_does_it_affect_local_taxes

is lower and has been decreasing in recent years. The real rate levied was 2.4134 in 2017. Figure 7 shows the real millage rate levied from 2009 to 2017.

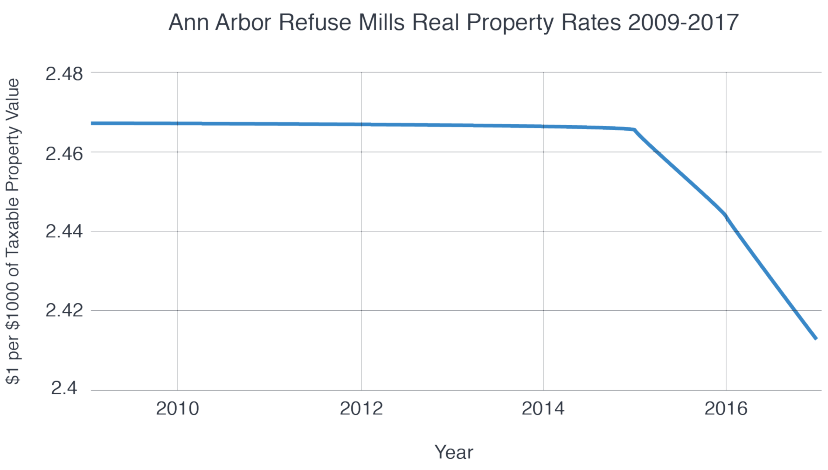

Figure 7: Ann Arbor Millage Rate 2009-2017, Data Sourced A2gov.org[41]

Due to the Headlee Amendment, the millage rate cannot be raised, therefore there is no mechanism to increase income to Ann Arbor's Solid Waste Fund.

On April 27th, 2017, at the Environmental Commission City Council meeting, city staff shared information about the past, present, and projected finances of the Solid Waste Fund.[42] At this meeting, it was explained that expenditures were increasing—largely due to issues with Ann Arbor's MRF, as well as pension liabilities — such that costs would exceed income. The current structure of the funding results in revenues that cannot be increased, thereby exacerbating this issue. On May 25th, 2017, the City Administrator issued a statement explaining that, given pension liabilities and the fact that operating costs were exceeding revenues, the City will be below the minimum fund balance by the end of FY18.[43]

Figure 8 depicts how the projected costs exceed revenues, and how the fund balance is expected to decline. As there is no current means of increasing revenues, and current income is unable to even cover the costs of operation in the status quo service level, in order to expand organics management programs, Ann Arbor must either find alternative sources of revenues or make trade-offs on which services it provides its residents. The survey conducted in the Ann Arbor Comprehensive Organics Management plan showed that while 73% of residents would be willing to segregate food waste if a compost cart is provided at no cost, the survey demonstrated an unwillingness to pay for additional composting services.[44] The subsequent sections illustrates further barriers to composting expansion.

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[41] Property Taxes. (2017). A2Gov.gov. Retrieved from https://www.a2gov.org/departments/finance-admin-services/assessing/Pages/Property%20Taxes.aspx
[42] City of Ann Arbor Formal Minutes Environmental Commission. (2017, April 27). Retrieved from http://a2gov.legistar.com/MeetingDetail.aspx?ID=521658&GUID=DCA529F9-70E3-435A-8692-2FA042158819&Options=info&Search=
[43] Lazarus, Howard. (2017, May 25). Solid Waste/Recycling Program Area Status Updates. Retrieved from http://a2gov.legistar.com/LegislationDetail.aspx?ID=3057255&GUID=180C4A25-D5B7-4A33-A186-15A24BBE7BC4&Options=&Search=
[44] Ann Arbor Comprehensive Organics Management Plan. (April, 2017). CB&I Environmental & Infrastructure, Inc.

Figure 8: City of Ann Arbor City Financial Summary, Source: City of Ann Arbor

Solid Waste Fund

PRIMARY SERVICES

- Collection of Solid Waste
- Residential and Commercial Recycling (Material Recovery)
- Compost Collection
- Responsible for Waste/Recycling Transfer station
- Landfill Maintenance

FINANCIAL SUMMARY

	Actual		Projected		
	FY2015	FY2016	FY2017	FY2018	FY2019
	($ Mil.)	($ Mil.)	($ Mil.)	($ Mil.)	($ Mil.)
Revenue:					
Solid Waste Millage	$ 11.7	$ 12.0	$ 12.4	$ 12.6	$ 12.9
Recycling Processing Credit	0.1	-	-	-	-
Waste Collection - Commercial	2.4	2.5	2.5	2.5	2.6
All Other	0.6	1.9	0.6	0.7	0.7
Total Revenue	$ 14.8	$ 16.4	$ 15.5	$ 15.8	$ 16.2
Expense:					
Waste	$ 5.5	$ 5.8	$ 6.5	$ 6.5	$ 6.6
Material Recovery	3.8	3.6	5.4	5.1	5.2
Compost	1.2	1.4	1.3	1.3	1.3
Depreciation	0.9	0.8	0.9	0.9	0.9
All Other	2.2	7.2	3.2	4.8	3.4
Total Expense	$ 13.6	$ 18.8	$ 17.3	$ 18.6	$ 17.4
Net	**$ 1.2**	**$ (2.4)**	**$ (1.8)**	**$ (2.8)**	**$ (1.2)**
Memo:					
Anticipated Capital Needs			$ 1.7	$ 1.4	$ 1.3
Unrestricted Fund balance (net position)	$ 15.1	$ 12.7	$ 9.3	$ 5.1	$ 2.6

OBSERVATIONS ABOUT ABOVE FINANCIALS:

- FY15 All Other revenue includes $1M in returned monies from Project Mgmt/Fleet/Risk funds.
- FY 16 All Other Expenses includes a one-time change in Landfill Liability $5 Mil
- FY 17 - FY 19 Waste and Material Recovery reflect increased TS/MRF Operations & Repairs
- FY 18 All Other Expenses reflects one-time and ongoing OPEB costs

CHALLENGES/OPPORTUNITIES IN OPERATING THIS BUSINESS

- Long-term revenues do not support expansion of programs.
- Waste Mgmt landfill contract (tip fees) expires FY18. Anticipate significant increase.
- Need Resolution to long-term operations of the MRF/Transfer station.
- Solid Waste Plan envisions an expansion of the food waste program.
- Addition of 800-1,000 service stops.
- Expansion of multi-families utilization of existing recycling program

FUND BALANCE (Net Position)	FY 2016 ($ Mils.)
6/30/16 - Total Fund Balance (Net Position)	**$ 26.2**
Less:	
Restricted - Capital Assets	(13.3)
Restricted - Capital Repair & Replacement Fund	-
Restricted - Landfill reserve	(0.2)
Unrestricted at June 30, 2016	**12.7**
FY 17 Planned Use of Fund Balance:	**(3.5)**
FY 18 Planned Use of Fund Balance & Capital:	
• Northside Methane Collection System Upgrade	(0.1)
• Landfill Entrance Improvements	(0.5)
• MRF/Transfer Station Site Evaluation	(0.8)
• Operating Use of Fund Balance	(2.8)
• FY 19 Planned Capital:	
• Landfill Entrance Improvements	(0.8)
• Termination of Public Dead-End Streets	(0.5)
• Operating Use of Fund Balance	(1.2)
• **Subtotal**	**2.6**
Less: Minimum Balance Requirement-25% of Oper Exp	(2.2)
Available Fund Balance	**$ 0.4**
Known Risk	
• MRF/Transfer Station Facility Repairs	tbd

Education

Contact: Nancy Stone, Former Communications Liaison, City of Ann Arbor

In conversations with Nancy Stone, who served as the city full-time staff member in Solid Waste Education for 24 years, it was made clear that education and outreach are critical to a compost program's success. Some of the pain points she observed in her work were the interruption in compost collection during the winter months, contamination, and maintenance of bin cleanliness. She advises a continuous collection system to incentivize composting behavior year-round, and education on how to keep bins clean. Additionally, much of her work addressed training staff members in commercial kitchens and providing in-person instruction and videos in multiple languages, informing staff how to compost. Since Nancy retired, her position has not been filled, and as a result there are few educational materials provided on behalf of the city. In order to increase composting participation while minimizing contamination rates, the city must integrate diverse educational campaigns into its solid waste budget and priorities.

Complications at the MRF

To complicate matters, in July 2016, the city terminated its contract with the third-party MRF operator, ReCommunity, due to safety concerns.[45] While the city sought a new contract operator, a short term, emergency contract with Waste Management was signed at a premium to handle recycling processing for Ann Arbor. Waste Management consolidated, baled, and shipped recycled material to Ohio for processing at a facility that could handle the necessary volume, a costly alternative to recycling.

A new MRF operating contract was subsequently put out for bid. Recycle Ann Arbor, a local non-profit, won the bid to take on operations of the MRF. As of July 2017, Recycle Ann Arbor started its one-year contract, with two 6-month extension options, to perform these functions.[46,47] Since then, issues with the MRF infrastructure continue and have been exacerbated by the extended idle time. In August 2017, a small fire broke out at the MRF causing minor damage.[48] As of December 2017, Recycle Ann Arbor is in the process of evaluating the MRF to assess necessary maintenance and efforts to make the facility operational again.

Due to the high price and extended nature of the emergency contract with Waste Management, the city is rapidly exhausting resources from the Solid Waste Fund to cover this additional expense (see " Solid Waste Financing in Ann Arbor").

Barriers to Success: Michigan Tipping Fees

Tipping fees are the fees associated with disposing of waste materials at a waste processing site, most commonly a landfill, represented as a cost per ton of waste. There are also often tipping fees for MRFs and compost facilities. While the EPA indicates that the national average for landfill tipping fees was $50.59 per ton in 2013,[49] tipping fees in Michigan are significantly lower than the average, at around $14 per ton.[50] Figure 9 below illustrates national tipping fee averages over time. As a result of these low tipping fees in Michigan, there are few economic incentives for diverting waste from landfills; as a result, Ann Arbor diversion services such as recycling and compost are only instated as a result of resident interest. In Ann Arbor, it was often heard through our

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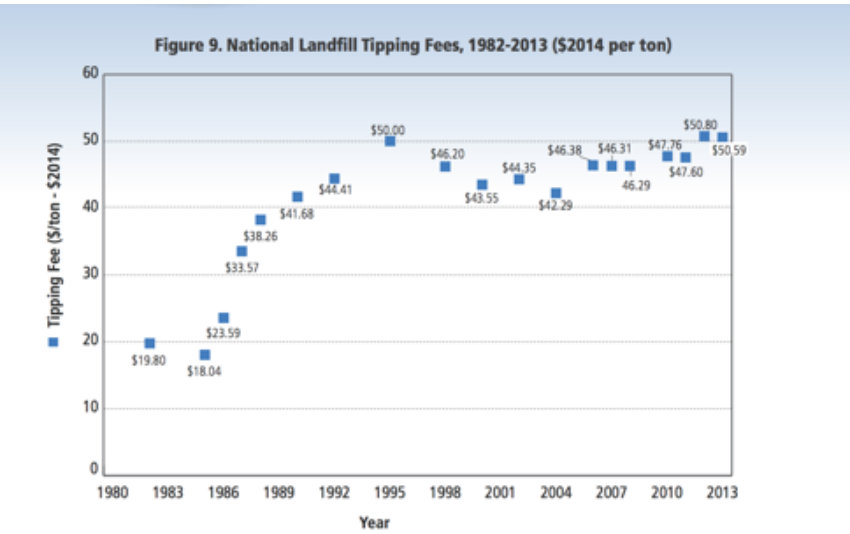
[45] Stanton, Ryan "City administrator gives update on fire at Ann Arbor recycling plant." *MLive.com*, 12 Aug. 2017, www.mlive.com/news/ann-arbor/index.ssf/2017/08/city_administrator_gives_updat.htm
[46] "MRF Interim Operations Agreement." *City of Ann Arbor*, http://a2gov.legistar.com/LegislationDetail.aspx-?ID=3021197&GUID=26B1FD0A-95EE-499F-930C-90E5BDE64DDC&Options=ID%7CText%7C&Search=Recycle+Ann+Arbor
[47] Bertram, Erica. "Recycle Ann Arbor Awarded Contract to Process Ann Arbor's Recyclables." *Recycle Ann Arbor*, recycleannarbor.org/news/416-recycle-ann-arbor-awarded-contract-to-process-ann-arbor-s-recyclables
[48] "City administrator gives update on fire at Ann Arbor recycling plant" *Ann Arbor News*, 12 Aug 2017, http://www.mlive.com/news/ann-arbor/index.ssf/2017/08/city_administrator_gives_updat.html
[49] Advancing Sustainable Materials Management 2014 Fact Sheet. (2016). Environmental Protection Agency. Retrieved from https://www.epa.gov/sites/production/files/2016-11/documents/2014_smmfactsheet_508.pdf
[50] Ann Arbor Comprehensive Organics Management Plan. (April, 2017). CB&I Environmental & Infrastructure, Inc.

conversations with various stakeholders that recycling and food composting services exist to serve the interests of its residents, not because it is economically preferable.

