SoilMillPGH Case Study Report

Prepared for the City of Pittsburgh and USDA

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Executive Summary

Introduction and Purpose

Pennsylvania Resources Council (PRC) conducted a multi-phase project that developed a regional compost asset database and systems analysis, offered technical assistance for CitiParks facilities, farmer's markets, and a summer lunch program via waste audits, and implemented the residential at-home composting pilot. This report consolidates all existing work contracted for SoilMillPGH that occurred between Spring 2022 and Autumn 2024.

Results and Recommendations

PRC developed a database that references a total of 41 sites that collect, transfer, or process food waste. 15 stakeholders provided enough information to create a public resource for accessing local composting, but most declined to respond to the survey, and several have closed their operations since. This database was paired with a food waste generation and processing analysis for the city and county. PRC conducted 11 waste audits for CitiParks demonstrating diversion potential up to 82.3% at Recreation Centers and Farmer's Markets. In 2023, PRC deployed the at-home composting component of the pilot to 210 residents. For those who received 2 months of curbside collection, 53% remain customers as of July 2024, with over 15,000 pounds diverted to date. Residents who participated with the home systems most preferred the bokashi and backyard bins compared to vermicomposting and the other systems offered.

Invest in Infrastructure and Policy

- Develop a 1–2-acre site with in-vessel and static pile systems in conjunction with an expansion of the compost pilot that develops 24/7 drop-off networks and increases subsidized curbside access.
- Use policy to increase funds and eliminate barriers to composting. Advocate for increased surcharges on landfill tips, permit urban garden composting by rule, and improve the municipal and zoning codes.

Seek New Funds and Partnerships

- PA's 902, EPA's SWIFR, USDA's CFWR, and all other grants must be sought to fund organics diversion.
- Multi-Municipal and Public-Private Partnerships will be key to regional food waste diversion.

Operational Changes

- Focus staff on zero waste, ban organics from the landfill, and enhance data tracking and enforcement.

1.0 Compost Database and Analysis

1.1 Introduction

This project aimed to create a database for the City of Pittsburgh to inform a public directory of composters, accessible to residents, businesses, and institutions of assorted sizes. This directory also included confidential information about the composters for the City of Pittsburgh to use in future decision-making processes. 15 entities provided complete sets of information for the public database, but only 2 of those 15 responded to the most critical fields in the private dataset: Annual Theoretical Processing Capacity, Annual Actual Processing Capacity, and Annual Compost Production. Challenges arose in translating the data into a uniform understanding of "capacity" due to variations in measurement units and composting methods, further complicating the evaluation.

Pennsylvania Resources Council also researched to approximate the tonnages of organics produced and diverted in the region, as well as evaluating the theoretical boundaries of compost hauling and processing. In addition to this, PRC explored the opportunities, needs, and challenges of the region, evaluated issues related to permitting and policy, and addressed the City of Pittsburgh's current operations and data tracking to provide recommendations for the future.

Some of the key findings include:

- Allegheny County produced 1.55 million tons of waste in 2016. 28% was diverted via recycling, 4% was diverted via yard waste, and 0.12% was diverted via composting of food scraps.
- Allegheny County's municipal solid waste (MSW) includes 233,000-264,000 tons of food scraps and 140,000-170,000 tons of yard waste and miscellaneous organics or combined approximately 24.7%-27.8% of all MSW per the Department of Environmental Protection's 2022 Waste Characterization.
- It is estimated that Allegheny County's current infrastructure and capacity can manage between 30-40% of the yard waste produced. It can likely handle between 8-11% of the food scraps.
- New, resilient organics diversion systems must be explored at the residential scale, community scale, and commercial scale through a combination of public-private partnerships, private entrepreneurship, nonprofit and grassroots activities, and urban gardens and farming.

1.2 Infrastructure and Policy Findings

Infrastructure

The City of Pittsburgh is lacking the infrastructure to operate a successful composting system on a reasonable scale. The city's primary assets for collecting, transferring, and processing include:

1. AgRecycle: A commercial processor in Washington County about 25 miles away from Pittsburgh.
    a. AgRecycle operated a drop off in Pittsburgh which accepted food waste from private businesses but closed in 2024. A new site is being developed at an unknown location.
2. At least half a dozen small and medium-sized private businesses that haul organic waste.
    a. AgRecycle hauls their own waste via dumpsters and currently primarily accepts contracts with large businesses, universities, hospitals, et cetera.
    b. Carbon Compost, The Compost People, Zero Waste Wrangler and Roadrunner Recycling deliver material to AgRecycle via the closed distribution center or AgRecycle dumpsters.
    c. Worm Return and Shadyside Worms appear to process their own material.
    d. Most businesses contract both residential curbside and private business collection.
3. Community gardens are allowed to compost captive organic waste but often accept external scraps from the gardeners.
4. 3 of the 4 CitiParks Farmer's Markets host organic waste drop-off services from Worm Return.
5. Ecotone Renewables has over half a dozen digesters either deployed or ready for deployment.
    a. A digester was hosted at the Homewood Senior Center in 2023, and others are placed at or planned for the airport, the University of Pittsburgh, and around the city. These may not legally accept external food scraps without acquiring a state permit.

AgRecycle is the only large-scale processor in the region and has declined to comment on their facility's throughput and capacity. PRC estimates that they can theoretically process up to around 10-20% of the food waste in Pittsburgh – which is more than the hauling network can collect and deliver. AgRecycle receives an unknown volume of material from Southwestern Pennsylvania, West Virginia, and Ohio. All estimations on their capacity are based on their permit, processing type, and operational scale. The current collection infrastructure in the city likely cannot capture more than about 1% of the city's total

food waste. The networks for collection are relatively small, there are few points to consolidate large volumes of food waste for efficient transfer, and the only option for large-scale processing is expensive and has high fuel demand due to its distance, which reduces the environmental benefits of composting.

Investments in local infrastructure to collect and process material affordably is critical. One of the only systems to currently drop off food waste is via the CitiParks Farmer's Markets, but this program is limited in scope and only available for a few hours per day a few days per week. Members who participated in the composting pilot and provided feedback consistently ranked dropping off their scraps as one of their least favorite methods or options. Other drop off systems, such as the Big Belly Smart Compost program or those that are run by local businesses using different sized toters or dumpsters, could be viable if they are accessible 24/7 and with some barrier, however small, to ensure they are being used by educated individuals to achieve low rates of contamination. There is not one site with a state-issued permit to process food waste within Allegheny County. By developing a 1–2-acre site for community-scale food scrap processing in conjunction with a network of curbside collections and accessible drop-off points, many of the previously noted gaps can be considerably reduced, bringing some organic waste management under the municipal umbrella. Full operations could begin within 3 to 4 years with projects feasibly fundable via state and federal grants. This would generate revenue from tipping fees while establishing the base infrastructure needed within the city for more accessible and affordable composting, and all material that is not able to be processed on-site can be consolidated and shipped to AgRecycle in large batches, reducing the frequency of travel.

Policy

The current municipal code does not accommodate composting. The code is unclear, outdated, or overly prohibitive, and the Urban Agriculture zoning code does not contain any direct references to composting. In Section 619.14, which includes all composting activities including residential accessory use permitted by right, there are mandatory guidelines, such as those described in sub-section (b) "Standard Practices" and sub-section (d) "Prohibited Materials." Standard Practices requires composters to follow the practices outlined in the Department of Environmental Protections Permit # WMGM017. This permit, as of the passing of this ordinance in 2019, was designed for on-farm source-

separated composting up to 5 acres and processing food waste using windrows, aerated static piles, in-vessel systems, or with worms or black soldier flies. This guidance is not applicable to residential composting systems. Prohibited Materials states that composting activities may not incorporate meat, bones, fat, oil, eggs, dairy products, synthetic fibers, diseased plants, or human, cat, or dog wastes, or any other materials determined to be prohibited by the Director. The mandatory practices for composters are designed to create clean, pest-free, odor-free compost systems that are not vectors for disease, have no risk of combustion, and do not leach liquids into neighboring properties. These requirements can produce those results, but there are also methods of composting at small and large scales that can process some prohibited materials with no greater risks to health, safety, or cleanliness.

