MONROE COUNTY SOLID WASTE MANAGEMENT DISTRICT

ORGANIC WASTE RECOVERY ANALYSIS

DECEMBER 2018

Prepared for: **Monroe County Solid Waste Management District**
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Overview

The Monroe County (County) Solid Waste Management District (District) contracted with Kessler Consulting, Inc. (KCI) to conduct an Organic Waste Recovery Analysis. This project originated following the results of the Mixed Waste Processing Feasibility Study that KCI conduct for the District in 2017-18, during which it was determined that organic waste represented significant untapped potential for diverting and recovering material from the County's waste stream. The Organic Waste Recovery Analysis consisted of a series of tasks including profiles of existing organics recovery programs in comparable communities; researching and assessing current organic waste generation, collection, and recovery in the County; evaluating potential recovery options for the County; and developing recommended next steps.

Case Studies

KCI researched and prepared case studies of six university towns or counties of approximately similar size to Bloomington (City) and the County that have organic waste recovery to some extent. Below are brief statements on the types of organics program in the selected communities.

- Fayetteville, Arkansas - Conducts an ongoing commercial organics pilot at the City-owned and operated composting facility.
- Orange County, North Carolina – Operates organics drop-off locations and promotes commercial organics collection by private haulers.
- West Lafayette, Indiana – Receives food waste from Purdue University's dining halls at the City wastewater treatment plant's anaerobic digester.
- State College, Pennsylvania – Provides residential curbside organics collection.
- Boulder, Colorado – Requires haulers to provide organics collection to all residential and commercial properties in the city limits.
- Madison, Wisconsin – Previously operated a residential curbside organics pilot, which ran for eight years, but ended due to contamination issues.

Full summaries of the case studies are provided in Appendix A.

Organic Waste Generation and Recovery Estimate

Estimated Generation

In 2017, a waste composition study (WCS) was conducted for the District that focused on four distinct sources of mixed waste in the County: District drop-off centers, City residential collection, Indiana University (IU), and private haulers who collect waste from businesses, institutions, multi-family residences, and households. The WCS estimated that annually approximately 25,400 tons of food waste and 20,500 tons of other compostables (paper, pet waste, clean wood, and yard waste[1]) are disposed of in the County's

[1] This does not include source-separated yard waste (e.g. City's curbside collection, landscaper-collected debris, etc.) and is limited to small amounts of leaves, grass, and brush found in mixed waste.

waste stream, the vast majority being collected by private haulers. Within the broad range of commercial and institutional generators that have private haulers, certain types are known to have significant amounts of food waste in the waste stream, in particular grocery stores, restaurants, and institutional food services (i.e., schools and hospitals). Using econometric data, KCI estimates that approximately 8,000 tons of food waste and 6,300 tons of other compostables are generated annually from these major generators, with most of the tonnage generated by restaurants.

Estimated Potential Recovery

Using the generation estimates, KCI assumed that up to 40 to 60 percent of the organic waste generated from each sector could be recovered with an extensive and robust organics recovery program. This equates to total potential recovery of 8,400 to 10,400 tons of organics per year in the County.

Existing Organic Waste Activities

Collection

IU has substantially expanded its organics collection program recently. The program now includes all IU dining facilities and athletics food service locations. IU estimates that it will be collecting 10-12 tons of organics per week in Fall 2018. All organics collected at IU are hauled to Green Earth by JB Salvage.

JB Salvage is a waste and recycling hauler based in the County that has started hauling organics. In addition to IU, JB Salvage also hauls from Boston Scientific in Owen County. They deliver all material they collect to Green Earth for composting.

Green Camino is a grassroots organics collector that has been in operation nearly a year. They provide residential and commercial collection on a subscription basis. The company hauls the organics they collect to Fable Farms for composting. Extrapolating their recent data, they currently collect an average of 12 tons per year.

Compost

Green Earth is currently the largest food waste composter in the County based on KCI's research. Green Earth receives all organics hauled by JB Salvage. They currently compost an estimated 540 to 610 tons of organics per year, but with a 10-acre site, they have potential to compost significantly more, up to 6,000 to 7,000 tons per year based on KCI's analysis.

Fable Farms is the County's newest composter. They receive organics from Green Camino, as well as collect their own from commercial locations. They currently compost about 600 pounds per week (approximately 16 tons per year) but have plans to expand to handle approximately 3,000 tons per year.

Good Earth is the County's oldest composter. They compost grass clippings and leaves from the community. They are not currently interested in adding organics to their compost operation.

Gap Analysis

Utilizing the information presented above, KCI developed a gap analysis to compare potential future recovery versus the existing organics recovery system and to identify gaps in services and infrastructure that would be needed to support expanding organics recovery in the County. Two major conclusions can be drawn from the gap analysis. First, the current organics collection system would need to expand significantly to handle potential organics recovery. Second, while existing organics composting capacity is

very limited, two facilities are interested in expanding capacity and together appear to have or will have sufficient land available to handle the combined potential recovery of both food waste and other compostables. The District could play a key role in facilitating the development both the collection system and composting capacity.

Organic Waste Recovery Options

Based on the results of the assessment of current organics recovery in the County, KCI identified a comprehensive, multi-faceted organics recovery strategy for further analysis. The strategy has six key components summarized below – four service & infrastructure components and two planning & program support components:

- District drop-off collection.
- City-sponsored collection for single-family households.
- Commercial and institutional collection.
- Private composting facilities.

The strategy also includes two components related to planning and program support:

- A coordinated outreach and education that spans the various generator types and sources of organics (e.g., residential, commercial, and institutional) providing consistent messaging and public awareness of organics recovery at home, at work, and at play.
- An organics recovery stakeholder group that engages various parties in the development and implementation of an action plan.

Each of these components is evaluated to identify common trends and best practices in organics recovery programs across the US, and to identify important planning and implementation issues specific to developing these components.

The following are overarching general themes and lessons learned that provide a guiding framework in all components for identifying and analyzing organic waste recovery options for the County:

- Matching accepted organic wastes to what can be handled by composters.
- Establishing clear guidelines for whether and what types of compostable bags and packaging are accepted.
- Placing primary focus on controlling contamination.
- Building participation and achieving critical mass.
- Providing effective outreach and education.
- Ensuring sufficient collection and recovery facility capacity.
- Engaging and coordinating a multi-faceted organics recovery system.

Potential Next Steps

It is recommended that the District take the lead to bring stakeholders together and establish an organics recovery working group or task force. The short-term work of task force could focus on:

- Review the information presented in this report and expand on it as necessary.
- Identify components of a comprehensive strategy that are most suitable for the County.
- Develop an action plan for implementing the strategy.

In the longer-term, a task force and the District can continue to support the County's organics recovery system through various activities related to the implementation issues and opportunities identified in this report. Some of the potential activities include:

- Develop standardized education and outreach materials (signs, instructions, flyers, social media resources).
- Implement a waste assessment service for commercial, institutional, and mixed-use generators addressing waste minimization, reduction, and organics and recyclables recovery.
- Facilitate peer-to-peer matching of local collectors and composting with similar businesses in other communities.
- Provide technical assistance to composting facilities regarding best practices, site design, equipment options, operations and process control, regulatory compliance, and market development.
- Provide technical assistance and/or partner with collectors and composters to apply for Recycling Market Development Program (RMDP) grants.
- Assess compost markets, develop compost usage guidance documents, and establish demonstration gardens using locally produced compost
- Host regular stakeholder meetings to discuss opportunities and barriers as they emerge and refine the action plan.

Section 1
Background and Introduction

Previously, The Monroe County (County) Solid Waste Management District (District) contracted with Kessler Consulting, Inc. (KCI) to conduct a Mixed Waste Processing Feasibility Study, which was completed in March 2018. Among other things, that study found that food waste and other compostables comprised 38 to 47 percent of the County's mixed waste, depending on the source. It was noted at the time that these organic wastes represent a significant opportunity to increase recovery and diversion from disposal. Based on this and other considerations, the District decided to further assess options to expand organic waste recovery.

In July 2018, the District contracted with KCI to conduct an Organic Waste Recovery Analysis. Project work entailed:

- Research organics recovery practices in other communities.
- Research and assess the County's current organic waste recovery system.
- Develop planning level estimates of organic waste generation and potential recovery in the County.
- Identify and analyze organic waste recovery options for the County.
- Develop summary recommendations and outline potential next steps.

This report presents the results of this work.

Please note that for the purpose of this report, "organic waste" refers to the food waste (discarded food) and other compostable materials found in mixed waste (primarily paper napkins, tissues, and towels, but also including pet waste and limited amounts of clean wood waste and yard waste). Organic waste does not include the source-separated yard waste (e.g., leaves, grass, and brush) which is already being collected separately by Bloomington, private landscapers, lawn services, arborists, etc. Nor does it include paper packaging like paperboard, boxboard, and cardboard. Organic waste discussed in the report are materials that may be acceptable for commercial composting operations and may not be appropriate for backyard composting (e.g. meat, bones, compostable food serviceware, etc.). It is generally recommended that backyard composting be limited to yard waste and vegetative food waste.

Section 2
Organic Waste Recovery Case Studies

2.1 Case Studies of Other University Communities

KCI researched and prepared case studies of six university towns of approximately similar size to Bloomington (City) and the County that have organic waste recovery to some extent:

- Fayetteville, Arkansas
- Orange County, North Carolina
- West Lafayette, Indiana
- State College, Pennsylvania
- Boulder, Colorado
- Madison, Wisconsin

For these case studies, KCI conducted online research and telephone surveys focusing on organics programs at the city and/or county level and the university. KCI gathered information regarding collection methods, service providers, participating facilities, contractual arrangements, quantities handled, and program costs. Please note that not all information was available for all case studies.

Other university communities are employing a wide variety of options to implement and increase organics diversion. Below is a summary of some of the main points regarding each community (more detailed information is provided in Appendix A):

- Fayetteville, AR: operates a city-owned composting facility and is conducting an ongoing pilot of commercial/institutional food waste, currently partnering with the University of Arkansas and public schools. While successful, the pilot initially received less food waste than anticipated due to fewer restaurants and institutions implementing organics collection than planned. One of the key issues was the lack of a comprehensive program to promote the pilot and provide technical assistance and educational support to generators in the commercial sector.
- Orange County, NC: provides organics drop-off to its residents and pays for the collection of commercial organics by a private hauler from businesses in the county. Public schools and the University of North Carolina – Chapel Hill also have their own organics collection. Over 2,000 tons per year of organics from the county are composted at a private, out-of-county compost facility; this does not include tonnages that the county or university do not oversee.
- West Lafayette, IN: has an award-winning partnership with Purdue University for anaerobic digesting food waste from the campus dining hall at its wastewater treatment plant and producing biogas for generating electricity. Not all wastewater treatment plants have an anaerobic digester (AD) that can handle food waste, so this model cannot be replicated in many places.
- State College, PA: provides residential curbside organics collection in which organics and yard waste are collected in automated roll carts. It collects about 1,400 tons of organics and yard waste per year. They have their own compost facility at which all material is composted. Penn State University also has organics collection and a compost facility; it collects about 1,600 tons of

organics per year. Centre County provides technical assistance to its municipalities for starting an organics program.