Figure 9: The EPA's reported National Landfill Tipping Fees, 1982-2013 ($2014 per ton), Source: EPA[51]



Supportive Policy: Michigan Yard Waste Ban

In 1995 Michigan enacted a ban on the disposal of yard waste in landfills.[52] As Ann Arbor's organics collection originated with only yard waste materials, and yard waste generation is much lower in winter months, Ann Arbor currently only provides service April through early December. Ann Arbor has allowed vegetative food waste to be commingled with yard waste in residential collection since 2009, and starting in 2014 it expanded to include all food waste, including meat, bones, and dairy.

Given Ann Arbor's policy priorities, an uncharacteristically low tipping fee, and its current yard waste ban, the city has a unique set of factors underlying its current approaches to compost management.

Priorities to Minimize Waste: City Climate Action Plan

Ann Arbor has long been recognized as a progressive city with environmental stewardship at its core. The city devised a Climate Action Plan in 2012 outlining

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[51] Advancing Sustainable Materials Management 2014 Fact Sheet. (2016). Environmental Protection Agency.
[52] Ibid
[53] City of Ann Arbor Climate Action Plan. 2012. https://www.a2gov.org/departments/systems-planning/planning-areas/energy/Documents/CityofAnnArborClimateActionPlan_low%20res_12_17_12.pdf

the current environmental impact the city bears, establishing time-bound goals in greenhouse gas reductions, and adopting strategic goals in mitigating and adapting to climate change. As part of these goals, resource management and food waste is a stated priority, yet recent strides in this area have stagnated. According to the Climate Action Plan, "although the City of Ann Arbor has made significant progress towards diverting waste through recycling and composting programs, a new set of actions and strategies are necessary to become a zero waste community."[53] As part of this plan, the city established a 60% diversion goal for single-family residences, and a 40% diversion goal citywide by 2017.[54]

DIVERSION	FY 06/07	FY 07/08	FY 08/09	FY 09/10	FY 10/11	FY 11/12
SINGLE FAMILY DIVERSION	41%	54%	43%	50%	50%	49%
TOTAL DIVERSION	33%	46%	34%	38%	34%	31%

Figure 10: Ann Arbor Diversion Rates 2006-2012, Source: City of Ann Arbor[55]

As of 2014, Ann Arbor reports that it has diverted 46.1% of its waste stream, indicating an upward trend.[56] However, estimates on diversion vary by source, as CB&I reports that in 2014 residential generators had a 54.6% diversion rate, whereas commercial entities had a 12.6% diversion rate, totaling 31.8%.[57] While the residential space has a much higher diversion rate, investments in commercial programs could significantly impact citywide diversion rates, as the city is lagging behind its stated goal of 40% diversion. To achieve its 40% diversion and Zero Waste goals, Ann Arbor must implement and incentivize changes in its current waste streams.

The Climate Action plan illustrates specific food waste initiatives requiring action. Composting emerges as a clear agenda item in addressing these needs, with priorities such as:

- Evaluating eliminating charges for composting carts
- Providing delivery to single family homes and duplexes
- Evaluating feasibility of compost collection at no additional cost to multi-family units
- Evaluate implementation of a commercial food waste collection program[58]

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[54] Waste Less: City of Ann Arbor Solid Waste Resource Plan. Updated 2013-2017. Published Feb. 2013. https://drive.google.com/file/d/0B1utoaE12eTmcVF3N1ZKeUpGTjg/view
[55] Ibid
[56] "Responsible Resource Use" *City of Ann Arbor*. https://www.a2gov.org/departments/systems-planning/planning-areas/climate-sustainability/Sustainability-Action-Plan/Pages/Responsible-Resource-Use.aspx
[57] Ann Arbor Comprehensive Organics Management Plan. (April, 2017). CB&I Environmental & Infrastructure, Inc.
[58] City of Ann Arbor Climate Action Plan. 2012. https://www.a2gov.org/departments/systems-planning/planning-areas/energy/Documents/CityofAnnArborClimateActionPlan_low%20res_12_17_12.pdf

Of relevance to this project, a key priority area outlined in the Climate Action Plan is conducting a feasibility study of the city's composting facility by January 2014.[59] The Climate Action Plan also states goals in expanding composting services to all residents, piloting consumer food waste reduction education campaigns, and expanding compost collections year-round, all of which have been mentioned as opportunity areas for compost expansion in the city.

While Ann Arbor has the infrastructure for existing city compost collection services, it has been unable to meet residential and commercial interest in expansion. Investment in composting can therefore achieve city environmental goals, reduce GHGs, and enhance Ann Arbor's status as an environmentally-conscious community and great place to live.

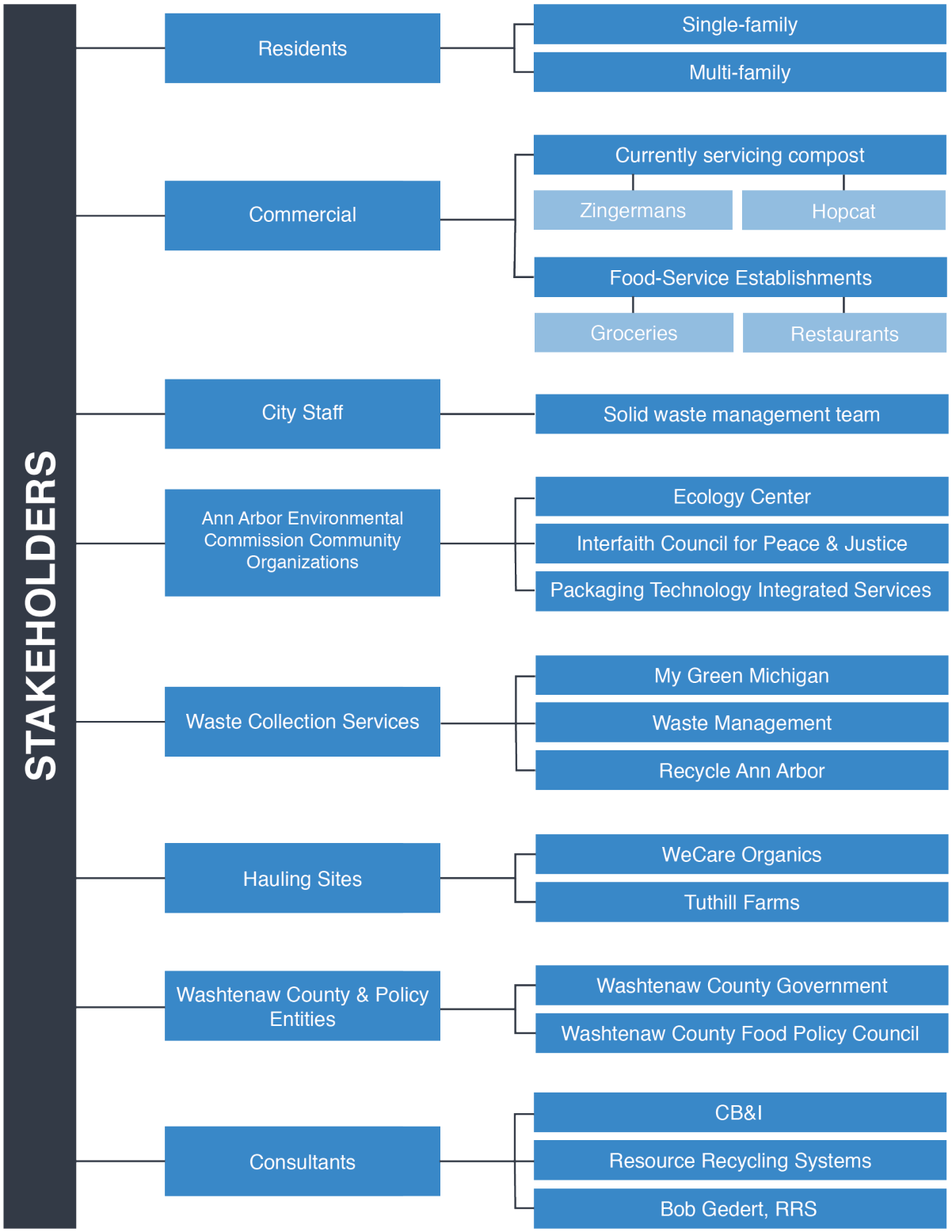
Composting Efforts to Date

Ann Arbor started their compost facility and collection many years ago, predating the yard waste ban legislation. They opened the current facility in the same area as the former city landfill, which is now closed, and near where the current MRF is located. Initially the city collected yard waste and operated the compost facility. The city excelled at manufacturing a high quality compost product, but did not have the expertise for selling the product and managing demand. In 2010, the city decided that outsourcing operations would be a better fit, contracting WeCare Organics to operate the site. Organics are still collected by the city and hauled to the site. Since, there have been some subtle changes to the collection process, including the termination of large scale street leaf collections, and the collection of food scraps beginning in 2014.

Within solid waste, there are a subset of individuals and organizations working towards composting specifically. A broad overview of stakeholders appears in Figure 11:

[59] Waste Less: City of Ann Arbor Solid Waste Resource Plan. Updated 2013-2017. Published Feb. 2013. https://drive.google.com/file/d/0B1utoaE12eTmcVF3N1ZKeUpGTjg/view

Figure 11: Ann Arbor Composting Stakeholders



Commercial: Commercial composting in the Ann Arbor area is still small-scale and is collected by a private hauler, My Green Michigan, based out of Lansing. My Green Michigan began its hauling services based on the request of a representative from BarFly Ventures, the restaurant group managing the Michigan-based HopCat restaurant. Following the opening of HopCat in Ann Arbor, a restaurant representative generated enough interest from surrounding Ann Arbor businesses to support a compost route. My Green Michigan now collects ten accounts in the area two days a week. This is a growing area of interest, and My Green Michigan has been able to max out its current truck capacity. Businesses pay My Green Michigan a one-time cart set-up fee or buy their own carts from My Green Michigan. They are then charged for weekly collection based on a sliding fee scale determined by the number of carts they have.

My Green Michigan has run into issues in Ann Arbor with high truck traffic in alleys where carts are located. To combat traffic, they start the Ann Arbor routes at 4 AM. This and other Detroit area routes are taken to Tuthill Farms and back to a compost yard in Lansing, Hammond Farms. (see Box for additional information on My Green Michigan).

My Green Michigan

Contact: Lee Hammond, Hammond Farms Landscape Supply, My Green Michigan

Operations and Clients

My Green Michigan is a small, for-profit commercial compost hauler based out of Lansing, MI that has been operating for about 3 years. They work in partnership with Hammond Farms (both are co-owned by Lee Hammond), a landscape supply company with a composting yard. Hammond Farms started as a composting company 11-years ago accepting yard waste as a one-stop shop for landscapers. The compost yard is also a tipping area for local municipalities.

Autumn Sands, a representative from Barfly Ventures, the restaurant group that owns HopCat, approached Hammond Farms about food scrap composting when HopCat opened a restaurant in Lansing, and were unable to find a compost contractor in the area. Autumn helped provide models from other composting operations and generated interest from nearby Lansing businesses to support a collection route. My Green Michigan's hauling operations started small and have grown from collection by small, enclosed trailer to retrofitted delivery truck. They are in the process of purchasing an additional, larger route truck.

The operation grew by word of mouth in the first two years. Now, with a dedicated staff person for client engagement, they approach businesses that would expand or complement current routes or could create a new, clustered

route. Most of My Green Michigan's business clients are electing to compost because of organizational sustainability initiatives. Coffeehouses, breweries, and organizations with a sustainability department are the most interested businesses, with some larger corporations seeking composting services to gain tax benefits. In Lansing, a public-private grant program from NDEQ is funding collection from local restaurants for 1.5 years to generate growth and interest in composting. Current operations service 70-75 businesses that range in scale from small shops with one 64-gallon cart to large food processing facilities that generate 30-60 carts per day. The company collects 65-75 cubic yards of material per week.

The current operations schedule is 5-days a week, year-round in many locations around the state between Detroit, Mt. Pleasant, and Holland. Their primary yard is Hammond farms in Lansing, however they work with many other compost yards around the state to serve dispersed geographies.

Ann Arbor

Ann Arbor was one of the first areas where My Green Michigan expanded, following the opening of the Ann Arbor HopCat location. This is a growing area and they have been able to max out their current truck capacity. They collect ten accounts in the area two days a week. They currently face challenges with high truck traffic in alleys where carts are located, which is compounded by the narrow size of the alleyways. To combat traffic, they start the Ann Arbor routes at 4 AM, bringing Detroit-area drop materials to Tuthill Farms. Hammond explained that their largest barriers are route optimization and improved route density, which could be improved through increased participation among commercial entities.

