Roadmapping to Increased Diversion and the Circular Economy in the Cincinnati Region

A comprehensive report
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Beyond 34: Roadmap to Implementation

Rob and Melani Walton Sustainability Solutions Service

Arizona State University

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Abbreviations

ASU	Arizona State University
CSA	Current State Assessment
HCRSWD	Hamilton County Recycling and Solid Waste District
GCP	Green Cincinnati Plan
MRF	Material Recovery Facility
NIMBY	Not in my back yard
RMWSSS	Rob and Melani Walton Sustainability Solutions Service

Executive Summary

This Roadmap to Implementation is a strategic plan for implementing projects identified in the three-phase Beyond 34 model. In the first phase, the Current State Assessment evaluated the waste, recycling, and recovery systems for collecting, processing, diverting, and disposing of Cincinnati's municipal solid waste (MSW). The Current State Assessment included an assessment of the economic activity resulting from recycling and circular economy activities in Hamilton County and a stakeholder assessment, which help to identify the institutions and actors whose actions or services directly impact the targeted region's diversion.

The second phase, an Opportunity Analysis informed by working groups of local stakeholders, was executed to identify potential solutions to improve the rate of municipal solid waste diversion within Cincinnati. The Roadmap to Implementation, the third phase in the Beyond 34 model, coordinates with local stakeholders to develop a strategic plan for implementing projects from the Opportunity Analysis to advance increased diversion and support the transition to a circular economy.

During the development of the Roadmap, working groups of local stakeholders that had a direct or potential role in the recycling and recovery systems in Cincinnati were convened to provide their insights and potential solutions into the three focus areas:

- Organic Solutions
- Commercial Diversion Strategies
- Residential and Consumer Education Strategies

A leadership group was also formalized, consisting of municipal leaders and other stakeholders already working across project categories.

Within each of the three focus areas, various potential solutions were identified, including food rescue, composting, commercial and residential education and training, and regional collaboration, to establish consistent messaging and signage.

This process evaluated physical, technical, social, and financial barriers to the specific solutions and barriers that spanned project solutions, such as the onset of the COVID-19 pandemic. Finally, each of the project solutions was identified as Top Priority Solutions or Next Priority Solutions based on stakeholder preference, the implementation readiness of each solution, and the availability of engaged stakeholders, available feedstock, and potential funding. As the Roadmap is a living document, continued engagement and development of the stakeholder network will enable the further refinement of this prioritization and continued development of the functional and operational detailed planning as more information becomes available.

1. Introduction

This Roadmap to Implementation was developed to support increased waste diversion and a transition to a [circular economy](#) in the City of Cincinnati and the greater region. It is part of the third and final phase in the Beyond 34 three-phased model. The Current State Assessment, which analyzed the waste, recycling, and recovery systems for collecting, processing, diverting, and disposing of Cincinnati's municipal solid waste (MSW), was developed in the first phase and included an Economic Impact Assessment and an Institutional Analysis. The Economic Impact Assessment measured the economic activity that was generated from recycling and circular activities in the region. The Institutional Analysis conducted a stakeholder assessment of the institutions and actors whose actions or services directly impact the diversion, including its waste, recycling, and recovery systems. The stakeholder assessment evaluated the impactful stakeholder interactions and priorities, local policies, points of intervention, and social norms that have led to the current state of recycling in the region.

The Current State Assessment supported the project stakeholders in understanding the waste and recycling material stream flows and processes as they currently function. The Opportunity Analysis, created in the second phase of Beyond 34, was guided by the Current State Assessment and working groups of local stakeholders who identified potential solutions to improve the rate of municipal solid waste diversion within Cincinnati.

This Roadmap is a strategic plan for implementing the potential projects that were identified in the Opportunity Analysis and further developed by the local stakeholders. The Roadmap is intended to be an adaptable tool focused on overcoming barriers, implementing solutions, and providing a guiding, collaboratively developed, strategic vision towards an increase in diversion and a transition to a more circular economy.