- Boulder, CO: Despite open market collection, Boulder, Colorado mandates universal collection of organics at all residential and commercial properties in the city. It collects almost 32,000 tons of organics and yard waste each year for composting at a private facility. Boulder County requires residential organics collection in its most urban zone and the University of Colorado – Boulder has its own organics collection. In addition, the county provides $150 grants for businesses to implement organics collection. This example shows the impact a mandate can have on significantly increasing tonnage.
- Madison, WI: Madison was running a residential curbside organics pilot but ended it last year. They were collecting food waste in carts and were anaerobically digesting it in a private AD facility. At its peak, it included 1,100 households and 40 businesses and was collecting about 270 tons of food waste annually. It ended because increasing contamination was problematic for the digester, which resulted in increased tip fees that were not sustainable for the city. The lesson with this example is to ensure that collection and processing systems are compatible and to carefully monitor and control contamination.

Section 3
Organic Waste Generation and Recovery Estimate

3.1 Estimated Generation

In 2017, a waste composition study (WCS) was conducted for the District that focused on four distinct sources of mixed waste in the County: District Drop-Off centers, Bloomington (City) residential collection, Indiana University (IU), and private haulers who collect waste from businesses, institutions, multi-family residences, and households. The WCS determined how much organic waste was present in mixed waste from each of these sources. Using 2016 tonnage data, KCI estimated the tons of organic waste, as shown in Table 1.

Table 1: Estimated Generation of Organics (Tons/Year)

Source	Tons of Mixed Waste	Type of Organics	% by Weight	Tons of Organics
Private Haulers	103,720	Food Waste	22%	22,300
		Other Compostables	17%	17,530
Bloomington	4,930	Food Waste	27%	1,310
		Other Compostables	20%	1,010
Indiana University	6,540	Food Waste	18%	1,200
		Other Compostables	21%	1,400
District Drop-Off	2,880	Food Waste	20%	580
		Other Compostables	18%	530
Totals	**118,070**	**Food Waste**	**22%**	**25,390**
		Other Compostables	**17%**	**20,470**

Note: tonnage estimates in this technical memo have been rounded to the nearest 10 and totals may not appear to add due to rounding.

Please note that private hauler tonnage includes materials from many different types of generators in the County, including multi-family residents, residents outside of Bloomington, and businesses throughout the County. In subsequent tables, the estimates focus a limited segment of private hauler mixed waste, namely generator which have a high percentage of organics in their waste stream.

Private Haulers

As shown in Table 1, private haulers that collect waste from commercial generators, among other sources, are a major potential source of organics. Within the broad range of commercial and institutional generators, certain types are known to have significant amounts of food waste in the waste stream (see Table 2, next page). Please note that the 8,010 tons in Table 2 is a subset of the total 23,300 tons of food waste from private hauler in Table 1.

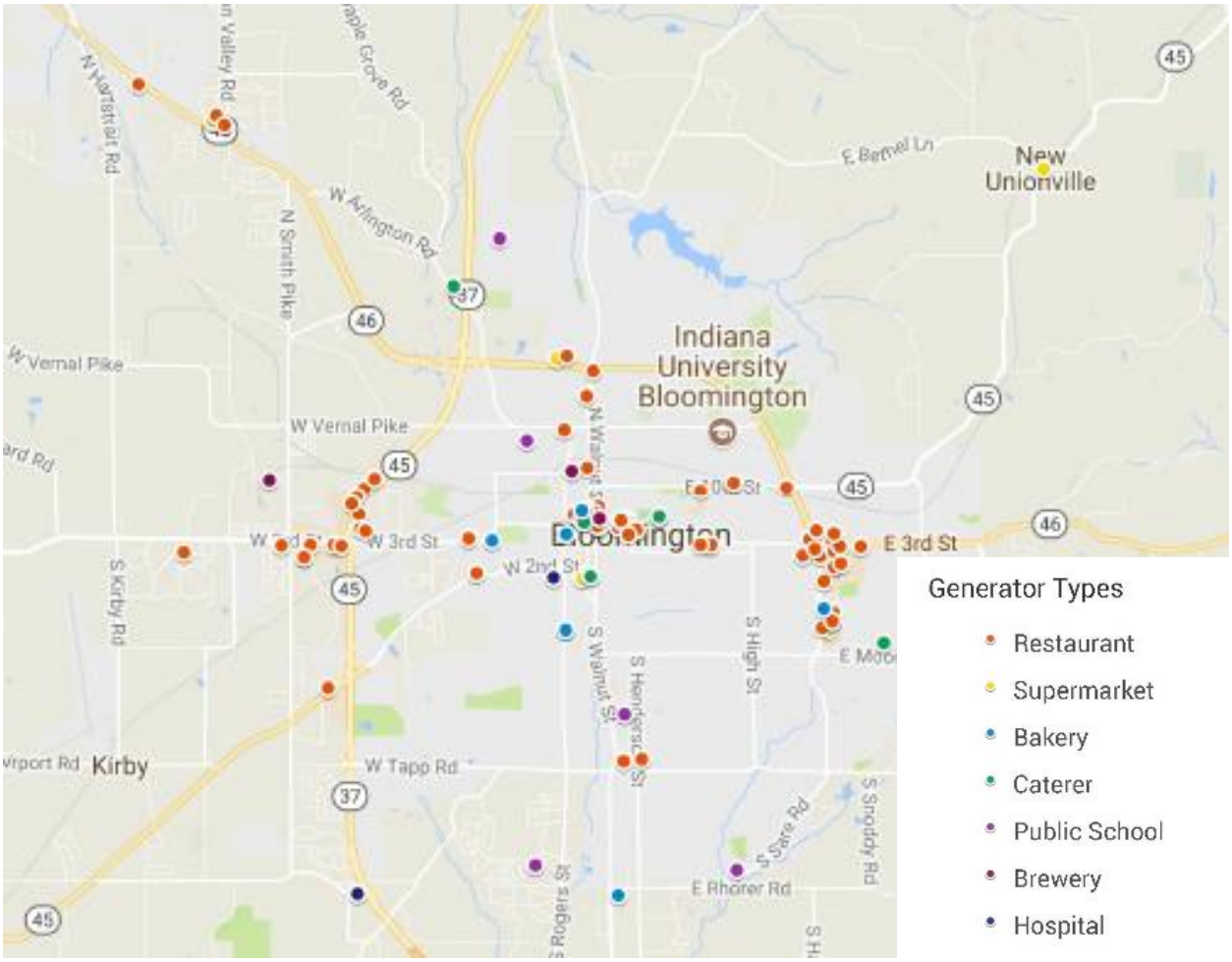
For each significant source, KCI utilized econometric data regarding the number and size of facilities in the County, and industry-standard food waste generation factors in order to estimate the amount of food waste generated from these business types, which are summarized in Table 2. Figure 1 (see next page) maps these locations around the County. This subset of non-residential organics is the focus for subsequent discussion in this report.

Table 2: Estimated Food Waste Generated by Significant Non-Residential Sources (Tons/Year)

Generator Type	Number of Locations	% Food Waste[1]	Tons Food Waste[1]
Restaurants (> 15 FTEs)[2]	84	47%	5,260
Grocery Stores (> 15 FTEs)	10	30%	2,200
Food Manufacturing (> 12 FTEs)	7	46%	180
Nursing Homes	20	20%	170
Schools	20	30%	170
Hospitals	3	20%	40
		Total	**8,010**

[1] Waste composition and generation rates based on CalRecycle's 2014 Generator-based Characterization Study.
[2] FTEs = full-time employee equivalents.

Figure 1: Map of Significant Commerical Food Waste Generators in Monroe County



Based on this research, we estimate that approximately 8,010 tons per year of food waste is generated by these major food waste generators. Restaurants and grocery stores alone account for 93 percent of food waste from these major generator types and 33 percent of food waste collected by private haulers.

It is difficult to estimate how much of the 8,010 tons could be recovered because much depends on how the collection program is implemented, how many generators participate, and how much food waste they separate. Assuming that commercial food waste collection would be voluntary, and an effective outreach and technical assistance program is implemented, a 40 to 50 percent recovery rate is a "high-end" estimate based on KCI's experience.[2] Based on these assumptions, a collection campaign targeted at the major generators in Table 2 could recover as much as 3,200 to 4,010 tons per year of food waste. Based on the ratio of food waste to other compostables as measured in the WCS for Private Haulers, 2,520 to 3,150 tons of other compostable could be recovered if included in the program.

Bloomington

Bloomington is committed to residential organics collection at some point in the future, however it has not yet determined how it would be provided. In the interim, it passed a resolution in 2018 that allows private collectors to offer voluntary, subscription-based organics collection to the households in the City. A more comprehensive program could be provided by a contracted service provider or City crews through either a voluntary subscription-based service or a city-wide residential service.

Recovery rates would depend greatly on how the program is implemented and supported by the City. Research has shown that volume-based waste collection, like the variable-sized cart service implemented by the City in 2017, is a significant motivator for increasing recovery. For example, if households have access to organics collection at no cost or a cost that enables them to reduce their waste cart size and offset some or all of the cost of organics collection, then they would have an economic incentive to divert organics for recovery. The vast majority of communities with municipally-provided food waste collection also have variable rate service for waste collection.

Based on KCI research, a full-scale program could recover in the range of 225 to 270 pounds of organics per household per year. Bloomington serves approximately 10,400 single family households, so this tonnage translates to 660 to 790 tons of food waste and 510 to 610 tons of other compostables per year. This does not include yard waste that could be collected in this program.

