

Creating a Circular and Decarbonized Economy

# Michigan Food Waste Roadmap: A Plan to Reduce Food Loss and Waste in Michigan by 50 Percent



## Project Team

**Michigan Sustainable Business Forum** is a nonprofit organization that promotes business practices that advance climate leadership, social justice and the creation of a circular economy. We are Michigan's leading organization for sustainability practitioners, serving its most recognizable brands, largest employers and most innovative entrepreneurs, advocates, educators, and the public sector. Through our campaigns and advocacy, we serve partners and diverse stakeholders as a boundary organization committed to the development of sustainability practices, policies and partnerships.

**Make Food Not Waste** is a Detroit-based nonprofit dedicated to eliminating food waste in order to promote climate health. The organization has grown significantly since its founding in 2017 by focusing on developing strong community partnerships and filling critical gaps in the local food system. Its key programs include: the Upcycling Kitchens where chefs process edible, nutritious food that would otherwise be wasted; The PLEDGE on Food Waste™, a training and certification program for foodservice operations; and education and advising for households, government agencies, and food-related businesses.

**Center for EcoTechnology** is an innovative non-profit organization that envisions a world that has embraced and advanced just and resilient climate solutions. They offer practical solutions to tackle climate change and build a just and equitable transition to the low-carbon economy by working with partners throughout the United States to transform the way we live and work. For nearly 50 years, CET's work has encouraged a better community, economy, and environment by implementing and scaling the environmental solutions that communities need to thrive.

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**We would also like to highlight the following resources from which this Roadmap draws substantial inspiration:**

- MI Healthy Climate Plan
- ReFED: A RoadMap to Reduce U.S. Food Waste by 20 Percent
- The ReFED Insights Engine
- Zero Food Waste Coalition: Achieving Zero Food Waste: A State Policy Toolkit
- National Resources Defense Council: Great Lakes Food Waste Policy Gap Analysis and Inventory
- Harvard Law School Food Law and Policy Clinic
- RMI and Industrious Labs: Priority Climate Action Plan Guide
- The Governor's Food Security Council Final Report 2022
- Big Hunger: The Unholy Alliance Between Corporate America and Anti-Hunger Groups
- NextCycle Gap Analysis
- Project Drawdown Reduced Food Waste Solution
- United Nations Sustainable Development Goal 12.3: Responsible Consumption and Production, Food Loss & Waste
- United States Environmental Protection Agency (2023): 2019 Wasted Food Report: Estimates of generation and management of wasted food in the United States in 2019
- RE-AMP Network: Guidance on Addressing Midwestern Emissions from Waste Disposal

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## Executive Summary

Michigan disposes of as much as 1.5 million tons of food waste<sup>1</sup> through its municipal and commercial waste stream each year, the single largest source of material disposed of in the state's landfills and waste-to-energy facilities. Food waste is responsible for an estimated 11.1 million metric tons of carbon dioxide equivalent emissions (MmtCO<sub>2</sub>e) and \$11.9 billion in lost revenue in the state.<sup>2</sup> Nationally, it is estimated that as much as 30 to 40 percent of food purchased is wasted.<sup>3</sup> Project Drawdown has highlighted food waste as one of the most impactful solutions to address climate change.<sup>4</sup>

There is enormous economic and environmental value lost to waste within local and regional food systems in Michigan that could be retained with efforts to promote less-wasteful, money-saving practices among farms, manufacturers, retailers, foodservice and other business and institutional stakeholders in the food system, and to retain value through reuse options, donation strategies or secondary markets.

Food loss and food waste present a unique intersectional opportunity to advance climate solutions, improve sustainable materials management, and promote social and environmental justice in Michigan communities. With federal Inflation Reduction Act funding and MI Healthy Climate Plan leadership seeding climate planning and associated actions throughout the state, and the new Part 115 planning process mandating and funding parallel efforts to improve local and regional materials management across Michigan, there is an unprecedented opportunity for communities to advance food waste reduction.

With intentional investments in waste prevention strategies, the rescue and recovery of surplus food, and organics recycling, Michigan will take substantial steps toward its climate and circular economy goals, reducing total emissions by upwards of 5 million metric tons of CO<sub>2</sub>e (MmtCO<sub>2</sub>e) each year and increasing the recycling rate by half, while creating an additional 4 billion meals.<sup>5</sup>

The Michigan Wasted Food Reduction Goal is a combination of prevention, rescue and recycling:

**50%**

**50 percent reduction of food waste sent to Michigan landfills** (and waste-to-energy facilities) through diversion of approximately 600,000 tons of additional material per year to compost, anaerobic digestion, or animal feed.

**25%**

**25 percent reduction in total wasted food in the Michigan food system** through prevention and rescue strategies (food loss and waste reduction), approximately 600,000 tons per year.<sup>6</sup>

**50%**

For a combined 1.2 million tons of food loss and waste removed from the system per year, **achieving a 50 percent total reduction based on a 2021 baseline** defined by the ReFED Insights Engine.



## Project Purpose

The Michigan Food System Waste Reduction Roadmap Initiative was a stakeholder-driven process to create a strategy for the state to reduce waste and loss in the Michigan food system. A partnership between Michigan Sustainable Business Forum, Make Food Not Waste, Michigan Department of Environment, Great Lakes and Energy (EGLE), and other state and national organizations, the initiative set out to create a plan for the state to reduce food loss and waste by half by 2030, the goal recommended in the MI Healthy Climate Plan.

The Roadmap identifies barriers to the implementation of the 50 percent reduction goal and highlights potential solutions and opportunities. This document outlines a pollution prevention strategy to complement the end-of-life investments the state is making through the Renew Michigan Fund and its sustainable materials management programs. Recommendations will guide state and local policy makers on potential incentives, funding mechanisms, technical assistance, outreach, policy changes and other programs that could be developed to reduce food waste among businesses and institutions in the farming, food manufacturing, foodservice and grocery retail sectors. Further, it attempts to create a shared language for Michigan businesses, institutions and other stakeholders working to reduce food waste and loss in the state.

Although end-of-life strategies and organics recycling is briefly discussed, the Roadmap is heavily weighted on pollution prevention, highlighting approaches for waste prevention and the rescue or recovery of surplus food, commonly referred to as food loss and waste reduction.

This is the first in a series of Creating a Circular and Decarbonized Economy reports produced by Michigan Sustainable Business Forum.



## Summary of Work

Michigan Sustainable Business Forum was the lead applicant to a Community Pollution Prevention Grant request for proposals issued by EGLE in 2022, alongside Make Food Not Waste, Center for EcoTechnology and other funders. The original RFP requested an analysis of waste reduction opportunities for farmers, food manufacturers and grocery retailers in Michigan, as those were the sectors deemed the best opportunities for support from existing or hypothetical programs available through the Sustainability Section of the EGLE Materials Management Division, which was championing the issue.

The Roadmap expanded this scope to include foodservice and a limited review of residential and consumer food waste, better aligning our efforts with that of the global and national programs that had inspired EGLE's interest. The project team began its work in late 2022 with the following objectives:

- Create a baseline document of farmers, food manufacturers, grocery retailers and foodservice in Michigan, identifying organizations that have implemented food waste reduction strategies, and evaluating those strategies.
- Identify barriers and analyze the effectiveness of current policies, programs, and outreach, targeting food farmers, manufacturers, grocery retailers and foodservice to adopt food waste reduction strategies.
- Document findings and write a Roadmap for supporting proposed food waste reduction outreach and incentive programs for farmers, food manufacturers and grocery retailers.
- Analyze and make recommendations on potential collaboration among and between federal, state, and local agencies to increase adoption of food waste reduction strategies.
- Host multiple stakeholder engagements to identify barriers to adoption and solicit feedback for recommendations.
- Hold discussions with relevant stakeholders and incorporate comments into the Roadmap.
- Inform constituents and discuss next steps.

In 2023, the project team and a coalition of public and private sector stakeholders met a total of 12 times to develop a work plan and review recommendations and other work products to meet the above objectives, this included:

- A series of brainstorming sessions with the advisory council.
- Recruited stakeholder representatives to participate in the project through interviews, meetings, reviews and contribution of data and resources.
- Primary research in the form of stakeholder interviews and focus groups with more than 100 business and community leaders representing diverse industries, roles and disciplines in the Michigan and Great Lakes food system, as well as national experts.
- Secondary research to inventory current state of the art for food waste and loss reduction in the target industries, and the key programs working to address issues.
- Review of current policies and programs relevant to food waste and loss reduction in Michigan.
- Review of current policies and programs from neighboring states in the Great Lakes and elsewhere in the country to establish benchmarks for best practices, common barriers and case studies for the target industries.
- Hosted a series of meetings with stakeholders to develop recommendations and hear testimony from expert witnesses.
- Drafted interim recommendations to inform fiscal year 2024 P2 grant RFP.
- Drafted this Roadmap report for stakeholder review.

In the fourth quarter of 2023, the project team executed a “road show” of meetings and presentations to gather feedback on recommendations, from which it developed this report. The Roadmap project team met once more in 2023. After that time, interested parties were invited to reconvene to execute its objectives through public and private-sector collaborations.



## Summary of Findings

**Michigan must act with a sense of urgency to leverage opportunities created by federal funding to address climate change and the state's new materials management planning mandates. Decisions are being made at this time which could impact its ability to fully invest in food loss and waste reduction, which is paramount to a robust emissions reduction strategy.**

With federal Inflation Reduction Act funding and MI Healthy Climate Plan leadership seeding climate planning and associated actions throughout the state, and the new Part 115 planning process mandating and funding parallel efforts to improve local and regional materials management across the state, there is an unprecedented opportunity for communities to advance food loss and waste reduction.

Opportunities created by IRA funding will occur during the next 12 to 24 months. Decisions related to Climate Pollution Reduction Grants are happening now. Michigan food businesses are also investing heavily in sustainability initiatives in response to investor pressure and consumer demand, especially climate solutions and circularity. Michigan should be prepared to support those efforts.

Further, Michigan has an opportunity to take a leadership role in food loss and waste reduction among Great Lakes states.

**Food waste will not be addressed strictly through environmental regulation or sustainable business practices, but a broad coalition of interests, disciplines, scales, and public and private-sector partners.**

Although this report is prepared for EGLE and its sister agencies in state and federal government, it is a call to action for all of Michigan's local governments, businesses and their non-profit partners. The food system is diverse and complicated, and addressing its inefficiencies and opportunities will require participation

and leadership at all levels of government, and across many different industries, including consumers themselves. As the co-benefits of food loss and waste reduction include improved business performance, lower costs of living, improved food security, and community empowerment, in addition to conspicuous environmental benefits, there is ample incentive for such a coalition to emerge if adequately resourced and incentivized.

This is already occurring at a limited scale, with food businesses and non-profit organizations already making investments to improve their practices with the resources available.

**There is a strong business case for food waste prevention, and the private sector will invest in recommended solutions if given adequate technical support, resources, an encouraging and supportive regulatory environment, and as necessary, capital for investment.**

There are competing drivers in the food system, with market expectations and consumer preferences encouraging decisions that create surplus and waste. Food loss is also insidious; businesses do not generally know how much value they are losing to inefficient practices, nor are low-margin operations prepared to make extraordinary investments to divert surplus product to the charitable food system.

However, food waste prevention, or food loss and waste reduction (FLWR), has been proven to lower costs and increase profitability in most sectors, with prominent examples of Michigan companies earning substantial savings through relatively accessible strategies.

If environmental sustainability and food security are not adequate motivation in the face of contradictory influences, a return on investment can be demonstrated through incentives that lower upfront costs or remove practical barriers.

**Reducing food loss is an economic opportunity for Michigan's farms and food manufacturers.**

Approximately a billion dollars of economic value is lost each year to Michigan's farms and food

manufacturers as unharvested food, shrinkage, or other inefficiencies in the supply chain. Farms are burdened with unpredictable market conditions, increasingly common extreme weather events, demanding quality expectations, and shortages in processing capacity, storage, or labor. Food processors and manufacturers are missing opportunities to optimize production or create new revenue streams.

Michigan can make farms more productive and profitable by investing in food loss and waste reduction, protecting its agricultural heritage while improving environmental outcomes: Development of imperfect and surplus produce channels, optimized market data and technology, and infrastructure for processing and storage.

Through its food manufacturers, Michigan could further position itself as a national leader on climate by championing food loss and waste prevention through industry innovation. Its long history of manufacturing excellence, research ecosystem, and industry clusters can support advancements in process efficiency, byproduct utilization (upcycling), packaging design and acceleration of entrepreneurial ideas.

### **Education, engagement and tools that promote behavior change will benefit food waste prevention across the supply chain, but especially consumer-facing businesses.**

A majority of food loss and waste happens in homes and consumer-facing businesses such as grocery stores, restaurants, and other businesses that sell and serve food. These operations need tools to improve their understanding of food waste causes and create more efficient processes. Management, workers, and especially consumers will benefit from education and engagement that is clear, consistent and accessible, in addition to improved food waste measurement.

### **Food rescue is one of Michigan's most successful strategies for addressing food loss and waste, despite considerable operational barriers, an environmental success story that benefits efforts to address hunger and**

### **promote justice. To keep pace with the 50% reduction goal, the amount of donated food in the charitable food system must double, while not distracting from efforts to address root causes of food insecurity.**

The charitable food system, also known as the “emergency food” or hunger-relief sector, serves an important role. The food banks and agencies that ensure Michigan residents have access to essential nutrition need food sources, and rescue of surplus food (or upcycling of food byproducts) is a meaningful supply source.

It is arguably Michigan's most successful means of preventing food loss and waste, with a long history of diversion. In fact, substantially more surplus food is processed through Michigan charities than through its commercial compost facilities.<sup>7</sup>

Arithmetic suggests that the 4.38 billion meals that ReFED estimates are wasted in Michigan each year would be enough to feed the 1.3 million people that face food insecurity in the state, according to the Michigan Food Security Council. With recent increases in grocery prices, the charitable food system has an increased demand for donated surplus food.

If Michigan were to divert just five percent of its food waste to the 4,653 hunger-relief agencies and programs served by its food banks, it would overwhelm its current distribution network, more than doubling the amount of food by pound that was distributed during the most recent year for which data is available. For rescue strategies to have a meaningful impact, capacity to receive and distribute donated food must double or triple over the next decade.

### **Michigan must continue to invest in development of end-of-life strategies for organics material, especially food waste.**

Current efforts to increase the processing of food waste are insufficient to meet the food waste reduction goal outlined in this report, as the infrastructure does not currently exist to divert this material from landfill.



## Summary of Recommendations

To achieve the level of investment necessary to reach the Michigan Wasted Food Goal, supportive state policies are critical. The Roadmap team reviewed recommendations through a series of stakeholder meetings during the summer and fall of 2023.

### **Priority Recommended Actions: Grants, Technical Assistance and Programs**

- Grant support to develop capacity for community and industry engagement, and to conduct educational campaigns on the prevalence of food waste in Michigan and opportunities to reduce emissions, lower household or business expenses, save money, address food insecurity and other outcomes through adoption of prevention strategies or donation of surplus food, including but not limited to date label interpretation and donation liability.
- Grant support for temperature-controlled food distribution and storage infrastructure, food storage equipment and transportation to facilitate donation, and pilot projects for rescue, upcycling, clarification of date labels, and/or access to new secondary markets.
- Grant support and technical assistance to develop a consistent and regular data collection and characterization process for surplus food supplies and food scraps within industry sectors and local communities, and/or promotion of standardized metrics for food waste, in order to measure and manage food loss and waste hotspots.
- Grant support and/or technical assistance to develop local or regional action plans that incorporate food loss waste reduction into climate action plans, or to develop pilot projects to advance existing FLWR goals in local climate action plans.
- Underwrite cost of wasted food technology solutions and associated tools for small to medium-sized food businesses in Michigan.
- Designate the Community Pollution Prevention Fund Grant for food loss and waste reduction exclusively, and increase the grant allocation and size of grants.

- Expand the Michigan Materials Marketplace to include surplus food solutions and technical support to food businesses seeking solutions.
- Support the continuation of the Michigan Food Waste Roadmap initiative through sponsorship of a Michigan Wasted Food Network.
- Create an EGLE or State of Michigan staff position to support food loss and waste prevention.

#### **Priority Recommended Actions: Agency Leadership and Collaboration**

- Create a multi-agency task force or council within the State of Michigan to support industry improvements and ensure funding opportunities are leveraged for improvements in wasted food prevention.
- Publish and regularly update an inventory of grant programs that could be leveraged for food loss and waste infrastructure investments across state and federal agencies, including the expansion of processing capacity, temperature-controlled storage, or site-specific equipment and technology upgrades.
- Through executive order, affirm support for the 50% food reduction goal.
- Execute an aggressive, multi-agency effort to educate businesses and the general public on liability protections and food safety for food donations and share tables: Require training for health inspectors on liability protection. Require county health departments to include information on food donation on their web sites and as leave-behind materials during inspections and educational events. Require local health departments to publish clear guidance on share tables.

#### **Priority Recommended Actions: Legislation**

- Create a funding mechanism for infrastructure investments that advance wasted food prevention.
- Establish guidelines explicitly allowing the donation or freezing of food after a quality-based date. Amend Michigan law and/or its interpretation to differentiate between quality and safety labels, and provide further clarity and standardization on required labels.
- Amend law to explicitly provide permission to donate after the quality-based date, and potentially, provide reasonable liability protections for doing so. Clarify law (e.g.: Food Safety Modernization Act) to indicate what foods can and can not be donated, and to execute recommendations in the section above that are not permissible by current law.
- Establish a Michigan tax credit for donation of surplus food and associated costs. Ensure that this is structured as a tax credit (versus a deduction) with no more than a reasonable limit, and that it is based on fair market value. Offer additional tax credits for transportation and processing costs
- Evaluate potential for a ban on the disposal of surplus food and food scraps in municipal and industrial solid waste through a phased approach, preceded by several years of investments in education and infrastructure, as is now underway in other states.

# Aggregated Recommended Actions

## Community Engagement and Collaboration

- Provide grant support to develop capacity for community and industry engagement, and to conduct educational campaigns on the prevalence of food waste in Michigan and opportunities to reduce emissions, lower household or business expenses, save money, address food insecurity and other outcomes through adoption of prevention strategies or donation of surplus food, including but not limited to date label interpretation and donation liability.
- Designate the Community Pollution Prevention Fund Grant for Food Loss and Waste Reduction exclusively, and increase the grant allocation and size of grants.
- Provide grant support and/or technical assistance to develop local or regional action plans that incorporate food loss waste reduction into climate action plans or to develop pilot projects to advance existing FLWR goals in local climate action plans.
- Technical support and administrative guidance for the inclusion of FLWR in CPRG grants and in Part 115 sustainable materials management plans.
- Deploy existing EGLE educational and outreach campaigns in support of FLWR.
- Support the continuation of the Michigan Food Waste Roadmap initiative through sponsorship of a Michigan Wasted Food Network.
- Create an EGLE or SOM staff position to support food loss and waste prevention.
- Ensure clear and consistent information is available for all stakeholders.
- Host a statewide or Great Lakes regional summit on food waste in 2024.
- Elevate and celebrate success stories.
- Fund U.S. Food Waste Compact pilot projects for Michigan businesses.
- Educate legislators on the need to invest in food loss and waste reduction.
- Create a multi-agency task force or council within the State of Michigan to support industry improvements and ensure funding opportunities are leveraged for improvements in food waste diversion.
- Coordinate efforts with federal and local agencies to ensure flow of knowledge and data, access to funding, collaboration for shared capacity initiatives, and to support champions in local government and partner agencies. Provide support for agencies to collaborate with county health departments, action agencies, food policy councils, colleges and universities, and municipalities on educational programs.
- Through executive order, affirm support for the 50% food waste reduction goal.
- Charter a “Michigan Food Waste Council” with representative appointments.
- Appoint food waste champions to relevant Michigan councils and commissions.
- Update the Michigan Green Communities Challenge to include FLWR.
- Require all State of Michigan sustainable business programs to cross-promote FLWR.
- Through grants and/or technical assistance, promote “zero-waste cafeterias” in K-12 schools.