1.1 Project Partners

[Beyond 34](#) is a multi-stakeholder initiative led by the [U.S. Chamber of Commerce Foundation](#) (The Chamber Foundation), aimed at increasing the baseline 34% recycling rate in the U.S. by providing a scalable model to optimize recycling and recovery systems. For this implementation of Beyond 34, The Chamber Foundation partnered with the [Rob and Melani Walton Sustainability Solutions Service](#) (RMWSSS) at Arizona State University (ASU).

2. Beyond a 34% Diversion Rate

2.1 A Vision for the Future - Developing a Strategy to Exceed 34% Diversion Rate

The circular economy is an approach to structuring economic activities to be regenerative by design and aims to decouple growth from the consumption of finite resources. In a circular economy, economic activity is designed to maximize the useful life of resources to benefit businesses, society, and the environment[1]. Cincinnati has opportunities to leverage the Beyond 34 platform and various forms of local capital (social, intellectual, experiential, cultural, financial, and material[2]) to redefine and reimagine material recovery for the region and move toward a more circular economy. According to the Hamilton County Solid Waste Composition Study, 62.2% of Cincinnati's landfilled material is divertible material that can be recycled, recovered, or composted[3]. This creates numerous possibilities for mobilizing municipal systems and local stakeholders to increase diversion rates and develop local circular economy solutions by creating capacity for increased diversion of existing material recovery streams and new source-separated collection of additional divertible material streams.

In 2018, Cincinnati enacted its second Climate Protection Action Plan, referred to as the Green Cincinnati Plan (GCP). The GCP established citywide goals towards becoming a more sustainable city. Beyond 34 has sought to identify projects that can support the City of Cincinnati in meeting goals set by the GCP.

Beyond 34 can amplify and drive local and national attention to the City of Cincinnati's initiatives, such as the Cincinnati Innovation District, to support investment in job creation in innovative industries and attract start-ups and Fortune 500 companies to Cincinnati. Innovation across the recycling and recovery value chain is critical to increasing diversion and to ensure that the City of Cincinnati can continue to provide high-quality service to its residents as materials in the waste stream continue to evolve.

3. Roadmap Development Process

This Roadmap establishes a strategic plan for implementing prioritized interventions to increase the diversion rate in Cincinnati. The level of planning in this Roadmap is meant

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[1] The circular economy in detail: https://www.ellenmacarthurfoundation.org/explore/the-circular-economy-in-detail

[2] Eight forms of capital: E. Roland http://appleseedpermaculture.com/wp-content/uploads/2011/04/8_Forms_of_Capital_PM68.pdf

[3] Hamilton County waste characterization: http://www.hamiltoncountyrecycles.org/UserFiles/Servers/Server_3788196/File/EnvironmentalServices/SolidWaste/About/Hamilton%20County%20WCS%202018%20Final%20Report.pdf

to create the foundation for more functional and operational levels of detailed planning as information becomes available.

During the Roadmap development, three working groups were formed, gathering stakeholders based on their role or potential role in Cincinnati's recycling and recovery systems. The three working groups focused on organics solutions, commercial diversion strategies, and residential and consumer education strategies. The stakeholders invited to these working groups included local and regional public representatives, local businesses, local non-governmental organizations, and regional environmental organizations. Lastly, a leadership group was created and convened consisting of municipal leaders and other stakeholders impactful to all project categories.

Each of the working groups convened to provide insights and potential solutions for relevant project categories. Prior to the meetings, members were provided documents outlining the topic of the meeting, potential solutions to be investigated, prior research that led to the prioritization of these solutions, and questions to be answered to support the implementation of potential solutions. Due to the COVID-19 pandemic, all working groups met virtually and the working group meetings were recorded. Upon completion of each meeting, a thematic analysis of the transcripts was completed that synthesized the common barriers, opportunities, resources, or other topics of conversation from the meeting.