Contamination

Contamination rates are important for haulers, as compost yards will not accept contaminated loads and are often fined if they drop off contaminated loads. Haulers monitor collection visually, by weight, and by sound, for example, a load may look fine on the surface, but if it contains glass, the driver can hear the glass when it is tipped. Haulers must pay a landfill charge for contaminated compost loads, and clients are charged $100 if they can be identified as the contaminator. Drivers take pictures of contamination to document issues. They do not accept any front of house collection due to concerns of contamination. Issues with contamination and monitoring materials has prevented My Green Michigan from expanding into residential collection after a trial residential route in Grand Rapids.

Education

Education of composting clients is imperative for the success of its operation. Education is heavily integrated into onboarding a new client. My Green Michigan develops a compost champion at the organization to help disseminate information. Upon request, My Green Michigan will come conduct a training of up to seven days with facility personnel including kitchen and janitorial staff; this could include My Green Michigan representatives working in client kitchens to instruct workers on proper disposal. They disseminate lots of visuals to customers to help in correct compost disposal. It was noted that educational videos could be an important support tool to the education process, especially for restaurants near universities with high labor turn-over.

Financing

Route density is also important for financial viability to minimize travel time and idle time. Fees are charged to customers based on the number of carts a business has on a sliding scale: The first cart costs $25, and it goes down to $5 in the Lansing market. There is a $20 set-up fee per cart, and My Green Michigan retains ownership of the cart. If the cart is damaged by the client, then they are responsible for replacement at a cost of $100. If My Green Michigan or a weather event damages the cart, My Green Michigan will replace it at no additional cost. Every week, a business is charged for collection based on the total number of carts (regardless of how full they are). Alternatively, a business can elect to purchase a cart for $100. For carts owned by a business, My Green Michigan only charges for collection if they are used. Companies may choose to do a combination of these options so that they have a regular collection volume, and additional carts for overflow weeks. My Green Michigan pays Hammond Farms and other composting yards a tip fee and only generates revenue from collections.

Other

There are four other haulers at the scale of My Green Michigan in the state, and one large hauler that services grocery stores and takes waste to be used as animal feed. To promote composting in Michigan, in addition to raising landfill tipping rates, it was suggested that Michigan follow the lead of other states and pass legislation requiring businesses that handle large levels of food waste to compost. This process would help create a more stable market and encourage investment in infrastructure.

Figure 12: Ann Arbor Solid Waste Carts

Residential: Ann Arbor provides its residents with compost service on a weekly basis. Residents who have a compost cart can place yard waste and food waste in their cart for weekly curbside collection. For residents who do not have a cart, they can have yard waste picked up if it is placed at curbside in a paper yard waste bag. Residents can purchase a 32 or 64-gallon compost cart from the city for $25. They must also retrieve the cart from the city. Currently around 5,000 households in Ann Arbor have compost carts, roughly 10% of the total city population. Of these households, only 30% compost food waste. The cart fee, along with the need to pick up the cart from the city, are barriers to adoption. Service is currently provided April through early December to accommodate periods when the majority of yard waste is generated.

Understanding the nature of composting efforts to date and current compost programs in the city of Ann Arbor help illustrate key opportunity areas for future programs.

Ann Arbor Comprehensive Organics Management Plan

Much of Ann Arbor's state of organics management is captured in the Organics Management Plan. The consulting firm CB&I was contracted in March of 2016 to complete a Comprehensive Organics Management Plan, after Ann Arbor City Council directed that a plan be developed in response to the recommendations of the city's *Waste Less: Solid Waste Resources Plan*.[60] In drafting this plan, CB&I conducted stakeholder engagement through stakeholder interviews, advisory committees, and a resident survey. CB&I provided an assessment of the current organics operations and performed an analysis on diversion potential, which formed the basis for our own analysis. Additionally, CB&I conducted an assessment of alternative management strategies such as source reduction, donation, home composting, wastewater treatment, and bio digestion/anaerobic digestion.

The report provided recommendations for expanding both residential and commercial programs: On a city-wide level, CB&I recommended creating a broad education outreach campaign to increase participation. For the residential sector, recommendations included a pilot roll-out of compost carts. This pilot would serve to assess the impact on resident cart usage for food waste, as well as a winter collection pilot to assess year-round participation and quantities diverted. The commercial sector

[60] Waste Less: City of Ann Arbor Solid Waste Resource Plan. Updated 2013-2017. Published Feb. 2013. https://drive.google.com/file/d/0B1utoaE12eTmcVF3N1ZKeUpGTjg/view

recommendations included a 3 to 6 month pilot with ten downtown restaurants and nine public schools, as well as to conduct a survey of citywide businesses; it then recommended using findings from both studies to determine whether the city should provide commercial services, or if franchising the service should be further explored.[61]

TABLE 1-3. PROPOSED IMPLEMENTATION SCHEDULE FOR SIGNIFICANT RECOMMENDATIONS

	2017		2018				2019			
Recommendation	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
Citywide Recommendations										
Education and Outreach										(Ongoing)
Residential Recommendations										
Compost Cart Pilot										
Year-Round Collection										
Commercial Recommendations										
Restaurant/Schools Pilot										
Commercial Franchise										
FOG Licensing										

Figure 13: CB&I Proposed Implementation Schedule for Significant Recommendations. Source: Ann Arbor Comprehensive Organics Management Plan.[62]

While these recommendations were made in April 2017, when the report was presented to the Environmental Commission, nothing has been implemented to date. The city is currently awaiting recommendation from the Environmental Council regarding which options to explore further. As will be explained further in the **Solid Waste Financing** section, the City of Ann Arbor has limited revenue streams to support new programs, and so must make trade-offs when considering how to fund new programs.

The CB&I findings provide a detailed assessment of how to expand composting programs as a means of achieving the Climate Action Plan goals and aligning with the values of its residents. Despite these recommendations, however, significant barriers exist in expanding Ann Arbor's organics management plan to the scale specified in the report. Given this context, expansion of composting requires an analysis of available infrastructure, assessment of financial feasibility, and summary of best practices to inform program roll-out.

In order to expand upon the information set forth in the Organics Management Plan, our group utilized the data generated by CB&I to perform a WeCare Organics capacity analysis. The goal of this analysis was to determine that if Ann Arbor expanded to full-scale, an option considered in the report, whether the infrastructure would be large enough to support increased organic waste streams. This analysis follows below.

[61] Waste Less: City of Ann Arbor Solid Waste Resource Plan. Updated 2013-2017. Published Feb. 2013. https://drive.google.com/file/d/0B1utoaE12eTmcVF3N1ZKeUpGTjg/view

WeCare Organics Capacity Analysis

Figure 14: Windrow composting at the city owned composting site, operated by WeCare Organics

The first part of our project scope was to determine whether Ann Arbor has sufficient capacity at its composting facility to expand its services to all residents and businesses. For context, the City of Ann Arbor owns its own composting site, and the operation of this site, including marketing and distributing the generated compost, is contracted to WeCare Organics. The resident hauling service is provided by city owned trucks, operated by city employees. These trucks deliver the yard and food waste materials collected from city residents to the WeCare facility. Under the contract, WeCare is also authorized to accept material from third-party collectors such as the University of Michigan and local landscaping companies.[63] The WeCare site uses windrow composting to process the material that it accepts.

Using the data provided by the CB&I Ann Arbor Comprehensive Organics Management Plan on projected compost generation, along with capacity data collected through conversations with Mike Nicholson of WeCare Organics, our group was to determine whether Ann Arbor would need additional composting infrastructure if it were to expand its composting services. Through our analysis, we determined that Ann Arbor would not need additional infrastructure, as the current compost site is sufficient to process projected materials.

Figure 15: Industrial compost turner used at the city owned composting site, operated by WeCare Organics

We analyzed the data to understand capacity needs if all single-family residents diverted food waste on par with average diversion rates of model cities, and if businesses diverted all of their compostable material. CB&I reported that current residential compost collection amounts to 8,323 tons per year, and projected a maximum diversion of an additional 2,925 tons of food waste per year (based on national average household generation), for a maximum residential diversion of 11,248 tons per year.[64] It is assumed that yard waste generation would remain stable,

[63] Ann Arbor Comprehensive Organics Management Plan. (April, 2017). CB&I Environmental & Infrastructure, Inc.
[64] Ibid.

as all households can currently have yard waste picked up by the city in paper bags, and yard waste is prohibited from landfills. CB&I also reported that on average in the statewide studies it examined, compostable organics comprise 30.3% of the commercial waste stream. If Ann Arbor commercial businesses were to divert all 30% of the waste stream that is compostable, an additional 10,225 tons would be diverted (assuming no current commercial compost diversion). If residents generated and diverted compost at the same rate as national averages, and all commercial compostable material were diverted, there would still be a small amount of excess capacity (Figure 16).

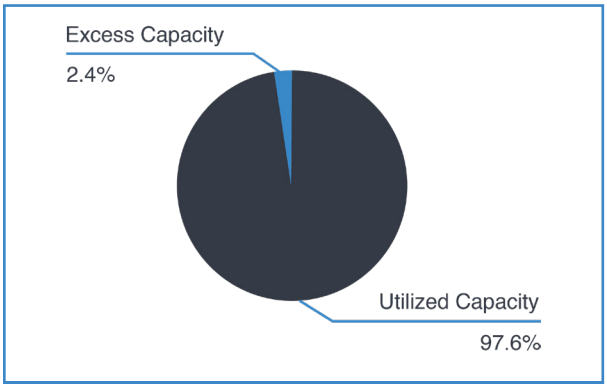


Figure 16: WeCare Capacity Utilization with 100% Commercial Organics Diversion

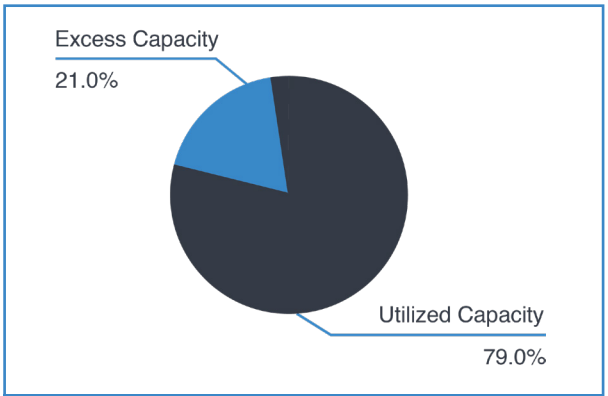


Figure 17: WeCare Capacity Utilization with 60% Commercial Organics Diversion

As the current recycling diversion rate for commercial businesses in Ann Arbor is only 12.5%, reaching a 100% diversion rate is an unlikely scenario, and there is sufficient capacity to expand residential and commercial composting services.[65] Seattle, a city that mandates recycling and composting, currently has a goal of achieving a 75% commercial diversion rate (of combined recycling and organics) by 2022. In 2016, the city achieved a commercial diversion rate of 64%.[66] Ann Arbor currently has a goal of achieving a 60% diversion rate. Figure 17 depicts a scenario with residents generating and diverting food waste at the national average rate, and commercial businesses diverting 60% of the compostable waste stream. In this scenario there is sufficient excess capacity. Seattle's high diversion rates are driven by both its mandatory diversion policies and its pay-as-you-throw (PAYT) financing system (see "Comparable Cities and Counties"), and therefore Ann Arbor would be expected to achieve lower diversion rates, unless similar policies were adopted.

[65] Ann Arbor Comprehensive Organics Management Plan. (April, 2017). CB&I Environmental & Infrastructure, Inc.
[66] 2016 Recycling Rate Report. (2017, July 1). Seattle Public Utilities. Retrieved from http://www.seattle.gov/util/cs/groups/public/@spu/@garbage/documents/webcontent/1_064754.pdf

While Ann Arbor's composting site currently has sufficient capacity to increase services to expand food waste collection, there are currently no limitations on ratios of food waste to yard waste. Michigan's Part 115 of the Natural Resources and Environmental Protection Act of 1994 legislation, which specifies yard waste policy, is currently being revised. Potential limitations on the food to yard waste ratio imposed in the new legislation, due to health and safety concerns about rodents and smell, could reduce the capacity to accept food waste. At this time, potential new limitations are unknown.

Available Funding Mechanisms

There are a variety of funding mechanisms that local governments use to fund public services and goods, such as solid waste collection. Below are detailed the primary funding mechanisms, used either alone or in combination, that are utilized by interviewed cities to finance their solid waste and compost programs.

Utility Based

Utility-based funding mechanisms involve the collection of fees for services on residents' and businesses' utility bill. Cities may collect flat fees for a services, or use a fee-for-service structure to charge based on the quantity of service used. The benefits of using a utility based fee is that it is part of an existing and necessary billing and payment process that the resident, rather than a landlord, *usually* receives and pays. This increases the ease of collection and is a transparent reminder to customers of what they are paying for. It can also be easier to raise utility based fees than taxes to support special programs. However, utility based fees can be complicated to calculate if they are a fee-for-service model, and can require additional administrative work to collect, especially if services are contracted out.