## Prevention: Technology and Infrastructure

- Create a grant program to underwrite the cost of wasted food technology applications and associated appliances for food businesses in Michigan.
- Commission an assessment of regional and/or industry capacity gaps for climate or temperature-controlled storage, and pending analysis, dedicate a grant program to fund initiatives that explicitly focus on temperature-controlled food distribution and storage infrastructure.
- Clarify to planning agencies whether FLWR qualifies for Part 115 sustainable materials management grants.

- Provide financial support for infrastructure investments for food storage equipment and transportation, and pilot projects. Provide seed funding for national programs.
- Execute an educational and engagement campaign to make food businesses aware of the potential for technology applications and infrastructure improvements to reduce loss and waste, and to maximize profits.
- Increase participation of food loss and waste projects in NextCycle Michigan.
- Publish and regularly update an inventory of grant programs that could be leveraged for food loss and waste infrastructure investments across state and federal agencies, including the expansion of processing capacity, temperature-controlled storage, or site-specific equipment and technology upgrades.
- Create development or business retention positions within MDARD and MEDC respectively to seek opportunities for investment among food businesses, deploying available job creation incentives to spur FLWR investment.
- Increase Value-Added & Regional Food Systems Grant and decrease match requirements.
- Provide grants and technical support to improve housing and transportation for H2A migrant farmworkers.
- Support efforts to improve the marketing of Michigan agricultural products and to improve reliability and utility of commodity data.
- Create a funding mechanism for infrastructure investments that advance wasted food prevention.
- Allow undocumented migrants and immigrants to obtain driver's licenses.

#### **Prevention: Technical Assistance, Practice Improvements and Employee Training**

- Grant support and technical assistance for data collection and characterization of surplus food supplies and food scraps within industry sectors and local communities, and/or promotion of standardized metrics for food waste.
- Develop a voluntary incentive for food businesses to measure wasted food.
- Grants to provide technical assistance and develop resources for food businesses and local communities to advance food waste prevention initiatives and improve access to secondary markets and donation channels for surplus food.
- Leverage investments in existing technical support programs, coupling objectives with other programs currently or potentially facing food businesses.
- Couple grant offerings with on-site technical assistance programs.
- Require applicants to MDARD Food Safety Training and Education Grants to include consideration for food donation or share tables in their proposals.
- Encourage or require certification, credential and license programs facing food businesses to provide applicable information on food loss and waste prevention.

### **Prevention: Date Labeling and Packaging**

- Launch education campaigns and guidance documents that promote consumer awareness and education on the meaning of date labels, and provide support for food businesses to improve standardization of date labels.
- Provide grants for pilot projects to manufacturers, retailers, and producers to implement new packaging, labeling standards and processes.
- Fund industry and/or university efforts to make Michigan a center of excellence for food production standards, including the development of packaging to extend the life of food.
- Establish guidelines explicitly allowing the donation or freezing of food after a quality-based date.
- Amend Michigan law and/or its interpretation to differentiate between quality and safety labels, and provide further clarity and standardization on required labels.

### **Prevention: Promote Secondary Markets**

- Provide technical assistance, grant support and shared resources to manufacturers for research and development of upcycled product lines, or to support participation in upcycling by food businesses lacking storage space, expertise, or other resources.
- Provide grants to non-profit organizations and schools to develop upcycling demonstration projects and pilot programs.
- Expand the Michigan Materials Marketplace program to include surplus food from farms, manufacturers, restaurants, retail, and other food businesses, and provide support to solution providers, animal farms, food banks, rescues and other agencies seeking new supply sources.
- Identify opportunities for surplus food and byproducts through MDARD's International Marketing Program, expanding the value of Michigan's exported food and agriculture products.
- Continue funding Michigan Agricultural Surplus System (MASS) at \$20 million or above, while maintaining focus on "seconds" that could not be marketed through normal channels.

### **Rescue: Increasing Donations**

- Provide financial support for educational campaigns on donation liability, infrastructure investments for food storage equipment and refrigeration capacity, transportation and vehicles, and pilot projects.
- Conduct further research on the potential for charitable food organizations to positively impact food loss and waste reduction.
- Leveraging infrastructure created by Sacred Spaces Clean Energy Grant program, mobilize food pantries housed in congregations to improve efficiencies and invest in storage and refrigeration capacity through targeted grants.
- Execute an aggressive, multi-agency effort to educate businesses and the general public on liability protections and food safety for food donations and share tables: Require training for health inspectors on liability protection. Require county health departments to include information on food donation on their web sites and as leave-behind materials during inspections and educational events. Require local health departments to publish clear guidance on share tables.
- Amend law to explicitly provide permission to donate after the quality-based date, and potentially, provide reasonable liability protections for doing so. Clarify law (e.g.: Food Safety Modernization Act) to indicate what foods can and can not be donated, and to execute recommendations in the section above that are not permissible by current law.
- To supplement federal food donation tax incentive, establish a Michigan tax credit for donation of surplus food and associated costs. Ensure that this is structured as a tax credit (versus a deduction) with no more than a reasonable limit, and that it is based on fair market value. Offer additional tax credits for transportation and processing costs.

# 1. Introduction

When environmentalist Paul Hawken, author of the seminal sustainable business text *The Ecology of Commerce* published what would become one of the defining texts of the climate change movement in 2017, *Drawdown: The Most Comprehensive Plan Ever Proposed to Reverse Global Warming*, ranking 100 potential approaches to global decarbonization as a response to the climate crisis, many were surprised to find “Reduced Food Waste” as the third most impactful solution. In 2020, Project Drawdown, a nonprofit organization launched by Hawken and others, named it as the most promising solution to reduce concentrations of greenhouse gasses in the atmosphere and mitigate future emissions.

Food waste is a widespread issue with considerable impact – roughly one-third of all food produced for human consumption on the planet is lost or wasted.<sup>8</sup> In the U.S., approximately 30 to 40 percent of the total food supply goes to waste, according to the USDA<sup>9</sup>. This translates to roughly 133 billion pounds and \$161 billion worth of food each year that is wasted. In addition to the economic loss, food waste contributes to the release of landfill methane into the atmosphere and the unnecessary consumption of natural resources in its production and distribution, such as water, land, and energy, as well as human resources and labor. In all, food loss and waste represents around eight percent of global emissions.<sup>10</sup> According to the U.S. Environmental Protection Agency (EPA), food is the most prevalent material in landfills out of all municipal solid waste.<sup>11</sup>

What is commonly referred to as “food waste” is actually a number of distinct inefficiencies in the global food system and local economies. In line with the EPA and the United Nations’ definition, leading U.S. food waste organization ReFED defines food waste as uneaten food and inedible parts (or scraps, e.g: peels, pits, bones) that are either not harvested or disposed of through one of seven end-of-life destinations: composting, anaerobic digestion, landfill, combustion, sewer, dumping or land application. According to ReFED, this is a subset of the “surplus food” that goes unsold or unused by a business or that goes uneaten at home, including food and inedible parts that are donated, fed to animals, repurposed to produce other products, and all of the definitions represented in food waste. In its most recent literature, EPA now refers to this as “wasted food.”

## In practical applications, “food waste” is a combination of Food Loss and Food Waste:

- Food Loss is the “unintended result of agricultural processes or technical limitations in storage, infrastructure, packaging, and/or marketing.”<sup>12</sup>
- Food Waste is caused by “individual behavior and occurs within the retail, restaurant, and household levels of the supply chain.”

Food loss and waste reduction (FLWR) refers to strategies and tactics to reduce what ReFED refers to as Surplus Food through “prevention” efforts, also known as pollution prevention (preventing the creation of pollution as opposed to cleaning up its effects).

Given its environmental impact through methane generation and resource use, food loss and waste reduction is considered one of the best solutions to climate change. The United Nations, the federal government, and several U.S. states have set a goal to halve food waste by 2030, including Michigan as a goal within the MI Healthy Climate Plan.

**In the Intergovernmental Panel on Climate Change special report on climate change, estimates suggest that food loss and waste could account for 8-10 percent of total anthropogenic greenhouse gas emissions.<sup>13</sup>**

**If this figure was contextualized to the scale of national emissions, food waste would be the world’s third largest emitter behind China and the United States.<sup>14</sup>**

## Illustration 1.1: Food Loss and Food Waste Defined

### Food Loss – 32%

In the U.S., around 32 percent of the food loss and waste occurs toward the beginning of the supply chain from farms and manufacturing.<sup>15</sup> Food is lost during agricultural processes and harvest, packaging, storage, and transit. Many stakeholders in the food system have identified limitations in storage and infrastructure as major barriers to saving food. A lack of marketing and connectedness to key partners can also contribute to food loss.

-  harvest left in the field (imperfect foods)
-  or  processing or packaging issues
-  extreme weather events and climate impacts
-  lack of proper storage can lead to spoilage
-  or  (market costs of labor or to harvest produce)
-  or  transportation, and in particular imported fruits and vegetables
-  supply chain considerations
-  or  lack of marketing and key connections across the food system can also contribute to food loss

### Food Waste – 68%

A majority of the food loss and waste happens in homes and consumer-facing businesses such as grocery stores, restaurants, and other businesses that sell and serve food. According to ReFED, 68 percent of food loss and waste occurs toward the end of the supply chain from consumer-facing businesses (including retail, restaurants, and foodservice) and homes.

-  Grocery stores and retailers
-  or  measurement tools and lack of data and projection tools (retail)
-  unused animal parts/ lack of market for specific animal products (bones, feet, tongue, etc.) (processing)
-  restaurants contribute to a large percentage of food waste
-  or  changing consumer tastes and trends (households, grocery stores, and restaurants)
-  Households contribute the most out of any sector to food waste
-  lack of education on where food waste can go instead of being landfilled

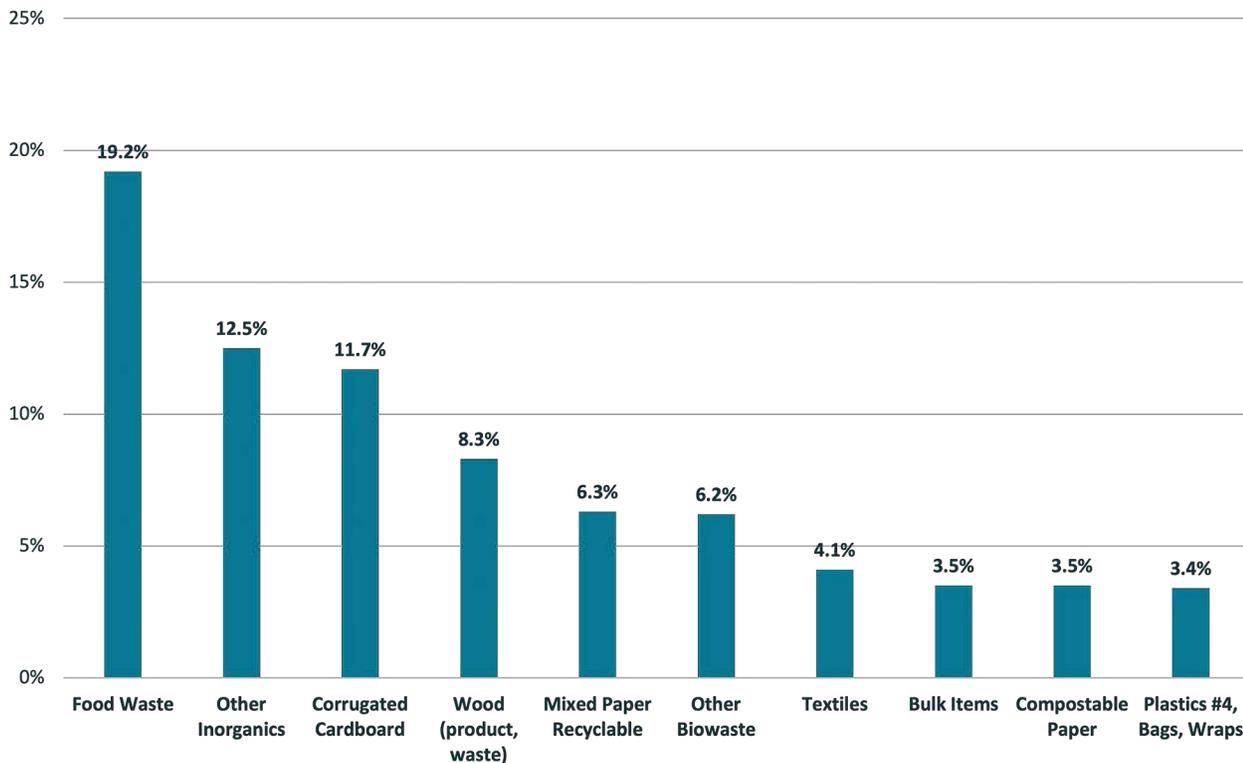
## Food Waste in Michigan Landfills

Food waste is the most common material currently disposed of in Michigan’s landfills and its one remaining waste-to-energy facility. The ReFED Insights Engine, the basis for most of the projections found in this document, estimates that between 2016 and 2021 approximately 950,000 to 1.5 million tons of food waste was disposed of through landfills or incineration each year. This is consistent with the 2016 Michigan Municipal Solid Waste Valuation and Characterization Study, the most recent statewide characterization study to use field data, and statistical estimates from EPA and NextCycle.

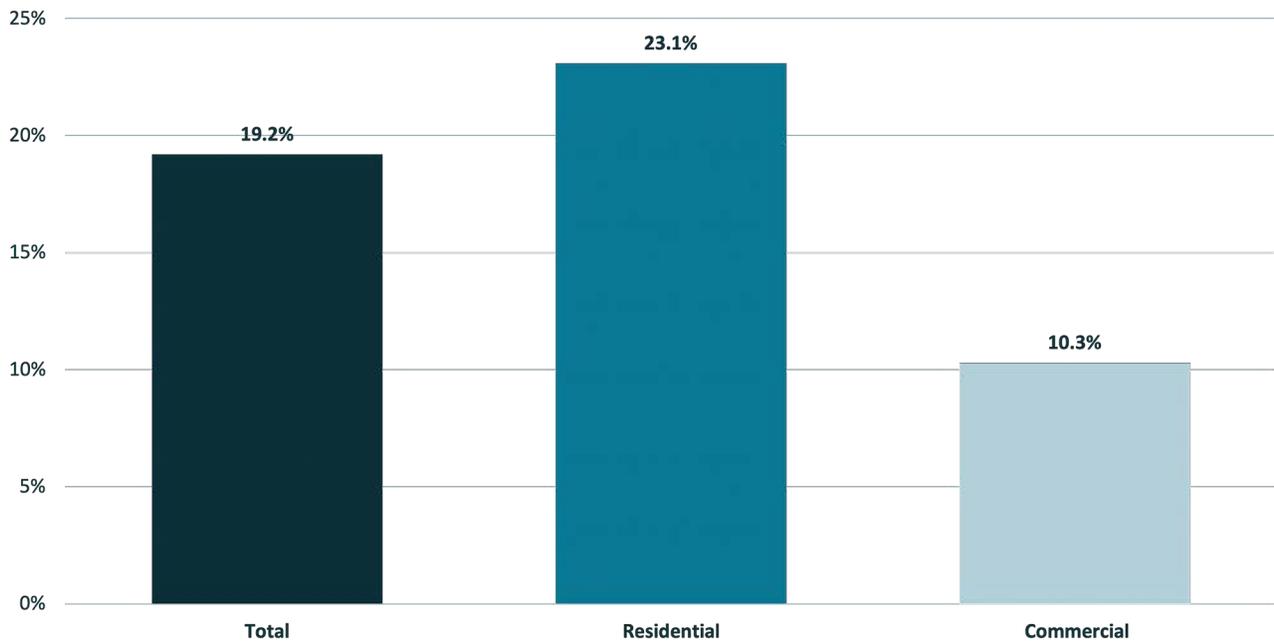
This year, Michigan Sustainable Business Forum, in partnership with Grand Valley State University and a coalition of recycling and waste management organizations, with support from an EGLE Recycling Market Development grant, will release an of the Michigan Municipal Solid Waste Valuation and Characterization Study. MiSBF sampled material from 10 landfills and the Kent County Waste to Energy Facility during the spring and summer of 2023, analyzing 6.5 tons of material.

Food waste was 19.2 percent of sampled material. Based on 2022 landfill receipts, the study will estimate that there is 1.49 million tons of material currently being disposed of in Michigan’s municipal and commercial solid waste, the traditional refuse materials commonly collected from homes and businesses. This was the most common type of material found by a wide margin.

**Illustration 1.2: Michigan Municipal Solid Waste 2023**



### Illustration 1.3: Food Waste in Michigan Municipal Solid Waste (Residential vs. Commercial)



### Food Waste in Michigan Industrial Solid Waste

An indeterminate amount of food waste was sent to Michigan landfills as part of the 634,000 tons of Industrial Waste not otherwise classified in 2022, including Food Processing Residuals and Food Processing Waste. These are defined by statute as shown below.

“Food processing residuals” means any of the following:

- Residuals of fruits, vegetables, aquatic plants, or field crops, including such residuals generated by a brewery or distillery.
- Otherwise unusable parts of fruits, vegetables, aquatic plants, or field crops from the processing thereof.
- Otherwise unusable food products that do not meet size, quality, or other product specifications and that were intended for human or animal consumption.

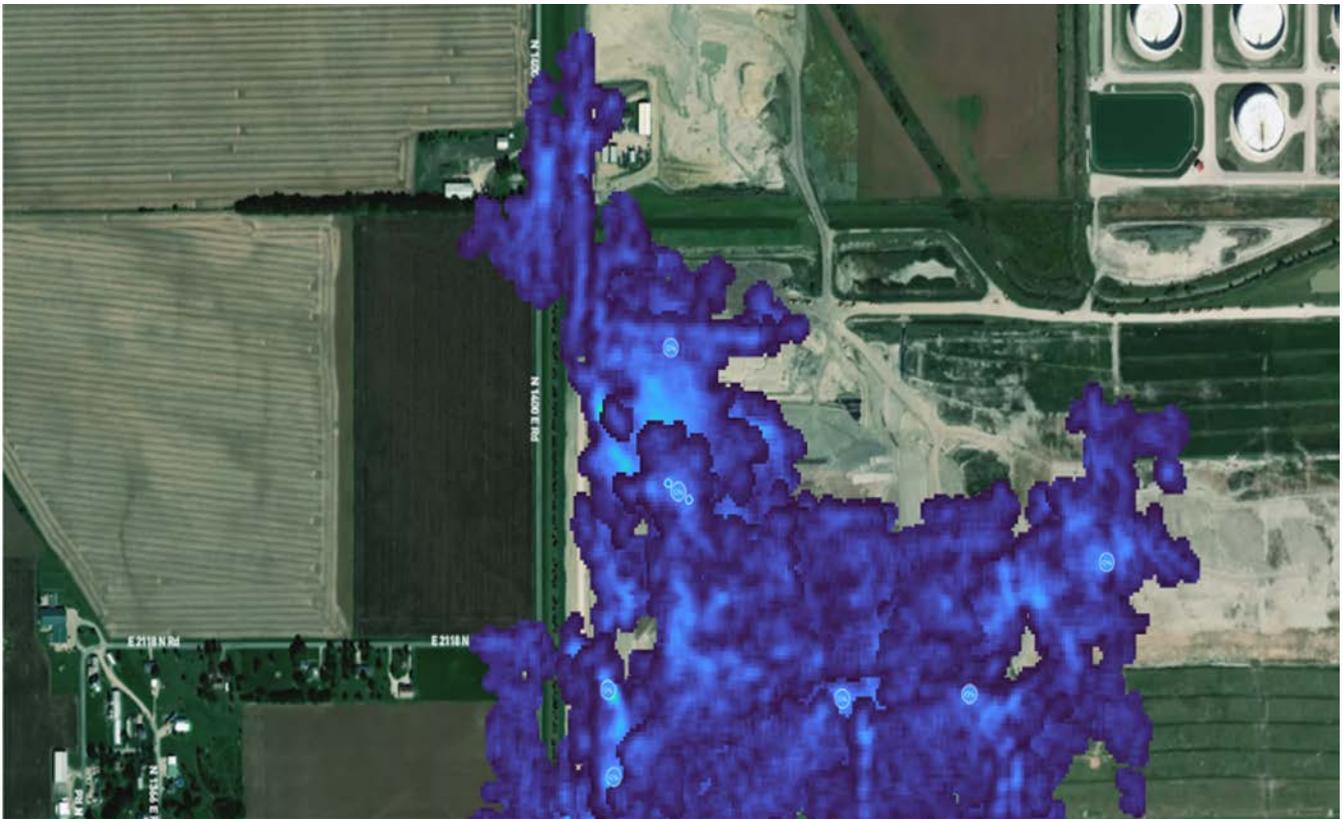
“Food waste” means an accumulation of animal or vegetable matter that was used or intended for human or animal food or that results from the preparation, use, cooking, dealing in, or storing of animal or vegetable matter for human or animal food if the accumulation is or is intended to be discarded. Food waste does not include fats, oils, or greases.<sup>16</sup>

## Food Waste is a Leading Source of Methane Pollution

According to EPA data compiled by Rhodium,<sup>17</sup> agriculture and landfills account for 18 percent of total CO<sub>2</sub>e in the Midwest. Emissions from food production and materials management are responsible for more greenhouse gas emissions than buildings or industry, and just slightly less than transportation and power generation.