The insights and knowledge that was generated from these working groups supported the development of this Roadmap. For readability and functional purposes, there are no citations for the information that was generated during the workshop. Where specific information is stated without citation, it should be assumed that the information was generated during the working group meetings.

3.1 Selected Project Categories

Organics Solutions

The goal for increased diversion of organics is to develop a comprehensive system of reducing and diverting organic waste through methods such as developing education techniques on food waste prevention, expanding technological assets that aid in donating excess food, and developing additional composting options for food waste in the community.

Commercial Diversion Strategies

The goal of the commercial diversion strategies is to increase commercial waste diversion in the region and spread learnings to the larger Cincinnati commercial community. Projects will focus on the expanded deployment of enhanced waste audit

resources and instructional material for all regional commercial entities, particularly in highly-trafficked and high employment commercial spaces.

Residential and Consumer Education Strategies

The goal for enhancing residential and consumer education strategies is to ensure that Greater Cincinnati residents across housing types and demographics are provided with consistent messaging and are fully empowered to engage in recycling and material recovery best practices. Projects will focus on optimizing and expanding existing education efforts through public-private collaboration and distribution of key instructional material such as updated recycling cart labels and will aim to effect demonstrable behavior change beyond general awareness.

4. Top Priority Projects

4.1 Organics Solutions

Create Collaborative Food Rescue Support Systems

Cincinnati is home to various food pantries, such as Cincinnati Freestore Foodbank and local food rescue organizations like La Soupe Cincinnati. Although existing food rescue

programs are in place, there is still surplus food from grocers and kitchens that can be redistributed to those in need of food assistance in the Cincinnati region. Generally speaking, the health care sector, which is the largest employer in the Cincinnati region, generates substantial food waste and may also benefit from additional technical assistance.[45]

In addition to the food banks listed above, there are many tools and programs that support businesses and organizations engaging in food rescue, such as Leanpath, Food Rescue US (application used by La Soupe), MealsConnect (application used by Freestore Food Bank), and Last Mile Food Rescue Cincinnati. These tools all provide different features that suit users with different needs.

To help enhance this suite of tools available to the region, Goodr has been identified as a useful addition given its unique use case and features. Goodr is a paid technology platform that provides robust logistical support and advanced tracking for commercial

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[4] Hospitals save when they reduce food waste - L. Hegwer, 2019: https://www.hfma.org/topics/operations-management/article/hospitals-save-when-they-reduce-food-waste.html

[5] U.S. Bureau of labor statistics: https://www.bls.gov/emp/tables/employment-by-major-industry-sector.htm

and non-profit entities engaged in food rescue. For logistical support, Goodr coordinates the specific donors with regional receiving agencies and connects paid couriers to execute pickups and drop-offs, either through their system of drivers or through leveraging third-party services like Postmates. Reliable pickup and drop off services that leverage volunteer couriers such as LastMile Food Rescue, Food Rescue US, and MealsConnect, are available. However, Goodr's system of paid couriers could be useful for organizations that have heightened security requirements or more limited time windows for when they need food donations picked up or delivered or where a full-service concierge approach might be required (e.g., packaging of the food is needed after an event).

Goodr's platform also allows businesses and organizations to track the amount of food they are donating in order to realize the federal tax incentives awarded for food donations. The tracking system also helps identify food products that are consistently being wasted so businesses can optimize their inventory and procurement. Both of these features help businesses realize a significant financial return for their successful food donations and operational savings. Finally, the tracking system also helps quantify the environmental benefits realized by users of the platform in terms of greenhouse gas emissions avoided by sending food waste to landfills, which can be incorporated into enterprise sustainability reports.