Pay-As-You-Throw

Pay-as-you-throw (PAYT) is a funding mechanism where waste generators (residents, businesses, institution, etc.) pay for their waste disposal based on the amount that they throw away. This format is meant to encourage a reduction in overall generated waste as well as encourage diversion of waste to recycling and composting streams by charging a lower rate for these services than trash rates.[67] PAYT can come in different forms. In some communities, generators pay for the number of trash bags they generate. Another way generators pay based on volume is to pay a rate per cart,

[67] PAYT. (2016). Environmental Protection Agency. Retrieved from https://archive.epa.gov/wastes/conserve/tools/payt/web/html/index.html

based on the size of the cart, regardless of how full the cart is at collection. If a resident wants a larger trash cart, he or she would pay a larger monthly bill. Another method of implementing PAYT is to charge based on the weight of the material generated. RFID technology can be used to track the weight of each individual resident or business' waste upon collection.[68]

PAYT models have been shown to create significant increases in recycling, composting, and reductions in waste, as well as to generate the revenue needed to cover the costs of operating a solid waste system.[69] The EPA also notes that this system is more equitable, as everyone only pays for what they actually throw away and the services they use.[70] The AMERIPEN "Analysis of Strategies and Platforms to Increase the Recovery of Used Packaging" notes that adopting a PAYT financing mechanism is the strategy that holds the most promise for increasing waste reduction and diversion in the United States.[71] Even Ann Arbor's own Climate Action Plan outlines a priority of evaluating an expanded "pay as you throw" system for residential solid waste, outlining benefits such as: Increased equity for customers, community incentives to reduce waste, informing members of the community of true waste disposal costs, and an improved revenue stream for the city.[72]

Tax Based

As discussed earlier, a property millage is a way that governments collect fees from residents to provide services. A mill is $1 for every $1,000 of taxable property value. This is a way to collect funds from residents through property taxes that then go into designated funds allocated to prescribed services and initiatives for that fund. The millage system is a relatively straightforward revenue generation system that allows for fairly predictable income streams. Some drawbacks of the system include that it is not readily transparent to residents how these funds are being used. Though city and county governments disclose how funds are allocated, many residents do not know where or how to access this information or interpret it. Moreover, property taxes are paid by property owners, so renters often do not even know what the property taxes are or what they cover. In sum, this means that financing solid waste programs through a millage creates a disconnect between individual behavior and the impact it has on the use of funds and the true cost to provide the services a household benefits from is

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[68] Smarter Trash: How Incentive Programs Can Motivate Participation in Recycling - WIH Resource Group. (2009, October 27). WIH Resource Group. Retrieved from https://wihresourcegroup.wordpress.com/tag/rfid-enhanced-payt/
[69] PAYT. (2016). Environmental Protection Agency.
[70] Ibid.
[71] AMERIPEN Analysis of Strategies and Platforms to Increase the Recovery of Used Packaging. (2013). AMERIPEN. Retrieved from http://www.ameripen.org/wp-content/uploads/2017/07/AMERIPEN_Financial_Platforms_Summarypdf.pdf
[72] City of Ann Arbor Climate Action Plan. 2012. https://www.a2gov.org/departments/systems-planning/planning-areas/energy/Documents/CityofAnnArborClimateActionPlan_low%20res_12_17_12.pdf

unknown. Additionally, people are averse to having their taxes raised which makes it hard to adjust funding for increased service levels or to cover unforeseen issues.

Enterprise Fund

Enterprise funds are another way that governments fund services to residents. Enterprise funds are designated for a specific use, usually to provide specific goods or services to residents, and are generally operated more like a business in that fees are collected from activities related to the fund's mission.[73] Enterprise funds can be generated in a variety of ways. Benefits of enterprise funds, over the use of general funds for instance, include specifying costs of certain services and the potential to link related activities and fees. The drawback of these funds is that it can be hard to link the fees or funding mechanisms with the actual amount needed to cover the goods or services. In Ann Arbor, the Solid Waste Fund is an enterprise fund.

Grants

Grants are funds that are given to a recipient for use on a specific purpose and often require meeting certain criteria. While governments are often *grantors* they can also be *grantees* of federal funding or organizations promoting certain activities, such as education campaigns around composting. This is an additional means by which Ann Arbor could increase its operating capacity.

[73] "What Is a Government Enterprise Fund?" *Bizfluent*, bizfluent.com/facts-7304143-government-enterprise-fund-.html

Comparable Cities and Counties

Figure 18: Funding mechanism of example cities and counties

CITY/ COUNTY	SOLID WASTE FUNDING MECHANISM	COMPOSTING VOLUNTARY/ MANDATORY	COMMERCIAL/ RESIDENTIAL
New York City, NY	Property Tax	Primarily Voluntary; Mandatory for some large food-service establishments	Commercial and Residential
San Francisco, CA	Pay-as-you-Throw (based on bin size)	Mandatory	Commercial and Residential
Seattle, WA	Pay-as-you-Throw (based on bin size)	Mandatory	Commercial and Residential
Portland, OR	Pay-as-you-Throw (based on bin size)	Voluntary- weekly organics/ recycling collection and biweekly trash collection	Commercial and Residential
Emmet County, MI	Enterprise Fund (from transfer station); Pay-as-you-Throw (by bin or bag)	Voluntary(food scraps) Mandatory (yard waste)	Commercial
Austin, TX	Pay-as-you-Throw (based on bin size and collected through Utility Bill) and Enterprise Fund	Mandatory for food service establishments	Commercial and Residential
Orange County, NC	Flat fee for each household and business (collected with property tax)	Voluntary	Commercial
Chelsea, MI	Pay-as-you-Throw (per bag)	No Composting	N/A
Oberlin, OH	Property tax millage and fee on utility bill	Voluntary (food scraps);Mandatory (yard waste)	Oberlin college
Massachusetts	N/A	Mandatory for businesses with 1 ton of organics waste	Commercial
Honolulu, HI	N/A	Mandatory for large food service establishments	Commercial

New York City, New York

Contact: Bridget Anderson, Deputy Commissioner, Recycling and Sustainability

Overview

New York City has a mostly voluntary organics program, although food-service establishments of a certain size are required to divert their organic waste. The city finances its residential programs through a property tax system. Commercial entities contract their own waste services through private haulers. New York City has some of the highest landfill tipping fees in the country at $110-120 per ton on average.

Voluntary or Mandatory

New York is currently operating under a voluntary collection system, with the exception of the largest food-service establishments, which are required to divert their organic waste. New York's goal is to expand the program as much as possible before making it mandatory, with the understanding that mandatory collection might be the only way to get buy-in from certain entities. One of the chief concerns with mandatory programs is the contamination rate, in which the city would charge fees for high levels of contamination.

Residential and Commercial Solid Waste Programs

Residential: Anderson describes New York's residential program as a "go big" option, in which all residential facilities, including high-rises, are included in composting collection. As they phase-in the program, the solid waste team has traveled from neighborhood to neighborhood, starting with single-family and up to nine-unit multi-family units, distributing brown curbside collection bins free of charge. Although larger high-rise and multi-unit buildings are currently voluntary collections, the city is actively recruiting property managers for compost participation, also by delivering as many brown bins as possible. In the case of multi-family buildings, composting is often implemented as a result of resident demands, although some high-rise buildings are demonstrating how they are saving money by utilizing compost collection. New York's priority is to expand composting services as much as possible, and supports this through intensive outreach and assistance.

Commercial: Local law in NYC requires the largest generators of food waste to separate organic materials. These businesses represent 500 out of roughly 200,000 businesses total in NYC, and a recent expansion proposal would include a total of 2,000 businesses. Other participants in commercial organics include smaller restaurants on a voluntary basis. Although the city is effectively subsidizing composting infrastructure, commercial entities are required to contract their own haulers independently.

With this mandate in place, many businesses are pursuing alternate routes for minimizing food waste, including sending waste to animal feed and donating food to local shelters. The city has outlawed food-grinders, as commercial entities were contaminating wastewater streams by relying upon in-sinkerators to reduce their food waste volumes. Businesses mandated to reduce their food waste have been evaluating loopholes for participation, including aerators and dehydrators. In order to discourage these practices, the city is looking to expand support to businesses such that cost of participation is less burdensome.

Tipping Fees

New York's tipping fees for trash run from $110-120 per ton on average, with compost tipping costing around the same price. Since there is not full participation in organics collection, composting collection costs are higher than trash collection costs, despite comparable tipping fees. The city has instituted a price cap on composting services, and while customers complain about costs of service, haulers have not yet reached this cap.

Financing

The city currently finances its composting operations through a property tax system. Under this system, homeowners and property owners pay for waste management services, without specific designations on how the money is earmarked. For renters, the price of composting is not directly seen, as the cost of collection is embedded in their rental costs; property owners finance collection services through their property taxes.

Franchising

The city is looking to move to a franchising/zoning system. Although consolidating routes would likely put smaller haulers out of business, the benefit is its ability to generate economies of scale. Current regulations, such as emissions reductions, are burdening the hauling industry: In recent years, there has been a drop from 200 haulers to roughly 83 total. Consolidation is already happening due to such market forces, and the city is looking to franchise in order to make the system run more efficiently and become less costly.

Education

New York is investing heavily in composting education and outreach. On their website, www.nyc.gov/composting, a variety of brochures and instruction sheets inform the public on how to compost. Their educational components include:

- Outreach Staff: The educational team consists of 15 outreach associates. These associates conduct tabling at schools and grocery stores, and the city has outreach staff on the street. Staff-members also go door-to-door at high rise buildings, helping to train the staff in rolling out composting for the facility.
- Starter Kit: Two weeks before NYC drops bins off at residences, the solid waste group sends out a mailer to notify residents. When the NYC team delivers the curbside bin, every housing unit also receives a kitchen container, a “how to” packet, as well as a coupon for compostable bags. A second mailer is sent a week into servicing.
- Mass communications: Through communication channels such as the local newspaper, social media, and ongoing community engagement, NYC has been aggressive in their roll out of organics.

New York has a robust offering of free resources online to help residents and businesses better understand how to compost. An online order form enables residents and businesses to receive educational materials free of charge. A sample of the website is in Figure 19.

Opportunity Areas

Anderson spoke of the infrastructural barriers to composting participation. In the energy sector, for example, various agencies provide subsidies for retrofitting machinery to enhance emissions and address climate change concerns. In the architecture industry, considerations are often made concerning air flow and HVAC systems, but waste management is often removed from the conversation. Although the American Institute of Architecture has expressed a growing interest in integrating waste considerations in their processes, Anderson highlights that future buildings should be designed with waste management considerations in place in order to maximize composting infrastructure.

Figure 19: New York's Free Educational Materials, Source: New York City Department of Sanitation Website[74]

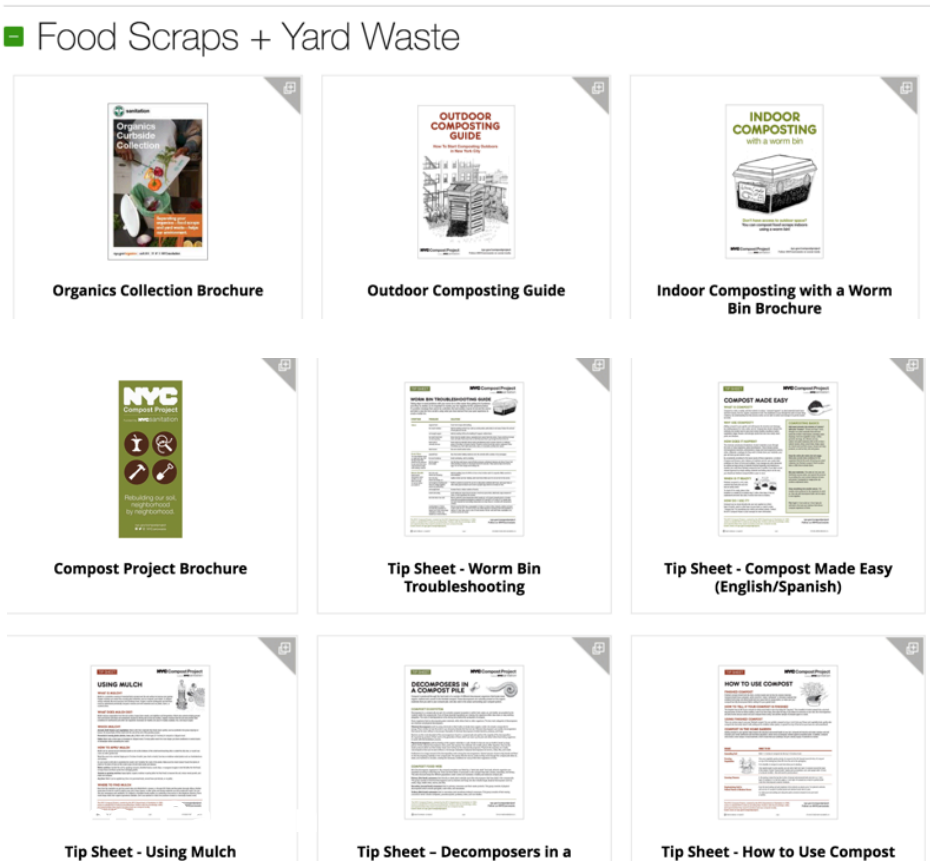
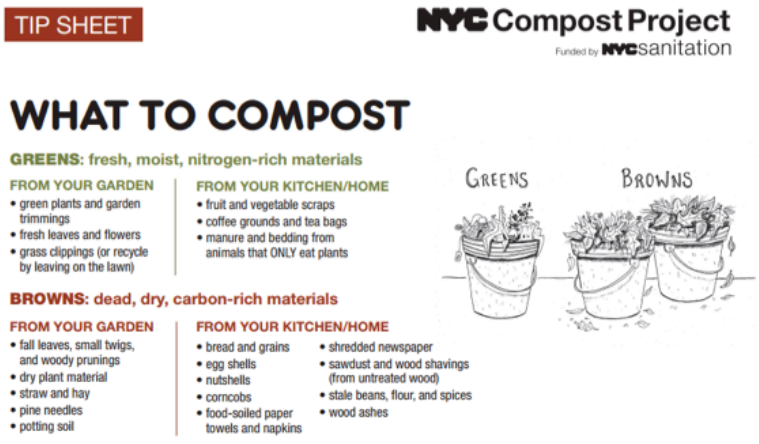