Indiana University

IU recently expanded its organics collection programs to major food waste generation points throughout the campus. At the time of the WCS, KCI estimated approximately 2,800 tons of organics were in the mixed waste stream. Based on studies at other universities, organics could have recovery rates in the range of 40 to 50 percent, or between 1,040 to 1,300 tons per year. This does not include any organics that were being diverted at the time of the WCS. According to IU staff, the program was collecting approximately 5 tons per week at the end of the previous school year (during the middle of which the WCS was conducted). In addition, with the recent expansion of the organics program, a portion of the tonnage estimated from the WCS data is likely already being diverted from the mixed waste stream. IU staff estimates it will double the amount of organics it collects as IU is transitioning to greater amounts of compostable serviceware. The tonnage diverted is expected to continue to increase as the program expands further and matures.

[2] Organics recovery rates are highly variable and performance metrics are very program-specific. For the purpose of this assessment, KCI is utilizing recovery rates that could be achieved by a program that has high levels of participation by the various types of generators served.

District Drop-Off

The WCS estimated that 580 and 530 tons per year of food waste and other compostables, respectively, were disposed in Orange Bag waste at the District's Drop-Offs. Organics could be collected separately at these locations using dedicated collection containers provided by the District or a contracted organics collection service provider. District facilities serve two general types of customers: those who bring recyclables only and those who bring both recyclables and Orange Bag waste. An organics drop-off would likely receive organics from both. Orange Bag customers in particular would have a financial incentive to separate organics, much like they have now for recyclables, and reduce the number of Orange Bags they buy. For the purposes of this assessment, it is assumed that a high-performing District Drop-Off program could capture 230 to 290 tons of food waste and 210 to 270 tons of other compostables.

3.2 Estimated Potential Organics Recovery

Based on the estimates above, an organics collection program that addresses the four major sources of waste in the County could recover as much as 8,000 to 10,000 tons per year of organics (See Table 3). This represents approximately 40 to 50 percent of the target sources of food waste and 18 to 22 percent of food waste generation in the County. Recovering this amount will depend largely on how extensively major commercial generators like restaurants and grocery stores implement food waste collection.

Table 3: Estimated Potential Organics Generation and Recovery by Sources (Tons/Year)

Source	Generation	Low Recovery	High Recovery	Low Recovery	High Recovery
Food Waste					
Significant Generators*	8,010	40%	50%	3,200	4,010
Bloomington	1,310	50%	60%	660	790
Indiana University	1,200	40%	50%	480	600
District Drop-Off	580	40%	50%	230	290
Subtotal	***11,100***			***4,570***	***5,690***
Other Compostables					
Significant Generators*	6,300	40%	50%	2,520	3,150
Bloomington	1,010	50%	60%	510	610
Indiana University	1,400	40%	50%	560	700
District Drop-Off	530	40%	50%	210	270
Subtotal	***9,240***			***3,800***	***4,730***
Total	**20,340**			**8,370**	**10,420**

*These are the portion of the total 22,300 and 17,530 tons of food waste and other compostables, respectively, collected by private haulers in the County.

Achieving recovery rates higher than what is projected in Table 3 would largely depend on a broader segment of private haulers' customer base implementing food waste collection (e.g., other businesses than significant generators, multi-family residential buildings, and single-family residents served by private haulers).

Section 4
Assessment of Existing Organic Waste Activities

KCI conducted interviews with the organics collection services and composters operating in the County. The purpose of this was to not only understand the activities currently taking place in the County, but also to understand the interest and capacity of the current players to expand in the future. Through the course of these interviews, KCI also learned about minor food waste diversion activities in the County, such as small-scale on-site compost operations at food banks (Mother Hubbard's Cupboard and Hoosier Hills Food Banks) and restaurants (Upland Brewpub). These latter activities are not discussed in detail since they only handle their own waste and are not in a position to serve other sources of organics.

4.1 Collection Services

Indiana University Organics Collection

IU has substantially expanded its organics collection program in the past year. What started as collecting food waste at select dining halls 6-7 years ago, has now expanded to cover all major food waste generation sites on campus. IU Dining, which oversees the program, now collects organics at 9 residential dining halls, 15 satellite (quick-service) facilities, the Memorial Union, and IU catering. In addition, the Athletics Department oversees the collection of organics at their athlete dining hall (Hoosier Room) and various sports venues. Starting in the Fall of 2018, all of IU Dining and Athletics facilities have a commitment to become zero waste, which includes switching to all compostable serviceware.

With these expansions, IU anticipates doubling the amount of organics they collect. At the end of the spring semester in 2018, they were collecting an average of approximately 5 tons per week; they anticipate collecting about 10 – 12 tons of organics per week in the fall, which may increase more as the program matures and expands. Based on a 32-week fall/spring semester and 12-week summer semester and assuming a third of the generation rate in the summer (based on enrollment numbers), these rates equate to 180 tons of organics per year for the previous school year and 360 to 430 tons per year for the current school year.

All organics collected at IU are hauled to Green Earth by JB Salvage. They collect material twice weekly, although IU is working with them to transition to three times weekly because they don't have enough containers to keep up with the amount of organics they collect. To do this they are also switching from rolls carts to 2 cubic yard (cy) dumpsters that can be serviced by JB Salvage's rear loader.

JB Salvage

JB Salvage is a waste and recycling hauler based in the County. They have recently started working to haul the organics from IU and the Boston Scientific offices in Spencer (Owen County). They haul all the organic material to Green Earth for composting. They see organics as the next frontier in waste hauling and are open to expanding and becoming more involved in the organics collection industry, but also recognize their limitations as a small business and do not want to get in over their head. They did not provide specific tonnage, but as reported by Green Earth, they are hauling equal amounts from Boston Scientific and IU (prior to the current increase in tonnage from IU). Therefore, JB Salvage is assumed to be hauling approximately 540 to 610 tons of organics per year with IU's expanded collection.

Green Camino

Green Camino is currently the only entity providing residential collection of organics in the County. They are a grassroots company that started in November of 2017. Their service provides kitchen pails and 5-gallon buckets to subscribers to collect food waste, food soiled paper, and certified compostable materials. They pick up the full buckets in a pickup truck either weekly or every other week (for compost without meat and dairy) and replace it with a clean bucket. The full buckets are hauled to Fable Farms' compost site (discussed further below) where they are emptied and sanitized to be used in subsequent collections. They monitor for contamination when they pick up the buckets, but it hasn't been a significant issue. They also operate a drop-off location at Bloomingfoods East where subscribers can bring their food waste for residents not in the city limits (their boundary for curbside service) or in apartments. In addition, they have collected organics from 5 zero waste events in Bloomington.

Costs for weekly service are $32/month or $364/year. For every other week service, the cost is $20/month. Cost for drop-off subscription is $15 for 6 buckets. They currently have 32 residential curbside subscribers and 17 drop-off subscribers. They have recently started working with City Hall and 3 commercial customers: Invisage, Cook Medical, and Bloomington High School South.

As of the beginning of August 2018, they had collected 14,734 pounds of organics since inception. Of that total, they collect:

- About 350 pounds per week from their curbside customers
- 293 pounds from the drop-off location since May 2018 (three-month period)
- 102 pounds from City Hall since June 15, 2018 (six-week period)
- 167 pounds from Invisage since July 16, 2018 (two-week period)

This puts them on track for an average collection of approximately 12 tons per year. Green Camino's business has been growing substantially in the past year, and they recently hired their first employee. They have a strong desire to expand their business but are running into a collection capacity issue, since they collect the buckets in a pickup truck. They are currently in the process of looking to purchase a larger and more practical vehicle to expand their collection abilities. They also understand that the capacity of Fable Farms to receive the organics may be limited at the moment.

4.2 Compost Facilities

Green Earth Compost

Green Earth is currently the largest food waste composter in the County based on KCI's research. They are located at 7323 W Gifford Road. Kevin Huntley, the owner of Green Earth, primarily works in excavating and land clearing, but started his compost operation a few years ago as a side project. He is now receiving all of IU's food waste, as well as food waste from Boston Scientific. Kevin has recently purchased a new grinder with which he grinds the food waste along with yard waste he receives from landscapers that bring the material to his site. He then constructs windrows from the ground material and turns the windrows weekly with his loader or excavator. He typically will hold material in the windrows for 3 to 4 months (in the summer) before moving to a curing pile. He sees longer retention times in the winter. His goal is to purchase a compost turner which will make turning the windrows easier and potentially increase the speed of the compost process. He uses most of the compost produced in the excavation business to construct bioswales.

The facility receives about as much food waste from Boston Scientific as IU, prior to the recent major expansion of IU's organics program. However, Boston Scientific's tonnage is more consistent, since IU's is seasonal. Using IU's tonnage as an estimate, Green Earth is composting approximately 540 to 610 tons of food waste per year with IU's estimated increase in organics diversion. He is fully able to compost the compostable serviceware that IU has started using at its food service locations. Contamination has been an issue with some of IU's material especially the stadium material, which can have glass bottles in it. Once glass bottles are put through the grinder, it is nearly impossible to separate glass from the finished compost.

Kevin currently has 10 acres of his 50-acre property dedicated to the compost operations, the remainder of the property is for his excavation business. He would like to buy more land to expand the compost operation but has run into hurdles with permitting. Based on general industry standards for food waste composting with turned windrow technology and assuming 6 of the 10 acres are dedicated to active composting (the remaining 4 acres used for curing, materials handling, grinding, and screening), Green Earth could handle up to 6,000 to 7,000 tons per year of food waste, if it was to become a fully operational compost facility using optimized composting methods.

Fable Farms

Fable Farms is the County's newest composter. Located between Bloomington and New Unionville, the farm started composting in February 2018. They are currently composting all the organics that Green Camino collects. In addition, they are piloting their own collection at a few businesses around the City. They had a pilot with Buffalouie's but collection proved difficult, so they are no longer collecting from them. They also collect twice weekly from 4 to 5 coffee shops and Rainbow bakery, as well as collecting from the weekly Food Truck Friday. They have an ongoing pilot with a sorority house with weekly collection and provide organics collection at weddings and other catered events. All organics are collected in 5-gallon buckets or 50-gallon trash cans for the events. They use a pickup truck to collect materials (in a similar fashion to Green Camino), charging $15 per pickup (except for the coffee shops, which are collected for free). They do not charge Green Camino a tip fee. Yard waste, which they grind as a bulking agent for the compost, is received from landscape companies in the area.