Much of this is due to the high potency of methane, which is generated when organic material decomposes in landfills, and through various agricultural processes, such as enteric fermentation in livestock and manure management. Methane is a greenhouse gas 85 times more potent than CO<sub>2</sub>.

### Aerial satellite image view of a Midwest landfill



#### Aerial satellite image view of a Midwest landfill depicting emitted methane pollution from May 4 through May 10, 2023

Methane emissions in the US have historically been understated due to outdated EPA formulas. EPA's own experts and empirical studies estimated that methane emissions were likely twice that of EPA estimates, while reviews of satellite photos suggested emissions may be as much as five times greater.<sup>22</sup>

In 2023, the US EPA attempted to quantify methane emissions into the atmosphere from degrading food waste in MSW landfills for the first time. It found that:

- In 2020, food waste was responsible for approximately 55 million metric tons of CO2 equivalents (MMT CO2e) emissions from U.S. MSW landfills.
- An estimated 58 percent of the fugitive methane emissions (i.e., those released to the atmosphere) from MSW landfills are from landfilled food waste.
- An estimated 61 percent of methane generated by landfilled food waste is not captured by landfill gas collection systems and is released to the atmosphere. Because food waste decays relatively quickly, its emissions often occur before landfill gas collection systems are installed or expanded.
- While total methane emissions from MSW landfills are decreasing due to improvements in landfill gas collection systems, methane emissions from landfilled food waste are increasing.
- For every 1,000 tons (907 metric tons) of food waste landfilled, an estimated 34 metric tons of fugitive methane emissions (838 MT CO2e) are released.
- Reducing landfilled food waste by 50 percent in 2015 could have decreased cumulative fugitive landfill methane emissions by approximately 77 million metric tons of CO2 equivalents (MMT CO2e) by 2020, compared to business as usual.

However, there is a substantial amount of CO2e embedded in food products, even more than what is produced in the landfill, which is why FLWR has emerged as such a larger priority in climate plans. The EGLE Sustainable Food Management hierarchy (below) outlines a management approach consistent with how emissions are produced in the food system.

### EGLE Sustainable Food Management hierarchy



October 2022



## Impact of Food Waste to Michigan Natural Resources

Food loss and waste is an intersectional issue with cascading impacts to the state's natural resources, economy, and local communities. When food goes uneaten, the utility of the land, water, energy, labor and other resource inputs used during growing, processing, distribution and storage are also wasted, in addition to the solid waste and emissions that are created throughout the supply chain. Michigan is the second-most agriculturally diverse state in the country, steward to the largest supply of surface freshwater in the world, and home to a vast array of energy-intensive industries. Wasted food uniquely impacts these resources and their uses.

### Land

An estimated 16 percent of cropland in the U.S. is dedicated to food that is never eaten.<sup>18</sup> In Michigan, 14.5 percent of surplus food is produce that was never harvested. Farmland in many Michigan communities are facing development pressure for conversion to residential housing, industry, retail and even renewable energy facilities; reducing the amount of unharvested food will increase profitability and potentially support family farms and preserve the character of rural communities. New expansion of land for agricultural conversion could lead to a loss of biodiversity, pollinators, soil health, and water filtration.<sup>19</sup>

Agricultural production depletes the nutrient value of land over time, requiring rest periods or crop rotation to ensure continued viability. Animal agriculture is especially intensive for land use, requiring substantial investments for the production of animal feed and grazing.

### Water

Food waste is a tremendously inefficient use of water resources. Surplus food consumes 22 percent of all freshwater use in the United States.<sup>20</sup> In 2021, 625 billion gallons of water was wasted in Michigan due to surplus food from across the food system. Although Michigan is a water-rich state, access to clean water can still be a concern, especially in disadvantaged areas and in communities where development pressure is exhausting groundwater supplies. Again, animal agriculture is more resource intensive, using a disproportionate amount of water: According to ReFED, in 2021 fresh meat and seafood accounted for 27.2 percent of water wasted, but just five percent of surplus food by ton.

Water is the most extensively used raw material in the food and beverage industry, the majority of which is not embedded in the food produced. The best-performing breweries in the state require three gallons of water to make a gallon of beer, for instance.<sup>21</sup> A substantial amount of wastewater is generated throughout the food supply chain in Michigan. Wasted food unnecessarily increases the burden of municipal and industrial wastewater treatment systems, a cost in dollars, energy, infrastructure and lost opportunity.

Further, agricultural wastewater runoff is an environmental priority in Michigan, contributing to water toxicity and algal blooms. Any natural or synthetic fertilizers and pesticides are also wasted.

## Energy

Food waste is an inefficient use of electricity, fuel, heat and other renewable or nonrenewable energy inputs: From fuel to power tractors and machinery to pumping and distributing irrigation water, equipment, processing, packaging, transportation, and refrigeration. Studies suggest that around two percent of energy consumption in the United States comes from energy embedded in wasted food.<sup>23</sup> This is the equivalent amount of energy to power around 56 million homes in the United States for one year.<sup>24</sup>

According to the EPA, food processing accounts for around one-quarter of the cradle-to-consumer energy use in the food system, retail is another 25 percent, consumption is around one-third (mostly from refrigeration and cooking), and transportation accounts for approximately six percent.<sup>25</sup> As with other resources, animal products are also more energy intensive.

Approximately one-fifth of food in the U.S. supply is imported, half of which are fruits and vegetables (which is lost and wasted at a high rate). Foreign production and international transport increase the energy use considerably.<sup>26</sup>



The Food Waste Energy Nexus: Chronic power outages in Michigan have been cited as a persistent source of wasted food by homeowners and businesses, especially in Southeast Michigan. Ann Arbor restaurant Eat highlighted lost inventory and revenue due to power outages when closing its Packard Street location in summer 2023.<sup>30</sup>

## Addressing Food Waste

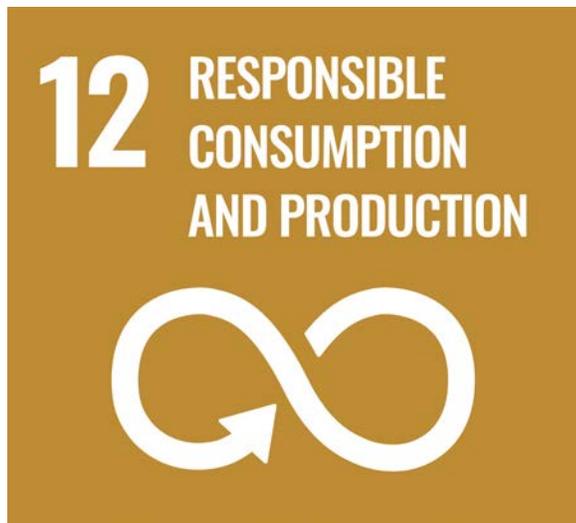
### Sustainable Development Goal 12.3: Halve Per Capita Food Waste

According to the Food and Agriculture Organization of the United Nations, the global food economy is facing tremendous strain from climate change, conflicts, slowdowns and downturns and high food prices. From an international perspective, reducing food loss and waste is necessary to address the impacts of “agrifood systems” that degrade agricultural land, contribute to greenhouse gas emissions and loss of biodiversity, consume ground water at an unsustainable rate, and failed to provide the nutritional needs of an estimated 783 million people in 2022.<sup>27</sup>

The United Nations introduced its Sustainable Development Goals in 2015, a universal call to action to end poverty, protect the planet and improve the lives and prospects of the human race. The 17 Goals were adopted by all UN member states as part of the 2030 Agenda for Sustainable Development, which outlined a 15-year plan to achieve the goals.

This plan included targets to promote decarbonization, pollution prevention and the creation of a circular economy to accomplish Goal 12: Ensure sustainable consumption and production patterns.

### United Nations Environment Programme Sustainable Development Goal 12



Target 12.3: By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses

### U.S. 2030 Food Loss and Waste Reduction Goal

The MI Healthy Climate Plan adopts the U.S. 2030 Food Loss and Waste Reduction goal, a joint initiative of the U.S. Department of Agriculture (USDA) and EPA that was announced in 2015, the first-ever domestic goal to reduce food loss and waste. The 2030 goal seeks to reduce the amount of food leaving the human food supply chain by 50 percent by 2030. It is a waste prevention goal, meaning that it aims to prevent food waste generation, as the majority of greenhouse gasses from food waste are created before the food goes to disposal.<sup>28</sup> This aligns with the SDG 12.3 target.

EPA, USDA, and the Food and Drug Administration (FDA) subsequently formed a Federal Interagency Collaboration to Reduce Food Loss and Waste, and worked alongside communities, organizations, businesses, and state and local governments to develop and execute programs to address food waste. This included tracking tools, an annual awards competition, and the U.S. Food Loss and Waste 2030 Champions, which recognized private sector leaders such as Firekeepers Casino + Hotel, Kellogg, Kroger, and Meijer for adopting the 50 percent reduction commitment, and annually celebrated Michigan organizations such as Barfly Ventures and Central Michigan University for reduction achievements.

Food loss and waste reduction is also considered one of the best solutions to climate change because of its relative ease of implementation and its immediate results. Most reduction initiatives do not require a large financial investment or the invention of new technology. Given that fact, these initiatives can be implemented quickly, which has a positive compounding effect on carbon reduction<sup>29</sup>.

In addition, food loss and waste reduction initiatives that are higher on the EPA scale (see page 32) have a greater impact. Prevention actions, or source reduction, such as buying less and using what you buy, is close to seven times more impactful than composting.<sup>31</sup>

## Draft National Strategy for Reducing Food Loss and Waste and Recycling Organics

In December 2023, the EPA, USDA, and FDA jointly released the Draft National Strategy for Reducing Food Loss and Waste and Recycling Organics, through which the Biden–Harris Administration identifies concrete steps and actions to accelerate the prevention of food loss and waste, where possible, and the recycling of the remainder with organic waste, across the entire supply chain. In doing so, it outlined seven key challenges that had slowed progress toward the National Food Loss and Reduction Goal, and proposed four objectives and associated actions to overcome them.<sup>32</sup>

### Challenges

- Limited outreach and education.
- Limited fundamental research funding.
- Need for collaboration.
- Obstacles facing underserved communities.
- Insufficient infrastructure and planning.
- Organics recycling market expansion.
- Obstacles to estimating food loss and waste and progress toward goals.

### Objectives and Actions

#### 1. Prevent food loss where possible.

- Optimize the harvest or collection of raw commodities and foods.
- Reduce food loss in food manufacturing/processing, storage and distribution.

#### 2. Prevent food waste where possible.

- Develop, launch and run a national consumer education and behavior change campaign.
- Educate children and youth about strategies to reduce food waste; encourage development and adoption of lifelong best practices in schools to reduce food waste.
- Partner with the private sector to find upstream solutions to consumer food waste.
- Facilitate and incentivize food donations to improve access to healthy and affordable food.
- Research and identify and address unique drivers of U.S. food loss and waste and the incentives to reduce it.
- Invest in behavioral science to determine the most effective strategies to change household behaviors related to food waste.
- Test new approaches in the United States and abroad, identify technology-based solutions, and facilitate sharing of best practices to reduce food loss and waste among retailers, manufacturers and food service providers, including in their supply chains.
- Participate in international forums to share best practices, data and tools.

#### 3. Increase the recycling rate for all organic waste.

#### 4. Support policies that incentivize and encourage food loss and waste prevention and organics recycling.

## MI Healthy Climate Plan: Michigan Food Waste Goal

In September 2020, Governor Gretchen Whitmer signed Executive Directive 2020-10, which committed Michigan to a goal of achieving economy-wide carbon neutrality no later than 2050 and maintaining net negative greenhouse gas emissions thereafter. The MI Healthy Climate Plan was developed by EGLE with input from hundreds of Michigan residents. Six workgroups met for a year to develop recommendations, with an ad hoc internal group led by EGLE staff providing additional recommendations on decarbonization related to materials management. The Plan included six categories of recommendations in its Roadmap to 2030 section (abridged):

- **Commit to Environmental Justice and Pursue a Just Transition:** Ensure that at least 40 percent of state funding for climate-related and water infrastructure initiatives benefit Michigan's disadvantaged communities (in line with the federal government's Justice40 guidelines for federal funding); that Justice40 is developed in partnership with leaders in disadvantaged communities; and that Michigan emphasizes a just transition for all workers through proactive engagement, job training, and workforce development.
- **Clean the Electric Grid:** Generate 60 percent of the state's electricity from renewable resources and phase out remaining coal-fired power plants by 2030.
- **Electrify Vehicles and Increase Public Transit:** Build the infrastructure necessary to support 2 million electric vehicles on Michigan roads by 2030. Increase access to clean transportation options – including public transit – by 15 percent each year.
- **Repair and Decarbonize Homes and Businesses:** Reduce emissions related to heating Michigan homes and businesses by 17 percent by 2030. Increase investments in repairing and improving buildings to reduce costs for working families and small businesses.
- **Drive Clean Innovation in Industry:** Encourage clean innovation hubs where private enterprises strategically co-locate and collaborate to develop and deploy new, cleaner manufacturing technologies and conduct research and development to reduce emissions from hard to decarbonize industries. Triple Michigan's recycling rate to 45 percent and cut food waste in half by 2030.
- **Protect Michigan's Land and Water:** Protect 30 percent of Michigan's land and water by 2030 to naturally capture GHG emissions, maintain and improve access to recreational opportunities for all Michiganders, and protect biodiversity. Leverage innovative strategies to support climate-smart agriculture.

In its executive summary, the plan acknowledges that the steps necessary to make Michigan's economy carbon neutral by 2050 will require substantial efforts in the sectors of our economy that are hardest to decarbonize, including industry, buildings and housing, and agriculture. The 2030 calls to action are the most urgent, as these must demonstrate real progress for the state to achieve its long-term goal.

The food waste reduction goal that is the focus of this Roadmap is included as part of the "Clean Innovation" goal without further explanation in the text. It is also highlighted briefly in the "Land and Water" section in the context of soil health and innovation in agriculture: The plan recommends solutions to implement best practices for managing working lands to restore soil health and store carbon, provide low-carbon equipment to farmers, increase access to locally sourced agriculture, and reduce food waste.

The Michigan Food Waste Roadmap is the first comprehensive attempt to outline the 50 percent food waste reduction goal and the actions necessary to achieve it.

**"Biochar and compost also have the opportunity to reduce both food waste and reliance on synthetic fertilizers. Innovative animal feed mixes and additives can be used to reduce GHG emissions from livestock."**

– MI Healthy Climate Plan recommendations to address food waste.



**Governor Whitmer created the Council on Climate Solutions through Executive Order 2020-182. The Council consists of 14 Michigan residents appointed by the governor to represent a range of sectors, experiences, and expertise relevant to climate issues.**

**Additionally, the Council includes the directors (or their designees) of EGLE and the Michigan Departments of Agriculture and Rural Development (MDARD), Labor and Economic Opportunity (LEO), Michigan Economic Development Corporation (MEDC), Natural Resources (DNR), Transportation (MDOT), and Health and Human Services (DHHS), as well as the State Treasurer and the Chair of the Michigan Public Service Commission (MPSC).**

According to the most recent EPA metrics available, little progress has been made toward the federal goal at a domestic scale. In 2018, 335 pounds of food waste per person left the human food supply chain through various management pathways. In 2019, that had increased to 349 pounds of food waste per person. Since the 2016 baseline year, per capita food has increased six percent.<sup>33</sup>

Simply put, it is not possible for Michigan to reduce food loss and waste by half in this decade through prevention strategies alone. In its Roadmap to 2030, ReFED instead defined the goal as a combination of prevention, rescue and recycling.

As the MI Healthy Climate Plan is ambiguous, this Roadmap will assume a focus in line with the ReFED model, which has become the standard bearer for food waste reduction in the U.S. (ReFED statistics differ slightly from more recent data presently available in Michigan MSW studies). To further quantify this goal, we are recommending adoption of the following objectives:

**50%**

**50 percent reduction of food waste sent to Michigan landfills** (and waste-to-energy facilities) through diversion of approximately 600,000 tons of additional material per year to compost, anaerobic digestion, or animal feed.

**25%**

**25 percent reduction in total wasted food in the Michigan food system** through prevention and rescue strategies (FLWR), approximately 600,000 tons per year.<sup>35</sup>

**50%**

For a combined 1.2 million tons of food waste removed from the system per year, **achieving a 50 percent total reduction based on a 2021 baseline** defined by the ReFED Insights Engine.

**Illustration 1.4: Quantifying Benefits of 50% Reduction of Food Waste in Michigan**



With federal Inflation Reduction Act funding and MI Healthy Climate Plan leadership seeding climate planning and associated actions throughout the state, and the new Part 115 planning process mandating and funding parallel efforts to improve local and regional materials management, there is an unprecedented opportunity for communities to advance food loss and waste reduction.

As will be outlined later in this Roadmap (page 92), opportunities created by IRA funding will occur during the next 12 to 24 months. Decisions related to Climate Pollution Reduction Grants are happening now. Michigan food businesses are also investing heavily in sustainability initiatives in response to investor pressure and consumer demand, especially climate solutions and circularity. EGLE should be prepared to support those efforts. Further, Michigan has an opportunity to take a leadership role among Great Lakes states.

Michigan must act with a sense of urgency to leverage opportunities created by federal funding to address climate change and the state's new materials management planning mandates. Decisions are being made at this time which could impact its ability to fully invest in food loss and waste reduction, which is paramount to a robust emissions reduction strategy.