Figure 20: New York Educational Materials, Source: New York City Department of Sanitation Website[75]



[74] Compost Project Materials. New York City Department of Sanitation. Retrieved from http://www1.nyc.gov/assets/dsny/about/inside-dsny/compost-project-materials.shtml
[75] Ibid

San Francisco, California

Contact: Jack Macy, Commercial Zero Waste Senior Coordinator

Overview

San Francisco residents and businesses receive their solid waste services through Recology, the exclusive hauler for the city. San Francisco uses a PAYT model to finance its solid waste services, and has a mandatory diversion policy for recycling and organics.

Voluntary vs. Mandatory

In 2009 the San Francisco Board of Supervisors passed the San Francisco Mandatory Recycling and Composting ordinance in order to achieve their goal of achieving zero waste by 2020. This ordinance requires everyone in San Francisco, both residents and businesses, to separate their trash, recycling, and composting. Businesses, including property owners/management of apartments and condos, are required to provide color-coded bins for all three waste streams. They are also required to provide education to tenants, employees, contractors, and janitors, as to what goes in each bin.[76] The city provides support for businesses, providing educational stickers for bins, providing containers for inside establishments, and working with them onsite to help learn how to sort material and train their employees.

Residential and Commercial Solid Waste Programs

Residential: Solid waste services in San Francisco are provided by an exclusive hauler, Recology. Recology provides residents with weekly pick-up service for trash, recycling, and compost. Multi-family properties are often serviced more than once a week.

Commercial: Businesses are also serviced by the exclusive hauler, Recology, and they can choose what size bins they need for their recycling, composting, and trash. San Francisco began to encourage businesses to compost in the 1990s, beginning with food generating businesses such as wholesale, food retail, and food service. The city

[76] San Francisco Mandatory Recycling and Composting Ordinance. Retrieved from https://sfenvironment.org/sites/default/files/fliers/files/sfe_zw_mandatory_factsheet.pdf

first focused on businesses in certain geographic areas, and then targeted businesses based on size.

Tipping Fees

The median tipping fee in the Bay Area, described as "urban counties in the San Francisco Bay area," is $68/ton, according to a 2015 report by the California Department of Resources Recycling and Recovery.[77]

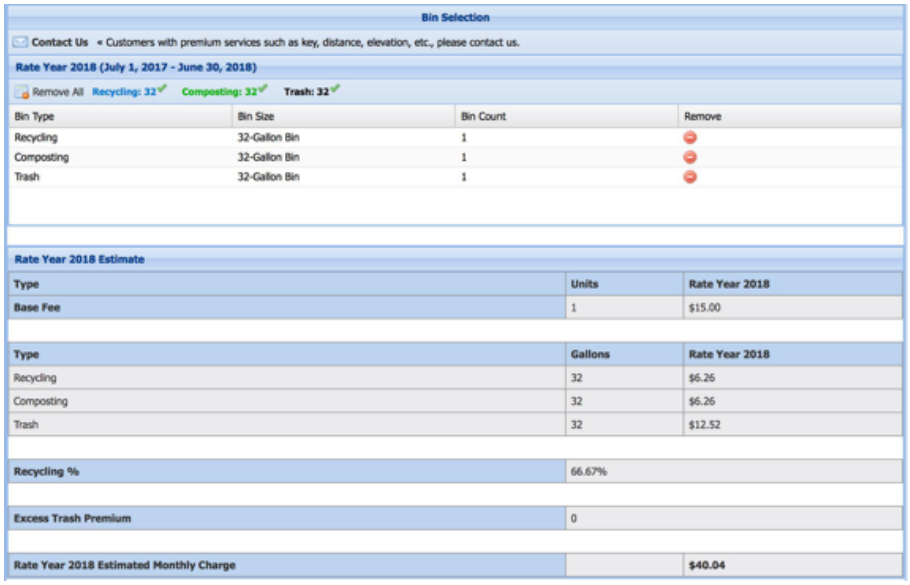
Financing

The solid waste program is financed by a PAYT mechanism, where residents pay Recology for their services. The rate that they pay is determined by the volume of the various types of waste being collected. Since there is only one exclusive hauler, the city works with Recology to establish the rate that can be charged for the service. They use past, present, and projected future costs to determine a rate that covers Recology's costs while incentivizing diversion of materials to recycling or composting. Rates are determined differently for residential customers and for commercial customers.

Residential Financing: Residential solid waste rates are determined based on the volume and type of material being collected. All customers are charged a base fee, and subsequent fees are assessed based on the type of material collected. Trash costs twice as much per 32-gallons as composting or recycling. When a customer chooses either a 64-gallon or 96-gallon bin for trash, an additional fee is added onto the customer's bill. These higher fees for large trash carts incentivize customers to choose smaller trash bins and divert more of their waste to recycling or composting. Figure 21 and Figure 22 depict two different potential customer bills based on different diversion structures. These estimates were created using Recology's Residential Rate Calculator available online.[78]

[77] Landfill Tipping Fees in California. (2015, February). California Department of Resources Recycling and Recovery. Retrieved from http://www.calrecycle.ca.gov/publications/Documents/1520%5C20151520.pdf
[78] Residential Rate Calculator. Recology. Retrieved from https://www.recology.com/sf-residential-rate-calculator/

Figure 21: Potential monthly bill for San Francisco resident with equal trash, recycling and composting, Source: Recology



Bin Selection

Contact Us « Customers with premium services such as key, distance, elevation, etc., please contact us.

Rate Year 2018 (July 1, 2017 - June 30, 2018)

Remove All **Recycling: 32** **Composting: 32** **Trash: 32**

Bin Type	Bin Size	Bin Count	Remove
Recycling	32-Gallon Bin	1	
Composting	32-Gallon Bin	1	
Trash	32-Gallon Bin	1	

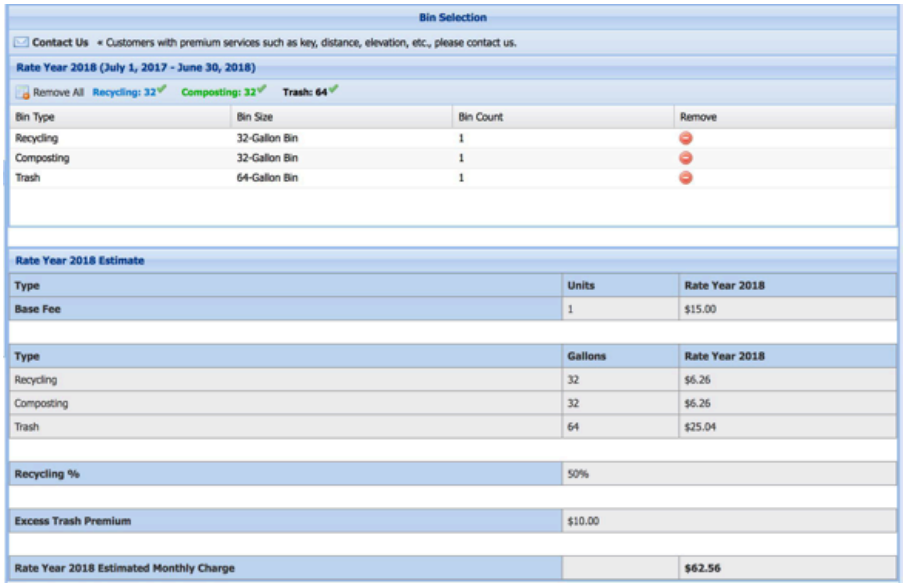
Rate Year 2018 Estimate

Type	Units	Rate Year 2018
Base Fee	1	$15.00

Type	Gallons	Rate Year 2018
Recycling	32	$6.26
Composting	32	$6.26
Trash	32	$12.52

Recycling %	66.67%
Excess Trash Premium	0
Rate Year 2018 Estimated Monthly Charge	**$40.04**

Figure 22: Potential monthly bill for San Francisco resident with more trash volume than recycling and composting, Source: Recology



Bin Selection

Contact Us « Customers with premium services such as key, distance, elevation, etc., please contact us.

Rate Year 2018 (July 1, 2017 - June 30, 2018)

Remove All **Recycling: 32** **Composting: 32** **Trash: 64**

Bin Type	Bin Size	Bin Count	Remove
Recycling	32-Gallon Bin	1	
Composting	32-Gallon Bin	1	
Trash	64-Gallon Bin	1	

Rate Year 2018 Estimate

Type	Units	Rate Year 2018
Base Fee	1	$15.00

Type	Gallons	Rate Year 2018
Recycling	32	$6.26
Composting	32	$6.26
Trash	64	$25.04

Recycling %	50%
Excess Trash Premium	$10.00
Rate Year 2018 Estimated Monthly Charge	**$62.56**

Commercial Financing: Commercial rates are determined by volume and by diversion rate. There is a uniform rate for all three types of services: trash, recycling, and composting. However, businesses receive a discount dependent on the amount of waste they divert from landfill. The discount on the total bill is calculated by subtracting 25% from the diversion rate. For example, a business that diverts 50% of their waste would receive a 25% discount on their utility bill. Examples of two potential commercial bills, calculated using Recology's Commercial Rate Calculator, are seen in Figure 23 and Figure 24.[79]

Figure 23: Potential monthly bill discount for San Francisco businesses with equal trash, recycling and composting, Source: Recology

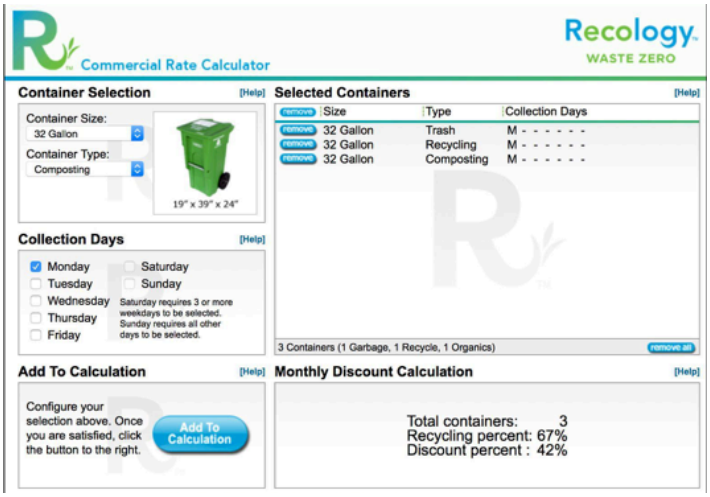
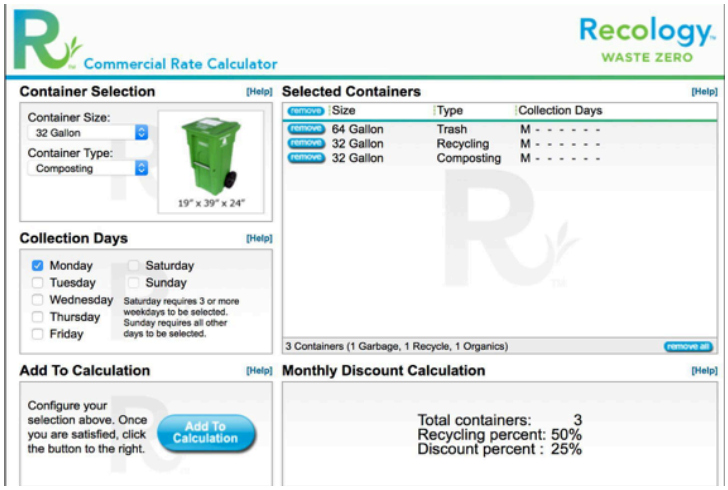


Figure 24: Potential monthly bill discount for San Francisco businesses with more trash volume than recycling and composting, Source: Recology



[79] Commercial Rate Calculator. Recology. Retrieved from https://www.norcalrecycles.com/rate_calculator/rate_calculator.php

Education

The City of San Francisco provides educational materials to its residents and businesses to help support its mandatory diversion of recycling and compost. Included in the residential and commercial service fees, determined by the city and Recology, is a fee that helps fund education. This fee goes back to the city to help support city staff level educational efforts such as outreach and onsite training for businesses.