Fable Farms is currently composting about 600 pounds per week (approximately 16 tons per year). They estimate that most of the organics is delivered by Green Camino, while the remainder they collect themselves. Their compost operation is currently occupying a limited area of their 4.6 acre farm. They started with turned windrow composting but are now experimenting with the aerated static pile (ASP) method with a positive forced-air blower system. The ASP method works better for them with limited space and limited capital to buy larger equipment needed to turn piles. They have a few 3-cy piles for the ASP system that they have in 30-day batch compost trials. Any excess material is still composted in their turned windrow. They have had success with the ASP method; although they are having issues with certain compostable serviceware and may not accept it in the future. They currently have a plan to implement the system in a full-scale compost operation. Their plan is to a have a 7-acre facility using the ASP system in large windrows. Based on their proposed plan, KCI calculates their capacity to be close to 4,000 cubic yards of material (organics plus bulking agent) every 2 months. Assuming an average density of food waste and a standard 3:1 mix ratio of food waste to bulking agent, this equates to a capacity of approximately 2,800 to 3,200 tons per year. Fable Farms does not currently sell their compost to the public, but they plan on doing so once they expand. Ryan and Andrea, the owners of Fable Farms, recently attended a United States Composting Council (USCC) training session and are very passionate about expanding their compost operation but recognize a number of factors limit the timing and ability to expand.

Good Earth Compost

Good Earth is another compost facility located at 650 E Empire Mill Road. They are currently only composting leaves and grass using a passive composting pile. They also grind limbs and branches, which they sell as mulch. Material is mostly received from customer drop-off, both residential and commercial, and occasionally the City will drop off material. Good Earth has considered adding food waste to their compost but at the time they felt the regulatory requirements were too burdensome; they aren't especially interested in starting to compost food waste.

4.3 Gap Analysis

Utilizing the information presented above, KCI developed a gap analysis to compare potential future recovery versus the existing organics recovery system and to identify gaps in services and infrastructure that would be needed to support expanding organics recovery in the County. The results are summarized in Table 4.

Table 4: Gap Analysis: Monroe County Organics Recovery System Estimates (Tons/Year)

	Low	High
Potential Organics Recovery		
Food Waste	4,570	5,690
Other Compostables	3,800	4,730
Total	**8,370**	**10,420**
Current Organics Collection		
IU/JB Salvage*	360	430
Green Camino	10	20
Fable Farms	6	8
Total	**376**	**458**
Current Food Waste Composting		
Green Earth*	540	610
Fable Farms	16	28
Good Earth	0	0
Total	**556**	**638**
Potential Organics Composting Capacity		
Green Earth	6,000	7,000
Fable Farms	2,800	3,200
Good Earth	n/a	n/a
Total	**8,800**	**10,200**

*JB Salvage collects approximately 180 tons of organics per year (assumed based on interview with JB Salvage) from Boston Scientific (out-of-county) that is composted at Green Earth.

Two major conclusions can be drawn from the gap analysis. First, the current organics collection system would need to expand significantly to handle potential organics recovery. Second, while existing organics composting capacity is very limited, two facilities are interested in expanding capacity and together appear to have or will have sufficient land available to handle the combined potential recovery of both food waste and other compostables. Each is discussed further in the following paragraphs.

Collection

JB Salvage has stated their interest in expanding as well as caution about becoming over extended. As an experienced waste hauler, JB Salvage likely has the knowledge and expertise to scale-up organics collection. Green Camino faces a different set of challenges. As a grass-roots start up, the company may be facing a significant learning curve both in terms of how to operate waste collection and how to manage and finance its growth.

Access to the capital necessary to expand depends on a number of factors, most significantly a business must be able to assure financial backers that a reliable revenue stream will come in that is sufficient to sustain the business and provide return on investment. The business must also be in a good financial position. The issues to the collection model "penciling out" financially are having sufficient assurances that customers want organics collection and are willing to pay a reasonable fee.

Green Camino and JB Salvage have fundamentally different business models that target distinct sectors of the marketplace. Each has unique needs and opportunities to grow their business, and it is likely that they can both co-exist and thrive in the County. Looking broadly at the collection sector, the District has a number of opportunities to close the gap by helping increase organics collection and support matching growth in availability of collection services. These include the following:

- Survey potential generators to help establish information regarding potential collection growth opportunity.
- Facilitate peer-to-peer communications for JB Salvage and Green Camino with comparable businesses in other communities.
- Develop outreach and education materials to encourage businesses and residents to recycle organics and make them aware of collection services being provided.
- Establish drop-off organics collection at the District facilities.
- Utilize the Green Business program to promote organics collection or offer rebates or grants to businesses for establishing organics collection.

Composting

Ryan and Andrea at Fable Farms and Kevin at Green Earth are all very passionate about their work in the compost industry and have expressed interest in expanding their operations. Fable Farms is currently a small-scale operation but have stated they plan to expand and use the ASP composting method. Based on KCI's estimates from the description of their planned facility, they would be able to compost approximately 3,000 tons of organics per year. Meanwhile, the 10 acres that Green Earth has available for composting could compost between 6,000 to 7,000 tons of organics per year with a fully dedicated, optimized composting facility.

It cannot be understated that these tonnages are enormous increases over the existing tonnages handled by the facilities – 10 to 100 fold increases. While the owners are passionate, for all of them composting is currently a side project. If they are to become full-scale composting facilities operating at or near their capacity, they must have full-time dedicated staff that are trained as professional composters as well as the appropriate composting equipment. Ryan and Andrea recently attended the USCC training course and Kevin has and will be purchasing dedicated composting equipment. While these are important first steps, they will likely need additional assistance along the way. Some of the challenges facing a full-scale compost

facility include financing, regulatory compliance, staffing, capital and operating cost of equipment, proper material handling, monitoring, and testing procedure, odor controls, and marketing the finished compost.

The District could play a key role in providing assistance as appropriate to help these facilities grow at a manageable and sustainable rate and as desired by the owners. Some ways in the which the District can assist in growing these facilities:

- Provide technical assistance in registration with the Indiana Department of Environmental Protection (IDEM).
- Provide technical assistance regarding composting best practices.
- Facilitate procurement of funding sources for equipment, e.g., Indiana Recycling Market Development Grants.
- Provide funding for the operators to attend USCC or other compost training courses.
- Assist with developing markets for compost.

KCI sees an environment where both facilities can thrive, continuing to partner with their respective haulers. As Green Camino and JB Salvage increase the amount of organics collected, so too should Fable Farms and Green Earth increase capacity. These partnerships will overcome one of the primary challenges that organics recovery programs face: collection programs without a viable facility and facilities unable to get the tonnages they need. However, the gap between current and potential organics diversion is not going to fill on its own. With the District's assistance on both collection and processing, the County could see significant increases in its organics diversion rate.

Section 5
Analysis of Organic Waste Recovery Options

5.1 Introduction

Based on the results presented in previous sections, KCI identified a comprehensive, multi-faceted organics recovery strategy for the further analysis. The strategy has six key components – four service & infrastructure components and two planning & program support components:

- Services and Infrastructure:
  - District Drop-Off collection.
  - City-sponsored collection services for single family households.
  - Private and Green Business Network (GBN) collection services for commercial, institutional and industrial (CII) sector, multi-family, and non-City households.
  - Private composting facilities.
- Planning and Program Support:
  - Coordinated public outreach and education program.
  - Stakeholder coordination and planning.

The planning and program support components are fundamental to any comprehensive organics recovery system going forward regardless of the specific services and infrastructure involved. The District's role in overall strategy is three-fold: to provide organics collection through its existing collection activities, to act as an impartial facilitator for strategy development and implementation, and to become a resource center providing information and technical support for the public and private sector stakeholders in the organics recovery system.

5.2 General Lessons Learned Regarding Organics Recovery

Organics recovery is a rapidly expanding in the United States. In 2007, a Biocycle survey identified 42 communities with organized food scrap collection programs. By 2017, the number had grown to 148 curbside and 67 drop-off collection programs. It is important to note, that these numbers do not include all the communities, like the County, where grass-roots and private organics collection is occurring in the absence of publicly-sponsored programs. Based on anecdotal information and industry research, KCI believes the number of communities with grass-roots and private collection far exceeds the Biocycle research.

Existing programs provide a wealth of experience from which it is possible to distill overarching general themes and lessons learned that provide a guiding framework for identifying and analyzing organic waste recovery options for the County. These include the following:

- Building Participation and Achieving Critical Mass:
  - Variable-rates (pay-as-you-throw or PAYT) can provide an economic incentive for generators to divert organics for recovery.
  - In addition, some who participate in organics recovery programs do so for environmental reasons and are willing to pay extra.

  - Initially target large-volume sources like grocery stores and institutional food service.
  - Restaurants are good potential sources of post-consumer food waste; however they are more susceptible to on-site constraints and potential for contamination.

- Providing Effective Outreach and Education:
  - A consistent brand can help ensure broad-based community awareness across various generator types (e.g., household and businesses).
  - Education and outreach materials need to be clear, concise, and rich with pictures, diagrams, and graphics.

- Ensuring Sufficient Collection and Recovery Facility Capacity:
  - The most significant initial challenge for most programs is the lack of organics collection services, organics recovery facilities, or both, that are sufficient to serve the potential demand.

- Engaging and Coordinating a Multi-faceted Organics Recovery System
  - Comprehensive programs address multiple generator types (single family residential, multi-family residential, commercial, and institutional) and service providers (collection and recovery) and which can benefit from coordination.
  - Consistent standards specify what is acceptable in organics recovery.

5.3 General Cross-Cutting Issues

Contamination

Contamination is a common challenge facing all organics recovery programs. In particular, collection programs that include other compostable materials like soiled paper, pet litter, and compostable packaging, typically experience higher levels of non-compostable contamination. While the inclusion of other compostables can be attractive in terms of increasing overall recovery rates, most composting facilities (especially those using basic composting methods without significant capital investment in processing and screening equipment) can be resistant to accepting more than just food waste due to the non-compostable contamination, which can cause operational problems and negatively impact their ability to produce high quality products.

Potential for contamination needs to be carefully considered in light of the specific capabilities of composting facilities that are developing in the County. Given their current plans to utilize simple turned windrow (TW) and ASP methods with limited pre-processing, the composter emerging as the County's organics recovery infrastructure may have limited tolerance for and capacity to handle contamination. So, collection programs may be well-served to initially focus on food scraps only.

Regardless, it is crucial that outreach and education be well-designed and implemented to control contamination while still promoting broad-based participation.

Another important lesson learned is that contamination can be especially challenging to address given the number of entities involved. When it shows up at the compost facility there needs to be an effective means of communicating the problem to the collector, back to the generator, and ultimately to the individuals who are not complying with proper source-separation requirements.