Aside from code changes, policies that create new revenue streams or funding opportunities for the city and prevent waste from being sent to the landfill are critical to support a zero-waste vision. PA House Bill 223, Session of 2023 would amend Act 101 of 1988 to increase the imposed surcharge on landfill and recycling disposal from $2.00/ton to $5.00/ton. This surcharge has not been changed since its implementation and would dramatically increase the amount of funding available through the DEP for composting and recycling grants. A Will of Council through the City Council could show support for this bill and move it forward. Additional Act 101 advocacy work includes increasing the number of recyclable materials listed within the bill to include organic waste and allowing organic waste to be counted toward recycling performance grants. These changes would increase funding opportunities for recycling projects and allow the city to ban food waste from being sent to the landfill. The city should seriously consider a Pay as You Throw system or a flat-rate fee structure for landfill and recycling to allow for new investments in staff and equipment to advance composting and improve existing services. Exemptions must be made to ensure low-income residents are not disproportionately affected. Policy changes must be leveraged to scale economies, drive community engagement, and prepare for decades of changes necessary for new streams of diversion.

1.3 Recommendations

1. **Develop Local Food Scrap Processing and Transferring Infrastructure**

A 2-acre site using aerated static piles, in-vessel systems, or other efficient methods may process up to 500 tons of food waste per year under the WMGM017 permit, even more under the WMGR025 permit. As the first step, the city should almost certainly establish an in-house yard waste composting site, which once successful can be scaled to incorporate food scraps over time. The city would not be required to complete a full permit to compost yard waste on less than 5 acres. Site plans from a 2021 conceptual design study by SCS Engineers should be referenced in developing a processing location.

The Bennett composting site in Philadelphia operates on a parcel less than one (1) acre in area and uses the space to process around 170 tons per year of food waste and export another 700 tons per year outside of the city to a centralized commercial facility around 30 miles away. This system of community-scale processing within the city and transferring excess material outside of the city would be an incredible asset to the region and could be viable within 5 years.

2. **Optimize and Expand Collection via Curbside Networks and Drop-Off Points**

The greatest and most demanded resource is affordable curbside collection. The average subsidized household in the curbside collection pilot generated 352 pounds of food waste per year. Approximately 1 ton of food waste will be diverted annually for every 6 households who receive curbside collection or around 4,820,000 pounds (2,400 tons) if 10% of the city's households receive curbside collection. The next best option is a set of drop-off points available 24/7 and located near generators (residents). At maximum capacity, a network of 10 drop sites with 50-gallon containers collected 6 times per week can capture several hundred tons of food waste over the course of a year.

3. **Competitively Pursue State and Federal Funding Streams for Composting**

The PA Department of Environmental Protection hosts several grants for recycling and composting. The city has previously used the 902 grant to support recycling education and to purchase recycling equipment, such as trucks, or bins for source-separated materials. In the future, composting projects should be targeted with these funds. Once received, the funds cannot be applied for again for 2 years. As of 2024, the PA Department of Agriculture has an Ag Innovation Fund, which could supply dollars

for advanced composting systems with the Regional Impact project grant offering up to $2 million in reimbursable funds. There is a 50% match required, and the City of Pittsburgh appears to be ineligible to directly apply – although it likely could provide technical assistance, matching funds, and support in developing projects and applications. At the federal level, the USDA's Composting and Food Waste Reduction grant has been annually offered for several years, which supported the original composting pilot and can provide up to $400,000 to support composting. The US EPA's newer Solid Waste Infrastructure for Recycling grant could provide up to $5,000,000 dollars for composting and food waste diversion, although it is currently at risk of being cut. Baltimore is building a facility that can compost 25,000 tons of material per year using these funds.

4. **Utilize Public-Private, Public-Nonprofit, and/or City-County Partnerships**

Municipally owned but externally operated infrastructure has been used in other cities, such as Philadelphia and Boston. Whether using public-private partnerships, nonprofits, or other governments, such as Allegheny County, the infrastructure that the region needs should not be exclusively profit driven and must be intentionally operated as a resource and service. If the city cannot internally manage the demands of a site, it can use municipally owned land and apply for the permit, contracting local businesses or nonprofits for operational purposes to allow the site to run efficiently.

5. **Introduce Policy to Encourage and Incentivize Composting and Disincentivize Landfilling**

Policy and code should encourage residential composting and clearly identify where composting at-scale can occur. The city should amend §619.14 by simplifying and altering the language to ease access to legal, clean, and safe composting within the city. Simultaneously, residential composting should be a permitted-by-right accessory use in Residential and H Districts as described in §912.02. Larger-scale composting sites that process material generated off-site and would need a permit from the DEP should also be incorporated into §911.04, distinguishing what districts to allow those activities in. Although it is likely outside of the city's power, bans will eventually need instated to deter landfilling organics.

6. **Call for Legislative Changes at the State Level**

The city should call upon the state legislature to pass bills that amend and expand Act 101 of 1988 to increase the landfill and recycling surcharge fee, as described in House Bill 223 of 2023. Additionally,

organic waste should be included in Act 101 recyclable materials, which should give the city regulatory authority over the organic waste stream. Ideally, organic waste other than yard waste could also count toward recycling performance grants. These changes would not force cities to recycle organic waste, but it would make it a legal option for them to develop their own bans and systems for managing it. Finally, the state 902 grant may not fund backyard composting or curbside collection systems and subsidies, which could be changed administratively to increase the applicability of funds.

7. **Enhance Mandated Reporting of Waste Data**

It is known that mandated reporting is difficult to enforce, but it is necessary to have accurate and actionable data on waste generation within the city. Enforcement measures should be enacted, and resources should be provided to acquire all data on landfill, recycling, and organic waste in the city. Additionally, the city should leverage the strength of Pittsburgh's 2030 District. Energy Star Portfolio Manager can accommodate waste data, and it would be a feat to work with the Green Building Alliance to make Pittsburgh's 2030 District track waste data alongside energy, water, and air quality.

2.0 Waste Audits

2.1 Introduction

PRC worked with two City of Pittsburgh recreation centers (Homewood's Healthy Active Living Center and Carrick's Phillips Recreation Center) three of the City's Farmer's Markets (Northside, East End, and Squirrel Hill), and one summer lunch program with the intent of providing baseline waste data. The waste audits were conducted over a two-year period with the first year providing baseline data and recommendations. A comprehensive report detailed the data and recommendations for waste minimization and improvements in waste capture systems. The second year provided technical assistance and support through an implementation or improvement phase and concluded with another set of waste audits conducted at all sites except for the summer lunch program. Periodically, PRC presented the findings and progress with the City of Pittsburgh and the participating recreation centers/markets.

2.2 Results

Through Year-1, six waste audits occurred on July 20 (Phillips), August 5 (Northside), August 14 (Squirrel Hill), August 15 (Mellon Park), September 19 (East End), and November 4 (Homewood HAL), all in 2022. PRC audited 168.3 pounds of waste. Throughout the Winter of 2022-2023, a report for the Year-1 audits was written that incorporated data findings/conclusions and recommendations for all the audited sites. It additionally included extrapolations that explored the annual greenhouse gas and environmental impact of the waste generated. Recommendations were oriented around improving purchasing and diversion tactics, covering site-specific recommendations to each of the audited locations such as how to improve physical infrastructure and signage. Implementation of some recommendations surrounding food waste composting occurred when the City of Pittsburgh piloted an Ecotone Renewable anaerobic digestion on the site of the Homewood Healthy Active Living Center and with goals set at the Phillips Recreation Center to develop an on-site hot composting program to manage captive-generated food waste. Other recommendations included the development of environmentally

preferred purchasing policies for City-operated programs that support the procurement of recyclable and compostable products, prioritizing waste reduction alongside diversion, supporting partnerships with food recovery organizations, and continuing to expand access to food scrap drop points within City-run farmer's markets. PRC determined that further audits of the summer lunch program would not yield useful results due to its miniscule waste footprint.