Seattle, Washington

Contact: Sego Jackson, Strategic Advisor, Waste Prevention and Product Stewardship

Overview

The City of Seattle uses a PAYT model to finance its solid waste systems. It has a mandatory diversion policy of recycling and composting for businesses and residents.

Voluntary vs. Mandatory

Seattle has been on a long journey to reach its current ban on food waste and organic materials from the trash stream. In 1988, yard waste was banned from residential garbage. In 2005, Seattle prohibited recyclables from the trash stream and put curbside food waste collection into place. The city adopted a zero-waste plan in 2007. In 2009 the city required all single family residences to subscribe to a food and yard waste collection or to participate in backyard composting. A similar requirement for multi-family residences was established in 2011. In 2015, Seattle established the ban on food waste from the trash stream, requiring all residents and businesses to separate their compostable materials from their trash.[80] See Figure 25 for a timeline of Seattle's commercial and residential requirements.

Our contact, Sego Jackson, highlights that the move to a ban on food waste in trash did not happen overnight. Seattle worked over many years to engage local stakeholders and eventually transition its residents and businesses to this mandatory diversion plan. He also notes the importance of the effect of the ban on local infrastructure. By enacting a ban, service providers were given the assurance that there would be a consistent flow of material that would justify their investment in infrastructure.

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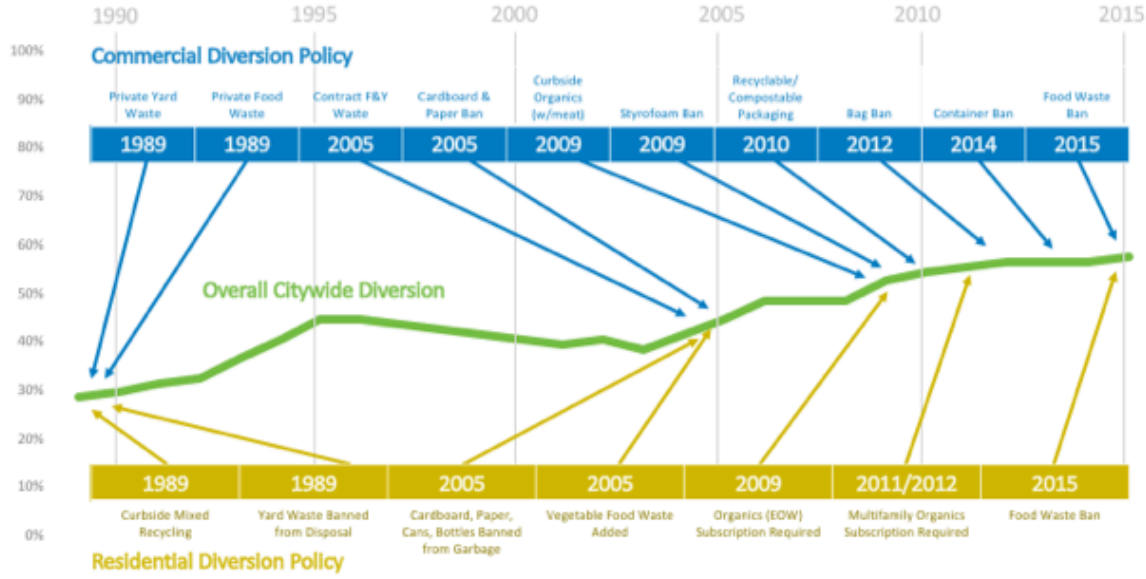
[80] Food Waste Requirements Frequently Asked Questions. Seattle.gov. Retrieved from http://www.seattle.gov/util/MyServices/Garbage/AboutGarbage/SolidWastePlans/AboutSolidWaste/BanOrdinance/FoodBanFAQs/index.htm

Figure 25: A historical timeline of Seattle's diversion bans, mandates, and requirements, Source: Sego Jackson's "A Seattle Update" presentation[81]



Residential and Commercial Solid Waste Programs

Residential: The City of Seattle contracts out all residential solid waste services except for transfer stations. Currently the city has contracts with Waste Management and Recology to collect and haul residential waste. Residents pay their bills for solid waste services to the city.

Commercial: Commercial entities contract solid waste services with local service providers on the free market.

Franchising

The city of Seattle does not franchise commercial waste services. Instead, it allows a free market where there are five major companies providing services.

Tipping Fees

Tipping fees in Washington vary based on county and transfer station. Sego reported that the tipping fee for Seattle, including the transfer fee, is around $41.50 per ton.

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[81] Jackson, Sego. (2017, September 28). A Seattle Update. Presentation.

Financing Mechanisms

Seattle finances its solid waste services and incentivizes diversion through a PAYT financing system.

Residential Financing: Residents pay based on the size of the carts for various waste streams. Recycling is free to Seattle residents, and food and yard waste rates are significantly lower than trash rates, and residents are encouraged to lower their bill by diverting and recycling and food waste. The residential rates can be seen in Figure 26.

Figure 26: Residential Garbage and Food and Yard Waste Rates, Source: Seattle.gov[82]

Monthly Residential Garbage Can Rates

Service Level (weekly)	**Curb or Alley** (per month)		**Backyard** (per month)	
	2016	**effective April 1, 2017**	**2016**	**effective April 1, 2017**
micro-can (12 gallon) View can, size and weight limit	$21.30	$22.85	N/A	N/A
mini-can (20 gallon) View can, size and weight limit	$26.10	$28.00	N/A	N/A
32-gallon can View can, size and weight limit	$34.00	$36.45	$47.55	$50.95
64-gallon cart View cart, size and weight limit	$68.00	$72.90	$95.25	$102.10
96-gallon cart View cart, size and weight limit	$102.00	$109.35	$142.80	$153.10
extra garbage (per bundle) 4' x 2' x 2' 60 lbs.	$10.60	$11.35	$10.60	$11.35

Monthly residential food and yard waste cart rates

Service Level (weekly)	**Curb or Alley (per month)**		**Weight Limit**	**Dimensions**
	2016	**effective April 1, 2017**		
13-gallon (mini-can)	$5.65	$6.05	20 pounds	11"W x 12"D x 27"H
32-gallon	$8.50	$9.10	60 pounds	21"W x 23"D x 40"H
96-gallon	$10.85	$11.65	180 pounds	29"W x 34"D x 46"H
extra yard waste (per bundle)	$5.40	$5.80	60 pounds	4' x 2' x 2'

Commercial Financing: Commercial entities contract their waste services through private haulers. Rates are determined by these private haulers.

[82] Residential Rates. (2017). Seattle.gov Retrieved from https://www.seattle.gov/util/MyServices/Rates/index.htm

Education

To educate its residents, the City of Seattle has invested heavily in outreach and engagement programs. To inform residents about the food waste ban before it was implemented, the city ran an educational campaign to educate residents about how they would need to change their behaviors. The city sends annual mailers to its residents and runs advertisements on bus lines. The city additionally provides free educational resources to businesses to educate their employees and customers, seen in Figure 27.

Figure 27: Educational Materials made available by the City of Seattle to local businesses, Source: Sego Jackson's "A Seattle Update" Presentation" [83]

[83] Jackson, Sego. (2017, September 28). A Seattle Update. Presentation.

Portland, Oregon

Overview

While we did not speak to a representative from Portland, it is a city that is often lauded for its composting services. Portland has a voluntary composting service and uses a PAYT model, as well as a unique pick-up schedule, to incentivize residents to divert their recycling and compost.

Voluntary or Mandatory

Composting in Portland is voluntary. Commercial businesses are required to recycle paper, plastic bottles, metal cans, and glass bottles and jars, but are not required to compost.[84]

Residential and Commercial Solid Waste Programs

Residential: Residents pay the City of Portland for their solid waste services and are serviced by a network of private haulers who pick up trash for the city.[85] In Fall of 2011 Portland reduced their trash pick-up to every other week and increased their recycling and compost pick-up to a weekly service. This change in pick-up schedule incentivizes residents to reduce their trash generation, and also to divert food scraps, which would become smelly over time, to compost, which is picked up more frequently. Residents can choose carts for their various waste streams based on size.

Commercial: Commercial businesses contract their waste services through private waste hauling companies. In 2005 Portland established the Portland Composts! Program which requires that all recycling and trash companies that provide commercial services also provide composting service.[86]

Financing Mechanisms

Portland uses a PAYT model. Residents pay a fee based on the size of their trash cart. This fee covers bi-weekly pick-up of garbage, and weekly pick-up of recycling and compost. This pick-up schedule incentivizes residents to divert materials to recycling or composting. If they do not divert materials, they need to pay for a larger trash cart

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[84] Business – Commercial Garbage, Recycling and Composting. (2017). The City of Portland. Retrieved from https://www.portlandoregon.gov/bps/58975
[85] Millman, Joel. (2012, June 27). Portland Puts New Twist On Trash Pickup. The Wall Street Journal. Retrieved from https://www.wsj.com/articles/SB10001424052702304458604577490532687633866
[86] History of Portland's Garbage and Recycling System. (2017). The City of Portland. Retrieved from https://www.portlandoregon.gov/bps/article/109782

to accommodate two weeks' worth of garbage. The city also offers a lower rate for only recycling and composting service. Rates for single family houses are seen in Figure 28.

Figure 28: Portland Residential Solid Waste Rates for Single Family Houses, Source: www.portlandoregon.gov[87]

Standard service – includes weekly recycling, weekly composting and every-other-week garbage collection

Container Size	Weight Limit	Monthly Cost	Non-curb Surcharge	Excess Distance
20 gallon can*	35 pounds	$24.60	$1.70	$0.55
32 gallon can*	55 pounds	$28.60	$1.70	$0.55
20 gallon roll cart	60 pounds	$24.60		
35 gallon roll cart	85 pounds	$29.25		
60 gallon roll cart	135 pounds	$35.10		
90 gallon roll cart	175 pounds	$41.60		
1.0 Cubic Yard Container		$83.70		
1.5 Cubic Yard Container		$114.75		
2.0 Cubic Yard Container		$145.80		

Every-four-weeks service – includes weekly collection of composting and recycling, and every-four-weeks garbage collection

Container Size	Weight Limit	Monthly Cost	Non-curb Surcharge	Excess Distance
32 gallon can*	55 pounds	$21.70	$0.85	$0.30
35 gallon roll cart	85 pounds	$21.70		

Special Services

Special Services	Monthly Cost	Per Unit or Per Pickup	Non-curb Surcharge	Excess Distance
Recycling only, weekly collection	$8.50			
Recycling and composting only, weekly collection	$18.20			
On-call garbage (32 gallon can or bag)		$9.40	$0.85	$0.30
On-call yard debris only (32 gallon can, bag or bundle)		$7.20		
Garbage, extra can or bag		$5.00	$0.85	$0.30
Yard debris only, extra can, bag or bundle		$3.75		
Courtesy callback (garbage or composting)		$8:15		
Roll cart delivery**		$12.25		
Extra composting roll cart	$12.35			
Extra recycling roll cart	$3.75			

Multiple cans and carts – includes weekly collection of composting and recycling, and every-other-week garbage collection

Container Size and Quantity	Monthly Cost	Non-curb Surcharge	Excess Distance
32 gallon can, two*	$38.85	$3.40	$1.10
32 gallon can, three*	$44.90	$5.10	$1.65
32 gallon can, four*	$49.40	$6.80	$2.20
35 gallon roll cart, two	$38.40		
35 gallon roll cart, three	$45.90		
35 gallon roll cart, four	$53.40		
60 gallon roll cart, two	$44.95		
60 gallon roll cart, three	$54.85		
60 gallon roll cart, four	$64.75		
90 gallon roll cart, two	$53.40		
90 gallon roll cart, three	$65.25		
90 gallon roll cart, four	$77.10		

[87] Standard Rates for Residential Garbage, Recycling and Composting Service. (2017). The City of Portland Oregon. Retrieved from https://www.portlandoregon.gov/bps/article/492501

Education

While Portland does not provide service to commercial businesses, it provides educational materials and tips to help businesses get started with composting. They additionally provide free educational posters and stickers for businesses to use.

Emmet County, Michigan

Contact: Elisa L. Seltzer, Director Emmet County Dept. Public Works

Overview

Emmet County operates a small commercial compost program, charging businesses per cart for collection. Residents and businesses contract private waste haulers that are required to use a PAYT model and must pass through the county transfer station. Tip fees from the transfer station go to an enterprise fund that supports recycling and compost programs.