Compostable Liners for Collection Containers

Many different types of compostable liners are available for organics collection and unfortunately some are marketed with misleading claims about the suitability for composting when in actuality they are not readily compostable. The difference between biodegradable and compostable is significant. A liner that degrades may simply break apart into small pieces. To be compostable, a product must be digested by microorganisms.

Compostable liners need to, at a minimum, meet one of the following criteria:

- Certified to be compostable by the Biodegradable Products Institute (BPI).
- Certified by a third party to meet ASTM[3] D6400 or D6868 standards for compostability.

Even within the class of products that are certified compostable, some decompose more easily and are more suitable for the kinds of windrow and static pile composting being practiced currently in the County versus products better suited to more mechanical composting methods. The rate of digestion must be compatible with the composting method, i.e., microbes digest the liner at the same rate as the organic wastes.

5.4 Collection at District Drop-Off Sites

Biocycle published the results of a nationwide survey of residential food waste collection in 2017. The survey included nearly 70 drop-off programs across 15 states with the majority located in Massachusetts and Minnesota, and most which started in the past three years.

Combined with our direct experience with organics collection programs in multiple jurisdictions, KCI identified the following common trends, general best practices, and planning and implementation issues.

Common Trends

- Drop-offs are a relatively cost effective and quick way to start organics recovery compared to collection at the point of generation (i.e., residential curbside and CII collection). Drop-offs can be designed and developed to readily handle a variety of small quantity generators like households, apartments, businesses and small restaurants. They are not well suited to serving large quantity generators like grocery stores and institutional kitchens.
- Drop-off programs can be used by themselves or in conjunction with a point-of-generation collection. Most communities with drop-off don't have curbside, but some started with drop-offs before launching curbside collection.
- Drop-off programs can be successful for communities of all sizes. Programs surveyed for Biocycle ranged from a few hundred to over a million population.
- Most programs have 1 or a few centralized drop-off locations, often located at municipal recycling drop-off facilities. Some programs have drop-offs at transfer stations, municipal buildings, farmer's markets, or city parks.
- Most programs have paid staff at all or some of their drop-off locations.

[3] American Society for Testing and Materials

- Examples also exist of drop-off networks serving a relatively large geographic, e.g., larger than the County, using a combination of staffed and unstaffed drop-off sites utilizing roll-carts collected by a rear-load collection truck with cart tippers.
- Nearly all programs accept vegetative food waste, meat, dairy, and uncoated food soiled paper. About half accept yard trimmings, compostable bags and food serviceware, and paper bags.
- Of those that reported, average participation (excluding outliers) was estimated at less than 5 percent of the total households in the area.

General Best Practices

- Site features: Convenient and high-visibility location conforming to citizens normal travel routes, well lit, easy traffic flow, convenient parking near containers, easily accessible containers, clean and well-maintained premises.
- Signage and information: These need to rely heavily on pictures and graphics to communicate acceptable and unacceptable materials, and multi-lingual where appropriate.
- Containers selection and servicing: Small roll-carts (e.g., 35 gallon) with compostable liners are commonly used due to their convenience. They can be easily maneuvered by hand, accessed by customers, secured when filled, and serviced by various waste collection trucks, including rear-loaders, box trucks with lift gates, and automated side loaders. After being serviced, carts can be rinsed out, washed if necessary, and re-lined for use by hand.
- Operations: Sites open on days and hours that are convenient, provide enough roll-carts or containers to avoid running out of capacity or overflowing before being collected. Organic wastes are putrescible and must be collected more frequently than recyclables. At a minimum, collection should occur weekly with twice weekly being recommended especially in hotter months.
- Staffed drop-offs: Staffed drop-offs reduce contamination and provide face-to-face opportunities for improved public awareness and participation. Multi-material drop-off sites that add organics typically do not need additional staffing. Work is mostly limited to monitoring and providing assistance to customers who already bring other materials to the site, occasionally moving filled containers to a secure place for collection and replacing them with empty containers.
- Unstaffed drop-offs: can expand the collection network making it more convenient, however it is recommended that they be co-located at sites that are widely used or can be readily observed by the public and secured at night to minimize improper disposal, such as government buildings, shopping areas, community centers, schools, and churches.

Planning and Implementation Issues and Opportunities

- Acceptable organic wastes: Establishing a standardized list of organics for all collection activities in the County helps to make outreach, education, and public awareness consistent. The list needs to conform to what is accepted by Fable Farms and Green Earth. And where differences exist between them (i.e., Fable Farms has indicated that it does not want compostable serviceware), it may be necessary reach a common consensus and/or help the facilities develop the capacity to handle similar materials.
- Container selection: As noted above, roll-carts are commonly used for drop-off collection due to their convenience and adaptability to difference collection methods. A standardized color should be

chosen for organic waste collection containers. The general trend is green for organics (blue for recyclables).

- Collection containers: The District could consider purchasing an inventory of in-home pails and 5-gallon lidded buckets for subsidized sale or give-away to households and businesses that bring organic waste to District Drop-Off sites. This may help increase participation by making food waste separation more convenient.
- Compostable liners: Liners facilitate collection by keeping carts cleaner and reducing the need to wash them. However, they need to be compatible with composting at private facilities serving the County, i.e., Fable Farms and Green Earth. The District could coordinate with local retailers to stock compatible bags as well as make them available for purchase at drop-offs.
- Collection method and responsibility: Based on KCI's experience, rear-loaders with cart tippers are an efficient option for collecting roll-carts at drop-offs. The District should discuss drop-off collection scenarios with the private companies to determine what services they may be able to provide. JB Salvage appears to be capable of serving District Drop-Offs with existing equipment. Green Camino is not currently set up to service roll-carts, however, serving District Drop-Offs may be an opportunity for the company to expand and serve other customers as well.
- Implementation: The District may want to consider starting organics drop-off collection either incrementally by first adding organics at the central site on South Walnut St. Starting first at South Walnut allows the District to assess participation and capture rates, refine signage and instructions, evaluate containers and collection procedures, and evaluate cost impacts.
- Operations: To minimize pest problems, filled roll-carts should be closed and potentially stored inside overnight. If space is not available at the District's rural drop-offs, then a small shed may be necessary. Alternately, several companies manufacture pest-proof roll-carts designed specifically for organic waste collection with a latching lid. Also, roll-carts will need to be occasionally rinsed or washed out after collection. The County Health Department has indicated that it may need to review operational plans for discharge of any such wash water.
- Costs estimate: The Materials Processing Feasibility Study included a planning level estimate of $55,000 to $60,000 annual cost to add organic waste collection at all the District's Drop-Offs.

5.5 Bloomington Residential Curbside Collection

As referenced above, Biocycle identified 142 municipally-sponsored residential curbside organics collection programs in the U.S. In aggregate, these programs serve 326 communities and over 5 million households in 20 states. Over two-thirds of the communities are in California, Washington, and Minnesota. Illinois is tied with Vermont for the 4th highest number of communities with curbside organics (24 each).

Based on experience with curbside organics programs and general industry knowledge, KCI developed the following summary of common trends, general best practices, and planning and implementation issues for curbside organics programs.

Common Trends

- Organics is increasingly being viewed as the next stream for curbside collection, leading to a three-way separation of household discards: recyclables, compostables, and other waste.

- Municipally-sponsored curbside programs can have several forms based on who receives the service. Universal service is most common and entails organics as a standard service alongside other services (trash, recycling, etc.) to all households. Opt-in service is where residents must sign-up to receive organics collection, which may or may not incur an additional fee. Mandatory service involves local ordinance requiring all residents to participate and divert organics. Only a handful programs in the U.S. are mandatory.
- Municipal programs in the U.S. are at all stages of development, of the 74 programs that reported to Biocycle, 12 are in the pilot phases, 7 are partially rolled-out, 43 are full-scale for single family households, while 12 are full-scale for both single and multi-family households.
- The vast majority of curbside programs contract with a private hauler for the collection of organics.
- Most programs (90 percent) accept meat, fish, and dairy, along with vegetable, fruit, and baked goods. Over two-thirds of programs accept paper bags or food soiled paper. Less than 50 percent accept compostable plastic products, such as bags or food serviceware.
- Many programs provide households with in-home pails that can be used in the kitchen to hold scraps until they are taken out to a larger container (i.e., roll-cart) for curbside collection. The pails offer a convenient way to manage the messiness of food waste and thus improve participation and capture rates.
- Over 70 percent of programs co-collect yard waste with organics. Some already had carted yard waste collection and instructed residents to simply add organics to their existing yard waste collection.
- Collection containers range from 10-gallon to 96-gallon roll carts. Programs that collect organics separately from yard waste are generally using 35-gallon or similar size roll-carts. Programs that collect organics and yard waste together mostly use larger carts, e.g., 64- and 96-gallon.
- Most programs have weekly collection of all materials (trash, recyclables, and organics). However, Portland, OR, for example, has reduced trash collection to every other week because of the large volume of materials diverted from trash in the weekly recycling and organics collection.
- Meeting diversion goals is the most commonly cited reason for implementing a program, followed by the opportunity to avoid disposal costs.

General Best Practices

- Co-collection with yard waste: If containerized curbside yard waste collection has been provided, adding organics to yard waste collection containers can be an easy and low-cost solution to transition to an organics collection program. Furthermore, the yard waste can act as a buffer for moisture and odors, alleviating some of the “ick” factor associated with organics collection. If co-collected, the composter must be equipped to handle the combined materials.
- Signage and information: As with drop-offs, signage and education materials need to be clear, and consistent, relying on pictures and graphics on what is and is not accepted. Signage should also be placed clearly on the cart lid. Stickers could also be provided for residents to place on their kitchen pails.
- Container selection: Containers need to be water tight and fully enclosed to minimize odor, leakage, and animal problems. Roll carts are almost exclusively used for curbside organics

collection. Animal proof carts are available if animal pests are a potential problem. Containers should be color-coded (e.g., green or brown) to distinguish organics collection from recycling and waste.

- Collection frequency: Organics should be collected weekly to prevent odors or pests.
- Pilot: Most successful programs start as a pilot. These generally are conducted in a selected area of the community, one likely to have high participation in the pilot. Since the goal of pilot is to test out the full-scale system, the parameters of the pilot should match what is planned for full-scale. However, the pilot gives the chance to work out the kinks, so a full-scale plan may be modified based on the results of the pilot.