In addition to enhancing the suite of tools available in Cincinnati, a supplementary deliverable is recommended that would offer comprehensive guidance for businesses and organizations on the tools and pathways available to them and address any key challenges to successful food rescue in the region. One such challenge is that liability concerns prevent several organizations from engaging in food rescue. They do not realize that they are protected from liability when donating food in good faith under the Bill Emerson Good Samaritan Food Donation Act.[6] Another challenge is refrigeration requirements and capacity. It is common for organizations supporting the hungry to have limited refrigeration capacity and some food donations that they receive may be close to expiration or time sensitive per health regulations. Additionally, food donations often occur outside the normal, often limited, business hours of a food pantry, creating logistical barriers. There is a need to streamline the process of getting the food to pantries, food banks, and soup kitchens, as well as a need to optimize refrigeration usage, increase capacity, and coordinate donations outside of normal business hours. Further research could provide insights into the donation behavior and capacities of

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[6] Clinton, W. J., Gingrich, N., & Thurmond, S. (n.d.). Protecting Our Food Partners: The Federal Bill Emerson Good Samaritan Food Donation Act. Retrieved December 15, 2020, from https://www.feedingamerica.org/about-us/partners/become-a-product-partner/food-partners

those providing the food for rescue and those involved in receiving and storing food donations, leading to more efficient use of food storage.

While local rescue organizations can likely offer information regarding the types, quantities, and flows of donated food in the greater Cincinnati region, the County Health Department can offer support on food handling requirements. Following the Beyond 34 approach of collaboration and engagement, local implementers can seek solutions with rescue organizations operating in Cincinnati to identify current donation levels and the untapped opportunities for additional food rescue.

Develop a Centralized Composting Facility

The goal of the centralized compost intervention is to establish the infrastructure to provide organic waste recovery and composting to Cincinnati citizens and businesses

by developing a large-scale compost facility for the region. Organic material provides the greatest opportunity for increased diversion within Cincinnati. As identified in the Current State Assessment, within Cincinnati's current residential MSW stream, 11,044 tons of food waste and 9,463 tons of yard waste are sent to the landfill. The commercial sector's organic

waste stream also provides significant opportunities for increased diversion. While some yard waste is being diverted, there are no large-scale food waste collection and composting programs within the Cincinnati region. Current food waste generators pay to have their compostable material trucked out of the region, utilizing business such as Go Zero. Deploying a centralized compost facility local to Cincinnati would significantly expand access to a more local, sustainable end-of-life option for residents and businesses for their organic waste and provide a valuable economic output for the region in the finished compost. The goal of developing a compost facility would be to process a minimum of 10,000 tons of organic material annually. The Department of Public Services currently provides yard waste collection every other week from April through the second week of January. This program collects over 5,000 tons annually, has a residential participation rate of 75%, and captures approximately 50% of the yard waste material generated by participating residents.

Opportunities for increased diversion include increasing residential participation in yard waste composting and capturing more of the yard waste generated by residents who already participate, in addition to providing new pathways for residential food waste composting. The system could also provide collection or drop-off options for commercial landscaping businesses and commercial food waste generators of all types.

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Previous efforts for centralized composting in the region experienced challenges regarding odor control. To overcome this, proper siting coupled with material mix and management strategies must be employed to reduce or eliminate potential odors. Covered or enclosed facilities could also help to mitigate these issues.

As a critical next step to assess feasibility, project implementers can collaborate with compost system developers and operators to identify the proper ownership model and site for the proposed facility and potential sources for organic feedstock to ensure a consistent supply, and off-takers of the finished compost.

4.2 Commercial Diversion Strategies

Waste Audit Trainings and Toolkit

Waste audits can help companies understand and quantify what is in their waste stream, identify opportunities to divert more material, and establish baseline metrics to measure the success of their diversion efforts. Additionally, conducting a waste audit may reveal opportunities for businesses to optimize their procurement and waste management system resulting in financial benefits. However, local stakeholders have identified barriers associated with developing this capacity within businesses. For example, some companies have expressed interest in obtaining a better understanding of their waste stream through a waste audit but lack a reliable, affordable way to complete one or do not believe they have the in-house expertise to conduct one themselves.