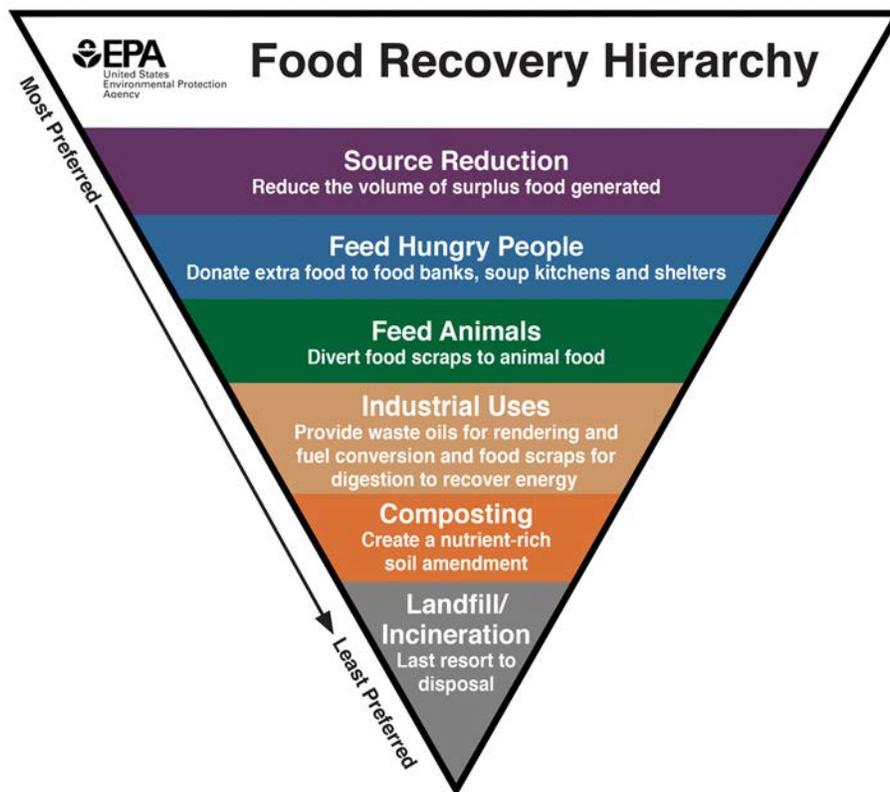
## Food Waste Action in the U.S.

There is a growing national movement to reduce food waste. Government agencies, non-profit organizations, communities and businesses are working to develop collective responses, and Michigan has the opportunity to leverage, contextualize and implement such solutions to achieve its reduction goals. Several of these organizations and initiatives participated in the creation of this Roadmap.

The following is an inventory of notable programs and initiatives that could be brought to Michigan, or that are already involved in the state directly or through local partners.

**The U.S. Environmental Protection Agency** has hosted a number of initiatives and programs to address food waste over the past decade, such as the 2030 Challenge discussed in the prior section and the Too Good To Waste consumer food waste reduction network. EPA is active on food waste nationally and in Region 5, with Chicago-based staff already actively involved in Michigan programs. EPA data is the starting point for most of the country's food waste initiatives, characterized and positioned using its Food Recovery Hierarchy or new Wasted Food Scale.

### EPA Food Recovery Hierarchy Pyramid



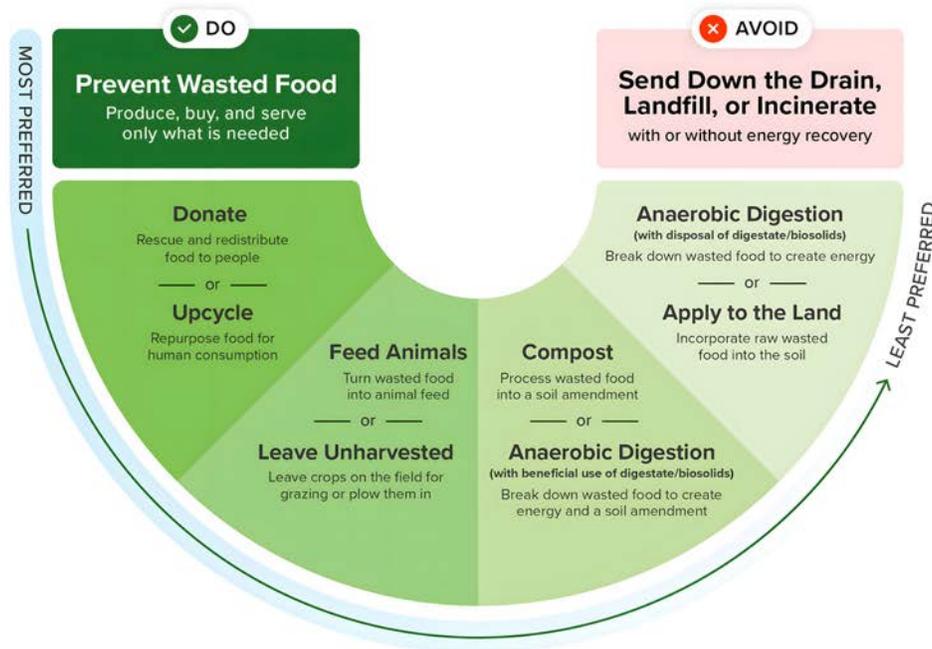
Each tier of the EPA Food Recovery Hierarchy focused on different management strategies for wasted food. The top levels were the best ways to prevent and divert wasted food because they create the most benefits for the environment, society and the economy. The hierarchy is how many stakeholders have understood food waste. In 2023, this was replaced by the Wasted Food Scale.

## EPA Wasted Food Scale



## Wasted Food Scale

How to reduce the environmental impacts of wasted food



October 2023

**ReFED** is a national nonprofit organization that aims to end food loss and waste by advancing data-driven solutions. The organization collaborates with key stakeholders to evaluate and ensure success, targeting action across the food system where there is most benefit. Their work includes leveraging data and insights to highlight supply-chain inefficiencies and economic opportunities to encourage actionable solutions to reduce the amount of food that goes uneaten, and catalyzing capital and innovation to spur high-impact initiatives.

ReFED works with thought leaders and decision-makers to mobilize people and businesses to encourage collective action around food waste solutions taking a systems-based approach. The organization and its partners have developed several important tools and resources that support learning, data-driven and cost-effective solutions, and methods to track progress when tackling food waste.

## ReFED Solutions Matrix

### PREVENTION



Optimize  
The  
Harvest



Enhance  
Product  
Distribution



Refine  
Product  
Management



Maximize  
Product  
Utilization



Reshape  
Consumer  
Environments

### RESCUE



Strengthen Food Rescue

### RECYCLING



Recycle Anything Remaining

ReFED's priority solutions are organized in three tiers: Prevention, Rescue and Recycling.

**Natural Resources Defense Council (NRDC)** is a U.S.-based international non-profit environmental organization working to safeguard the earth— its people, plants, animals, and the natural system on which life depends. NRDC spearheads a project to reduce food loss and waste called “Food Matters”,<sup>36</sup> partnering with city agencies and local collaborators to take action to drive system-wide waste reduction through both policy change and programming. NRDC has developed a suite of tools and resources including guides, toolkits, and a resource library that cities can use to guide their policies and programs to reduce food waste. NRDC’s groundbreaking report, *Wasted: How America is losing up to 40 percent of its food from farm to fork to landfill*,<sup>37</sup> helped to spark a national conversation about excessive waste in the U.S. and potential solutions that could arise from implementing various solutions. NRDC also organizes various cohorts for cities, one of which Detroit’s Make Food Not Waste, Food Rescue US Detroit, and FoodPLUS Detroit are engaged in.

**World Wildlife Fund (WWF)** is an international conservation organization that collaborates with people around the world to implement solutions that protect community, wildlife, and the places in which they live. Working both locally and globally, they support local communities to conserve their natural resources, transform markets and policies, and protect and restore species and their habitats.<sup>38</sup> One of its six ambitious goals is to double net food availability and freeze its footprint, of which reducing food waste is encompassed. It promotes a comprehensive target-measure-act approach for the public sector to address food waste.

**Harvard Law School Food Law and Policy Clinic (FLPC)** serves communities, governments and partner organizations in the U.S. and globally by providing law and guidance on food system issues while engaging students in food law and policy practice. Their work focuses on supporting sustainable and equitable food production, increasing access to healthy foods, reducing waste and promoting community-led systemic change in the food system.<sup>39</sup> FLPC has produced guides, presentations, briefs, and other resources around liability protection for food donation including a global food donation policy atlas, food justice and equity in the food system, and state policy toolkits to achieve zero food waste including designing and implementing organic waste bans.

**Zero Food Waste Coalition:** In 2023, the four leading food waste and environmental organizations named above — ReFED, NRDC, WWF and FLPC — formed the Zero Food Waste Coalition. This united group is focused on informing policy at the federal level while supporting state and local policy efforts.

**Waste & Resources Action Programme (WRAP)** is an international nonprofit organization working to tackle the climate crisis and advance a sustainable future based in the UK. WRAP particularly focuses on transforming food and textile systems, eliminating plastic pollution and increasing recycling.<sup>40</sup> WRAP's work in food waste focuses on offering solutions and guidance on date labeling, reducing greenhouse gas emissions, reducing water stress, and surplus food redistribution. The Courtauld Commitment 2030, an agreement that aims to reduce food waste by 50 percent by 2030, and the Food Waste Reduction Roadmap are flagship resources that governments and communities can utilize to combat food waste. "Love Food, Hate Waste"<sup>41</sup> is another WRAP initiative that provides recipes and food habits that individuals can take to reduce food waste and greenhouse gas emissions.

**Food Recovery Network (FRN)** is a student-led movement established in 2010 aimed at fighting waste and feeding people. FRN unites students on college campuses to fight food waste and hunger by recovering perishable food that would otherwise go to waste from their campuses and communities and donating it to people in need. It mobilizes thousands of student leaders on college campuses across the U.S. to engage in food recovery, hunger-fighting, and food justice work.

**Drexel Food Lab at Drexel University** is a food product design and culinary innovation lab that applies culinary arts and science to improve the health of people, the planet, and economies. The Drexel Food Lab focuses on upcycling foods and creating sustainable menus by taking foods and food byproducts that are often considered to be trash and developing them into safe, healthy, cost-effective and desirable products. The Drexel Food Lab collaborates with various organizations to focus on upcycling foods and studies the most commonly wasted food items to lead the way in tackling food waste through research and partnerships.

**Champions 12.3** is a coalition of executives from governments, businesses, international organizations, research institutions, farmer groups, and civil society dedicated to inspiring ambition, mobilizing action and accelerating progress toward achieving Sustainable Development Goal Target 12.3, which seeks to "ensure sustainable consumption and production patterns." These leading businesses, including Kroger, Walmart, and Ikea have committed to significant food waste reduction goals by joining the UN's 10x20x30 initiative. This action brings 10 of the largest food retailers together to engage 20 of their suppliers in order to reduce food waste in half by 2030.

**The U.S. Food Waste Pact** is a voluntary agreement for food businesses to publicly commit to private sector action to reduce food waste. A replicable model for Michigan and the Great Lakes, this program is an expansion of the **Pacific Coast Food Waste Commitment (PCFWC)**, which calls on food businesses and jurisdictions to join a public-private partnership to work toward a shared ambition of effective, industry-wide actions that prevent and reduce wasted food along the West Coast. The U.S. Food Waste Pact is designed to go beyond commitment setting to drive meaningful progress on food waste reduction, as well as serve as a connective fabric to support other national and regional food waste efforts across the country.

## Part 2: Surplus Food and Food Scraps in the Michigan Food System

In this section, the Roadmap will outline a baseline for the Michigan food system, defining the issue as it pertains to farms, food manufacturers, grocery retailers, foodservice and consumers in the state. This will include a review of food waste reduction strategies, organized according to their preference and the value each will retain in the food system for prevention, rescue and recycling. These benchmarks represent the first statewide stakeholder engagement effort to quantify food waste performance and awareness in Michigan, and are believed to be the most comprehensive available at the time of publication.

However, given the size and scope of the Michigan food system, continued and ongoing engagement and data collection is necessary to meet the state’s food waste reduction goals.

### Introduction to the Michigan Food System

Michigan’s food system is as diverse and unique as its economy, people and natural resources. In general, local food systems consist of an ideally circular process of growing, harvesting, gathering, selling, buying, processing, preparing, and eating food, as well as the disposal of surplus food and food scraps. Depending on the product and consumer, this system may be local to a community or neighborhood, or part of a global supply chain.

Illustration 2.1: Food Supply Chain<sup>42</sup>



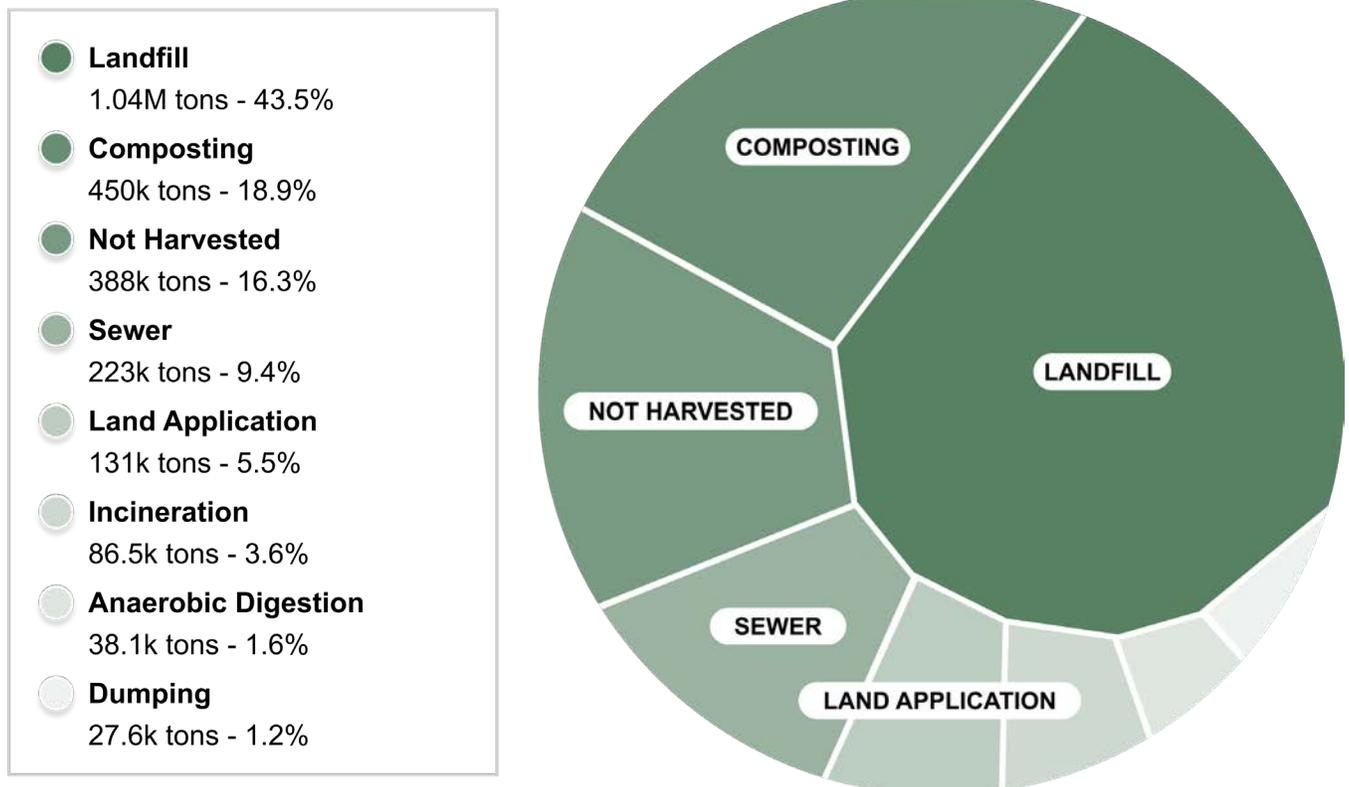
An ideal “local food system” is circular, as shown in this illustration from the Kent County Food System Assessment.

For the purposes of this Roadmap, we will define the state’s food system by five industry segments, aligning definitions to the national food waste movement:

- Farms
- Manufacturing (and Processing)
- Retail (Grocery)
- Foodservice
- Consumers

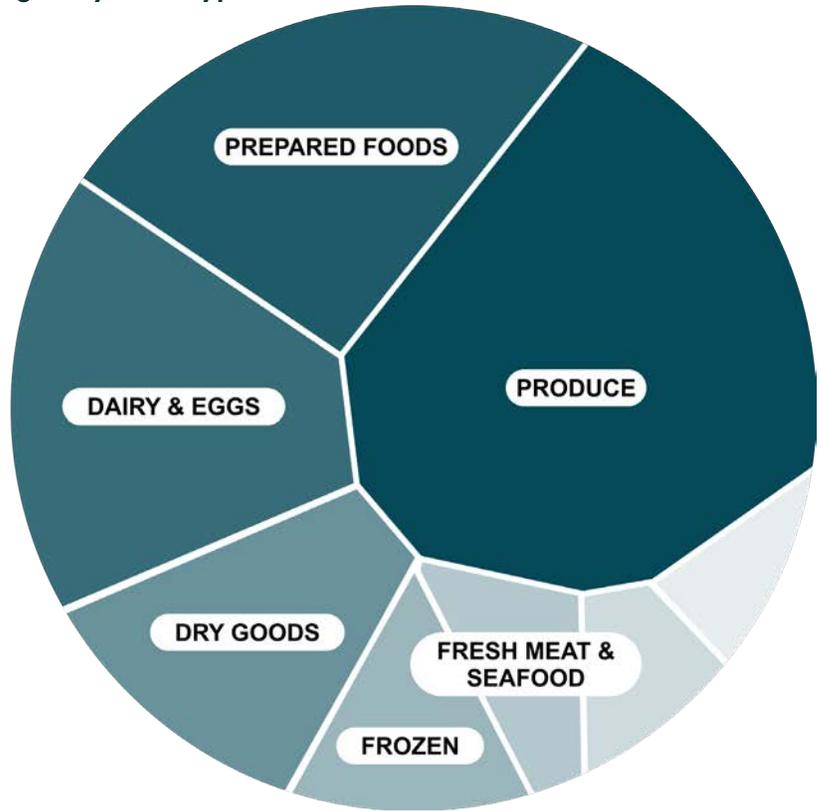
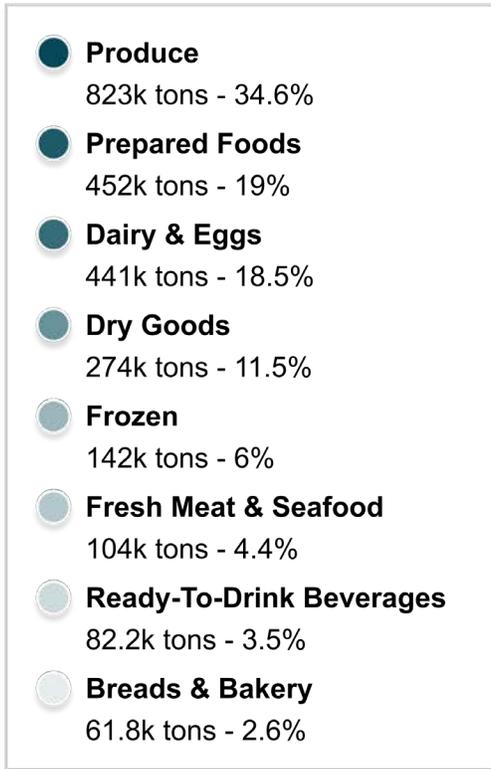
The following pages include an introduction to each segment, followed by a discussion of the solutions relevant to each segment, prioritizing prevention strategies. Input from additional stakeholder groups including logistics, transportation and distribution, social service and hunger-relief agencies, educators and advocates, state and local government, and end-of-life service providers has been included in the appropriate section. The section concludes with additional examinations of donation and recycling strategies.