Planning and Implementation Issues and Opportunities

- Acceptable organic waste: As discussed above, the list of organic waste accepted in the program will need to conform to the materials accepted by Fable Farms and/or Green Earth.
- Collection method and responsibility: The City currently allows residents to contract directly with private organics collection service providers. Depending on the company, different collection methods may be used, e.g., one using buckets without liners collected in a tow-behind trailer and another using 36-gallon roll carts with liners collected in a rear-loader. Eventually the City may decide to provide a uniform service either through a private contractor or its own crews. The City may benefit from considering various collection scenarios, developing a coordinated plan to ensure that organics collection meet citizens needs and is synchronized with other City services. The City could also establish set out procedures, e.g. same day service as trash and recycling, and common standards for service.
- In-home containers: The District and City could collaborate in providing in-home kitchen pails for subsidized sale or give-away which may help to boost participation by making food waste separation more convenient.
- Compostable liners: The District and City could collaborate to ensure that liners compatible with local compost facilities are available for purchase.
- Supplies provided: As with a drop-off program, providing in-home kitchen pails and liners (if accepted) can boost participation by providing residents with all the supplies they need to start collecting organics.
- Contamination: Residential curbside organics programs can be particularly problematic due to lack of oversight relative to the potentially large number of participants, compared to a drop-off or commercial program. Education, monitoring, and enforcement are extremely important as a permanent fixture of an organics program.
- Pricing: Most successful programs have a rate schedule that incentivizes participation in the organics program. As mentioned earlier, a PAYT system can benefit diversion of organics. Similarly, some programs have found success with offering every other week collection of garbage at a lower rate. Not charging a separate fee for organics collection can greatly enhance participation, however, overall fees need to be sufficient to services.

5.6 Commercial and Institutional Collection

Common Trends

- High volume generators of organic wastes account for the vast majority of material currently being recovered. Grocery stores, food distribution facilities, commercial kitchens, processors and restaurants are able to divert a substantial percentage of their overall waste stream. These collection efforts have been instrumental in development of large-scale organics recovery facilities.
- Large-scale CII organics collection has been driven by recovery mandates or disposal bans in a handful of states and local jurisdictions. However, much of the recovery is being driven internally by business and institutional efforts to reduce environmental impacts (e.g., greenhouse gas emissions), achieve resource efficiency objectives, and control waste management costs.
- Space constraints are a common problem for CII generators, especially restaurants. Separated organics need to be stored somewhere in between collection days. And health codes may require that it be refrigerated.
- Many CII collection programs focus on pre-consumer, or back-of-house, organics because it is easier to control collection and minimize contamination compared to post-consumer, or front-of-house, organics. This is often dictated by what materials can and cannot be handled by organics recovery facilities.
- Many small-scale CII organics collection initiatives are emerging not driven by public sector policy or program, but by environmental entrepreneurs and grass-roots community organizations. In most cases, CII collection is provided by the private sector. As the public sector becomes involved in this sphere, it is finding ways to support and expand these initiatives through planning and program coordination.

General Best Practices

- Focus on pre-consumer first: Due to high potential for contamination, many CII collection programs focus on pre-consumer, or back-of-house, organics. Front-of-house organics collection needs to be carefully designed and implemented and can require a high level of education and outreach, proven effective signage and container styles, and monitoring.
- Signage and program information: Signs and instructional materials need to rely primarily on pictures and graphics to communicate what are acceptable and unacceptable materials. Signs need to be placed at all points where organic wastes are generated and a waste container provided if any non-compostables are generated there as well.
- Training: Worker training programs are also essential in order to communicate proper procedures for separating organic waste, managing the internal movement and interim storage of containers prior to collection, and provide information about the benefits of organics recovery to the business and the environment.
- Container selection: Organic waste is typically generated in specific locations (i.e., food prep station). Organic collection containers need to be conveniently placed and properly sized. Containers placed in areas that do not generate significant amounts of organics are more susceptible to contamination.

Planning and Implementation Issues and Opportunities

- Acceptable organic wastes: As noted previously, a common list of organic wastes that are accepted for CII collection by local composter will help facilitate outreach, education, and compliance.
- Space consideration: Many CII generators face space constraints when trying to add organics collection. Site specific analysis is generally needed to identify standard operating procedures, container locations and movement, find enough space for interim storage requirements (e.g., refrigeration), and determine how to set out organics for collection.
- Collection containers: CII generators need different kinds of collection containers depending on their size and type of business. Smaller locations may only need a few 5-gal buckets, while others may need roll-carts to handle the volume generated and cope with space constraints. Larger generators may have the volume and the space available to have internal roll-carts for collection at individual points of generation and a dumpster located outside for collection.
- District and private sector collection services: Both the District and private haulers currently provide CII recycling collection services. Current options include JB Salvage, Green Camino, and the District GBN. Each uses a different type of collection vehicle: rear-loader, pick-up truck, and box truck, respectively. The GBN program provides collection of source-separated materials to a relatively small list of clients. When considering the option of adding organics to the list of GBN services, the District should consider the potential impact it may have on other private sector collectors and establish a service that integrates with them without negatively impacting their business growth opportunities.
- Compostable liners: These are widely used for CII organics collection. And as noted previously, information on the specific types of compostable liners accepted by local composters is needed.
- Focus on pre-consumer organics from large generators: Grocery stores, institutional food services, food processors, and other CII generators provide two important opportunities. First, collecting from a few, large generators is more cost effective than from many, small generators. Second, they generate a significant amount of pre-consumer organics and can more readily limit contamination through training and employee compliance.

5.7 Composting Facilities

Biocycle published the results of a nationwide survey of U.S. organics composting facilities in 2017. The survey identified over 4,700 facilities and categorized them based on the materials they handle (food waste, yard waste, manure, etc.). The majority of composters only handle yard waste (57 percent) while facilities that handle food waste and mixed organics represent 18 percent. For Indiana, a total of 119 composters were reported with 110 being yard waste facilities and 9 also handling food processing residuals. Nationwide, 8 percent of facilities are farm-based, with these being concentrated in states with regulatory exemptions for farm-based composting.

Based on our direct experience with organics composting facilities in multiple jurisdictions and general knowledge of the industry, KCI identified the following common trends, general best practices, and planning and implementation issues.

Common Trends

- As noted above, most composters handle only yard waste. However, the number of facilities handling other organics wastes is increasing in response to market demand. The U.S. Environmental Protection Agency and Department of Agriculture jointly established a 50% recovery goal for food waste. Citizens and businesses are increasingly aware of the environmental impacts of food disposal. Some are willing to pay higher overall waste management costs in order to recover food waste and other organics.
- Yard waste composters are also moving into other organics seeing opportunities to generate more revenue and enhance the composting process. Depending on local market conditions, composters can charge higher tip fees for food waste than for yard waste. Food waste is wet and heavy and generates significantly more revenue on a volume basis than yard waste. In addition, yard waste composters generally are carbon-rich and nitrogen-poor, which means it can take several months to produce stable, mature compost. Food waste typically has comparatively high nitrogen content as well as excess moisture, both of which can help optimize yard waste composting when blended and managed properly.
- The vast majority of organic waste composting facilities in the U.S. rely on simple turned windrow composting. The composting business operates on narrow margins and must adapt to local market conditions regarding collection and disposal costs. Investment in capital items (shredders, grinders, compost turners, screeners, buildings, aeration systems, etc.) are difficult to justify financially for most small and medium size composters. Turned windrow composting focuses less on capital and more on proper materials handling and process control in order to manage contamination, odors, ambient weather conditions, and site size limitation while maintaining optimal conditions for rapid aerobic decomposition and production of consistent high-quality products.
- Composters broadly classify organic wastes in two categories: pre-consumer and post-consumer. Pre-consumer organics includes food service prep waste, spoiled food, and food processing residuals that have not yet been sold for consumption. Post-consumer organics have come in contact with the consumer and include plate scrapings and home food prep waste. Post-consumer organics are generally more challenging to compost because they can have high levels of contamination.
- Most organics composters handle only pre-consumer waste, not only to minimize contamination and maintain consistent process control, but sometimes due to regulatory restrictions.
- To handle the contamination in organic wastes, several manufacturers offer specialized depackaging equipment for food waste, removing inorganic contaminants, and producing consistent feedstocks for composting. However, this equipment can be costly and not economically viable for small-scale composters who need to rely on good outreach and education and generators properly separating contaminants.
- In recent years, a number of states have revised their composting regulations in order to better address food waste and other compostables. Common parameters used for classifying facilities include the types of materials (e.g., putrescible food waste versus yard waste versus mixed waste), the source of materials (e.g., pre-consumer versus post-consumer), and the amount of materials (e.g., tons per month).
- Most yard waste compost has traditionally been sold in bulk for soil blending, landscaping, agriculture, and horticulture. Despite being an excellent material for improving soil quality, it is

mostly been sold as a relatively low value product. In addition, most composters do not have the throughput to justify investments in bagging compost for retail markets. In recent years, research has shown that a number of soil and plant diseases can be controlled with compost due to the large, diverse ecology of beneficial microorganism present in it. This is helping to demonstrate increased value and open up new markets and expand existing ones for compost.

General Best Practices

- Site selection: Even a well-operated composting facility can have major problems if not properly sited. A wide array of criteria needs to be considered much like for any waste handling facility, in particular distance to sensitive receptors, visual impacts, site terrain, drainage, and soil conditions. Design and construction can mitigate some issues, but at a cost.
- Contamination control: The best place to control contamination is at the generator so that it does not arrive at the composting facility. Once it is mixed into the organic waste it can be very labor intensive to remove it without depackaging equipment. Some facilities simply leave it in the pile until composting is complete, and then remove it during final screening.
- Receiving and pre-processing: Because it is wet, heavy, and putrescible, organic waste needs to be handled very soon after receiving. Low technology facilities can lay out a bed of bulking agent onto which organics can be dumped. The bed can act like a sponge to absorb free liquid while more bulking agent is added and the materials blended for composting with either a bucket loader or mechanical mixer.
- Bulking agents and mixing: Food waste typically has high moisture content, is heavy, and highly putrescible. It is essential to have sufficient amounts of suitable bulking agent to achieve optimal composting conditions and minimize problems. Yard waste can be a good bulking agent, but it can be highly variable in terms of moisture content, particle size, and available carbon. In other words, both are moving targets, so it takes expertise to properly match bulking agents and develop mixing recipes for composting.
- Composting process control: The key conditions for maintaining optimal windrow composting are oxygen, moisture and carbon to nitrogen (C:N) ratio. These conditions need to be established during pre-processing and pile construction and then oxygen and moisture maintained during the composting process. Temperature is the one essential parameter for monitoring the composting process. Temperatures in excess of 130°F must be sustained for an extended time to ensure pathogen reduction, weed seed kill, and rapid decomposition.
- Odor and vector control: Composting food waste can cause odor problems. Many conditions can cause odor problems (excessive moisture, low C:N ratio, lack of oxygen, etc.). The compost facility operator must have the experience and knowledge to maintain optimal conditions to avoid odors in the first place and properly diagnose and fix problems when they do occur. Food waste also presents potential vector, or pest, problems. Once birds and rodents locate a potential source of food, it can be difficult to control. To minimize vector problems, food waste needs to be kept enclosed and then immediately mixed with bulking agent and subjected to composting's high temperatures. Another successful strategy is to cover new piles with a layer of aged mulch or a breathable fabric cover.