Voluntary or Mandatory

Emmet county currently has a voluntary compost program for food waste for a small number of commercial entities. Yard waste is banned from landfills in Michigan, thereby requiring compost services for yard waste.

Residential and Commercial Solid Waste Programs

Emmet County started their organics program in 2005 as a composting yard accepting yard clippings and brush from both commercial and residential sources. In 2015, after contracting RRS to conduct a study outlining potential pilot program options for commercial and residential compost, they started a commercial pilot to accept food waste. Currently, 40% of the waste stream is recycled.

Residential: There is currently no residential compost collection. The county sells backyard composting bins and is working to generate awareness through handing out kitchen compost bins at farmers markets. Residents can fill these kitchen bins and then take collected food scraps to drop-off centers or farmers markets. Residents contract their own waste haulers that are licensed by the county and must go through the county transfer station. Curbside recycling is provided to 60% of residents, with the township or municipality paying for the service that is operated by Emmet County. There are also 12 recycling drop off sites spaced throughout the county so that every resident is within 6 miles of a site on main travel routes.

Commercial: An initial compost pilot was comprised of a few dozen businesses that already had recycling accounts and that produced a large amount of food and/or floral waste. The city budgeted $50,000 for the initial pilot, and businesses participated for free. The pilot was very successful, with 800,000lbs of food scraps collected. The pilot included collection with a retrofitted county truck and took the compost to the county compost facility. After the pilot, all businesses wanted to continue and the county began charging for collection of the 64-gallon carts. Many of the early compost adopters are committed to minimizing waste streams, have established sustainability goals, and are realizing savings on waste. The program occurs year-round with cart compostable liners used in the winter to prevent compost freezing to the sides of carts. Liners were free during the pilot, but are now available for purchase. Florists have been a particularly successful segment, reducing their landfilled waste stream by 90%. The county has also had success getting buy-in from hotel chefs.

Infrastructure/ Facilities

Emmet County owns and operates the compost yard, which is a windrow site turned by a front-end loader. The facility accepts yard waste and food scraps (including meat and dairy) but does not take food service wear as they do not have a grinder.

Franchising

The city licenses waste haulers in the county for each household or business to contract with individually. There are currently three haulers in the county.[88] All haulers are required to go through the county owned transfer station.

Tipping Fees

From 2005-2008, Emmet County charged for organics deposited at their compost yard, but stopped charging in 2008 to incentivize composting. Tipping fees are now charged to commercial entities per cart for composting. One cart is $7, but for large customers with many carts, such as casinos and hospitals, it is $4 per cart. The county also owns and operates its landfill. Mechanically compacted and tipped trash is $26.00 per cubic yard.[89]

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[88] "Garbage Emmet County Recycling." *Emmet County Recycling*, www.emmetrecycling.org/what-can-i-do-with/garbage

[89] "Waste Disposal." *Emmet County Recycling* http://www.emmetrecycling.org/what-can-i-do-with/garbage/#Garbage Collection Services

Financing Mechanisms

Emmet County uses an enterprise fund to finance their waste programs including hazardous waste, recycling, and composting. The policy structure that enables the enterprise fund is the County Solid Waste Ordinance which enforces "flow control" by requiring all trash haulers to go through the county transfer station. Michigan is a home rule state that gives counties authority to manage their own waste. The county only flow controls waste, not recyclables. A facility must be publicly owned in order to be flow controlled. This ordinance includes a waste reduction incentive and 'levels the playing field for haulers.[90] The ordinance also requires a PAYT model for trash. Haulers provide either cart service or residents may purchase hauler specific bags that incorporate the cost of collection.[91] Haulers are required to provide cardboard recycling that they can then tip for no cost. Many municipalities contract the county to provide curbside recycling collection, which is financed out of the municipality general fund.[92] Selling recyclables covers half of the processing costs, and the tip fee generated through the transfer station provides money for the enterprise fund, which covers the rest of the costs of collection, processing, and operations. Other counties and townships also contract with the Emmet County transfer station. The county received permission from the public works board to authorize the use of money from the enterprise fund to run the commercial compost pilot. The county also sells compost and wood chips.[93]

Education

A community education foundation grant enabled expanded outreach to residents about composting and enabled the purchase of 1,000 kitchen caddies that were handed out at farmer's markets for free along with toolkits, including the hierarchy of how to manage food and waste. These kitchen caddies can be brought to a drop off center or to the farmers market when full. The county has applied for a follow-up grant to continue farmer's market education and has engaged school cafeterias in composting to raise awareness in schools.

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[90] "Our Model." *Emmet County Recycling* http://www.emmetrecycling.org/everything-else/about-us/our-model/
[91] "Garbage Emmet County Recycling." *Emmet County Recycling*, www.emmetrecycling.org/what-can-i-do-with/garbage
[92] "Our Model." *Emmet County Recycling* http://www.emmetrecycling.org/everything-else/about-us/our-model/
[93] "Compost and Woodchips for Sale." *Emmet County Recycling* http://www.emmetrecycling.org/i-want-to-get/compost-woodchips/

Austin, Texas

Contact: Bob Gedert, Former Director of Austin Resource Recovery for 7 years, currently works for Resource Recycling Systems (RRS)

Overview:

Austin currently has a mandatory diversion policy, the Universal Recycling Ordinance, which requires property owners to provide recycling services, and requires that properties with food service permits divert food scraps. The city uses a PAYT financing model to finance its services and incentivize diversion.

Mandatory or Voluntary

Austin's city council created a mandatory system referred to as a universal recycling ordinance. This ordinance requires property owners of multifamily units and commercial buildings to provide recycling services for tenants. As of October 1, 2017, all properties with food service permits are required to provide food scrap diversion programs. Bob Gedert personally prefers a voluntary system, and explained that the benefits of a voluntary system are that residents and businesses can pilot an approach, learn how to separate materials, and are ultimately more receptive to the idea of composting as compared to when they are required to do so. Gedert pointed to his experience in Fresno, California, where there was never a mandatory composting system, yet over the span of seven years, their diversion rate increased from 23% to 75%.

Residential and Commercial Solid Waste Programs

Residential: Carts are offered in 24, 32, 64, and 96-gallon sizes with the 96-gallon bin for trash incurring a penalty rate to discourage higher waste levels. If residents want to change the size of their cart, it is free of charge to downgrade, and $25 to increase bin sizes. For composting, the city has been phasing in the disbursement of 64-gallon bins, distributing them to one quarter of the city over the course of four years. The cost for organics collection for residents is approximately $8.70 per month, and is added to their utility bill.

Commercial: City council recently passed a law that requires businesses and multi-family units (over 5 units) to receive organics and a recycling service. Multi-family units will be phased in through 2018, and businesses through 2020. Effective October 1, 2017, businesses are required to compost, and Austin's phase-in is beginning with food-service establishments. This phase-in was chosen to help commercial haulers with lead time to invest in vehicles for collection. The city currently has a registration system in place in which haulers must register with the city, although not all haulers are being captured by this system. Austin has considered a franchising model to better

track its haulers and to avoid overlap of hauler routes, but haulers are largely opposed to franchising due to its limitations on the free market. Federal law currently prohibits private haulers from self-designating territories for collection sites.

Tipping Fees

The landfill tipping fee in Austin is $21 per ton, while composting costs $20 per ton.

Financing

The city pays for composting through an enterprise fund. Gedert recommends utilizing a utility-based stream, as the revenue stream is more stable and shielded from political sway. Austin utilizes a PAYT program, in which the costs of all three waste streams are bundled together. The fee residents pay includes both a base charge plus a bin size charge, depending on the size of the cart. Austin's enterprise fund pays for its composting facility, which is contracted out to Organics by Gosh, whose sole source of revenue for the site is the tipping fee. Within the city and composting company's contract, Organics by Gosh is entitled to charge a $60 per ton penalty fee for contamination and the subsequent sorting it requires.

Transitioning from a Tax Based System to Utility Based System

Gedert notes that when transitioning from a tax based system to a utility based system, the public's expectation is that there will be a drop in taxes, and that politicians might be tempted to do so. Instead, he suggests cancelling the millage while at the same time adding the utility bill, and doing so in either a revenue-neutral or increased revenue model.

Orange County, North Carolina

Contact: Blair Pollock, Solid Waste Planner, Orange County Solid Waste Department, North Carolina

Overview

Orange County is a county similar to Washtenaw County as it houses a large public university, the University of North Carolina, Chapel Hill. Orange County has a contract with a local hauler and compost yard to provide some commercial compost services. There is another private hauler that provides some services to businesses and residents. Orange County has a solid waste fund that is generated through a flat fee assessed to every property, commercial or residential.

Residential and Commercial Solid Waste Programs

Residential: Compost Now, a private hauler, services some households and small businesses in Orange County. For $25 a month, residents receive a compost bin, weekly compost collection, cart cleaning, and a weighing every six months.

Commercial: Chapel Hill's composting program evolved from a small agricultural feed program in the 90s. The Brooks family, a former dairy farming family located 30 miles outside of Chapel Hill, began a windrow composting system to collect city food scraps to disburse locally to farms. Harnessing existing relationships, Brooks Compost slowly expanded from restaurants, to grocery stores, to food waste generators. Currently, Brooks Compost services restaurants, groceries, the University of North Carolina at Chapel Hill, and a small local school system. Brooks has a competitor called McGill, who provides sewage biosolids and sludge services.

The Brooks family both provides compost collection services and operates the compost site for Orange County. The county subsidizes their collection services and maintains a contract with Brooks. Brooks provides a suite of services within their tipping fee, including a dumpster, compost cart, collection, and cart-washing.

Tipping Fees

Landfill tipping fees in the county are about $40 per ton. Orange County pays a true cost of about $80 per ton to compost.

Financing

Orange County's solid waste budget totals to $9 million. The current contract with Brooks is a $180,000 contract. Solid waste convenience centers are financed 35% by the solid waste program fee (SWPF), with the remainder coming from the general fund. The SWPF is created by a universal program fee assessed to every improved property in Orange County. This is a yearly flat tax fee of $128 (in 2017) paid by all improved properties which includes habitable residences, multi-family units (apartment complexes), shopping centers, owners of land with mobile homes, public buildings--schools, local government, state government, and Orange Water and Sewer Authority (OWASA).[94]

[94] "Solid Waste Programs Fee Introduction" *Orange County North Carolina*. http://www.orangecountync.gov/departments/solid_waste_management/solid_waste_programs_fee.php

Chelsea, Michigan

Contact: Frank Hammer, City of Chelsea Council Member and Former Chair of the Board for Washtenaw County Solid Waste Management Planning Committee

Chelsea is a small city in Washtenaw County, Michigan with a population of 5,185.[95] While it does not offer composting services to its residents, it uses a PAYT system to cover the costs of its solid waste management and to encourage recycling. As a result of its PAYT system, Chelsea reports the highest recycling diversion rate in Washtenaw County.

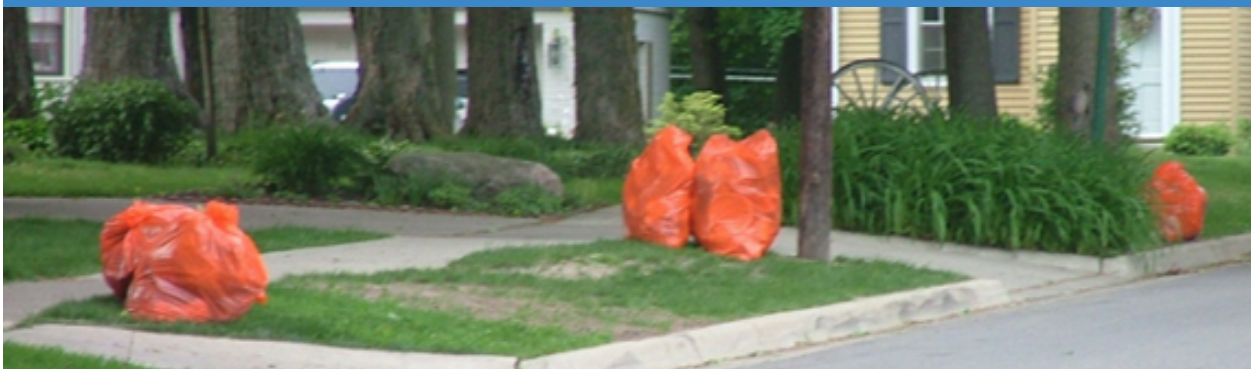
Voluntary or Mandatory

Chelsea does not offer composting services to its residents, and recycling is voluntary. Residents are incentivized to recycle by the PAYT system which requires residents to pay per bag of waste they produce.

Residential and Commercial Solid Waste Programs

Residential: Residents purchase specific orange trash bags in which to deposit their waste. They then place these orange bags at their curb for pick-up by the city (see Figure 24). There is no limit as to how many bags can be put on the curb. Residents purchase the bags from the City Office, or from the local Ace Hardware, Chelsea Farmers Supply, Vogels Party Store, or Chelsea Pharmacy.[96] There is no pick-up service for recycling, and residents must bring their recycling to local drop-off centers.