**Illustration 2.2: Food Waste Tons in Michigan by Destination Type (2021)**



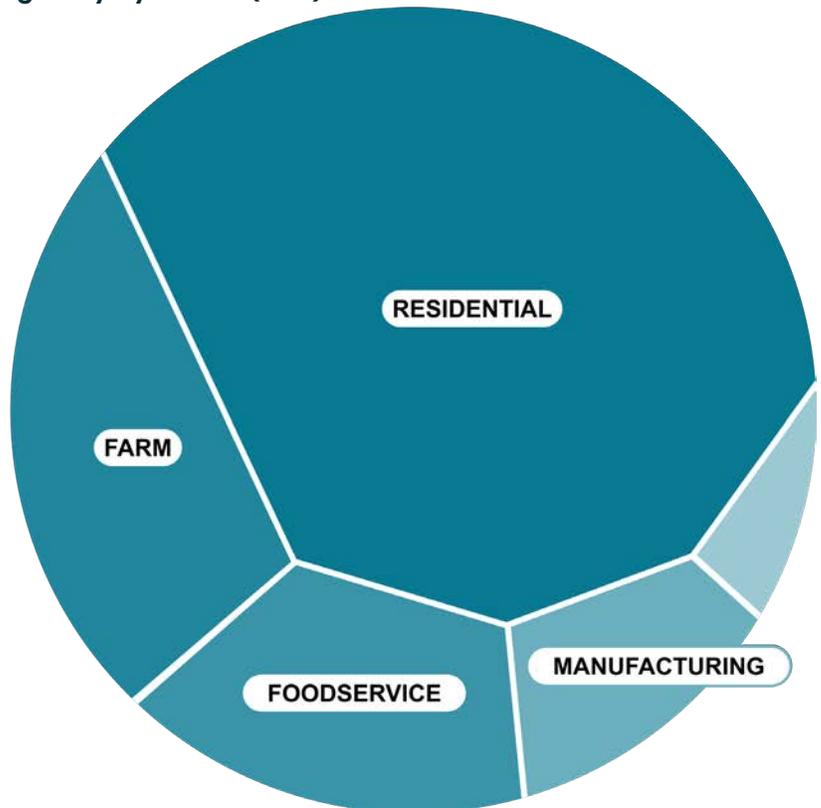
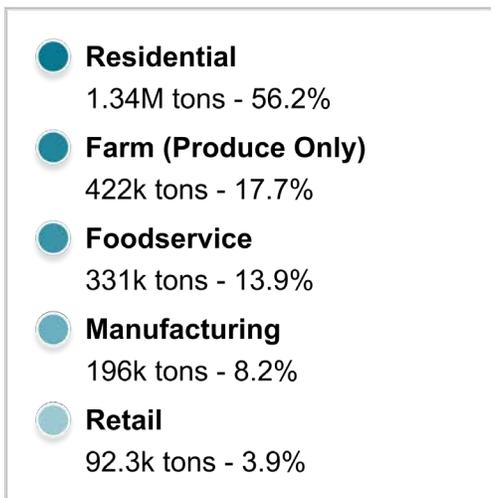
Source: ReFED

**Illustration 2.3: Food Waste Tons in Michigan by Food Type (2021)**



Source: ReFED

**Illustration 2.4: Food Waste Tons in Michigan by Sector (2021)**



Source: ReFED



## Benchmark Report

Illustrations 2.2, 2.3 and 2.4 on the preceding pages show Food Waste Tons in Michigan by disposal destination, by food type and by sector, according to the ReFED Food Waste Monitor. Estimated data is also available for economic value lost, gallons of water, meals and metric tons of CO<sub>2</sub>e. Except when otherwise noted, this Roadmap uses surplus food tons or food waste tons to quantify the impact of potential solutions.

The table below shows estimated Food Waste Tons in Michigan by sector for the most recent five years for which data is available. Michigan has performed slightly better over this period than the nation, producing marginally less total food waste in 2021 than it did in 2016.

**Table 2.1: Food Waste Tons in Michigan by Sector, 2016 to 2021**

Year	FW Tons, 2016	FW Tons, 2017	FW Tons, 2018	FW Tons, 2019	FW Tons, 2020	FW Tons, 2021
Residential	1.24 M	1.19M	1.26M	1.26M	1.41M	1.34 M
Farm (Produce Only)	627k	554k	619k	559k	494k	422k
Foodservice	315k	319k	376k	385k	249k	331k
Manufacturing	217k	215k	203k	201k	190k	196k
Retail	87.1k	88.4k	94.6k	98.1k	95.5k	92.3k

Source: ReFED

As will be described in the section that follows, there are competing drivers in the food system, with market expectations and consumer preferences encouraging decisions that create surplus and waste. Food loss is especially insidious – businesses do not generally know how much value they are losing to inefficient practices.

However, food waste prevention, or food loss and waste reduction (FLWR), has been proven to lower costs and increase profitability in most sectors, with prominent examples of Michigan companies earning substantial savings through relatively accessible strategies. If environmental sustainability and food security are not adequate motivation in the face of contradictory influences, a return on investment can be demonstrated through incentives that lower upfront costs or remove practical barriers. There is a business case for food waste prevention, and the private sector will invest in recommended solutions if given adequate technical support, resources, an encouraging regulatory environment, and as necessary, capital for investment.

### **Michigan Good Food Charter**

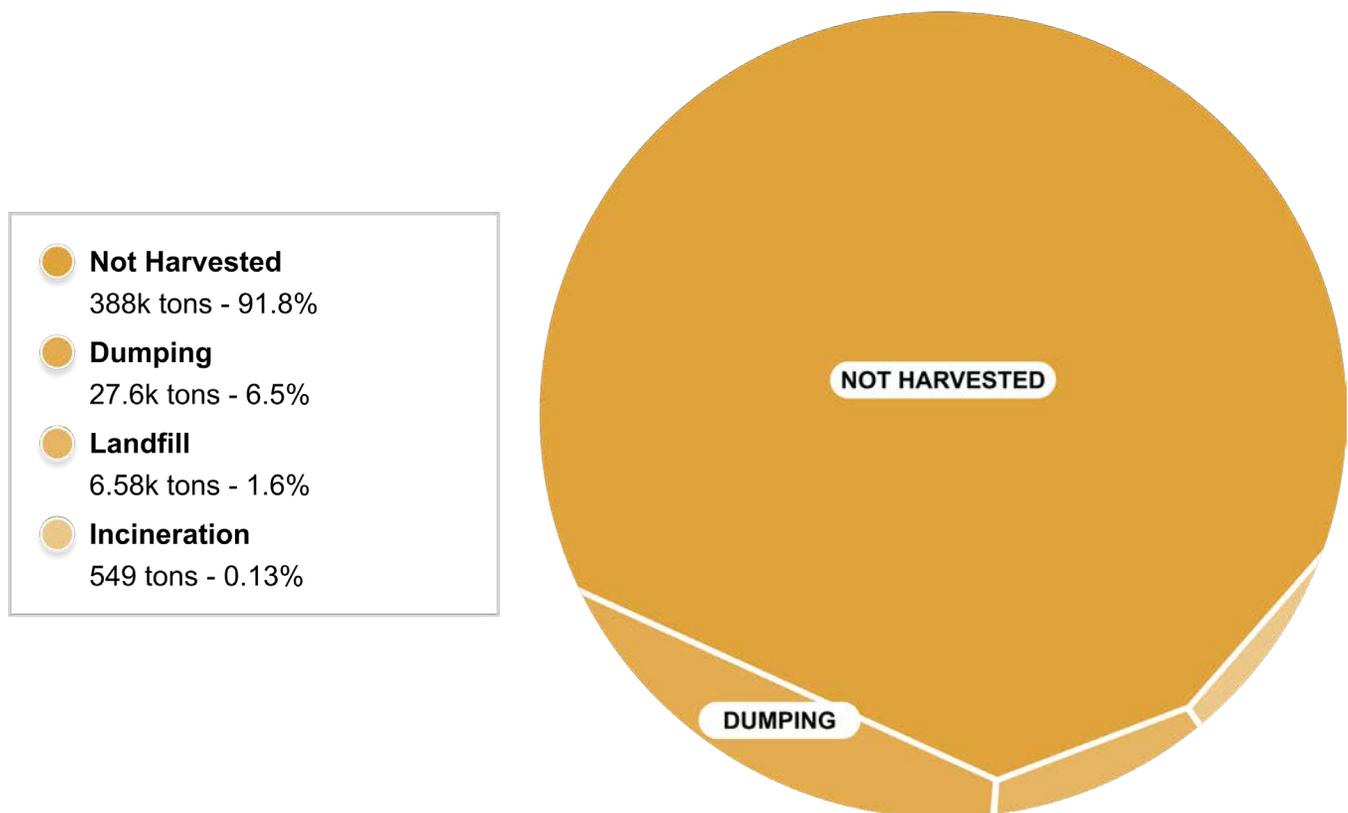
The Michigan Good Food Charter<sup>43</sup> is a manual to promote the systemic change necessary for a food system that is prosperous, equitable, healthy, and sustainable. The Charter has identified six interconnected goals:

- Food access to food sovereignty
- Farm and food business viability
- Health equity
- Fair wages and economic opportunity
- Sustainable ecosystems
- Climate change mitigation and resilience

Michigan is unique for its extensive network of food councils, local organizations that work on food and food policy issues through public-private partnerships, or as independent non-profit organizations, in general alignment with the Michigan Good Food Charter. Michigan has the third most councils of any state, supported collectively and individually by the Michigan Local Food Council Network, a program of the Center for Regional Food Systems at Michigan State University.

# Farms

Illustration 2.5: Food Waste in Tons by Destination in Michigan: Farms (produce only)



Source: [ReFED](#)

Michigan agriculture contributes more than \$104.7 billion annually to our state’s economy, second in diversity only to California<sup>44</sup>. Approximately 17 percent of the state’s employment stems from the food and agricultural sector,<sup>45</sup> delivering a vast array of agricultural products as well as farm entertainment and U-pick experiences for strawberries, raspberries, blueberries, peaches, cranberries, cherries and other specialty crops. There are just under 10 million acres of farmland and roughly 47,600 farms producing more than 300 commodities on a commercial basis in the state.

According to ReFED, farms were responsible for 17.7 percent of food waste by ton in Michigan in 2021, the most of any commercial segment. Unlike other segments, virtually none of this material is disposed of in the state’s landfills. The vast majority is left in the fields; a substantial waste of resources, but not a tremendous source of emissions (farms are responsible for only 1.1 percent of Michigan food waste MMT CO<sub>2</sub>e, according to ReFED). An estimated 76,000 tons of surplus food are also used for animal feed, which is not considered food waste in this metric. For Michigan farms, food waste is an economic issue, an estimated cost of approximately \$300 million in lost value per year, according to ReFED.

Table 2.2 provides a representative list of agricultural commodities produced in the state, and identifies the organization through which additional engagement and pilot programs could be implemented. There is no data available that would allow a meaningful comparison of inefficiencies and loss among the various commodities produced in the state. However, the size and value of production, and the concentration of specialty crops do provide a reasonable measure of the greatest opportunities for FLWR in Michigan agriculture.

**Table 2.2: Representative Michigan Agricultural Commodities**

Commodity	Production (in Tons)	Value of Production	Seasonality	Michigan Specialty	Representation
Apples	680,000	\$420,400,000	August to June	55% of MI apples are processed into other products	Michigan Apple Committee Michigan Tree Fruit Association
Asparagus****	13,695	\$26,332,000	April to June	First in nation	Michigan Asparagus Committee Michigan Asparagus Advisory Board
Barley*****	9,600	\$2,320,000	October to April	NA	
Beans*	200,000	\$126,000,000	August to October	Large variety of dry edible beans	Michigan Bean Commission
Beef**	1,150,000 cattle	\$575,000,000	Year Round	Over 12,000 beef farms and ranches	Michigan Beef Industry Commission
Blueberries	29,200	\$97,471,400	July to October	Third in nation	Michigan United Blueberry Producers Michigan Blueberry Growers Association Michigan Blueberry Commission
Cabbage****	94,600	\$32,032,000	June to December	NA	
Carrots**	76,000	\$14,500,000	July to November	Fourth in nation	Michigan Carrot Committee
Celery**	55,000	\$19,500,000	June to October	Second in nation	Michigan Celery Promotion Cooperative, Inc.
Cherries	90,250	\$36,813,000	June to August	70% of US. tart cherries	Michigan Cherry Committee
Chestnuts	Data not available	Data not available	October to December	First in nation	Midwest Nut Producers Council
Corn, Grain*****	9,360,960	\$2,116,800,000	October to November	2.3 million acres, tied with soybeans for the most coverage in Michigan crops	Corn Marketing Program of Michigan
Cucumbers****	246,000	\$63,210,000	July to September	First for pickling in nation	Michigan Vegetable Council
Dairy/Milk**	5,585,000	\$1,660,000,000	Year Round	Fifth in nation	Michigan Dairy Market Program Michigan Milk Producers Association United Dairy Industry of Michigan Dairy Herd Improvement Association
Eggs**	4,548,000,000 eggs	\$655,000,000	Year Round	Seventh in nation	Michigan Allied Poultry Industries
Grapes*	93,400	\$30,200,000	August to November	Eighth in nation	Michigan Grape Society
Honey	2,650	\$12,000,000	Year Round	Eighth in nation	Michigan Beekeepers Association Michigan Commercial Beekeepers Association
Hops	Data not available	Data not available	August to September	Fourth in nation, 20 different varieties of hops	Hop Growers of Michigan
Maple Syrup	188,000 gallons	\$6,975,000	February to April	Seventh in nation	Michigan Maple Syrup Association
Oats*****	29,280	\$9,333,000	April to July	NA	
Onions	79,000,000 onions***	\$10,000,000	April to September	NA	Michigan Onion Committee
Peaches	11,160	\$20,099,000	July to September	NA	Michigan Peach Sponsors
Peppers, Bell****	225,000	\$22,380,000	July to September	NA	
Pork	1,180,000 hogs**	\$373,000,000	Year Round	NA	Michigan Pork Producers Association
Potatoes****	944,150	\$262,474,000	July to October	Nation's leading producer for potato chip processing	Michigan Potato Industry Commission
Poultry	14,170,000 birds**	Data not available	Year Round	NA	Michigan Allied Poultry Industries

Commodity	Production (in Tons)	Value of Production	Seasonality	Michigan Specialty	Representation
Pumpkins****	465,500	\$16,439,000	September to October	NA	Michigan Vegetable Council
Snap Peas****	825,000	\$31,030,000	June to October	NA	Michigan Vegetable Council
Soybeans*****	2,865,229	\$1,547,616,000	Late Fall	Michigan's top food export	Michigan Soybean Promotion Committee
Squash****	82,125	\$39,469,000	June to October	First in nation	Michigan Vegetable Council
Sugarbeets	3,974,000	Data not available	April to September	Michigan Sugar Company is the third-largest of nine sugarbeet processing companies in the US, and MI is one of 11 states where sugarbeets are grown	Michigan Sugar Company
Sweet Corn	43,000	\$21,800,000	July to September	NA	Michigan Vegetable Council
Tomatoes*	157,100	\$48,400,000	August to September	NA	Michigan Vegetable Council
Wheat*****	1,033,350	\$268,671,000	Summer	Michigan has six large commercial mills that process wheat	Michigan Wheat Program

\*Data from 2016  
 \*\*Data from 2018  
 \*\*\*Data from 2015  
 \*\*\*\*Converted from hundredweights  
 \*\*\*\*\*Converted from bushels

Some of the largest commodities by ton produced include corn, dairy, sugarbeets, soybeans and wheat, plus a substantial amount of pork, beef, poultry and eggs by other units of measure, while the most valuable commodities in the state included poultry, corn, dairy, soybeans, eggs, beef, apples and pork.

In addition, asparagus, blueberries, carrots, celery, chestnuts, pickle cucumbers, sugarbeets, tart cherries and hops are all highly concentrated in Michigan, and/or specific regions of the state. (Targeted engagement in Southwest Michigan could focus on blueberries, for instance. Tart cherries in Northwest Michigan; pickle cucumbers and asparagus in Muskegon and Oceana counties.)

### Engagement Findings

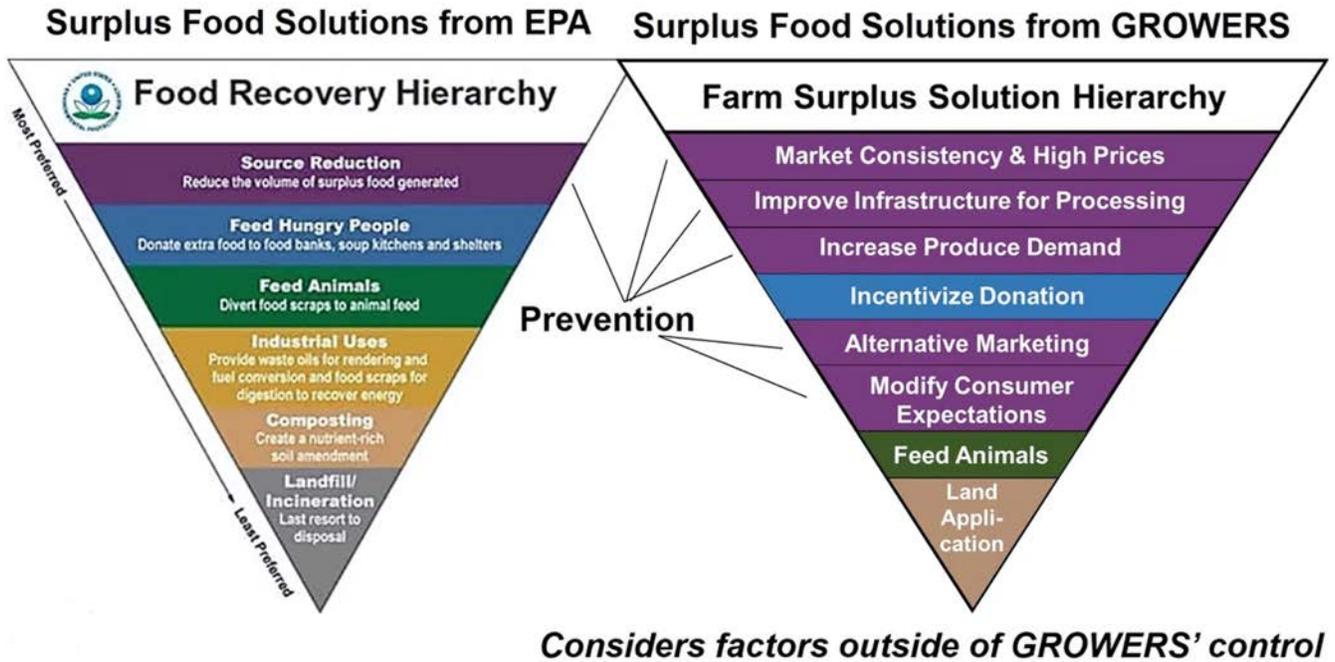
Stakeholders interviewed had a variety of roles: from growing or sourcing products to produce distribution, wholesale, milling, education, consulting, and youth engagement. Several farms had processing operations, as well as markets, bakeries, slaughterhouses, hoop houses, or retail spaces.

Engaged farmers and stakeholders grow or support the production of asparagus, strawberries, tart cherries, peaches, apricots, apples, nectarines, plums, cucumbers, squash, pumpkin, food grade soybeans, food grade oats, dry beans (such as navy or black beans), and wheat. Some also produce sweet and hard ciders, concentrates, pies, and jams. Many also raised animals such as cattle or pigs.

Farmer networks, co-ops, researchers, and consultants are important stakeholders in the food system that enable innovation, collaboration, and support for farmers and the community at large. Researchers interviewed focused on increasing harvest efficiencies and reducing labor demands through automation and technology, while educators shared knowledge on rotational grazing, vertical farming techniques, or innovations and best practices in the pork industry.