As such, project leaders are expanding upon the current waste audit training programs offered by Hamilton County Recycling and Solid Waste District (RSWD) to develop a comprehensive waste audit toolkit for commercial entities. Though based in Hamilton County RSWD programming, the toolkit will be accessible by and relevant to commercial organizations across the region.

This toolkit will help explain the business case for conducting a waste audit by pulling from successful real-world examples and providing comprehensive step-by-step guidance on each of the different types of waste audits available to companies, ranging from procurement audits to walk-through waste stream analyses. It will incorporate case studies, in the form of filmed instructional waste audits conducted at actual businesses in Cincinnati, at several different types of locations representative of Cincinnati's different business sectors. Testimonials by local businesses leading in waste management and circular practices will also be embedded in the toolkit to expand peer-to-peer learning opportunities.

Project leaders can engage "green teams" from businesses around the region to expand access to waste audit resources and ultimately help develop and leverage the

toolkit. Regional organizations, such as Green Umbrella, can help extend the reach of programming to municipalities within and outside Hamilton County for broader geographic relevance.

Internal planning among project leaders and stakeholders will be done to identify which businesses are interested in a waste audit toolkit for Cincinnati's commercial sector. Additionally, considerations must be made regarding COVID-19 as the operationalization and execution of waste audits traditionally require close, in-person collaboration.

Educational Collateral

Educational and contextually relevant messaging has been shown to be important for increasing the diversion rate in different regions[7]. Implementing an effective commercial waste diversion program requires robust employee and customer participation and education on the proper disposal of the different material streams. Local stakeholders have identified opportunities to increase consistency in the recycling messaging and instruction being conveyed to local commercial entities and their patrons. Easily identifiable signage that clearly displays what is recyclable and what is landfilled can help reduce confusion around recycling and waste disposal, increase participation, and decrease contamination in the commercial and public spaces recycling streams.

It is recommended to introduce a tool that creates customized signage for businesses to communicate which materials can be diverted. A user-friendly online tool would allow managers of commercial and public spaces to create signage for their storefronts or property that displays images and instructions on recyclable products and materials that are most relevant to their employees and customers. For instance, restaurants that sell beverages in plastic bottles could generate signage with prominent placement of those bottles as recyclable materials and instruction to dispose of them in nearby recycling bins. Two existing platforms have been identified as successful models that can be replicated and offered to stakeholders in the region:

- San Francisco's DIY recycling Sign Maker
- The Recycling Partnership's DIYSigns for Recycling

To enhance consistency in the messaging presented to Cincinnati region constituents, it would be preferred to create a similar online tool that contains the standardized images used by the local waste hauler, Rumpke, in other places such as the residential recycling carts in the region.

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[7] Success stories in recycling – EPA 2019: https://www.epa.gov/sites/production/files/2019-11/documents/americarecyclessuccess_2019_v3.pdf

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4.3 Residential and Consumer Education Strategies

Recycling Cart Label Replacements

The primary goal of any recycling communication plan is to convey to the public the proper recycling practices that increase diversion and reduce the amount of contamination in the recycling stream. One of the most significant opportunities for education is at the residential recycling carts themselves. Currently, many of the labels on residential carts deployed around Cincinnati are due for replacement. Updated and modernized signage can provide both a common message for what is recyclable within the community and customized messaging to address specific challenges such as high contamination, such as plastic bags, in the recycle bins.

Rumpke, the local waste management company serving many of Cincinnati's residents and commercial entities, owns and operates the Material Recovery Facility (MRF) that is used by the majority of the Cincinnati region. Rumpke periodically updates their cart labels to reflect up-to-date and modernized instruction and is currently in the process of doing so. Once fully developed, these labels will need to be properly applied to all carts deployed in Cincinnati. While Rumpke will apply the updated labels to all new carts, supplementary funding and human resources for the application of the labels can greatly accelerate their deployment on all existing carts.