The Year-2 audits occurred in Summer of 2023 covering each of the sites (save for the Mellon Spray Park) once more throughout the timeframe of July and August of 2023, with analysis occurring again and weight totaling 159.3 pounds. Due to the short timeframe between recommendations and Year-2 audits, few were able to be fully implemented. All audited sites in Year 2 still showed potential improvements and demonstrated continued opportunities. In 2023, the Homewood HAL hosted an anaerobic digester through Ecotone Renewables which was able to divert much of their food scraps for the months it was active. Also, the Phillips Recreation Center is working to expand their on-site gardening and agriculture activities with a large, efficient composting system to divert on-site food scraps. Pittsburgh's Director of the Department of Parks and Recreation has identified interest in zero wasting the farmers' markets. PRC's recommendations from the 2022 audits stand as both feasible and impactful opportunities to reduce food waste and improve waste diversion from landfill across City of Pittsburgh programming, especially within Parks and Recreation.

To reference data impacts, between 2022 and 2023, there was a 5.3% total decrease in the amount of waste produced across all audited facilities, with noteworthy shifts in several waste streams. On average, we saw increased numbers for recyclables and decreased numbers for trash. The final diversion rate data from the Year 2 audits demonstrates the highest theoretically achievable impacts for waste diversion within the current system if recommendations are fully implemented. At the time of the audits, all waste at all locations was exclusively landfilled. The data shows the average potential diversion across all audits is 77.4%. The farmer's markets have the highest diversion potential, alongside the highest volumes of waste on average, with the East End and Squirrel Hill farmer's markets reaching 81.3% and 82.3% potential diversion from landfill based. Notable changes in waste streams year-to-year show increases in divertible materials and decreases in landfill materials such as:

- 5% reduction of total waste production
- 100% reduction of reusable materials (such as games, puzzles, or durable materials)
- 48% reduction of pre-consumer food scraps
- 182% increase of both compostable serving-ware (plates, bowls) and glass bottles
- 18% reduction of miscellaneous landfill waste
- 121% increase in cardboard

Complete Aggregate	2022 (pounds)	2023 (pounds)	Total Percent Difference
	168.3	159.3	-5.3%

3.0 Residential Composting Pilot

3.1 Introduction and Scope

PRC aimed to provide curbside collection, access to a drop-off network, or a home composting / food waste processing system to 300 residents across the City of Pittsburgh. The goal was 150 participants for subsidized curbside collection, 45 for backyard composting, 15 for worm composting, and 30 for bokashi. Additionally, 30 residents were offered a pilot with Mill, an in-home food waste dehydrator and grinder, with the remaining individuals intended to participate via the drop-off network. All equipment and curbside collection was funded through the National Resources Defense Council.

PRC developed a curriculum of workshops/trainings, selected and acquired home composting systems, and coordinated the logistics to set up curbside collection with all five of the local small hauling businesses. Once the City of Pittsburgh selected the participants for the pilot, PRC informed residents of their status as pilot participants, of the basic expectations of participation in workshops, engagement events, and surveys, and began hosting training workshops and distributing equipment. A second invitation was sent to increase the number of total participants after attrition from the first.

3.2 Education, Implementation, and Technical Assistance

PRC started with a litany of resources that we synthesized into a curriculum covering fundamentals first with additional modules for each type of composting. PRC developed comprehensive scripts and slide decks for each aspect of the pilot program using our own materials, a curriculum outline provided by the city, and curricula from universities and master composter courses. The hot composting methods included basic yard bins, rotating tumblers, and aerated yard bins, while the cold composting opportunities were vermicomposting and bokashi. The final methods of composting that received a smaller scale workshop included the curbside pick-ups, which focused on the logistics of establishing collection with a local hauler, the drop-off networks which covered the opportunities available for food waste drop-offs, and an introduction to Mill, a food waste dehydration system that was offered to a limited number of pilot participants through a collaboration with the company.

Home Composting Workshops and Distribution

The curriculum was trialed in a workshop hosted by the Department of City Planning in the City County Building in early July of 2023. Around the same time, audio recordings of the scripted content for the workshop curriculum and slide deck were taken in the sound stage with the Department of City Planning. We hosted the first in-person workshop at the Squirrel Hill branch of the Carnegie Library system on Sunday July 23rd, 2023, covering hot composting. A total of 12 pilot participants attended the workshop. The second in-person "hot" workshop took place at the Phillips Recreation Center in the neighborhood Carrick on July 24th, 2023. 4 participants attended and took their systems home with them. The third in-person workshop was hosted at the East Liberty branch of the Carnegie Library system on July 25th, 2023, and covered worm and bokashi composting. A total of 3 participants joined for the worm composting session and 8 people participated in the bokashi composting session. The fourth workshop was on July 26th, 2023, at the Carrick branch of the Carnegie Library system. It was attended by 9 participants – 3 for worm composting and 6 for bokashi composting. The fifth and sixth in-person workshops were hosted at the Allegheny branch of the Carnegie Library system on August 5th, 2023. The fifth session focused







on thermophilic methods and the sixth on worms and bokashi. At the hot composting workshop, 6 pilot members attended, and at the cold composting workshop, five members attended.

The first and second online workshops occurred virtually on August 9th, 2023. The first was focused on the curbside pick-up opportunity and the second used breakout rooms to cover both the thermophilic and the cold composting methods simultaneously. These online workshops were repeated on August 13th, 2023, totaling 4 synchronous, virtual workshops. On August 16th, the online participants were invited to Homewood, where PRC brought all materials and equipment for the composting pilot for them to collect. On August 22nd, 2023, full recordings of all the sessions were uploaded to PRC's YouTube channel. The four videos were scripted based on the material covered at the in-person and online sessions covering an introduction to the composting pilot (6 minutes, 6 seconds), the information needed for those doing drop-offs, curbside collection, or Mill subscriptions (5 minutes, 35 seconds), and one video each for the thermophilic (25 minutes, 30 seconds) and cold composting (25 minutes, 37 seconds) workshops. The playlist of videos has a total of 317 views.

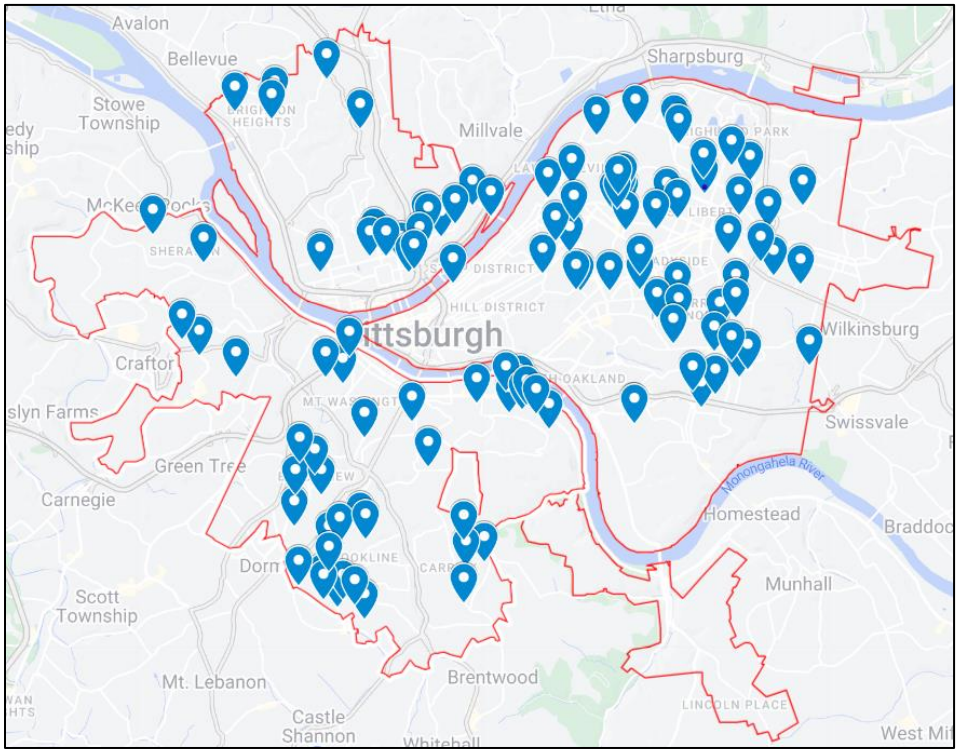
The videos were distributed to all participants of the composting pilot, regardless of whether they attended a workshop previously, so that they could be educational resources that members could return to periodically if they had questions. All individuals who had not received their equipment yet were given pick-up windows at PRC's office for the weeks following the recording post. Throughout the pilot, several individuals bowed out early for reasons such as health issues, moving out of town, loss of interest, et cetera, resulting in a total distribution of 10/15 rotating tumblers, 7/10 standard backyard composting bins, 13/20 aerated hot composting bins, 10/15 vermicomposting systems, and 26/30 bokashi systems. PRC distributed the remaining systems via external programming.