Lisa Johnson, a renowned expert on food loss and waste in agriculture based in the Department of Horticulture Science at North Carolina State University, noted that crops go unharvested despite being edible.<sup>46</sup> Farmers underestimate how much is left in the fields, and better metrics and practice are needed to help them visualize the loss.<sup>47</sup> Illustration 2.6 depicts an alternative to the now-defunct

Illustration 2.6: The Farm Surplus Hierarchy



EPA Food Recovery Hierarchy Johnson developed to detail Surplus Food and food waste solutions from a farm perspective.

**Best Practices**

Given the character of wasted food on farms, farmers and associated stakeholders emphasized the need to harvest all available products and to not produce a surplus. Much of this is demand driven: Encouraging consumers to buy more Michigan agricultural products is an obvious best practice.

Building secondary markets and informal networks for consistent surplus products was a common topic highlighted by stakeholders and a proven strategy for surplus food utilization. Many farmers spoke of utilizing whey, pumpkins, purge flour/transition products, spent grain, and culled vegetables and fruits for animal feed. In this scenario, farms serve as a solution for food waste generators: One farmer integrates cereals from WK Kellogg Company in Battle Creek into feed for cattle to boost milk production, while pumpkins have been given to cattle, pigs, and chicken for feed throughout the state. Apple mash is also a great stream of surplus food that is healthy to integrate into farmers' cattle feed. Tart cherries can be utilized for deer bait.

Surplus food donation was another topic of interest from farmers and distributors. One interviewee said that prior to their partnership with Forgotten Harvest, the company was dumping around 80 pallets of food a week. Although donation is a common strategy for producers, few felt that the currently available federal tax benefits were worth the paperwork to submit IRS claims.

Innovation was also a topic of discussion and several farmers cited grant programs for inspiring them to adopt more sustainable farming practices, typically soil management or other climate solutions, such as solar panels or climate-smart commodity labeling.

Table 2.3 is an inventory of recommended solutions from the ReFED Solutions Database and the estimated potential benefits from large-scale adoption. Based on our stakeholder engagement, we have estimated the current adoption of each solution (High, Medium, Low or Unknown).

**Table 2.3: Recommended Surplus Food Solutions for Farms (Produce)**

Solution	Tons	Mt CO2e	Meals	Solution Scale	Mich. Adoption
Livestock Feed	71,600	23,400	0	Recycling Anything Remaining	High
Imperfect & Surplus Produce Channels	47,700	11,000	79,600,000	Optimize the Harvest	Medium
Centralized Composting	29,500	482	0	Recycling Anything Remaining	Low
Donation Education	25,800	3,070	43,000,000	Strengthen Food Rescue	Low
Buyer Specific Expansion	18,000	4,150	29,900,000	Optimize the Harvest	Medium
Donation Transportation	11,100	1,320	18,500,000	Strengthen Food Rescue	Medium
Co-Digestion At Wastewater Treatment Plants	11,100	1,230	0	Recycle Anything Remaining	Medium
Centralized Anaerobic Digestion	9,590	1,070	0	Recycle Anything Remaining	Low
Temperature Monitoring (Pallet Transport)	8,560	30,200	14,300,000	Enhance Product Distribution	Unknown
Donation Value-Added Processing	6,770	602	11,300,000	Strengthen Food Rescue	Low
Donation Storage Handling & Capacity	5,350	637	8,920,000	Strengthen Food Rescue	Medium
Decreased Transit Time	2,470	570	4,110,000	Enhance Product Distribution	Medium
Partial Order Acceptance	752	174	1,250,000	Optimize the Harvest	Unknown
Gleaning	118	14	197,000	Optimize the Harvest	Medium
Improved Market Data*	NA	NA	NA	Optimize the Harvest	Low
Cold Chain Infrastructure*	NA	NA	NA	Optimize the Harvest	Low
Field Cooling Units	NA	NA	NA	Optimize the Harvest	Unknown
In Field Sanitation Monitoring	NA	NA	NA	Optimize the Harvest	Unknown
Innovative Grower Contracts	NA	NA	NA	Optimize the Harvest	Unknown
Labor Matching	NA	NA	NA	Optimize the Harvest	Low
Smaller Harvest Lots	NA	NA	NA	Optimize the Harvest	Unknown
Advanced shipment notifications	NA	NA	NA	Enhance Product Distribution	Medium
Early spoilage detection (hyperspectral imaging)	NA	NA	NA	Enhance Product Distribution	Low
Inventory traceability	NA	NA	NA	Enhance Product Distribution	Low
Direct to consumer channels	NA	NA	NA	Refine Produce Management	High
Online marketplace platform	NA	NA	NA	Refine Produce Management	Low

Source: ReFED Solutions Database and \*MiSBF Stakeholder Engagement

Based on stakeholder engagement and secondary research, this Roadmap will highlight the following solutions for specific consideration:

- **Imperfect & Surplus Produce Channels** that allow for the marketing of seconds or the development of whole animal programs, as well as increased funding for surplus food purchasing programs.
- **Temperature Monitoring (Pallet Transport)** that uses measurement and alert technology and other systems for pallet- or truck-level temperature tracking to identify areas for improved cold chain compliance, third-party issue identification, and real-time detection and resolution.
- **Cold Chain Infrastructure** to increase the availability of climate-controlled storage to manage surplus crops.
- **Improved Market Data** to provide growers better information to forecast customer demand, and/or **Innovative Grower Contracts** that may promote a consistent market and prices.
- **Labor Matching** improvements through policy or market innovations.

### Barriers to Adoption

Interviewees and stakeholders discussed several food waste vectors and barriers to the adoption of best practices on their farms and businesses, including market unpredictability, a need for more education (specifically on date labeling, household waste reduction, and community collaboration) and data, expanded infrastructure and (refrigerated) transportation, labor costs and availability, lack of donation support, and a general need for policy change.

Unpredictable market demand was most frequently mentioned. Several meat producers highlighted a lack of market for specific animal parts like hearts, intestines, bones or tongues, many of which end up being exported out of the country. One interviewee said that almost 40 percent of the pork cuts that are raised in Michigan are exported. They emphasized a need for support in finding an end market for all animal parts and would like to implement a whole animal program. Others mentioned a lack of research on market potential or how for fruit growers, quick change is not possible with a seven-year investment before trees start producing, unlike vegetable growers. Small growers also struggle to stay current with research on new varieties due to a rapidly changing industry and change in consumer taste. Several farmers mentioned that many large producers will “set aside” batches of produce to keep prices high, whereas small growers typically do not. Secondary markets are also needed to address buyer rejections or imperfect foods: One interviewee said that one or two semi trucks are dumped a week because there is no market for “mediocre produce”.

Unpredictable market demand intersects with a lack of larger market data, although many farmers and producers have years of data that are not shared. Moreover, there is typically a lack of measurement on what is left in the field and a lack of data sharing mechanisms that work for all constituents. Infrastructure gaps such as processing for animals and produce, commercial composting facilities, and a lack of trucking connections have proven difficult. There are also labor issues when it comes to wages and quality infrastructure to house migrant farmworkers. For many, attracting skilled workers has become a struggle year after year.

Apple farms provide an illustrative example: A bumper crop in 2022 led to a peak in unharvested produce due to a shortage of labor for picking (or affordable labor rates), processing capacity, and climate-controlled storage. In 2012, most Michigan farms lost their entire crop due to unseasonable weather.

Tart cherry farms provide another, where an industry-mandated set-aside practice has been regularly used to address supply volatility and foreign competition. Some set-aside cherries are frozen and preserved for later, but most are lost. In 2019, for example, the industry voted to withhold 35 percent of that year’s yield.<sup>48</sup>

## Tortoise & Hare Farm, Muskegon



Surplus food on farms are typically left in the field or on trees unharvested. This may occur because the produce is inedible or not marketable, bad weather, buyer rejections, over-ripening in the sales process, low market prices, or lack of labor, among other reasons.<sup>49</sup>

### Support or Resources Requested

- Recruit gleaners, 4H clubs, or citizen scientists to support data and measurement on what is edible and marketable.
- Infrastructure needs such as community-based biodigesters, storage, refrigerated distribution, and composting facilities. Processing infrastructure for small and mid-sized farms.
- Support with H2A migrant farmworker costs, transportation and housing.
- Food donation support including liability education, improved incentives, and technical support.
- Additional funding for the Michigan Agricultural Surplus System program to reduce excess product from farms and feed families who are experiencing food insecurity.
- Technical support and guidance on date labeling, packaging, and relevant production standards.
- Development of government programs to buy misfit or imperfect produce.
- Education and more predictive tools and technologies to better anticipate market demands.

## King's Orchard, Central Lake



## Case Studies

### King's Orchard

King's Orchards, located in Central Lake, is a vertically integrated operation consisting of a farm, processor, and both retail and wholesale channels. With multiple markets, King's Orchards finds that it can efficiently utilize its entire crop. Excess crops, typically corn and winter squash, are donated to a local food bank. At the same time, the operators believe that key market changes, such as access to smaller-scale processing, the development of local commercial composting, and increased purchasing by downstate wholesale markets, would help prevent potential food loss.

### Star of the West Milling Company

Founded in 1870, Star of the West is one of the few remaining mills in Michigan. The company focuses primarily on milling wheat and processing and distributing dry beans. Recently, Star of the West created a new sustainability position in response to customer interest. Current projects include the promotion of sustainable wheat, climate-smart labeling, and data processes for farmers.

Star of the West produces little in the way of food waste. Purge flour (the flour left after transitioning product lines) is donated to Hidden Harvest

where volunteers repackage it into household-size bags. Unusable beans are sent to compost. The business also takes steps to address sustainability in packaging, including distributing beans in bulk when possible, shipping in poly totes or forest-certified paper packaging, and eliminating inventory by making shipments to order.

### Lavender Life Company

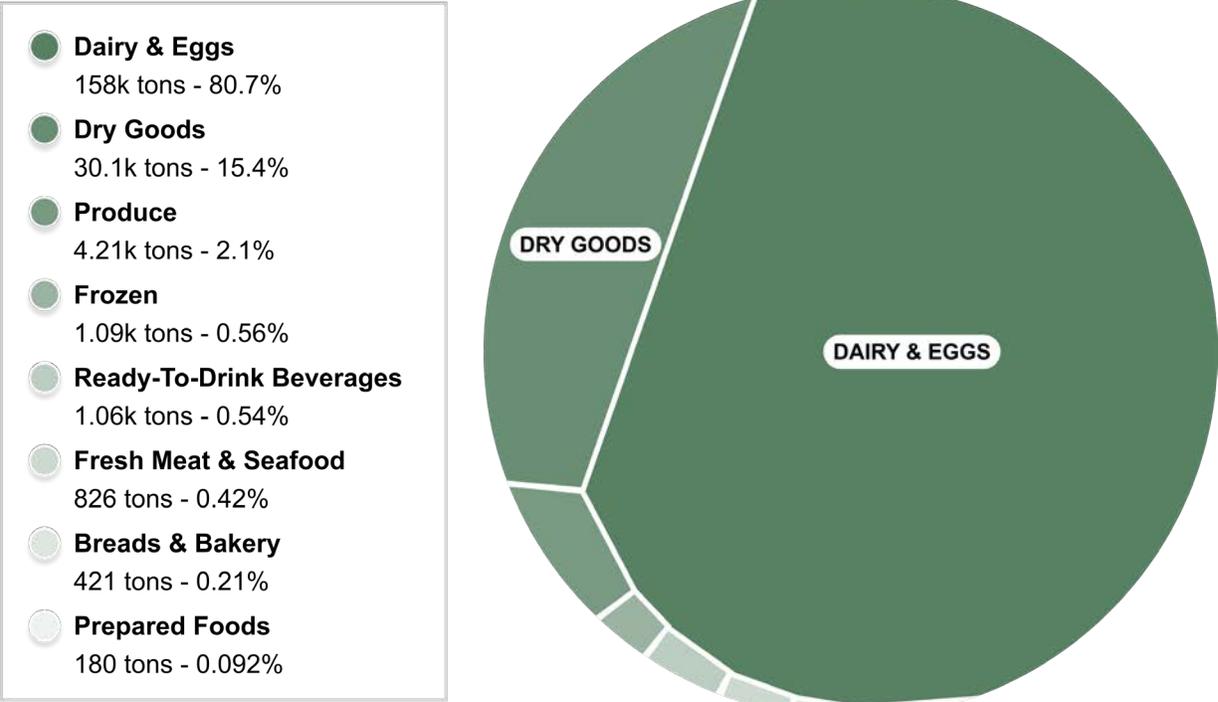
The Lavender Life Company is a lavender farm in Caledonia. Although the company does not grow food, its Xander Bunny line of stuffed toys have created a substantial market for a byproduct from Michigan's cherry farms. The popular toys are filled with lavender and cherry pits.

### Kalamazoo Valley Gleaners

Kalamazoo Valley Gleaners is an organization with a mission to alleviate hunger in Southwest Michigan and throughout the world. The organization partners with local farmers to glean produce that would otherwise go to waste due to size, color, shape, or expiration date. By working closely with community volunteers to process this food into nutritious meals, it delivers four to five million meals annually. The organization was founded in 2021 and recently acquired a 23,000-square-foot building to operate large-scale gleaning endeavors.

# Manufacturing

Illustration 2.7: Food Waste in Tons by Food Type in Michigan: Manufacturing



Source: ReFED

Table 2.4: Food Waste in Tons by Destination and Food Type: Manufacturing, 2016 to 2021

Food Type	FW Tons, 2016	FW Tons, 2017	FW Tons, 2018	FW Tons, 2019	FW Tons, 2020	FW Tons, 2021
Dairy & Eggs	175k	172k	164k	163k	153k	158k
Dry Goods	33.5k	34.5k	31.5k	30.5k	29.9k	30.1k
Produce	4.17k	3.98k	4.08k	3.96k	4.09k	4.21k
Ready-To-Drink Beverages	1.3k	1.21k	1.17k	1.12k	1.1k	1.06k
Frozen	1.14k	1.07k	960	983	101k	1.09k
Fresh Meat & Seafood	595	602	770	768	749	826
Breads & Bakery	581	576	410	396	413	421
Prepared Foods	147	159	183	181	171	180

According to ReFED, food manufacturers and food processors were responsible for 8.2 percent of food waste by ton in Michigan in 2021. Reliable data estimating the disposal destinations of manufacturing food waste in Michigan is not available, but ReFED believes the majority of wasted food is managed through land application, with a smaller portion managed through anaerobic digestion. Anecdotal evidence from stakeholder interviews suggests a much greater amount is landfilled than ReFED estimates.

Michigan is home to a variety of food and beverage companies as well as two major food processors associations. Most of the commodities highlighted in the prior Farms section have an associated processing segment, and there are hundreds of other Michigan companies or local subsidiaries involved in the processing of raw food materials and the manufacturing of food and beverage products.

### Engagement Findings

Stakeholder engagement interviews suggest that processing, manufacturing, distribution, and packaging interests have implemented a variety of sustainability and waste reduction strategies. Interviews included on-farm and near-farm food processors, beverage-makers and brewers, snack food and cereal makers, and various vendors and agencies that support Michigan food product manufacturers and processors.

Manufacturers are starting to learn about food waste, though there is some skepticism that FLWR opportunities are readily available and worthwhile. Larger brands especially were prepared to discuss sustainability initiatives: there are a great deal of programs and initiatives currently underway to advance emissions reductions, energy efficiency programs, wastewater reduction and water efficiency, regenerative agriculture techniques, green roofs, and community education on climate action. Shipping efficiency in routes and sustainable lightweight packaging are some best practices that are frequently implemented. For example, many use cartons which can be shipped flat that use less space than shipping plastic gallons of liquid.

One interviewee stated a goal for all packaging to be made with recycled, recyclable, or renewable materials by 2030. There was a great deal of interest in plastic packaging, and some interest in compostable packaging. (Compostable products have been shown to help enable more food scraps to be diverted from the landfill as the food can be composted along with its container.)

### Best Practices

Manufacturers and processors interviewed universally expressed an interest in improving recycling practices. Most manufacturers of packaged goods have implemented some type of recycling practice to divert byproducts from the landfill, including composting, upcycling or partnership with anaerobic digesters. Several, and all of the major brands, had zero-waste-to-landfill goals.

Nearly all makers of edible products interviewed had a donation relationship with a food bank or rescue to manage surplus or close-dated inventory. Some also utilized product destruction services in lieu of donations due to safety or marketing concerns. Animal feed was mentioned occasionally, especially by brewers, who enjoy a mature secondary market in spent brewers' grain for cattle feed.

There was limited discussion about manufacturing optimization. Ingredient manufacturers were the most interested, presumably because donation strategies would have limited utility. The most advanced program interviewed set specific FLWR goals last year and has since developed a food loss dashboard. It is now value-stream mapping process improvements and identifying resource needs.

Table 2.5 is an inventory of recommended solutions from the ReFED Solutions Database and the estimated potential benefits from large-scale adoption. Based on our stakeholder engagement, we have estimated the current level of adoption for each solution (High, Medium, Low or Unknown).

Illustration 2.8 features 24 representative Michigan brands with production operations around the state, including cereal makers, bakeries, ingredient formulators, snack food makers, breweries, meat processors, and more.

Illustration 2.8 Representative Michigan Food Processor/Manufacturer Brands



**Table 2.5 Recommended Surplus Food Solutions for Manufacturers**

Solution	Tons	Mt CO2e	Meals	Solution Scale	Mich. Adoption
Manufacturing Line Optimization	69,200	188,000	115,000,000	Maximize Product Utilization	Medium
Manufacturing Byproduct Utilization (Upcycling)	47,900	130,000	79,900,000	Maximize Product Utilization	Medium
Centralized Composting	45,200	19,700	0	Recycling Anything Remaining	Low
Livestock Feed	44,200	11,200	0	Recycling Anything Remaining	High
Standardized Date Labels	25,100	145,000	41,800,000	Reshape Consumer Environments	Low
Active & Intelligent Packaging	22,900	143,000	38,200,000	Maximize Product Utilization	Low
Co-Digestion at Wastewater Treatment Plants	19,100	8,870	0	Recycling Anything Remaining	Medium
Centralized Anaerobic Digestion	16,100	7,500	0	Recycling Anything Remaining	Low
Package Design	10,400	75,700	17,300,000	Reshape Consumer Environments	Medium
Temperature Monitoring (Pallet Transport)	8,090	34,400	13,500,000	Enhance Product Distribution	Unknown
Assisted Distressed Sales	6,860	20,000	11,400,000	Refine Product Management	High
Donation Education	3,100	4,840	5,170,000	Strengthen Food Rescue	Low
Intelligent Routing	1,240	5,710	2,070,000	Enhance Product Distribution	Medium
Decreased Transit Time	937	5,760	1,560,000	Enhance Product Distribution	Medium
Buyer Specification Expansion	771	3,720	1,290,000	Optimize the Harvest	Unknown
Partial Order Acceptance	754	2,990	1,260,000	Optimize the Harvest	Unknown
Donation Storage Handling & Capacity	644	1,000	1,070,000	Strengthen Food Rescue	Medium
First Expired First Out	217	1,350	361,000	Enhance Product Distribution	Medium
Reduced Warehouse Handling	64	325	107,000	Enhance Product Distribution	Unknown
Innovative grower contracts	NA	NA	NA	Optimize the Harvest	Unknown
Early spoilage detection (hyperspectral imaging)	NA	NA	NA	Enhance Product Distribution	Low
Inventory traceability	NA	NA	NA	Enhance Product Distribution	Low
Modified atmosphere packaging system:	NA	NA	NA	Enhance Product Distribution	Unknown
Vibration & drops tracking:	NA	NA	NA	Enhance Product Distribution	Unknown
Direct to consumer channels	NA	NA	NA	Refine Produce Management	Medium
Online marketplace platform	NA	NA	NA	Refine Produce Management	Low
Repackaging partially damaged products	NA	NA	NA	Refine Produce Management	Medium
Precision food safety	NA	NA	NA	Reshape Consumer Environments	Low
Edible coatings	NA	NA	NA	Reshape Consumer Environments	Unknown
Donation reverse logistics	NA	NA	NA	Strengthen Food Rescue	Unknown
Blast chilling to enable donations	NA	NA	NA	Strengthen Food Rescue	Low
Insect Farming	NA	NA	NA	Recycling Anything Remaining	Low
Rendering	NA	NA	NA	Recycling Anything Remaining	Medium
Waste-Derived Bioplastics	NA	NA	NA	Recycling Anything Remaining	Low
Waste-Derived Biomaterials	NA	NA	NA	Recycling Anything Remaining	Low
Waste-Derived Processed Animal Feed	NA	NA	NA	Recycling Anything Remaining	Medium
Early spoilage detection (hyperspectral imaging)	NA	NA	NA	Enhance Product Distribution	Low

Source: ReFED Solutions Database and \*MiSBF Stakeholder Engagement

Based on stakeholder engagement and secondary research, this Roadmap highlights the following solutions for specific consideration:

- **Manufacturing Line Optimization** can identify opportunities to reduce food waste from manufacturing and processing operations. Food loss and waste can occur in manufacturing operations due to outdated equipment, product line changeovers, or inefficient procedures.
- **Manufacturing Byproduct Utilization (Upcycling)** can prevent whole food items, underutilized parts of foods, and byproducts from being wasted by turning these items into a value-added product for human consumption, retaining value in the food system and encouraging innovation.
- **Waste-Derived Bioplastics, Biomaterials and Animal Feed** also present exciting opportunities for Michigan, with several start-ups and/or second-stage companies advancing solutions around the state.
- **Active & Intelligent Packaging and Package Design** are solutions through which Michigan could demonstrate global leadership by enlisting its industry hubs for packaging design and production in West and Southwest Michigan, as well as university partners.
- **Donation Storage Handling & Capacity** investments could allow for the industry to build on current strengths.