One possible source for the funding is the series of Ohio EPA Recycling grants, a portion of which are designed to support projects that can reduce contamination, as the updated labels will include instruction on common contaminants in the Cincinnati region waste stream. If certain grants are limited to state and local governments or nonprofit organizations, municipal waste managers or local nonprofits can collaborate with the hauler to apply for the grant. Supplementary funding could help sponsor the additional labor costs required for label deployment. Project leaders can also approach volunteer organizations focused on environmental improvement projects to assist, such as local university environmental students or local chapters of national environmental organizations.

Connect Public and Private Communications Efforts

Communication that is widespread and consistent throughout the region is anticipated to be effective in increasing public participation in and knowledge of local recycling guidelines and processes. One identified opportunity for collaboration within the region is between the public and the private sectors. Businesses involved with Beyond 34 Cincinnati could collaborate with the municipalities to establish regional specific best practices that will guide the development of a communication strategy. Several of the local businesses that have been involved in the Beyond 34 initiative in Cincinnati could

have insights about how to communicate a unified message across regional and municipal barriers effectively. Local stakeholders have suggested a focus on messaging that appeals to residents' informal social rules and norms while communicating that recycling is integral to Cincinnati's identity as opposed to the more traditional approach of stating the financial or environmental benefits from recycling.

Annual collaboration on communication planning between the municipalities in the Cincinnati region already occurs. From these collaborations, effective content has been generated; however, more efforts to coordinate this content distribution at a greater scale would benefit the region. To enhance regional communication campaigns, municipalities in the region can establish a common template for communication campaigns based on established protocols from other municipalities to communicate and pool resources. Additional elements that local stakeholders have identified as possible areas for improving these regional efforts are outlined in section 5.3.

5. Next Priority Projects

5.1 Organics Solutions

Decentralized Food Waste Composting Options

In addition to centralized composting, a decentralized compost intervention could provide citizens with distributed composting infrastructure that can be deployed quickly and at a low cost. Analysis of the existing decentralized composting facilities located in Ohio, outside of Hamilton County, indicates that a decentralized composting facility can process ~300 tons of organic material, primarily food waste, per year with a small footprint, ~500 ft^2, and has relatively low financing and start-up requirements. As analyzed in this solution, decentralized facilities can obtain feedstock through food waste collection schemes from residential single-family and multi-family households and drop-off availability for residents and commercial businesses. As identified in the Current State Assessment, all 11,044 tons of food waste in the current residential MSW stream are sent to the landfill.

It should be noted that there are opportunities for both the centralized and decentralized composting facilities to co-exist and operate in the same region. Large scale centralized composting generally obtains feedstock from commercial haulers, landscapers, and commercial food waste generators. Smaller decentralized units support distributed processing, which could support smaller residential food waste collection and local residential yard waste. Better Bin Compost and Queen City Commons are existing food

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waste collection and small scale composting businesses in Cincinnati that could be leveraged to feed larger decentralized or centralized facilities sited in Greater Cincinnati.

The opportunity for citizen education and exposure to food waste composting could prove to be a highly valuable step toward the addition of a larger centralized compost facility. Well managed, small composting facilities could help change the "NIMBY" (Not in my backyard) perspective that many residents often have on composting facilities. Proper material mix and management strategies can be employed to reduce or eliminate potential odors. Covered or enclosed facilities could also help to mitigate these issues.

5.2 Commercial Diversion Strategies

Provide Diversion for Multi-family living

There is a lack of recycling infrastructure in Cincinnati's downtown region, partially due to the prevalence of apartment buildings that traditionally do not offer recycling to their residents. A proposed solution for this is to build relationships with property management companies so that their tenants have access to reliable recycling options. Another proposed solution is to identify and further develop Cincinnati's current infrastructure and rules to incentivize and include multi-family developments in their current recycling collections.