Subsidized Curbside Collection

PRC liaised between members of the pilot and the curbside collectors. All five of the local curbside operators (Carbon Compost, Shadyside Worms, The Compost People, Worm Return, and Zero Waste Wrangler) participated. Each of the businesses created a special customer code or special webpage for pilot members to access, and each of their services was discounted to $10/month for 8 weeks (2 months) of service. The one-time initiation fee of $15 was also covered. All offer biweekly or weekly

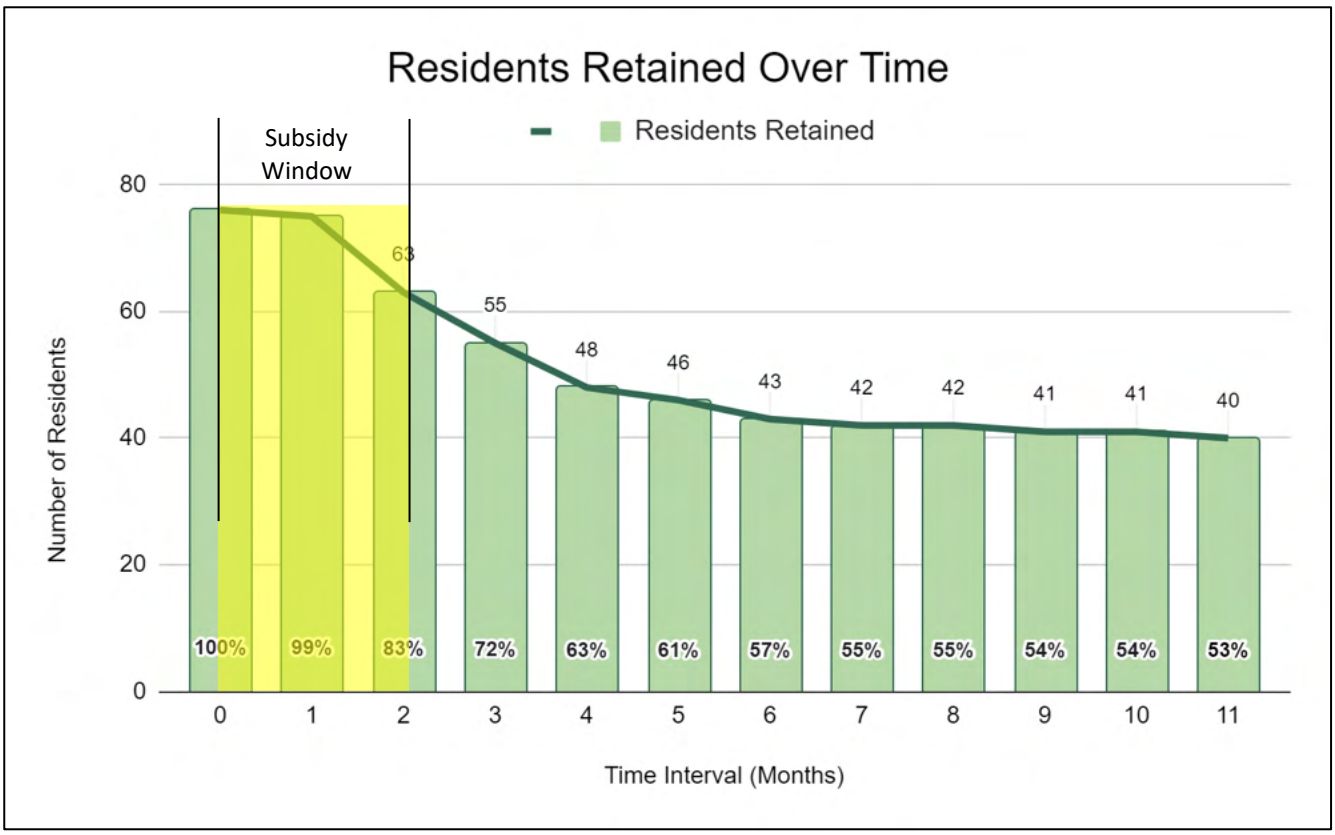
pickups and use buckets that are around 3-5 gallons with most offering the option for households to use several buckets at higher rates. The list of residents selected by the city and confirmed for participation in the curbside collection subsidy included 136 individuals.

PRC mapped addresses and developed spreadsheets to share with the compost hauling businesses. The businesses provided color coded zones using maps or shared the zip codes that they service, which were used to assign participants to the haulers. If a resident was serviceable by only one hauler, they were not offered a choice of hauler. If a resident was outside all service zones, Carbon Compost accepted them. PRC created overlays to distribute the remaining candidates across the five businesses with consideration for each of their unique service areas, providing a choice between two businesses. 117 total assignments were made. 55 total residents were assigned "uniquely," or to only a single business, and the remaining 62 were given a "shared" assignment and had the opportunity to choose their hauler of preference. 76 total individuals signed up for their subsidized collection with most starting their services between the final week of August 2023 and the first week of September 2023.



Distribution of Residents Assigned Curbside Subsidies

The businesses tracked the start and end (if applicable) of each of the households as well as the amount of food waste in pounds diverted. Shadyside Worms is the only hauler who does not keep exact data records and utilizes general times and averages, reducing the precision of his data. We distinguished between the amount collected throughout the subsidy and then all material collected after the subsidy through to July 2024. The total amount of material collected during the first two months of service was 3,863.4 pounds of food waste, averaging 50.8 pounds per household throughout the subsidy. Only 1 of the 76 participants cancelled their services before the end of the subsidy and only 12 cancelled their services at the end of the subsidy. 63 households chose to continue their services at full price once their discount ended, slowly falling off throughout the following months.



By the end of July 2024, 40 of the original 76 households remained, showing an 11-month retention of 53%. On average, residents stayed for 227 days, extending their services 5 months beyond the subsidy. By the end of July 2024, 15,331.5 pounds of material was collected. Retained residents generated an average of 27.9 pounds per month – 2.5 more pounds per month than the average during the subsidy. Extrapolated to annual waste generation, each household with curbside collection is composting an

average of 334.8 pounds. If this average holds among the general population, for every 1,000 households who receive curbside collection, 334,827 pounds (167.4 tons) would be composted. Against the original $3,946.00 investment, $11,918.00 was generated in gross revenue to the haulers – about $3.02 returned for every $1.00 put in. These metrics, alongside the successful retention of residents, demonstrate that the program was effective at diverting food waste from the landfill and at yielding impressive economic results from the original investment.

Curbside Collection Data

Total Customers	Residents Retained (Beyond Subsidy)	Residents Retained (to July '24)	Avg. Days Served	Pounds Collected (Under Subsidy)	Avg. Pounds per Month (Under Subsidy)	Est. Annual Generation per Household
76	63	40	227	3,863.4	25.4	334.8 Pounds

Original Investment	Est. Gross Revenue to Haulers from Pilot	Pounds Collected (through July '24)	Avg. Pounds/Month (Retained Residents)	Est. Annual Diversion Potential per 1,000 Households
$3,946.00	$11,918.00	15,331.5	27.9	334,827.3 Pounds

Ongoing Technical Assistance and Support

Throughout the duration of the months of implementation, when members of the pilot were setting up their systems and beginning to compost, PRC was accessible for technical assistance and support. Through our website, PRC established a "hotline" for participants to direct their questions to, which we would respond to promptly with advice to resolve their concerns. PRC fielded a total of 7 technical assistance inquiries throughout the months following the pilot via the form, with others reaching out directly to PRC staff via phone call and email when concerns arose.