### Barriers to Adoption

Among several barriers in the processing, manufacturing, distribution, and packaging space are a lack of time-effective, affordable, and sustainable solutions. One interviewee stated “if we have to sacrifice price and performance, there’s a good chance that a sustainable change will not be opted for”. Infrastructure is also of concern – in many places there are limited options for organizations or waste management companies that can receive or process materials. In many cases, there is a lack of solutions for unique waste streams such as byproducts from aseptic processing.

Notably, most of the barriers discussed pertained to recycling and other end-of-life strategies. Zero-waste-to-landfill is the present currency of sustainability personnel in food manufacturing, but with sufficient incentives, prevention strategies would likely be explored and

adopted. Jon Schroeder, a Sustainable Materials Management Specialist for the Minnesota Technical Assistance Program, shared that the university’s technical assistance program often works to identify optimization or upcycling opportunities on production lines. These are typically “mining exercises” that would not be possible without external support or incentives, as production personnel, even sustainability staff, do not have time or resources to invest in solution valorization.

In terms of food donation, manufacturers have a fairly significant amount of finished product that cannot be donated including expired or damaged goods. These materials are often composted. Cooling, refrigeration and storage were mentioned as barriers to food donation along with a lack of personnel capacity to break down large quantities of product into smaller portions required for donation. Insufficient education and training can also lead to recycling or composting contamination.

Packaging improvements could reduce food loss and waste throughout the system, but come with conspicuous trade-offs. Single-serve containers, while often creating more packaging waste, typically provide a reduction in food waste. There is currently high demand for packaging that is recyclable, compostable, and reusable (not returnable).

### Support or Resources Requested

- Capital for improvements in donation logistics, including cold-storage facilities, general storage, and third-party logistics to handle frozen goods or parse donations into manageable quantities.
- Capital for recycling infrastructure and technology through grants or incentives.
- Technical support for line improvements or byproduct solution development and valorization.
- Best practice education and benchmarks.
- Community education to encourage recycling and/or the use of compostable materials to create a more positive environment for sustainable materials management and food waste prevention.

## Case Studies

### Brewery Vivant Spent Grain animal feed



#### Brewery Vivant

Brewery Vivant is heavily invested in sustainability and has a zero-waste-to-landfill initiative, sending just 3.3 percent of its waste to the Kent County Waste to Energy facility in 2022, with the rest sent to various recycling, composting or upcycling destinations. The company sends nearly 100 tons of spent grain from the brewing process at Brewery Vivant and sister brewery Broad Leaf to Wernette Beef in Remus each year, which in turn provides the steak, brisket and ground beef served at its various locations. A circular economy in action.

#### GTF Technologies

GTF Technologies, based in Ada, is utilizing cutting-edge technology to minimize waste, feed communities, and contribute to environmental sustainability. Established in 2015, the company employs a micro-drying technique to repurpose byproducts from food production into powders. These powders are then used in supplements, food ingredients, biomaterials, fertilizers, and other applications. The compact mill technology can be installed directly within a food processing plant and can be applied to various industries and products. A common byproduct of the brewing industry is brewers' spent grain, for instance, which accounts for 85 percent of total waste generated within the industry. The grain

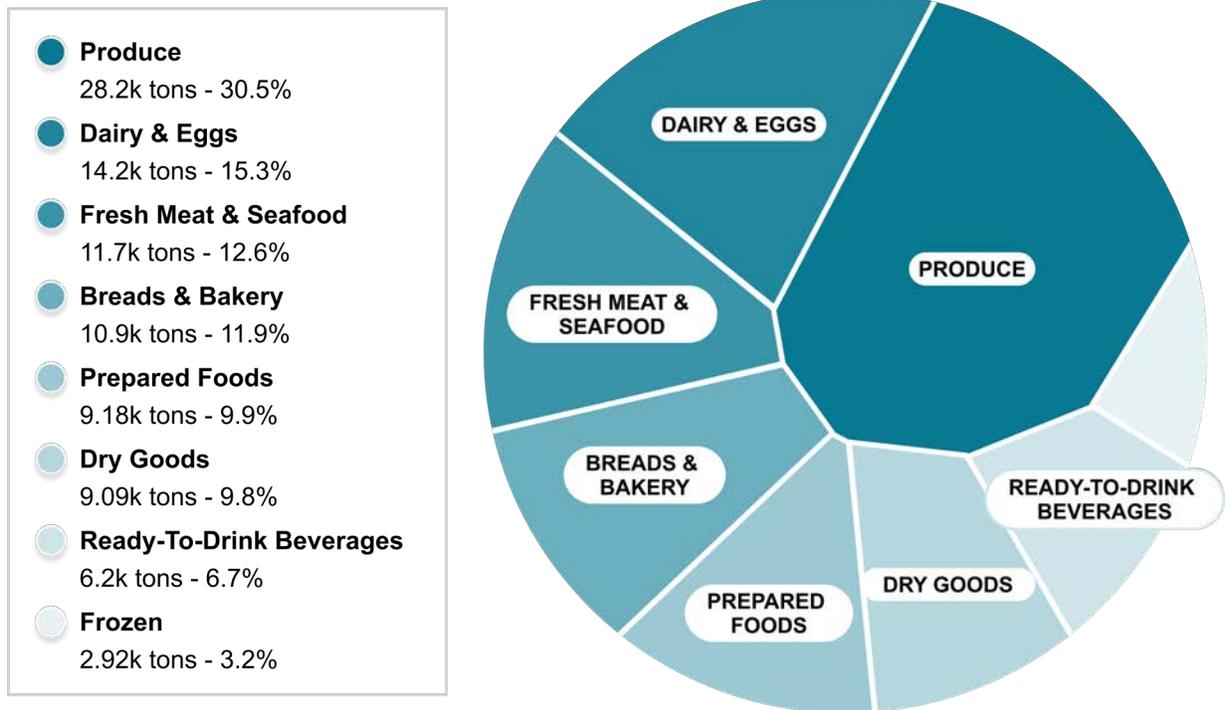
goes through GTF's system and comes out as a powder that can be used as cooking flour, as a bioplastic, or in sustainable packaging such as bowls or compostable paper.<sup>50</sup>

#### Shoreline Fruit

Shoreline Fruit is a grower-owned processor and marketer of dried fruits and cherry-inspired products. It harvests 12,500 tons of tart cherries annually, which are dried or turned into cherry concentrate, juice, salsa or dietary supplements which are sold to the commercial, ingredient and export markets. Once a month after cleaning, Shoreline Fruit resets the system of conveyors attached to the fruit dryer. Poor set-up resulted in fruit tumbling over the guardrails. Michigan Manufacturing Technology Center trained a team leader to apply the Plan-Do-Check-Adjust method for continuous improvement as a means to address the fruit loss problem. Through this, the company was able to optimize and align the conveyer guardrails to reduce the tumbling issue, while also employing other control initiatives to reduce volatility in material production. This saved the company \$42,000 in food loss, reduced its daily picking process time from up to 60 minutes to five minutes, and increased cycled accuracy for packaging inventory from 96 to 99 percent.<sup>51</sup>

# Retail

Illustration 2.9: Food Waste in Tons by Food Type in Michigan: Retail



Source: ReFED

Table 2.6: Food Waste by Destination and Food Type: Retail, 2016 to 2021

Food Type	FW Tons, 2016	FW Tons, 2017	FW Tons, 2018	FW Tons, 2019	FW Tons, 2020	FW Tons, 2021
Dairy & Eggs	7.88k	6.14k	6.65k	6.25k	5.06k	8.16k
Dry Goods	9.46k	7.49k	8.34k	7.83k	5.96k	9.64k
Produce	5.71k	4.52k	5.11k	4.8k	3.55k	5.79k
Ready-To-Drink Beverages	6.38k	5.2k	5.47k	4.99k	3.93k	6.27k
Frozen	359	286	304	283	215	345
Fresh Meat & Seafood	7.47k	5.89k	6.4k	6.03k	4.7k	7.61k
Breads & Bakery	3.76k	2.94k	3.19k	3.01k	2.41k	3.86k
Prepared Foods	274k	287k	340k	352k	223k	289k

Source: ReFED

According to ReFED, retail operations were responsible for 3.9 percent of food waste by ton across the value chain in Michigan in 2021, the least of any commercial segment. Reliable data estimating the disposal destinations of retail food waste in Michigan is not available, but it is understood that the majority of the materials from the segment are managed through landfill or the state's remaining waste-to-energy facility in Kent County.

Despite its single-digit contribution to the state's food loss and waste impacts by any measure, retail is a promising segment for FLWR solutions in the state at present, especially in grocery, a segment primarily concentrated on a small number of companies. Michigan is home to two large grocery chains, Meijer and SpartanNash, which share the state with national brands such as Walmart, Kroger, Trader Joe's, and ALDI, among others. It is also home to the Michigan Farmers Market Association, which works with and for farmers market organizers, managers, farmers, and vendors to create a thriving marketplace for local food and farm products.

According to the definitions used by the USDA, there are 16 potential classifications of retail stores that sell food products in Michigan. Although we generally associate this category with supermarkets and retail supercenters that offer a full line of groceries, meats and produce, which is by the far the largest source of retail food sales, convenience stores and general retail stores such as gas stations and dollar stores are also an important source of retail food purchases in the state, especially in "food desert" communities where no grocery stores exist.

(For example, Dollar General was highlighted in multiple interviews for its partnership with food banks in Michigan).

### Engagement Findings

Grocery stores and partners interviewed operated retail, distribution centers, and technology solutions for surplus food from retail. Some grocers are focused on food waste and plastic reduction tactics because they are consumer-facing issues, while for others, food waste is not a focus area in their sustainability work. The need for sustainable solutions most often occurs at the individual store level, even if part of a larger retail chain operation. For many

retailers, much of their produce goes through distribution centers and visual unautomated inspections to cull certain produce before it becomes available to consumers.

Stakeholders highlighted relationships with key partners such as Flashfood, an app-based solution to market close-dated food, Feeding America, or Perfect Circle Recycling, a product destruction and depackaging firm, while others indicated that compost services were their preferred management solution for surplus food. Also, some brands work with reverse-logistics vendors to have goods redistributed or returned to the vendor instead of disposing of the surplus product themselves. One company interviewed has a unique service repackaging close-dated or imperfect products for distribution in the secondary market through discount stores.

### Best Practices

Many large scale grocers have landfill reduction goals and use a digitized system to monitor inventory, suggest which items should be marked down due to the sell-by date, and mitigate surplus food. Some distributors prefer to presell products to find a buyer prior to reception of a product. Temperature inspections throughout the transportation process also help to prevent food waste. Although many grocers are hesitant to implement changes due to thin profit margins, pilot programs have proven an effective way to measure outcomes before implementing large-scale changes.

The state's larger grocery chains have embraced Flashfood to sell surplus food at a reduced price (a brief case study can be found later in this section), and have long standing relationships with Feeding America and other local agencies to donate surplus and close-dated food, with composting service available for byproducts and any remaining surplus that can not safely sold or eaten. (As mentioned, some utilize depackaging firms to ensure that material can be recycled or composted). One chain offers "free food Tuesdays" for employees to take home products that would otherwise be sent to depackaging and composting.

Table 2.7 Recommended Surplus Food Solutions for Retail

Solution	Tons	Mt CO2e	Meals	Solution Scale	Mich. Adoption
Consumer Education Campaigns	99,600	578,000	166,000,000	Reshape Consumer Environments	Medium
Imperfect & Surplus Produce Channels	47,700	11,000	79,600,000	Optimize the Harvest	Medium
Meal Kits	39,500	189,000	65,800,000	Reshape Consumer Environments	Medium
Standardized Date Labels	22,000	128,000	36,700,000	Reshape Consumer Environments	Low
Markdown Alert Applications	20,100			Refine Product Management	Medium
Buyer Specification Expansion	18,700			Optimize the Harvest	Unknown
Intelligent Routing	15,000			Enhance Product Distribution	Medium
Decreased Transit Time	14,600			Enhance Product Distribution	Medium
Centralized Composting	11,100			Recycling Anything Remaining	Medium
Dynamic Pricing	11,100			Refine Product Management	Unknown
First Expired First Out	10,600	43,100	17,700,000	Enhance Product Distribution	High
Enhanced Demand Planning	8,270	33,300	13,800,000	Refine Product Management	Medium
Temperature Monitoring (Pallet Transport)	7,270	29,900	12,100,000	Enhance Product Distribution	Medium
Co-Digestion at Wastewater Treatment Plants	7,220	4,960	0	Recycling Anything Remaining	Low
Centralized Anaerobic Digestion	5,580	3,840	0	Recycling Anything Remaining	Medium
Decreased Minimum Order Quantity	3,810	15,300	6,340,000	Refine Product Management	Unknown
Assisted Distressed Sales	2,350	10,100	3,910,000	Refine Product Management	High
Donation Transportation	1,940	4,210	3,240,000	Strengthen Food Rescue	Medium
Minimized On Hand Inventory	1,820	9,600	3,040,000	Refine Product Management	Low
Partial Order Acceptance	1,510	3,160	2,510,000	Optimize the Harvest	Unknown
Increased Delivery Frequency	1,280	6,870	2,130,000	Refine Product Management	High
Donation Education	1,130	2,450	1,890,000	Strengthen Food Rescue	Low
Donation Coordination & Matching	1,010	2,180	1,680,000	Strengthen Food Rescue	Medium
Livestock Feed	792	292	0	Recycling Anything Remaining	Low
Donation Storage Handling & Capacity	780	1,690	1,300,000	Strengthen Food Rescue	Low
Community Composting	518	387	0	Recycling Anything Remaining	Low
Active & Intelligent Packaging	498	1,930	829,000	Maximize Product Utilization	Unknown
Reduced Warehouse Handling	219	769	365,000	Enhance Product Distribution	Unknown
Package Design	5.47	41,400	9,120	Reshape Consumer Environments	Medium
Improved Food Loss and Waste Measurement*	NA	NA	NA	Refine Product Management	Low
Field Cooling Units	NA	NA	NA	Optimize the Harvest	Unknown
In Field Sanitation Monitoring	NA	NA	NA	Optimize the Harvest	Unknown
Innovative Grower Contracts	NA	NA	NA	Optimize the Harvest	Unknown
Labor Matching	NA	NA	NA	Optimize the Harvest	Low
Smaller Harvest Lots	NA	NA	NA	Optimize the Harvest	Low
Early spoilage detection (hyperspectral imaging)	NA	NA	NA	Enhance Product Distribution	Unknown
Inventory traceability	NA	NA	NA	Enhance Product Distribution	Medium
Online Marketplace Platform	NA	NA	NA	Refine Product Management	Medium
Blast Chilling to Enable Donations	NA	NA	NA	Strengthen Food Rescue	Low

Solution	Tons	Mt CO2e	Meals	Solution Scale	Mich. Adoption
Donation Reverse Logistics:	NA	NA	NA	Strengthen Food Rescue	Low
Insect Farming	NA	NA	NA	Recycling Anything Remaining	Low
Rendering	NA	NA	NA	Recycling Anything Remaining	Medium
Waste-Derived Bioplastics	NA	NA	NA	Recycling Anything Remaining	Low
Waste-Derived Biomaterials	NA	NA	NA	Recycling Anything Remaining	Low
Waste-Derived Processed Animal Feed	NA	NA	NA	Recycling Anything Remaining	Low

Source: ReFED Solutions Database and \*MiSBF Stakeholder Engagement

Table 2.7 is an inventory of recommended solutions from the ReFED Solutions Database and the estimated potential benefits from large-scale adoption. Based on our stakeholder engagement, we have estimated the current adoption of each solution (High, Medium, Low or Unknown) in Michigan.

Based on stakeholder engagement and secondary research, this Roadmap will highlight the following solutions for specific consideration:

- **Consumer Education Campaigns** can be implemented through grocery stores and supercenters, integrated with the company's branding and/or sustainability messaging. As community assets that center food, this would be an ideal venue for consumer education.
- **Markdown Alert Applications, Dynamic Pricing** and **Online Marketplace Platforms** have been proven successful through major retailer adoption of Flashfood and similar applications. Smaller stores do not yet have access to the service and technology, and there is room for growth among users across all segments.
- **Standardized Date Labels** represent a low-hanging fruit opportunity to extend the useful life of food in the home, to clarify safety concerns, and increase supply of donated material.
- **Improved Food Loss and Waste Measurement** was cited as a priority for retailers engaged through the Roadmap initiative.
- **Donation Education:** Charitable food organizations highlighted competition for store-level relationships to source donations, and the need to educate local management to support donation. There appears to be inconsistent participation in rescue activities at the store level, and this is an opportunity

for future growth.

### Barriers to Adoption

Grocers engaged highlighted challenges due to a lack of data on the quantity of food waste or a lack of food waste reduction goals to focus investment. Education and/or sustainability training for team members and employees are needed to address consumer confusion on date labels (e.g.: sell by vs. quality date) and a recognition that policy improvements or industry standardization are necessary to address this comprehensively, with expressed anxiety for how that might be accomplished, especially if done through regulatory intervention. There is also inconsistent participation in rescue at the store level, and education or engagement programs to encourage greater participation in donation programs would be impactful.

Finding solutions before sending expired or damaged product or food scraps to be composted is another challenge (for example, corn husks and pineapple cores are typically composted whereas temperature-damaged goods are sent to landfill). Space for organic collection bins was also mentioned as a barrier for mitigating food waste from going to the landfill.