It should also be noted that multi-family communities often do not have the same access to recycling resources. Providing accessible education and resources for multi-family residents regarding opportunities where they can access recycling and reuse practices could increase participation. Being inclusive to more communities can increase the amount of waste diverted from landfills and reduce the amount of contaminants appearing at local sorting facilities.

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5.3 Residential and Consumer Education Strategies

Leverage Simple Messaging and Instructions

Residents often believe that industry terminology or jargon is complicated, leading to confusion and a lack of understanding of what is recyclable and what is not. The vocabulary used to inform and direct the public needs to be simplified, getting away from industry jargon and into layman terms that the public can understand.

Simple messaging strategies that encourage clean recycling of the most common recyclable material can empower residents to recycle correctly. Providing lists of the top ten recyclable items or the top ten contaminants could simplify a messaging campaign.

Food waste and film plastics are the primary contaminants found in recycling facilities. Contamination results in a higher cost of separating the material and lowers the value of the recycled material. Simple slogans such as "clean and empty" or "when in doubt, throw it out" can build confidence in residents who want to recycle right.

Designing a messaging strategy around the proper disposal of cardboard recyclables could include instructions on how to break down cardboard boxes and to remove items inside of boxes prior to recycling, which can reduce the presence of food waste and other contaminants showing up at recycling facilities.

Focus on Plastic

Plastic films, such as plastic shopping bags, are the most significant contaminant within Rumpke's MRF processing. Designing messaging around proper disposal of plastics, such as "hard plastics only", will inform residents of the differences between recyclable and non-recyclable plastics. In addition, providing residents with locations that commonly accept plastic grocery bags for recycling, such as grocery stores, may help decrease plastic-film contaminants at the recycling facilities.

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Enhance Existing Digital Educational Campaign

Due to the COVID-19 pandemic, there has been an increase in residential presence online as more individuals work remotely due to social distancing guidelines in the area. As a result, digital educational material should be enhanced to reflect the changes in residential behavior. Doing so could increase accessibility to more residents with limited financial resources.

Forging partnerships with universities can expand access to resources and intellect to strategize the best tactics for educating the public. Utilizing the resources of the University of Cincinnati and other colleges and universities may prove useful in identifying specific motivators to educate and encourage more of the public to properly divert their waste from landfills.

6. Overcoming Barriers

6.1 Physical and Technological Barriers

There are few commonly used diversion metrics that support goal-setting and are easily communicated to residents. The most commonly used waste diversion metric is the diversion rate. This weight-based metric represents the percentage of the total material generated in the waste and diversion streams that is diverted. This metric lacks specificity regarding the detail of the material composition of the waste or recycling streams and does not:

- Provide an understanding of how much of the waste stream is recyclable
- Indicate how much recyclable material ends up in the waste stream
- Identify whether a municipality is generating less waste overall
- Provide an understanding of how residents can recycle better
- Reflect the changing nature of the material stream where the composition of both the waste and diversion streams is continually evolving as new packaging and materials are introduced into the consumer marketplace

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Identifying a location for composting or recycling facilities can be difficult. These facilities generally have poor public support and "NIMBY" issues because of the additional traffic, often consisting of garbage trucks and long-haul trucks, and the potential for the odor that can spread to nearby residential communities.

6.2 Social and Cultural Barriers

Social and cultural barriers can be found in the behavioral patterns of businesses and residents. These behavior patterns are often the result of local and cultural norms, local policies, and societal disruptions such as COVID-19. The development of strategies based on an awareness of these barriers can encourage behavior change.