3.3 Community Engagement and Surveying

Community Engagement Session

In October 2023, PRC hosted an event focused on the composting pilot and food scrap diversion programs within the City of Pittsburgh in collaboration with the City and City Council, the Pittsburgh Food Policy Council, and Pasa Sustainable Agriculture. There were approximately 75 attendees including members of the host organizations, small business owners in the field of curbside compost collection and compost processing, members of the SoilMillPGH composting pilot, and representatives from the City Council and City Planning. Attendees responded to prompts asking what a sustainable/resilient regional composting system would look like, how they would be composting in a perfect world, and if they participated in the compost pilot. About 60% of the attendees were members of the pilot. Most said that a resilient and sustainable composting system would be curbside collection with it being low cost and easy to understand regardless of your base knowledge level or resource access. Mirroring the previous prompt, in an ideal world most attendees asked for low-cost or subsidized curbside collection with a few noting that subsidized materials for backyard composting could be helpful as well, especially when paired with technical assistance.

The guided discussions used the frameworks of SWOT (Strength, Weakness, Opportunity, Threat) analyses, Bullseye Prioritization Diagrams, and Cost-Impact Matrices. Each table was led by a leader of one of the hosting organizations, a staff member of a Pittsburgh City Council district, or a community and environmental organizer. Compost Pilot participants engaged in the SWOT analyses and analyzed

the strengths and weaknesses of the composting pilot alongside the opportunities and threats to composting broadly. Community and organizational members – often more seasoned composters – participated in the bullseye prioritization diagrams, and community composters and composting business owners were prioritized for developing the cost-impact matrices. Some mixing of the stakeholder groups occurred to prevent total homogeny and encourage diverse discussion. PRC developed prompts and guiding questions for each discussion leader to utilize if organic discussion did not satisfy the expected level of engagement. In the SWOT analysis, the prompts focused on communication and clarity, quality of the orientations, and success in starting to compost. For the other tables, prompts focused on local infrastructure and policy, economics and partnerships, cost barriers, and overall impact of different projects, policies, and changes to organic diversion systems.



SWOT Analyses

Compost pilot members had excellent experiences broadly with the local compost haulers. Carbon Compost, Worm Return, and The Compost People were noted as providing high quality service and communication. Its strengths include convenience, little-to-no smell, large variety of accepted

materials, and the subsidization increased access dramatically. Attendees said bokashi composting was the strongest home composting method due to its quick fermentation process and the production of both compost tea and finished compost once completed. Attendees found more weaknesses than strengths in home composting methods. Several noted that the space and energy demanded from backyard and home composting was too high, the duration of time from start to harvesting finished compost was too long, and the type of material acceptable in all home composting methods (except bokashi) were too limited. The Exaco Aerobin was said to be difficult to set up. Several participants had issues with pests. The few complaints about curbside collection were that the compost bags were thin and breakable, the buckets were difficult to open, and the cost was too high. Some participants felt the orientations were unclear at times and desired more check-ins during the pilot.



Pilot members felt the greatest opportunities lie with education, accessing new funding streams, and capturing more materials. Education campaigns could lead to more home and neighborhood-based composting, especially if they leverage community gardens. They also hoped the city will pursue or allocate funds to subsidize home composting and pick-ups in the future and thoroughly enforce the fine system to penalize contaminated recycling and illegal dumping. Participants desired more frequent collections of yard waste and advancements in technology to give residents access to automated or

partially automated curbside collection. A few opportunities were also noted with creatively using finished compost, sending finished compost to community gardens, or encouraging the sale of finished compost on the market to generate revenue. The threats discussion created a list of needs and wants. Funding a long-term subsidized curbside or at-home composting program was the most desired – especially if access is given to low-income households. More composting classes and technical assistance programs for starting home systems were requested. Cost is one of the greatest threats to uptake. Other threats include a lack of infrastructure for composting at-scale in the city, the stigma of pest attraction, and high levels of contamination due to careless or uneducated composters. Successful methods must be low cost and pest resistant paired with quality education to eliminate contamination.

Bullseye Diagrams and Cost-Impact Matrices

The highest priority items in the bullseye diagrams included increasing and improving education, implementing local policy to develop composting, and increasing the convenience factor to elicit habitual change. These tables believed that unique solutions need to be proposed for residents, businesses, and institutions and that education needs to be distributed via the grassroots and the "grasstops." The most specific request in the center of the bullseye was a need to clarify the legality of centrally located, community-organized compost drop-offs. The current belief is, without a permit from PA's Department of Environmental Protection (DEP), food scraps generated off-site may not be



collected, stored, or processed at a given location. However, it is being questioned that if the organic material is totally contained, for example within air-tight, sealed buckets, can they be collected at a non-permitted site for drop-off and short-term storage if they are promptly removed for commercial composting at a permitted facility. Clarity about this could result in a campaign for policy change or the immediate implementation of new drop-off systems.



The middle level priorities request the development of a traditional or modified pay-as-you-throw system in the City of Pittsburgh that would create a base fee for trash and recycling disposal. Once this fee is established, the city can establish a rebate program or investments in composting. Residents who landfill large amounts of organic waste would be paying the cost via the weight or volume of their pick-ups and those who divert via composting would benefit. Another pathway is to expand the pilot's curbside collection system within neighborhoods to create dense routes of collection. The lowest priority level asks the city to develop a webpage to inform people about the environmental benefits of composting and co-existing with animals. They also note that calculating the social cost of carbon to demonstrate composting's benefits could be useful data to leverage.

Finally, the cost-impact matrix yielded the most specific requests for leveraging funds and policies to develop organics diversion systems. The low-cost, low-impact recommendation was to review the

National Resources Defense Council's model policy toolkits to inform decisions and create local policy. The low-cost, high-impact suggestions include developing composting systems at K-12 schools. We also must increase access to wood chips and browns for community gardens and composters, invest in education, and create a decentralized drop-off network for organics that uses gardens, parks, and other public, city-owned/operated locations. The only high-cost, low-impact idea is to develop a publicly accessible map of all community-based composting sites. The high-impact, high-cost recommendations start by asking for full-time staff in the city for composting work. Policy changes and infrastructure investments come next with the focus being permitted processing facilities and transfer stations. Philadelphia's Bennett Composting, a municipally owned site operated by a local business, processes and transfers over 800 tons of food waste annually on a property of less than 1 acre. This model should be replicated or translated to Pittsburgh. This team noted, at the county level, there are abandoned properties, such as old malls, that could serve as compost sites with the proper investments.



Engagement Session Survey Results

All attendees were surveyed at the event and responses were digitized for analysis. The one-page survey asked about their experience with composting, what types of composting they do, and what barriers they face. They were also asked to rank 1-4 (1 being best, 4 being worst) what the most

preferred types of composting are and to rank access to or quality of resources like equipment and technology, frequency of city yard waste collections, access to browns, and more. The survey concluded that curbside collection is the most preferred composting method with 71% of responses ranking it first. By average ranking, the next most preferred method is composting at a community garden, followed by at-home composting, and then the use of a drop-off network. These methods all scored similarly by average preference with gardens scoring 2.78, at-home 2.86, and drop offs 2.92. When considering frequency rather than average, at-home composting and drop-off networks change rank. 40% of participants ranked drop-off networks 3rd, while 45% ranked at-home composting as the worst. Either way, curbside and community gardens prevail as most preferred.

When controlling for variables (types of composting respondents do, experience level) curbside collection is most preferred regardless of respondent status as a beginner, intermediate, or expert composter or whether they currently compost at-home or curbside. Members of the composting pilot are the most skeptical of drop-off networks, while seasoned composters view them as viable. This may be related to the limited drop-off opportunities during the pilot. Drop points were available at 3 of 4 city farmers' markets, limiting access to a four-hour window every Sunday in Squirrel Hill, Monday in the East End, and Friday in the Northside. Some of the individuals who ranked the drop-off networks highly indicate familiarity with successful networks either by nature of participating in one or running a composting business. Composting at gardens is essentially a drop-off network, however, more people ranked gardens highly and indicated in other responses that the growing community is important.

Respondents will generally tolerate a cost up to $20/month for curbside services. Few would pay $30-50/month, while most prefer $0-10/month. Many who prefer no continuous cost are willing to put in the effort to compost at home. Active composters spend little to no money on the upkeep of their home systems and invest around 45 minutes per week to manage their established system. The major barriers that respondents face are space and cost. Easy access to browns for composting can be challenging, many people live in multi-family homes or apartments and cannot compost in the space they have available, and the amount that it costs to either commit to ongoing curbside collection or invest in equipment leaves many individuals isolated and unable to access composting systems.