Planning and Implementation Issues and Opportunities

- Regulatory compliance: The IDEM has very limited regulations specific to composting facilities and composters that handle yard waste and source-separated organic waste. This makes it easy to obtain regulatory approval but poses potential for a few composters with poorly designed and operated facilities to give the industry a bad reputation.
- Available capacity and site suitability: The County has two active composters that handle organic wastes. Together the two sites appear to have sufficient land available to expand operations enough to meet the County's potential recovery without the need for the District or other public entity to develop one. However, the District may want to assess the composting sites' suitability and development potential. This may help clarify if the existing facilities face possible site-related issues in the future.
- Phased capacity development to match collection: One of the most common problems faced by organics recovery programs is lacking either sufficient collection or composting capacity. This kind of imbalance is typical of an emerging market where supply and demand relationships are not well established. The District can play a role in monitoring the growth in collection programs and composting capacity and implement strategies to support coordinated development of a mature and diverse organics recovery market.
- Composting expertise: Both Fable Farms and Green Earth are relatively new organic waste composters. Good Earth has extensive yard waste composting experience but has not handled organics. The District should consider options to ensure that local composters have the expertise to handle organic waste efficiently and in an environmentally-sound manner. Two possible options are to provide grants to attend programs like the U.S. Composting Council training and assist local composters with peer-to-peer matching with other experienced organics composters.
- Access to capital: Small scale composters, especially new ones, can find it difficult to access the capital needed to grow their business. Capital is needed for site improvements and equipment. The District should consider what services it might provide to facilitate this process, such as assisting with grant applications, identifying sources of business development and management expertise, and helping facilitate interactions with local economic development groups.
- Contamination control: Contamination can cause serious problems at composting facilities and reduce the marketability of compost products. Effective outreach and education are essential to control contamination. Just as important is communication of contamination problems across the supply chain from generator to collector to composter. When contamination shows up at the composter, the generator needs to be informed and receive actionable information to address the problem. The District can help play a central role in developing and implementing a comprehensive contamination control program.
- Support for market development: Composting facilities rely on two sources of income: tip fees for inbound materials and sales of outbound products. Both are essential to economically viable private composting facilities. A growing organics recovery program needs to be matched by parallel growth in the demand for composting end products. Small scale facilities typically produce two products: finely-textured compost and coarsely-textured compost or mulch. Each is suitable for a variety of different uses. Compost market development requires identifying potential users and providing them with information about the benefits and proper use of specific compost products. The District should consider playing a role in helping to build awareness of the benefits

and uses of compost while maintaining its impartial position. Options include developing and distributing guidelines for compost use, establishing demonstration gardens, and encouraging City and County government to utilize compost from local sources.

- Cost estimate: The cost to develop a composting site and purchase equipment depends on many factors. Windrow composting can be operated with a simple front-end loader or a specialized windrow turner. Many smaller operations choose to lease this equipment on an as needed basis or share it with other bulk materials handling operations. The Materials Processing Feasibility Study included a planning level estimate for a windrow composting facility with an operating cost in the range of $30 per ton not including site development and capital costs. Based on analysis of numerous composting facilities, KCI expects that the facilities in the County can achieve similar operating costs.

5.8 Program Planning and Support

Common Trends

- Local government efforts to develop collection programs often falter due to the lack of access to the recovery facilities that are willing and able to handle organic wastes. Community-scale collection also faces challenges, including obtaining the commitment and financing to implement a new service. These are typical problems for emerging industries where services, infrastructure, and supply and demand relationships are not yet established.
- Grass-roots and small business initiatives are thriving in many communities by starting on very small-scale with limited investment and the dedication of a few individuals. Some then are growing into thriving businesses able to provide community-scale collection and composting.
- Government-sponsored efforts to develop and expand CII organics collection are using many of the same tools that have been proven successful in promoting business recycling programs. These include community-wide outreach and education programs, waste audits and customized technical assistance, green business certification programs, presence on multiple social media platforms, and collaboration with business associations and community leaders.
- Disposal bans and recovery mandates are being used at both the state and local level with many of them being targeted at the CII sector. Bans and mandates help to drive development of collection and recovery infrastructure which is necessary to achieve economies of scale and establish opportunities for more wide spread recovery.
- Public-private partnerships are almost universally used by organic waste recovery programs. CII collection is typically provided by the private sector, and most organics composting facilities are private. Local government generally acts as a coordinating body and takes a leading role in residential collection and composting services.

General Best Practices

- Communication: With multiple actors across the recovery supply chain from generator to composter, communication is essential to manage contamination, coordinate services that meet generators' needs and constraints, and match the operational requirements of composters.

- Stakeholder coordination: Establishing a stakeholder group facilitates communication and coordination of the various components of a multi-faceted organics recovery system.
- Outreach and education: Well-designed and multi-faceted outreach and education are a hallmark of successful residential and CII collection programs to build wide public awareness and participation.
- Technical assistance for generators: Generators targeted for organics collection can benefit from a wide range of information and technical services. Waste audits can establish where, how, and how much waste is generated. This forms the basis for developing site-specific separation and recovery plans. Informational resources on types of collection containers, compostable liners, pre-design signs and labels, and training manuals can help generators with implementation.

Planning and Implementation Issues and Opportunities

- The basic pieces are in place: The County is in relatively good position for developing an organics recovery system. Although they are small, organics collection services and composting facilities exist, and they appear to be interested in expanding.
- Multiple stakeholders: An organics recovery system in the County will involve multiple entities (City, District, private collectors, private composters, and residential and CII generators). Collection and composting operations will need to be coordinated in order to grow and be successful. The District appears to be well positioned to take the lead in coordination.
- State composting regulations: Based on discussions with IDEM staff, the current rules for composting organics are relatively flexible. Composters that handle source-separated organics need only register their facility. The application for registration requires information regarding the site and operations, including a description of procedures for controlling vectors and pathogens. Unlike most other states, specific standards do not exist for site operations, composting time and temperature, monitoring and testing, and product classification and use. While the procedures for regulatory compliance appear to be simple, the District could provide technical support to help composter not only comply with regulations but also establish general best practice guidelines.
- Organics recovery goals: Although Indiana has a 50% recycling goal, there is little current focus at the state level to move communities and districts towards that goal. Nevertheless, goals and mandates have been an effective driver of organics recovery in the few jurisdictions where they have been implemented. The District may want to consider working to establish this kind of policy framework as the basis for expanding organics recovery.
- State grants: Access to capital is necessary to expand organics recovery in the County. Various grant and funding opportunities exist to help at least to some degree, which can also help leverage other sources of private or philanthropic funding. For example, the Indiana RMDP provides grants for up to $500,000 and require 50% matching funds. Eligible entities include private companies, local government, and non-profits. RMDP program goals and priorities include increasing recovery, local economic development, and improving collection, processing, and public awareness. Previous grants have included funding for collection program start-up, food waste composting equipment, recycling equipment, educational materials, and program management.
- Local funding: Boulder County, CO (see Appendix A) operates a small grant program to help small businesses set up organics collection, and Orange County, NC helps subsidize collection cost for

commercial generators. The District could consider a similar effort to help extend CII collection services to smaller quantity generators.

- Outreach, education, and technical assistance: Given the various actors and stakeholders likely to be involved in a County organics recovery system, the District is well-positioned to take the lead on establishing the framework, branding, and general information resources. Naturally, this work should be undertaken in a collaborative manner with other stakeholders to ensure the program information can be adapted to their specific needs.
- Technical assistance: The District is also well-positioned to provide various technical assistance services to generators, collectors, and composters in the County. For residential and CII generators located in the City, services can be provided in collaboration.

Section 6
Summary and Potential Next Steps

6.1 Summary

This report presents an Organic Waste Recovery Analysis for Monroe County. Initial work entailed profiling organics collection programs in several similar communities in the U.S. Then, further research was performed to distill knowledge and lessons learned from across the organics recovery industry in the U.S. and apply them to the County's unique conditions.

Drawing from a previously prepared profile of the County's waste stream, the analysis developed generation and recovery estimates for four distinct sources of organic wastes: District Drop-Offs, Bloomington's residential collection, Indiana University, and typical large volume generators served by private collectors (e.g., grocery stores, restaurants, and institutional food services).

A gap analysis helps to highlight opportunities to leverage the existing collection and composting activities for development of a comprehensive, multi-faceted organics recovery strategy. It was determined that a variety of public and private collection services can be matched to potential sources and quantities of organic waste. It was also determined that existing private composters have the expansion capacity to handle the amounts of organic wastes that may potentially be recovered in the County, so development of a publicly-sponsored facility is not necessary at this time. Lastly, the gap analysis concluded that the existing private collection and composting service could benefit from significant technical support, coordinated planning, and program support.

The conclusion of this work is a proposed multi-faceted organics recovery strategy for the County. The strategy has four components related to organics recovery services and infrastructure:

- District Drop-Off collection
- City-sponsored collection for single family households
- Commercial and institutional collection
- Private composting facilities

The strategy also includes two components related to planning and program support:

- A coordinated outreach and education that spans the various generator types and sources of organics (e.g., residential, commercial, and institutional) providing consistent messaging and public awareness of organics recovery at home, at work, and at play.
- An organics recovery stakeholder group that engages various parties in the development and implementation of an action plan.

This report then provides an analysis of each component. Based on an inventory of common industry trends and common best practices, the analysis identifies important issues and opportunities that need to be addressed in order to successfully plan, implement, and expand organics recovery in the County.

The District's proposed role in the overall strategy is to be a central coordinating entity that provides organics collection through its existing collection activities, facilitates strategy development and implementation, and provides information and technical support for all public and private sector organics recovery efforts.