Figure 29: Residential Curbside Trash Collection in Chelsea, MI, Source: City of Chelsea[97]



[95] 2016 U.S. Census Bureau.
[96] Refuse. Trash Collection. 2017. City of Chelsea. Retrieved from http://city-chelsea.org/refuse/trash-collection
[97] Ibid.

Financing Mechanisms

Chelsea operates its solid waste services through a combination of a tax millage and a PAYT system. The solid waste tax millage in Chelsea is low, at 0.7355 in 2017.[98] An additional millage of $100 per household in the city of Chelsea, or $60 per household for residents of nearby townships, is assessed by the Western Washtenaw Recycling Authority (WWRA) to fund the local recycling center. The WWRA operates separately from the City of Chelsea. The city solid waste operational costs are funded mostly through the PAYT system, where residents are required to purchase 33-gallon orange trash bags from the city or local retailers. The bags cost $25 for a box of ten 33-gallon bags. The $2.50 price per bag includes the costs incurred by the City of Chelsea to haul, transfer, and landfill the trash. Since residents pay based on the amount of trash they generate, they are encouraged to reduce their waste and to divert materials to recycling when possible.

Oberlin, Ohio

Contact: Heather Adelman, Assistant Director, The Oberlin Project

Overview

Oberlin, Ohio is similar to Ann Arbor in that it is a college town that attracts residents who value waste diversion, located in a region where landfill tipping fees are low and there are few economic incentives to recycle and compost. Ann Arbor is further along in its waste diversion efforts. Oberlin College has a food waste composting program that operates independently from the city's waste services.

Voluntary or Mandatory

Recycling and composting are voluntary at this time.

Residential and Commercial Solid Waste Programs

The city has established a zero waste plan. There has been an initial focus on recycling efforts in the city, but the city has started to assess further options for composting.

Residential: There is curbside trash and recycling pick-up for Oberlin residents and yard waste is collected and taken to a small city owned site. There is currently no

[98] Tax & Assessing. Rates & Timing. 2017. City of Chelsea. Retrieved from http://city-chelsea.org/tax-assessing/rates-timing

curbside food scrap composting. The city runs a recycling incentives program, which in 2017 reimbursed residents up to $100 for the purchase of a home composting bin.[99] The city is considering expanding residential composting and building its own, larger compost facility that could take food scraps.

Institutional

Oberlin college runs its own composting program with a food scraps grinder to reduce contamination and volume of waste installed in the main dining hall. Organic waste from the college was going to a local farm, but material exceeded the site's capacity, so compost is now taken by a private hauler, that also services the local Wal-Mart, to Columbus, Ohio. This initiative is being driven by student demand and college sustainability initiatives.

Financing Mechanisms

Solid waste services are funded through a combination of property tax millage as well as a small fee on utility bills. While it is difficult to raise taxes to fund new programming, the utility bill fee allows some flexibility in generating new revenues to fund new solid waste services.

State of Massachusetts

Overview

While we did not speak to any representatives from Massachusetts, the state has been praised for significantly increasing food waste diversion in the state. As of October 1, 2014, Massachusetts has enacted a ban on commercial businesses and institutions that generate more than 1 ton of organics waste from disposing of commercial organics waste in the trash stream.[100] In the first year of the program businesses diverted five times the organic waste from the previous year. RecyclingWorks is a state funded program that provides support to businesses to help them to maximize food waste diversion opportunities, through online resources, a hotline, and direct technical assistance.[101]

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[99] 2017 Recycling Incentives Program Retrieved from http://www.cityofoberlin.com/wp-content/uploads/2016/06/compost-bin-tv-recycling-ad-end.pdf
[100] Commercial Food Waste Disposal Ban. 2017. Commonwealth of Massachusetts. Retrieved from http://www.mass.gov/eea/agencies/massdep/recycle/reduce/food-waste-ban.html
[101] Fischer, John. (2015). Massachusetts Commercial Food Scraps Disposal Ban - One Year Milestone. EPA SMM Webinar. Retrieved from https://www.epa.gov/sites/production/files/2015-11/documents/fischer.pdf

Honolulu, Hawaii

Overview

While we did not speak to any representatives from Honolulu, the city has also passed innovative compost legislation that requires large restaurants, markets, and other food manufacturers and processors to compost food waste.[102] This policy helps to achieve a 76% of Oahu's total waste from landfills.[103]

[102] " Food Waste Recycling" *Honolulu's Department of Environmental Services*. http://www.opala.org/solid_waste/food_waste_recycling.html
[103] " Recycling and Waste Diversion" *Honolulu's Department of Environmental Services*. http://www.opala.org/solid_waste/archive/facts2.html

Key Findings

Funding

Ann Arbor was a leader in establishing its own compost yard before the yard waste ban went into effect. Building on this legacy and foundation to expand to a comprehensive organics program will help lead the region and other similar cities in the nation that look to Ann Arbor as a trend setter. A comprehensive program can also spur the rest of the county and surrounding townships into action. An increased program will also provide economies of scale for operations, lowering the per household cost of operations.

To finance an expanded composting program, the team recommends that Ann Arbor pursue a PAYT solid waste funding structure as supported by a consensus of experts from across our interviews. Furthermore, several studies indicate that PAYT is the most promising mechanism to incentivize behavior change. A study by AMERIPEN states that:

> *"The strategies that hold the most promise for adoption in the U.S. include unit-based pricing/pay as you throw (PAYT) initiatives, disposal bans, and recycling mandates that can collectively help shift consumer practices away from waste disposal and towards recycling and other recovery strategies."*

Additionally, a comprehensive study by the European Environment Agency on municipal waste management found that:

> *"All countries with recycling rates above 45% employ a [PAYT scheme]… while most countries with recycling rates below 20% do not use them, indicating that PAYT schemes are an effective instrument that drives recycling up."*

PAYT mechanisms link behavior to services received and fees paid. Fees can also be adjusted more readily to fund infrastructure. However, PAYT systems can be more complicated to operate than other tax or utility based systems and must be carefully managed to ensure incentives are correctly aligned. Furthermore, any change in funding for solid waste programs will require buy-in from Ann Arbor residents and will require significant educational campaigns. There is likely to be push back to changes in funding structure.

Voluntary or Mandatory

Based on interviews with other cities, a generally recommended approach is to start compost programs voluntarily and progress to a mandatory system for food waste generating entities. This approach may take a long time, but helps to adequately build out infrastructure, establish norms in the community, build buy-in, and prove

effectiveness. Starting with a voluntary program attracts interested businesses that are more likely to be patient with changes as the program gets under way. Moving to a mandatory system once the initial program is in place will help achieve economies of scale by pushing additional waste streams into the compost system, thereby lowering marginal costs of compost, creating a market, and further incentivizing composting to reduce overall solid waste disposal costs. Various cities and entities have adopted a mandatory model to drive behavior change, with examples such as Seattle, Honolulu, and Massachusetts, in which policy changes were key drivers to accomplishing higher diversion rates.

Education

As demonstrated by numerous interviews with cities and compost professionals, education about proper compost disposal is a crucial component of any composting program. Participation in and compliance with program guidelines by residents and businesses is imperative to maintain a viable organics collection program and to stay below manageable levels of contamination. Education can be done by many actors in the compost system, including the city, compost yard, haulers, a third-party, or a combination of these actors. The strengths and weaknesses of these entities in Ann Arbor should be considered when moving forward with an education campaign: The *composting yard operators*, WeCare Organics, have the most comprehensive view of the aggregate organic material collected and can best identify issues with contamination. Moreover, compost yards are incentivized to prevent contamination because it impacts the quality of the compost product which affects the compost yard's bottom line. However, WeCare does not currently have personnel capacity or direct contact with composters to conduct an education campaign.

The *city/ haulers* have financial incentive to prevent contamination, as it bears financial burden if a contaminated load must be taken to the landfill. The haulers also know the collection routes the best and are most likely to be able to identify who is responsible for contamination and provide targeted intervention at the source. Furthermore, the city has ongoing contact and communication channels with which to communicate with residents. However, funding for solid waste programs in the city is already tight and there is limited staff capacity to conduct additional educational outreach. A *third-party entity* or engaged *community group* may have the time and expertise to design and disseminate effective educational materials. They may be able to seek grants or other funding sources to support these efforts. However, additional care would be necessary to ensure that details and logistics are verified and coordinated with city officials and the compost yard operators, in addition to preventing resident confusion regarding from whom the information is coming. Despite the various trade-offs to be made with selecting an education campaign director, the net benefit to composting success of implementing a comprehensive organics education campaign far exceeds the aforementioned challenges.

Policy

Franchising compost haulers, especially for commercial collection, has proven to be effective in other cities. There is precedent in Ann Arbor for creating a policy requiring commercial entities to contract with private waste service providers and limiting the number of providers serving the city. The licensed operator(s) then operate on a contract that is periodically rebid. Though this may reduce competition, it also reduces pressure on city infrastructure, minimizing truck traffic, pollution, and general road wear-and-tear. As aforementioned, other franchising models create formal hauler networks, serving the benefit of improving hauling logistics, with the potential disadvantage of crowding out smaller haulers. Ordinances or policies at the state or city level-- whether they address hauler requirements or mandate composting for certain entities-- can be very effective means of growing compost systems and infrastructure.

Other Considerations

Reduce Current Expenditures

To help generate additional funding of programs in a revenue constrained environment, the city may also consider creative ways to stretch the current funding programs further. This may require reducing the service level to which residents and businesses are accustomed. Many options have been considered by city staff, and range from changes in services the city offers to the way in which collections are carried out, but require public support for such service level changes. Examples include:

- Moving carts to one side of the road, reducing the number of truck trips down each street (as trucks only have to go down the road once).
- Ending city pass-through billing services between commercial entities and the franchised waste hauler. The city currently acts as an intermediary between Waste Management and businesses, requiring further city engagement beyond what may be necessary.
- Implementing education campaigns to promote efficient behavior. This might include providing tips to residents such as: not placing the bin out for collection unless full (so as to minimize inefficiencies in collections), providing detailed guidance on what is compostable, and engaging residents regularly to ensure usage of composting services.

By streamlining or reducing current services that are non-crucial, it may enable the city to use these saved funds to expand composting programs.

Implement Year-Round Collection

Year-round collection encourages composting behavior and is recommended to establish a robust program. When collection stops over the winter, many residents may get out of the habit of composting, or are dis-incentivized to compost as waste materials sit in their bins for months. In interviews with Zingerman's, the company maintained composting bins despite halted collections, serving to maintain staff and consumer behavior surrounding organics disposal. As yard waste generated in bins fluctuates greatly over the year, but is generally very low in the winter, a modified schedule may be appropriate for organics.

Reduce Barriers to Participation

Some residents are unable to afford and/or pick up composting carts. Delivering carts to all users may help alleviate this problem. New York has been utilizing this approach to increase participation.

Maintain Reputation

Ann Arbor currently diverts roughly 32% of its waste from landfill, lagging behind its stated goal of 40% diversion. The top performers in the US are San Francisco and Seattle with rates of 80%[104] and 58.8%[105], respectively. For an international context, several countries in Europe, including Germany, Sweden, and the Netherlands, send only 1% of their municipal solid waste to landfill. CB&I's report indicates that citywide divergence rates could increase between 4-17.5%, depending on scale and mandatory or voluntary status.[106] To maintain its reputation as a progressive and environmentally conscious community, to meet its sustainability goals, and to stay on par with innovative solid waste programs, Ann Arbor has considerable potential to expand composting programs.

Increasing the organics collection in Ann Arbor creates benefits beyond the waste management space: It will increase the solid waste diverted from landfills, which is in line with Ann Arbor's climate action plan; achieving this diversion from landfill will help the city continue to be a leader in the nation in innovative and forward-thinking climate action initiatives. Additionally, such progressive thinking and design has helped to maintain Ann Arbor's quality of life and the satisfaction of its residents; In fact, Ann Arbor was named the best city to live in America in 2017 by Niche.com, a website that evaluates and ranks cities. Expanding composting programs can continue to make Ann

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[104] Zero Waste Case Study: San Francisco. Environmental Protection Agency. https://www.epa.gov/transforming-waste-tool/zero-waste-case-study-san-francisco
[105] 2016 Recycling Rate Report. Seattle Public Utilities. July 1, 2017. http://www.seattle.gov/util/cs/groups/public/@spu/@garbage/documents/webcontent/1_064754.pdf
[106] Ann Arbor Comprehensive Organics Management Plan. (April, 2017). CB&I Environmental & Infrastructure, Inc.

Arbor a place where residents want to live and work: As many people in the city want to compost and are confused about the current system, making composting easier for residents, through increased education outreach such as stickers on bins and mailers, reduced barriers to participation, such as by delivering bins to houses, will improve ease of use of the system and can enhance community satisfaction and well-being.