The second ranking asked respondents to score 1-5 (1 being poor, 5 being excellent) the quality or access to education/resources, city yard waste collection, technology/equipment, growing community, local composting policy, public engagement, city-wide initiatives, city drop-off locations, and access to browns. Access and quality of education/resources and opportunities to grow community scored an average of 3.3 and 3.2 respectively, and they were the only 2 of the 9 to have an average score greater than 3. Access to technology/equipment and access to browns for composting both scored 2.5 with public engagement receiving a 2.4 and city-wide composting initiatives receiving a 2.3. The lowest scoring three include the city yard waste collections (1.9), local composting policy (1.8), and city food waste drop-off sites (1.7). Across all responses and categories, 31% of all scores were a 2 out of 5 and 28% of all scores was a 1 out of 5, indicating a negative skew in public perception everywhere except in quality of the community and access to educational resources.

City of Pittsburgh Surveys (October 2023, November 2023)

The first survey assessed the orientations and the first couple weeks of use with several before and after questions (e.g., how did you feel about your compost method before/after the orientation). These were scored 1-5 with higher scores indicating favorability or ease. Long form responses provided feedback on the orientations, setup, and first week composting. The second survey asked for feedback on whether participants hit snags with their systems, asked for feedback on the materials and equipment, and asked for feedback on the community engagement event hosted at Phipps on October 24th. Similarly, this survey generally used a combination of scores and long form responses.

Survey 1 received 122 responses from 38 participants who attended in-person workshops and 84 who were oriented online with synchronous virtual sessions or recordings. The responses were assessed using qualitative coding on the feedback-based responses and averages on the rankings. There were three questions used for qualitative analysis – *"Any thoughts or feedback on orientation?"*, *"Any thoughts or feedback about getting setup with your composting method?",* and *"Give us your highlights, thoughts, or feedback about the first weeks of composting?"* Responses were scored as promoting, detracting, or neutral based on keywords in the responses that indicated positive or negative feelings toward the orientation, setup, and general feedback after the first weeks. Trends were identified to

summarize the general sentiments across the questions and responses in each of the 7 categories ranging from high promotor to high detractor. As one point of quantitative reference, these trends were then compared to how each respondent ranked their difficulty in setting up their pilot method. A clear trend emerged that those who found the setup difficult also had increasingly negative remarks about the full process. When compared with the results of all other ranked questions, those with positive responses scored their feelings as higher than the average, while those with neutral or negative answers tended to score their feelings as below average in nearly every category. The average scores broadly indicate that most entered the pilot feeling great, that the orientation was mostly helpful, and that people's feelings and confidence greatly improved after attending an orientation.

	Pre-Orientation Feeling (Pilot)	Pre-Orientation Feeling (Composting)	Pre-Orientation Feeling (Method)	Helpfulness of Orientation	Post-Orientation Feeling (Pilot)	Post-Orientation Feeling (Composting)	Post-Orientation Feeling (Method)
Average Feeling	**3.9**	**3.5**	**3.1**	**3.8**	**4.2**	**4.1**	**4.1**
Highly Positive	3.7	3.6	3.9	4.4	4.6	4.5	4.7
Positive	4.0	3.5	3.1	4.2	4.6	4.2	4.3
Somewhat Positive	4.0	3.7	3.5	4.0	4.6	4.4	4.5
Neutral	3.9	3.3	2.7	3.2	3.7	3.8	3.7
Neutral Negative	3.2	3.0	2.4	3.0	2.8	3.4	2.8
Negative	3.8	3.8	2.5	2.5	3.3	3.8	3.5
Highly Negative	4.0	5.0	3.0	1.0	2.0	5.0	5.0

Average Difficulty Setting Up Pilot Method (Coded by Positive or Negative Response to Pilot)		Sum of Responses by Code	
Total Average Difficulty	**4.2**	**Total Responses**	**122**
High Positive	4.9	# High Positive	10
Positive	4.6	# Positive	52
Neutral Positive	4.2	# Neutral Positive	19
Neutral	3.6	# Neutral	31
Neutral Detractor	3.2	# Neutral Detractor	5
Detractor	2.75	# Detractor	4
High Detractor	2.0	# High Detractor	1

The second survey assessed participants' feelings about the compost pilot, the resources provided and offered opportunities for the pilot members to express their questions, concerns, or comments on their mode of composting (or food recycling). The survey was deployed after the community engagement workshop at Phipps, so it also provided a chance for people to score the impact of the session on their personal composting efforts, their participation in the pilot, and on the future of composting in Pittsburgh. This survey received 93 total responses. Most responses (45) stated that they have increased the amount they are composting. Nearly the same amount (44) say that they are composting the same and using the system regularly. Only 3 responses noted a decrease in their composting, 2 bokashi composters and 1 worm composter. Each method of composting received responses, with the response rate generally trending with the number of offerings made in each category (e.g., curbside pick-ups comprise most responses, and they were also the largest singular method piloted). 12 of the 93 respondents did attend the in-person community engagement session.

Through the responses, we learned that the bokashi composters were least confident in their food waste reduction process, which was attributed to either filling the bucket so quickly that they had nowhere to put their new food scraps while it fermented, to the complete opposite – they produced so little that the bucket was fermenting at a rate faster than they could add and the contents began spoiling, likely due to prolonged air penetration in the mostly empty bucket. The bokashi composters had otherwise positive reviews of their system, most had no problems, and they were one of the most

likely groups to consistently use their kitchen scrap collection pail. The other cold composting system (worms) received a very similar distribution of responses as bokashi scoring generally positively across the board, having very few concerns, and generally being favorable to the collection pail. Comments generally note that the worms are very slow eaters, and people mention that the worms are far more cumbersome and inconvenient to manage than a classic backyard pile or bin. Two bokashi composters and zero worm composters attended the community engagement session, and those who attended said it had very little impact but felt it added to the pilot experience and encouraged them.

The hot composters (FPMC Tumblers, Earth Machines, and Exaco Aerobins) trended closely enough to group them together in the analysis as well. They all scored their experiences very highly, suggesting their methods were easy to manage with few complaints or problems arising in this survey. The concerns that arose about the earth machine bins were primarily about equipment with participants wishing they had optional tools that the pilot did not provide for pest-proofing their setup or monitoring temperature with a thermometer. These respondents viewed the collection pails differently with the yard tumbler composters finding it fairly helpful and the other two system users finding it very helpful. The other two had similar concerns with being slightly difficult to build. The two people who attended the in-person session gave it perfect scores.

The final three methods (drop off, pick up, and the Mill) were mixed in their responses. Only two drop off composters responded, but both used their system regularly and liked the method well enough. The kitchen pails were critiqued here, and they noted concern with how they were going to drop off materials when the farmers' market season ended. The Mill received glowing reviews in terms of the composting process with most stated they were composting more than ever. It had some of the highest scores across the board, but the users of this system found the countertop pail to be useless considering the Mill itself is a countertop system. Some concerns were raised about energy consumption with one person noting it runs for 23 hours at a time regularly. Another person happened to note that by cleaning the filter daily and reducing the amount added to the machine to beneath the "max fill" line allowed it to run normally instead of having 24+ hour dehydration cycles. Finally, with pretty much the highest scores in total, the curbside collection participants. Rare concerns with the flimsiness/leakiness of the compostable bags used in the collection buckets were raised. Otherwise,

the only concerns are the cost being too high to maintain for some consumers. Generally, the kitchen pails were well utilized among this set of participants as well with some concerns about fruit flies.

System Type	# of Responses	Waste Reduction Process	Compost or Mill System	Helpfulness of Scrap Bin	Home Composting (Post Workshop)	Pilot Participation (Post Workshop)	Future of PGH Composting (Post Workshop)
Bokashi	8	3.75	3.375	4.5	1.5	3.5	3.5
Drop Off	2	5	4	3	N/A	N/A	N/A
Pick Up	50	4.7	4.56	4.04	4.125	4.375	3.25
Mill	7	4.86	3.86	1.57	N/A	N/A	N/A
Earth Machine	4	4.25	4	4.75	N/A	N/A	N/A
Aerobin	8	4.25	4.63	4.25	5	5	5
Worm	8	4	3.63	4.13	N/A	N/A	N/A
Yard Tumbler	6	4	4.17	3.67	5	5	5
Total / Averages	**93**	**4.47**	**4.27**	**3.82**	**3.83**	**4.33**	**3.58**

4.0 Feasibility Assessment

4.1 Obstacles to Implementation

1. **Education and Outreach**

Falsehoods and myths about composting persist and "wish-cycling" remains an obstacle to clean streams of material. Signage, direct engagement, and technical assistance is needed to get residents engaged and well-educated. Education must be a major component of any new programs in the city.