6.2 Potential Next Steps

It is recommended that the District take the lead to bring stakeholders (e.g. City sanitation and utilities, composters, collection providers, schools, major CII generators, IU sustainability staff) together and establish an organics recovery working group or task force. The short-term work of the task force could focus on:

- Review the information presented in this report and expand on it as necessary.
- Identify components of a comprehensive strategy that are most suitable for the County.
- Develop an action plan for implementing the strategy.

In the longer-term, a task force and the District can continue to support the County's organics recovery system through various activities related to the implementation issues and opportunities identified in this report. Some of the potential activities include:

- Develop standardized education and outreach materials (signs, instructions, flyers, social media resources).
- Implement a waste assessment service for commercial, institutional, and mixed-use generators addressing waste minimization, reduction, and organics and recyclables recovery.
- Facilitate peer-to-peer matching of local collectors and composting with similar businesses in other communities.
- Provide technical assistance to composting facilities regarding best practices, site design, equipment options, operations and process control, regulatory compliance, and market development.
- Provide technical assistance and/or partner with collectors and composters to apply for RMDP grants.
- Assess compost markets, develop compost usage guidance documents, and establish demonstration gardens using locally produced compost
- Host regular stakeholder meetings to discuss opportunities and barriers as they emerge and refining the action plan.

In conclusion, Monroe County already has the seeds of an organic waste recovery system in place and a variety of opportunities to develop a comprehensive program. The information and analysis presented in this report provides a foundation for the discussions, decision-making, and development work ahead.

Appendix A: Organics Recovery Program Case Studies

Fayetteville, Arkansas

The City of Fayetteville in Northwest Arkansas is home to the University of Arkansas. Fayetteville has a population of 73,580, and the university has a student population of 27,558 undergraduate and graduate students. Arkansas has a landfill ban on yard waste and the city has a goal of 40% waste diversion from landfills. The city provides its own residential and commercial collection of mixed waste, recycling, and yard waste (residential only), as well as 2 recycling drop-off facilities. The city is located in Washington County; the county has open market collection and does not have organics collection beyond yard waste.

The city owns and operates a 3-acre compost facility at which it composts yard waste its collects. In 2015, the city launched a food waste compost pilot that focused on commercial vegetative (non-meat) food waste. The pilot received food waste from the university, local restaurants and markets, and grade schools. At the university, food waste is collected from 5 dining hall locations around campus. The pilot had a capacity of composting 10 tons of food waste per week but received 3 to 5 tons per week. The pilot is ongoing but is presently receiving about 156 tons of food waste per year from the university and schools only. In addition, the city estimates it composts about 7,500 tons of yard waste. The city collects food waste 3 times weekly (MWF) in 35-gallon locking carts with a compostable liner. The facility uses the modified static aerobic pile composting method. The pilot is currently free for participants, but the city will be conducting a rate study to determine if a fee is appropriate. The city sells its compost in bulk (at $8/cy) or bagged ($4/bag). The city does not provide organics collection for residents.

Orange County, North Carolina

Orange County, located in central North Carolina, has a population of 57,233. The county includes the University of North Carolina – Chapel Hill, which is one corner of North Carolina's Research Triangle. The university has a population of 29,911 students. The county provides curbside collection of solid waste and recycling in the unincorporated county through its franchise haulers. The municipalities provide collection themselves or through a private hauler. The county also operates 5 drop-off locations that accept special waste, recycling, and yard waste. Two of the drop-off locations also accept food waste and food contaminated paper (e.g. napkins). The county has a temporary food waste drop-off location at the weekly farmers market during season; the farmers market received 10 tons of food waste last year. The county partnered with Brooks Contractors, an organics hauler and compost facility located in neighboring Chatham County, for transporting and composting food waste from the drop-offs. One of the county's major efforts for organics diversion is to promote commercial collection by paying for collection from restaurants and grocery stores. The county subcontracts with Brooks Contractor, paying them $80/ton to collect food waste from these large-scale generators. It is currently working with 45 restaurants and grocery stores, from which 1,300 tons were collected last year. In the past year, the county has been transitioning larger grocery stores such as Food Lion and Whole Foods to pay for the collection themselves. In addition, 18 public schools in the county partner with Brooks for food waste collection; the county does not pay for the school collection. About 200 tons of food waste were collected from schools last year. The county receives finished compost from Brooks and sells it in bulk ($30/cy) and in bags ($5.50/cubic foot).

The university has had an organics collection program since the early 1990's, partnering with Brooks Contractor. Organics are collected from around campus in carts and are aggregated at a central collection site. At dining halls, food waste is collected by a separate collection provider, Compost NOW, due to logistics at the loading dock. Compost NOW is a third party private organics collector that delivers organics to Brooks Contractor's compost facility. Approximately 700 tons of food waste were collected at the

university in FY17. The university piggybacked on the county's contract with Brooks and is paying $80/ton plus $2/cart rental fee. However, it is transitioning to a $9-12 per cart tip fee in lieu of the $80/ton tip fee.

In addition to the organics collection provided by the county and the university, Compost NOW and Food FWD are private organics collectors that provide food waste collection to residents and businesses in the county. Both companies deliver the food waste to Brooks Contractors for composting.

West Lafayette, Indiana

The City of West Lafayette, with a population of nearly 30,000, is home to Purdue University, which has a student population of 41,573. The city provides residential collection of mixed waste, recycling, and yard waste. While in the unincorporated county, mixed waste collection is open market and recycling and yard waste are collected at drop-offs. The city or county does not have a residential or commercial organics collection program.

The city does, however, have a partnership with Purdue that started in 2011 to receive food waste from its dining halls for digesting in the anaerobic digesters at the city's waste water treatment plant. Pre- and post-consumer food waste is shredded and collected in totes, then transported to the digester on a daily basis where it is fed to the digester. In FY17, the university collected 232 tons of food waste, while in FY18, it collected 145 tons. The university is not sure why tonnage dropped. Approximately 75% of the food waste is post-consumer, while the remainder is pre-consumer food waste from the kitchen. The food waste, along with the fats, oils, and grease, that the university provides to the digester has been able to substantially increase the biogas production at the treatment plant. Using micro-turbines to produce electricity from the biogas, the city is able to produce about 20% of the plant's electricity needs. The city is now considering composting the digestate to make a more usable end product.

State College, Pennsylvania

The Borough of State College, located in Centre County in central Pennsylvania, has a population of 42,034. It is home to Penn State University, which has a student population of 46,606. The City provides for the curbside collection of mixed waste, yard waste, and organics, while it contracts recycling collection to the county. The curbside organics program started in the borough in 2010 as a pilot program and was expanded borough-wide in 2013. Food waste, compostable paper, yard waste, and certified compostable bags and products are collected weekly in automated carts. The program is optional and available to residential and commercial customers. It does not have a separate fee; the cost is included in the monthly refuse fee. The program collects about 1,400 tons of organics and yard waste per year. The borough owns and operates a 3-acre compost facility, where the organics are delivered and processed. In addition to the borough's organics, the facility has contracts with other municipalities in the area. They charge a $40/ton fee for these municipalities to tip at the facility. The borough sells compost in bulk directly to residents and to third party vendors which sell in bag or bulk.

The university also has a separate organics program. Organics are from all locations around campus, with the majority of organics collected from dining halls. The university owns and operates its own compost facility on campus. In 2017, the university composted nearly 1,600 tons of organics and 2,700 tons of yard waste. The facility also receives fall leaves from the borough.

Centre County does not have an organics program, but does provide technical assistance to boroughs and townships in the county for organics program. For example, it has recently worked with a consortium of 5 townships for developing a contract for a new organics collection program. It has also developed an RFP for a compost facility for this new program.

Boulder, Colorado

Boulder, Colorado, located in Boulder County, has a population of 97,385, while the county has a population of nearly 320,000. The University of Colorado – Boulder has a student population of 33,426. All waste collection in the city and county is open market; however, the city has a universal zero waste ordinance and a goal of 85% diversion rate from landfills by 2025. The ordinance requires all residents and businesses to have adequate trash, recycling, and organics collection services. The city does not control rates, but requires that material is collected every other week, at a minimum. The program accepts all food waste and certified compostable materials. In 2017, 31,800 tons of organics and yard waste were collected in the city. A1 Organics is a privately owned and operated compost facility in neighboring Weld County that receives all organics collected in the city. The city does not have any agreement or contract with the facility.

The county does not have a universal zero waste ordinance, but it does have a zero waste resolution (goal) by 2025. It has 4 zones for residential collection based on services provided. In the most urban zone, organics collection is required to be provided by the haulers, which is open market. In more rural and mountainous zones, organics collection isn't feasible. The county does operate 2 rural drop-off locations that accept organics. In 2017, the county collected 36 tons of organics at these drop-offs. The county does not have mandatory commercial organics collection but does offer businesses a $150 grant to help set up organics collection with a private hauler. Since the program started in 2010, the county has distributed nearly 150 of these grants. All material collected at the county drop-offs and by private haulers is composted by A1 Organics.

The university's compost program started in 2004 at its dining halls and has since expanded to include quick food service locations with compostable serviceware, deskside bins, restrooms (for paper towels), and residence halls. In 2015, 572 tons of organics were collected from food service locations and 107 tons were collected from other buildings around campus. All material is ultimately collected and delivered to A1 Organics.

Madison, Wisconsin

The City of Madison in Dane County has a population of 233,000 and is home to University of Wisconsin – Madison with a student population of 38,883. The city provides residential collection of mixed waste, recycling, and yard waste, as well as commercial yard waste collection. From 2010 to 2017, the city was operating a pilot curbside organics collection program. For the pilot, organics (food waste and soiled paper) were collected in 35-gallon carts. The pilot started with about 500 households and expanded to 1,100 and 40 businesses by the time it ended in 2017. The pilot collected about 270 tons of organics in its last year. Organics were delivered to a private anaerobic digester, GL Dairy Biogas, in Middleton, WI. The tipping fee started at $50/ton but due to increasing and persistent contamination in the organics, the tip fee increased to $200/ton for the digester to install a container screen to remove these contaminants. This high tip fee (by comparison the landfill tip fee is $50/ton) was ultimately the reason why the pilot ended and didn't move to full-scale. The city is now reevaluating its options for organics diversion in order to meet its zero waste goal by 2050. Three private organics collection providers still currently operate in the city. Dane County does not currently have an organics collection program.

The university has its own organics collection at its housing and dining buildings that started in 2008 as a student driven initiative. Food waste is collected in roll carts and dumpsters delivered to the GL Dairy Biogas digester, paying a tip fee of $50/ton. The university also collects yard waste that is composted at an on-campus compost facility. In 2017, 194 tons of food waste and 174 tons of yard waste were collected.