- Waste contamination in the recycling stream is a social barrier resulting from the lack of understanding and/or an incentive to properly recycle material or understand what material is allowed in the recycle bin and the negative impacts that contamination has on the processing of the recycled materials. The most common contaminants in Greater Cincinnati are plastic films (i.e., plastic bags, newspaper bags, trash bags, etc.) and food waste. Rumpke and the local municipal waste managers are conducting substantial efforts to decrease the contamination rate, including collaboration with The Recycling Partnership for local programming to reduce contamination. Several of the Beyond 34 projects enumerated in this report aim to supplement these efforts and further decrease contamination.

- There is a perceived confusion regarding what materials in Cincinnati are recyclable, possibly reducing confidence in or motivation towards participation in recycling initiatives. Local stakeholders have identified this as an opportunity for improvement by expanding existing messaging campaigns to develop a unified messaging system for the greater region.

6.3 Economic and Financial Barriers

- The implementation stage of diversion projects will require continued engagement with stakeholders, recruiting entrepreneurs, and processing technology into the region to ensure sustained support and sufficient funding.

- A lack of partnerships with the business community can create barriers in commercial diversion activities and miss the opportunity of involving the private sector in broader waste diversion activities. Additional collaboration between commercial, municipal, and NGO stakeholders in the design and implementation of the projects enumerated in this report will offer increased commercial diversion

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and leverage the unique strengths of the Cincinnati business community in educating local consumers and residents.

7. Conclusion and Next Steps

7.1 Implementation Post-Pandemic

The impact of the 2020 COVID-19 pandemic has had a halting effect on many industries and government agencies. At the onset of the pandemic, the Beyond 34 initiative in Cincinnati was evaluating the opportunities identified in the Current State Assessment and meeting with the stakeholders.

Throughout this period, the Beyond 34 Initiative continued remotely, engaging with stakeholders, analyzing opportunities, and developing this Roadmap. At the same time, many businesses and government agencies were able to continue providing their services in new ways, developing new business models that supported social distancing or remotely serving residents and customers. With the onset of the pandemic, the necessity of improving and expanding recycling and recovery systems could not be more important. An increase in the number of restaurants offering take-out and delivery services, online shopping, and people eating more at home has resulted in an increase in single-use disposables and an increase in the amount of recyclable materials entering the waste stream. Corresponding to this increase in single-use disposables has been and more confusion on what is recyclable. Addressing these issues will require innovation and stakeholder collaboration and offers the opportunity to implement the initiatives outlined above in this Roadmap.

The following are gaps that will need to be addressed moving forward to bolster this action plan for implementation:

- What can be funded, and what are possible external funding sources?
- Who are the individual stakeholders to implement and track the proposed projects?
- What are the metrics of each potential project for measuring success and communicating results to the community and project funders?

In addition, the pandemic raises additional questions:

- What potential projects can be executed safely regarding COVID-19?
- What potential projects must be executed after the safe suppression of COVID-19 and the return to normalcy?
- What modifications are necessary to implement projects throughout COVID-19 and to sustain success in a post-COVID-19 environment?

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Framing an action plan around these core questions will help identify and overcome additional barriers to implementation and inform the feasibility of each project plan.

7.2 Ongoing Engagement Opportunities and Chamber Foundation Support

Moving forward, the U.S. Chamber of Commerce Foundation will support the local project leaders in the implementation of these projects. The Chamber Foundation will continue to coordinate and connect interested regional and national stakeholders to enhance these projects through collaborative strategic planning, operational support, amplification, or financing. For more information, engagement opportunities, and connections to local project leaders, please email the Chamber Foundation's Beyond 34 team at Beyond34@uschamber.com.

Additionally, through multiple channels, including the Beyond 34 website, the Chamber Foundation will capture and disseminate success stories, best practices, and impact metrics that result from the explicit projects enumerated in this report, as well as Beyond 34 efforts supporting other municipalities. Resources resulting from this regional effort will be incorporated into the comprehensive Recycling and Recovery Resources Hub. This will be coupled with a forthcoming cross-regional measurement and evaluation effort to measure progress across other regions that implement the Beyond 34 Initiative.

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