2. **Costs and Funding**

Composting must be more affordable for residents through rebates or subsidies. **Their cost tolerance for monthly curbside services hover between $10-20/month, and most prefer curbside over home composting**. The city cannot afford to invest in composting without leveraging state and federal funds. Initiation costs are high, but the city will later profit from tipping fees and selling finished compost.

3. **Infrastructure and Policy**

There is **not enough infrastructure** to collect Pittsburgh's food waste, nor is there enough to process it into compost. The region must develop new systems for **collection** (dense curbside routes, 24/7 drop-off points located near generators), **transferring** (locations to consolidate food waste to send outside of the city), and **processing** (sites that directly manage and transform organic waste into finished compost). Additionally, policy changes must occur at the city, state, and federal levels to increase funding for composting initiatives, expand the authority of the city to regulate its organic waste stream, and begin restructuring curbside collections of landfill and recycling to accommodate composting.

4.2 Recommendations to Scale Organics Processing and Collection

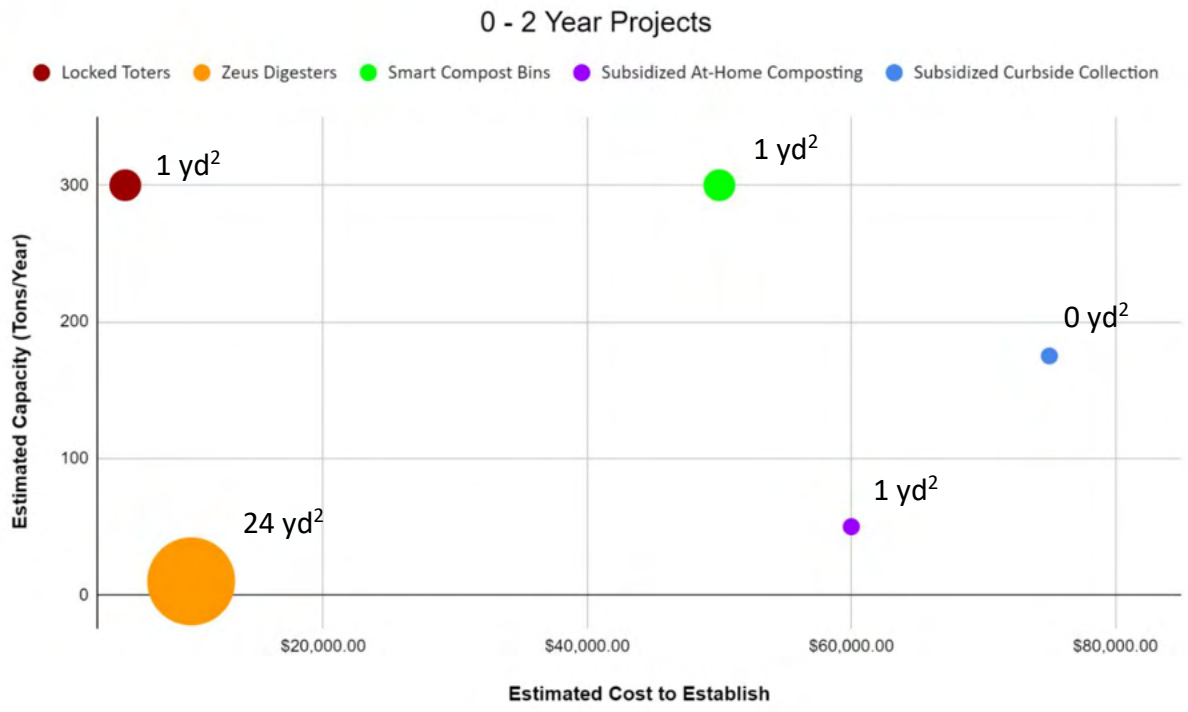
0 – 2 Year Decentralized Diversion Network: Currently Feasible

These projects are feasible via USDA Composting and Food Waste Reduction ($400,000), and/or DEP 902 ($150,000) grants. They improve on pilot methods to enhance home and community composting.

Method	Time to Establish	Annual Capacity	Estimated Cost to Establish	Area/Space	Permit	Outputs
EcoTone Digester (1)	0-2 Years	10-13 tons per digester	$1,000 set-up + $700/month Total Budget: $10,000	200 ft^2	Unknown	Nutrient-Rich Liquid
Locked Toters (10 Bins)	0-2 Years	300 tons, 35-gal bins at max capacity	$500/drop point Total Budget: $5,000 + Collection	1 yd^2 per bin	No	-
Smart Compost Drop-Off Network (10 Bins)	0-2 Years	300 tons, 35-gal bins at max capacity	$4,400/bin initiation fee + $500/bin/year Total Budget: $50,000 + Collection	1 yd^2 per bin	No	-
Curbside Collection (1,000)	0-2 Years	175 tons	$15/person initiation + $20/month/person Total Budget: $75,000	N/A	No	-
Subsidized At-Home Composting (1,000)	0-2 Years	50 tons	500 Bokashi: $35,000 500 FreeGarden: $25,000 Total Budget: $60,000	N/A	No	Finished Compost
Growing Community Gardens			Total Budget: $30,000			
Permitting Technical Assistance (2 Sites)			Total Budget: $40,000 – $50,000			

All methods above are achievable with the existing funds, infrastructure, and personnel. Assuming that the Ecotone Renewable digesters can be placed without a permit, they can be deployed in centrally located areas for drop-off access. An alternative compost drop-off network with locked containers is achievable to create 24/7 accessibility. Curbside collection should be deeply subsidized for 3 months using a “neighborhood expansion model” that targets dense neighborhoods across the city to develop efficient and economical routes for haulers. At-home composting subsidies should continue to invest in bokashi and standard thermophilic bin methods. Community gardens, limited in ability to compost due to vague but obstructive regulations at the state level, could be a great community composting asset if the regulatory tape is cleared and investments are made.

Due to the lack of permitted sites in the region, PRC additionally recommends investing in permitting technical assistance/contracted services to acquire the DEP WMGM017 or WMGR025 permit for up to 2 sites in advance of future projects to expand local processing.



3 – 5 Year Small and Community-Scale Processing: Possibly Feasible

These projects are feasible through federal grants like the USDA's CFWR ($400,000) or the EPA's SWIFR ($5,000,000), a compilation of funds from the local and state governments, or large private investments. There are successful examples that have been municipally and privately operated in peer cities. These four methods were prioritized due to their affordability for this scale and their high throughput with low acreage demanded. When accounting for major initiation costs (site development, equipment, staffing, et cetera), all projects should be possible with $3,000,000 or less.

Method	Time to Establish	Annual Capacity	Cost to Establish	Area/Space	Permit	Outputs
30 Yard Aerated In-Vessel (1)	2 – 4 Years	300 tons	Vessel Cost: $25,000 – (could be repurposed) Site Development: $125,000 Equipment: $650,000 Total Cost: $800,000	0.8 acres (Vessel + Curing Pad)	WMGM017 or WMGR025	Finished Compost
11.2 Yard In-Vessel Drum (EVT) (1)	2 – 4 Years	200 tons	Vessel Cost: $75,000 Site Development: $100,000 Equipment: $650,000 Total Cost: $825,000	0.5 acres (Vessel + Curing Pad)	WMGM017 or WMGR025	Finished Compost
Harp Renewable CX10 Aerobic Digester (1)	2 – 4 Years	400 tons	Vessel Cost: $145,000 + $5,000/year ongoing Site Development: $50,000 Equipment: $200,000 Total Cost: $400,000	0.25 acres Can be Indoors	WMGM017 or WMGR025	Dry Biofertilizer
Small-Scale Aerated Static Pile Processing	3 – 5 Years	500 to 1,000 tons	Site Development: $750,000 Equipment: $1,400,000 Total Cost: $3,000,000	2 acres	WMGM017 or WMGR025	Finished Compost

A set of repurposed, retrofitted 30-yard dumpsters can be placed on a 1-acre site for high volume processing with relatively low footprint. Retrofit kits with covers and piping are on the market for less than $10,000. Site development, such as electrical and curing pads are mid-level expenses, while equipment (hoppers, grinders, conveyors) can cost more than $200,000 each. Costs are similar for

rotating drums, but their mechanical complexity and lower throughput makes them a slightly worse choice. Another option is the CX10 Harp Digester, which can intake over 1 ton per day with the lowest spatial demand. The base vessel cost is $144,968 as of August 2024 with an equipment package available for $94,837 more that includes a shredder, hopper, and bin tipper. This method appears to be the most versatile with the best balance of initial cost, processing capacity, and footprint. Ongoing annual costs are about $5,000, which factors power consumption, filter and pad replacements, the remote monitoring subscription, and maintenance.



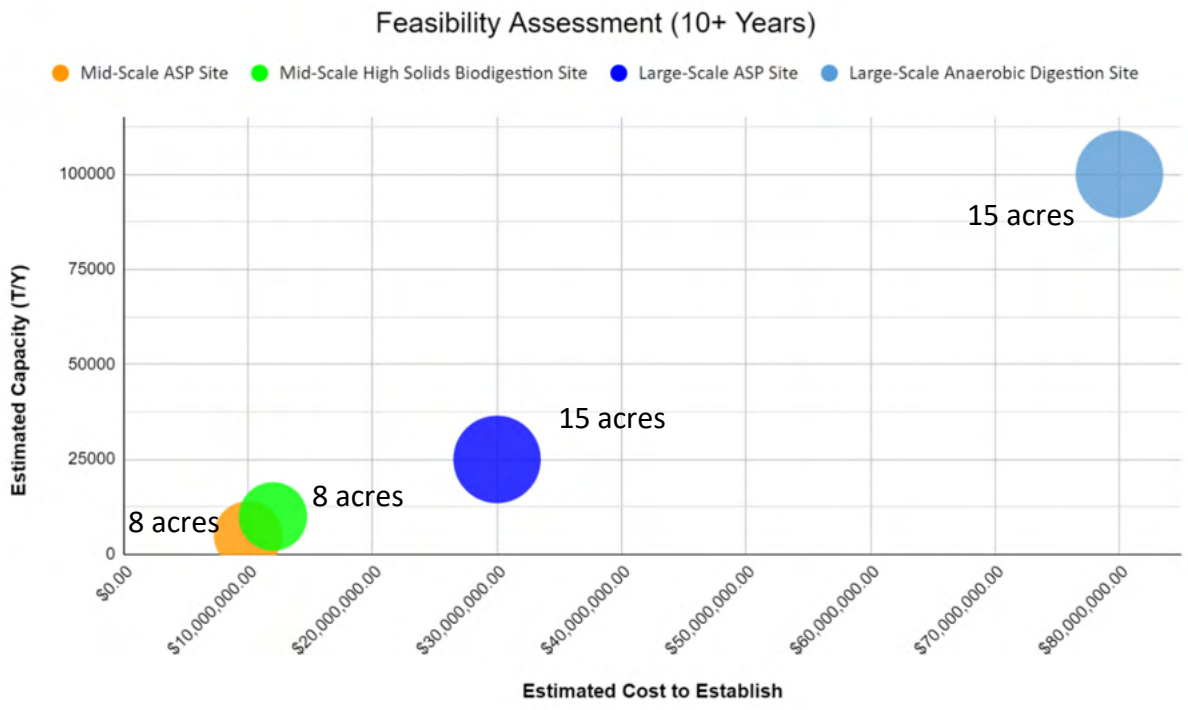
The final option is the translation of a bay-style aerated static pile system. On 2 acres, 500+ tons per year could be processed on-site with the ability to transfer more off-site. Costs rise when factoring equipment and the costs to develop a larger site and construct the required pads and bays.

PRC's recommendation for investment at this scale is a site with *both* ASP, such as AgriLab's HotBox, and in-vessel systems, with preference toward the Harp Digesters, to process the maximum volume possible at a lower resource intensity than the full aerated static pile site demands alone. Multiple

processing methods can also add resiliency to the system and increase efficiency. The WMGM017 permit caps the site at 2 acres, while the WMGR025 permit allows up to 15 acres but appears to require higher intensity monitoring, testing, and filtering for heavy metals and synthetic materials. With 3-5 years to plan and coordinate funding among public and private partners, a site as described should be attainable. Some turning is nearly inevitable, but windrow-exclusive composting sites are not recommended due to the emissions and odor that occur when turning, the initial and ongoing costs of equipment and labor for turning, and the lower processing efficiency. The budgets assume use of a parcel needing minimal grading, structures, and surface improvements. Some equipment, such as a front-loader, may already be owned by the city. Ongoing labor is not factored.

5 – 10 Year Mid- and Commercial-Scale Processing, Likely Infeasible

The final projects are likely infeasible without massive funding infusions via grants, direct investments, and private ownership. Their footprints extend up to 15 acres with costs as high as $80,000,000, but they are the type of infrastructure that could realistically process much or all the divertible food waste in the region. While the aerated static pile sites would be able to use the WMGR025 permit, anaerobic digestion at this scale does not yet have an applicable permit via the DEP. Like the previous small-scale projects, there are successful models of all the following methods across the United States.



These options are broadly infeasible without a paradigm shift and massive investment (most likely private) into the region's waste diversion ecosystem. Nonetheless, they serve as benchmarks and goals for what the region can implement and each of these facility types exists, including in locations with smaller populations (but better organics diversion laws/systems), such as Vermont. Due to the complexity of these sites, the costs are estimates and could fluctuate significantly based on land acquisitions, site development and remediation, and more. If any of these options were on the table, PRC would prioritize a mid-scale high solids dry digestion facility, as seen in San Jose, California with Zero Waste Energy, or a mid- to large-scale ASP site, such as the Chittenden Solid Waste Management District's system in Williston, Vermont. There are likely private partners, such as Northern Biogas or Northstar Recycling, who would make investments in regional infrastructure if the economic outcomes were favorable, but these systems deviate from the need for resilient, affordable, and community-focused infrastructure.

Method	Time to Establish	Annual Capacity	Cost to Establish	Area/Space	Permit	Outputs
Mid-Scale ASP	5 – 10 Years	5,000 tons	Total Est. Cost: $10,000,000	8 acres	WMGR025	Finished Compost
Mid-Scale High Solids Biodigestion	5 – 10 Years	10,000 tons	Total Est. Cost: $12,000,000	8 acres	Permit Does Not Exist	Methane, Digestate
Large-Scale ASP	10+ Years	25,000 tons	Total Est. Cost: $30,000,000	15 acres	WMGR025	Finished Compost
Large-Scale Anaerobic Digestion	10+ Years	100,000 tons	Total Est. Cost: $80,000,000	15 acres	Permit Does Not Exist	Methane, Digestate

Pennsylvania Resources Council
A Pennsylvania where nothing is wasted

Resources

Pittsburgh's Reports, Designs, Plans, and Legislation

- Roadmap to Zero Waste
- Climate Action Plan 3.0
- Recycling Division Performance Audit
- Conceptual Compost and Mulch Facility Design
- Municipal Code 619.14
- Zoning Code 912.02 and 912.07

State Legislation and Studies

- Act 101 of 1988
- House Bill 223 of 2023
- Department of Environmental Protection 2022 Waste Study

Research Articles and White Papers

- National Resources Defense Council PA Policy Gap Report
- ILSR Model Policy Library
- PennEnvironment 2023-2024 Legislative Priorities
- Institute for Local Self-Reliance PA Waste Surcharges
- US Composting Council's Organic Waste Ban Tracker
- Composting Consortium's Policymaker and Investors Guide
- Ohio Model Urban Agriculture and Community Composting Regulations
- Food Waste & Greenhouse Gas Emissions
- Municipal Food Scrap Composting in Mid-Sized Cities
- Decentralized Community Composting in Chicago
- Bioremediation via Composting
- Harp Renewable CX10 Digester
- AgriLab Hot Box 250
- Biocycle Composting Capital Cost Assessment
- Vermont Solid Waste Composting Technology Appendix
- DC Large-Scale Compost Site Feasibility Study