A lack of connections to peers or solution providers engaged in food waste reduction was highlighted as a barrier, along with a lack of data on charitable food organization needs. One interviewee suggested that some charitable food organizations would prefer cash donations or prepared food in lieu of food or non-perishable items. This is true, but hunger-relief agencies engaged did emphasize a desire for both cash and food donations, and stated desire to increase the share of donated products in their inventory.

Although Flashfood can be a solution for larger retailers, small and medium-size stores have

not been able to access the technology due to a lack of funds or space for the terminal or a cooler for Flashfood items. Others cited concerns that Flashfood would impact their donation programs. At least one hunger-relief organization indicated that this was happening. On that note, unique among segments engaged, retail stakeholders expressed sincere concerns about how successful prevention strategies may reduce supply for hunger-relief agencies.

### **Support or Resources Requested**

- Auditable and reliable network for local acceptors of food waste (such as spoiled milk).
- Support for machine learning and innovation to determine optimal sale of products at specific price points.
- Investments or incentives to allow small grocers and chains to partner with services such as Flashfood or otherwise amplify their ability to mitigate food waste.

## Case Studies

Image: Perfect Circle Recycling depackaging machine



### Flashfood

Flashfood is a free app that connects shoppers to deals on groceries at retailers across Michigan and North America. Users browse surplus close-dated items at discounts of up to 50 percent, including fresh produce, meat, dairy, and shelf-stable items. Retailers must supply the freezer or refrigerator that the Flashfood items will be kept in, typically near the customer service desk. In the U.S., Flashfood's most popular items include produce boxes, ground beef, and ground chicken breast.

While Flashfood's business model is centered around those who are asset limited, income constrained, employed individuals (ALICE) – at some retailers, items in the Flashfood app can be purchased with SNAP EBT – the environmental benefits of Flashfood have typically been highlighted most. In 2022, 14,000 tons of food was saved from disposal, with shoppers enjoying discounts of \$56,233,945 using the Flashfood app<sup>52</sup>.

### Natural Choice Foods

Natural Choice Foods is an overstock food buyer and reseller headquartered in Marne. It also owns and operates five Daily Deal retail store locations. NCF partners with companies to repackage and sell anticipated products in secondary markets. Such products are either

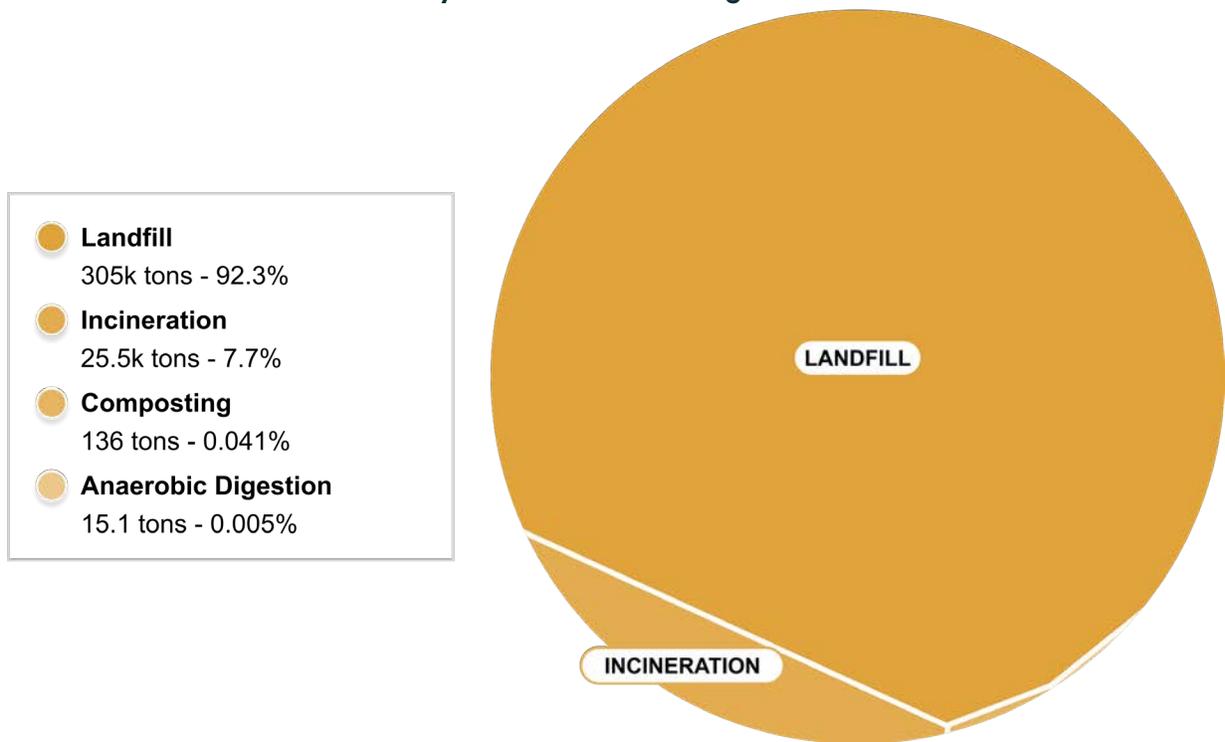
distressed, overstock, off-spec (eg: discolored) or outdated (mostly dry, shelf-stable pantry products). NCF prefers to presell shipments prior to their arrival to reduce the amount of time spent in transit or storage. Before sending its surplus products to recycling vendors, it has "Free Food Fridays" to give employees an opportunity to take home and use products.

### Perfect Circle Recycling

Perfect Circle Recycling (PCR) is a depackaging business based in Grand Rapids that receives around 20 to 30 53-foot semi truck loads each day full of both liquids and solids from grocers, packers, packaging companies and warehouses that would otherwise be landfilled due to quality control, expired product or products close to expiration date, or mislabeled goods. A T-20 Turbo Separator processes various types of packaging and post-consumer items. The machine separates the packaging from the organic material without grinding, cardboard is broken down and bailed, as are rigid plastics, and sent to local recyclers. Organic materials go to animal feed, biofuels, anaerobic digestion or compost.

# Foodservice

Illustration 2.10: Food Waste in Tons by Destination in Michigan: Foodservice



Source: [ReFED](#)

Table 2.8: Food Waste by Destination and Food Type: Foodservice, 2016 to 2021

Food Type	FW Tons, 2016	FW Tons, 2017	FW Tons, 2018	FW Tons, 2019	FW Tons, 2020	FW Tons, 2021
Dairy & Eggs	7.88k	6.14k	6.65k	6.25k	5.06k	8.16k
Dry Goods	9.46k	7.49k	8.34k	7.83k	5.96k	9.64k
Produce	5.71k	4.52k	5.11k	4.8k	3.55k	5.79k
Ready-To-Drink Beverages	6.38k	5.2k	5.47k	4.99k	3.93k	6.27k
Frozen	359	286	304	283	215	345
Fresh Meat & Seafood	7.47k	5.89k	6.4k	6.03k	4.7k	7.61k
Breads & Bakery	3.76k	2.94k	3.19k	3.01k	2.41k	3.86k
Prepared Foods	274k	287k	340k	352k	223k	289k

Source: [ReFED](#)

According to ReFED, foodservice operations were responsible for 13.9 percent of food waste by ton in Michigan in 2021, sending more material to Michigan landfills than any other commercial sector. Unlike other commercial segments, virtually all of the surplus food and food scraps from foodservice operations are disposed of in landfills or waste-to-energy facilities. Although compost services are popular within a certain niche of restaurants and institutional foodservice, where regionally available, the amount of material managed is statistically meaningless. Likewise, very few foodservice operations donate their surplus food due to a variety of logistical challenges or liability concerns.

Michigan foodservice establishments include restaurants, cafeterias, delicatessens, mobile units, temporary foodservice establishments, and special transitory food units. The Michigan Department of Agriculture and Rural Development (MDARD) licenses all categories of food establishments. According to the Michigan Restaurant Association, the foodservice industry plays an integral role in Michigan's economy with over 16,500 eating and drinking establishments in Michigan, employing more than 447,200 people (10 percent of employment in the state) and creating more than \$17.9 billion in total estimated annual sales<sup>53</sup>. Many of these restaurants are represented by the Michigan Restaurant & Lodging Association (MRLA), which assists the hospitality industry through advocacy, education, and innovation.

### Engagement Findings

Stakeholders in the foodservice sector included representatives from healthcare foodservice, university dining, golf courses, restaurants, event staffing, and distributors. They maintain a diverse set of operations from cafes, cafeterias, coffee shops, farmers markets, in-patient room service, and vending machines. Depending on the location, healthcare institutions interviewed serve anywhere from 1,500 to 3,000 meals per day along with packaged salads, snack cups, and baked goods. While many businesses have implemented recycling practices (one stakeholder mentioned an organizational recycling rate of around 30 percent), most do not have composting practices or infrastructure in place, particularly for post-consumer products. Many representatives interviewed partner with food donation organizations such as Feeding America and some provide education and engagement opportunities for advancing waste

reduction.

Of particular interest were K-to-12 school cafeterias, an opportunity to prevent waste (or promote recycling) through practical application, while also developing FLWR skills in future professionals and consumers. School lunch programs are believed to be poor performers currently from a prevention standpoint, as students are often encouraged to take items that they have no desire to eat.

### Best Practices

Buying locally/regionally was frequently mentioned as a sustainability and waste reduction priority, which also boosts local economies and minimizes climate impacts from transportation. (Local sourcing is not a recognized FLWR solution, though it does advance harvest optimization.)

One constituent said that around 30 to 33 percent of purchasing is local. Another organization has a goal to increase responsibly sourced food by two percent every year.

Mitigating food loss and waste from the planning phase is key. Planning meals according to demand helps to decrease surplus food and many hospitals make use of their long history of transactional data to inform consumption expectation. One constituent mentioned that because their hospital is almost always at capacity, the number of patients is very predictable. Tracking food production and demand using software, forecasting, and intentional menu planning also help to reduce food waste. Spending more time on the front end instead of focusing time on solving unique waste stream issues has been helpful to reduce the sourcing of items that they might not have a way to sustainably dispose of.

Sales, using up food in-house through specials, or repurposing items (such as freezing fresh meat to have available for later use) help to address food waste before items reach their "use by" dates. If foodservice stakeholders do have surplus food, it is common to donate food to other restaurants or charitable food organizations. One participant mentioned that their organization has a policy to know how and when to donate product safely: they have a three to four-day hold time to get the product in the hands of donation centers or customers. An item

expiration report is used to document this.

Several interviewees used compostable products for both food and beverage, and regularly conduct employee training on composting and recycling. Restaurants of any size and scale with high-performing sustainability programs achieve results by prioritizing employee engagement and training. Not only does this reduce waste and deliver associated savings, it will increase employee engagement. Workers will be more satisfied and invested in the organization, as demonstrated by best-in-class programs across the state.

On campuses, many universities and colleges are moving away from using trays in dining halls – plating up to ½ or ¾ portions on compostable plates helps reduce waste that would be more prevalent with “all you can eat” models. Although far from common, a handful of banquet operations and events have a process to donate food, such as using blast chillers to freeze the food, or by ferrying surplus food to local agencies for distribution. In K12 schools, “share tables” facilitate the donation of food on a small scale. Share tables are tables or stations where students return whole food or beverage items they choose not to eat. These are then available to other children who may want additional servings, or to take home.

Table 2.9 is an inventory of recommended solutions from the ReFED Solutions Database and the estimated potential benefits from large-scale adoption. Based on our stakeholder engagement, we have estimated the current adoption of each solution (High, Medium, Low or Unknown).

Based on stakeholder engagement and secondary research, this Roadmap will highlight the following solutions for specific consideration:

- **Staff Engagement and Training** should be the starting point for food loss and waste reduction programs in Michigan foodservice establishments, and the crux of their sustainability efforts in general.
- **Portion Sizes, Trayless Dining, and Small Plates** have proven an effective means to reduce food waste in higher education cafeterias. This practice could be adopted across all establishments, potentially providing public health benefits as well.

- **Donation Education** is required to address misinformation and confusion about food safety and liability protections.
- **Low-Waste Event Contracts, Precision Event Attendance** and other strategies to reduce food waste from events will prove impactful, as events are especially challenging food waste vectors in Michigan.
- **Waste Tracking** through technology or journals has been proven to reduce food loss dramatically for institutional foodservice in Michigan. It has applications for businesses of all sizes.
- **Donation Transportation, Donation Coordination & Matching** are necessary for foodservice establishments to regularly donate surplus food.

### Barriers to Adoption

Infrastructure, education, and a lack of consistent data and support were frequently mentioned. Several stakeholders highlighted a lack of cold-storage, distribution and transportation for donation, as well as infrastructure and logistical challenges to access commercial compost services (including need for space to stage compost bins). One interviewee mentioned that due to the location of their organization and a rise in fuel costs, their former compost collector decided to no longer service their location.

Education around food waste reduction solutions were needed at all levels – community, industry, staff, and students. A lack of support from management, personnel to manage waste programs, and employee training were named barriers. Inconsistent or incomplete data was also frequently mentioned as an opportunity for growth, particularly when working with vendors. Many organizations do not track or measure their waste, which can contribute to heightened costs, another adoption barrier.

While some organizations have robust waste journaling practices, the vendors they work with might not have the same waste reduction requirements. Lastly, a lack of access to secondary markets, logistics and understanding of food donation and liability protection, and holiday goods (due to their seasonal nature) were also mentioned as barriers to adoption of preferred solutions.

**Table 2.9 Recommended Surplus Food Solutions for Foodservice**

Solution	Tons	Mt CO2e	Meals	Solution Scale	Mich. Adoption
Centralized Composting	65,700	45,100	0	Recycling Anything Remaining	Medium
Portion Sizes	56,100	300,000	93,500,000	Reshape Consumer Environments	Low
Imperfect & Surplus Produce Channels	47,700	11,000	79,600,000	Optimize the Harvest	Low
Waste Tracking (Foodservice)	26,900	149,000	44,900,000	Refine Product Management	Low
Co-Digestion at Wastewater Treatment Plants	24,800	23,800	0	Recycling Anything Remaining	Low
Centralized Anaerobic Digestion	21,400	20,600	0	Recycling Anything Remaining	Low
Livestock Feed	10,200	9,600	0	Recycling Anything Remaining	Low
Markdown Alert Applications	7,610	40,700	12,700,000	Refine Product Management	Low
Donation Education	6,190	19,000	10,300,000	Strengthen Food Rescue	Low
Donation Transportation	6,130	18,800	10,200,000	Strengthen Food Rescue	Low
Donation Coordination & Matching	3,260	9,970	5,430,000	Strengthen Food Rescue	Low
Community Composting	2,660	1,830	0	Recycling Anything Remaining	Low
Trayless	1,860	9,940	3,090,000	Reshape Consumer Environments	Low
Donation Storage Handling & Capacity	1,770	5,440	2,960,000	Strengthen Food Rescue	Low
Standardized Date Labels	1,530	12,000	2,540,000	Reshape Consumer Environments	Low
Partial Order Acceptance	1,510	3,160	2,510,000	Optimize the Harvest	Unknown
Intelligent Routing	1,450	10,500	2,410,000	Enhance Product Distribution	Low
Decreased Transit Time	1,360	12,000	2,270,000	Enhance Product Distribution	Unknown
Buffet Signage	1,120	6,000	1,870,000	Reshape Consumer Environments	Unknown
Increased Delivery Frequency	287	2,230	479,000	Refine Product Management	Unknown
First Expired First Out	250	2,040	417,000	Enhance Product Distribution	High
Small Plates	125	667	208,000	Reshape Consumer Environments	Medium
Temperature Monitoring (Foodservice)	116	1,010	194,000	Refine Product Management	Medium
Reduced Warehouse Handling	43.8	348	73,000	Enhance Product Distribution	Low
Innovative Grower Contracts	NA	NA	NA	Optimize the Harvest	Low
Inventory Traceability	NA	NA	NA	Enhance Product Distribution	Unknown
Modified Atmosphere Packaging System	NA	NA	NA	Enhance Product Distribution	Unknown
Vibration & Drops Tracking	NA	NA	NA	Enhance Product Distribution	Unknown
Low-Waste Event Contracts	NA	NA	NA	Refine Product Management	Medium
Online Marketplace Platform	NA	NA	NA	Refine Product Management	Low
Precision Event Attendance	NA	NA	NA	Refine Product Management	Low
Edible Coatings	NA	NA	NA	Maximize Product Utilization	Unknown
Improved Recipe Planning	NA	NA	NA	Maximize Product Utilization	Medium
In-house Repurposing	NA	NA	NA	Maximize Product Utilization	High
Precision Food Safety	NA	NA	NA	Maximize Product Utilization	Medium
Staff engagement and training	NA	NA	NA	Maximize Product Utilization	Low
Regular storage maintenance	NA	NA	NA	Maximize Product Utilization	Medium
Simplify menu	NA	NA	NA	Maximize Product Utilization	Medium
Home Shelf-Life Extension Technologies	NA	NA	NA	Reshape Consumer Environments	Unknown
Blast Chilling to Enable Donations:	NA	NA	NA	Strengthen Food Rescue	Low
Donation Reverse Logistics	NA	NA	NA	Strengthen Food Rescue	Low

Source: ReFED Solutions Database and \*MiSBF Stakeholder Engagement

### Support or Resources Requested

- Establish a universal language for date labeling and set statewide standards for packaging and production.
- Clarity and education on food donation liability protection and actions permitted by law.
- Incentives and technical support.
- Best practice education and technical support for recycling, rescue, composting, animal feed, and prevention strategies.
- Data support to limit food waste on the front end through point data usage and menu planning; support for data consolidation from vendors.
- Although out of scope of this effort, capital support for cardboard balers was mentioned multiple times by foodservice establishments.
- Low barrier, low-cost waste audits.
- Food recovery vehicles would also provide opportunities to constituents and could be made possible through grants or other avenues of support.

### Firekeepers Casino Hotel food & beverage team teaching a food safety class at a local farm market during a FreshFood Initiative event



### Case Studies

#### The PLEDGE on Food Waste™

The PLEDGE™ is a global, third-party verified certification tackling food waste by motivating foodservice businesses to monitor and reduce waste, generate buy-in with employees and customers, implement new procedures to improve efficiency, and establish new standards of excellence to differentiate their restaurant from competition. The PLEDGE™ includes 95 criteria to receive certification and emphasizes prevention strategies for long-term change.

Make Food Not Waste is the first in the U.S. to

assist foodservice operations in receiving certification.

In June 2023, three Oakland University dining halls managed by Chartwells, and restaurants Alchemi, Johnny’s Speakeasy, Sylvan Table, and Folk Detroit received certifications. As a result of taking The PLEDGE™, the seven sites no longer send any food to landfills. One restaurant saw a four percent drop in food costs. Another repurposed previously unused trimmings into a new appetizer that generated \$6,000 in the first quarter. All sites reported a dramatic increase in employee engagement, demonstrating that staff members are highly receptive to incorporating new sustainability practices.

### FireKeepers Casino Hotel

FireKeepers Casino Hotel is located in Emmett Charter Township and is owned and operated by the Nottawaseppi Huron Band of Potawatomi. The casino boasts seven restaurants, which include fine dining experiences, cafe selections, sports bar & taphouse, and easy grab and go options. The Food & Beverage team gathers organic food scraps to compost at the My Green Michigan commercial compost facilities, resulting in the production of superior quality soil that is rich in nutrients.

Through various methods, FireKeepers Casino Hotel is slated to divert 125 tons of organic food waste from the landfill in 2023. In addition to the compost service, it partners with local food banks to minimize waste through the FreshFood Initiative (FFI). The facility repackages and freezes unused food from its production kitchens to donate to the area food bank. FireKeepers and the South Michigan Food Bank partner to provide an average of four FFI events each month. During FFI events, fresh produce is handed out to those in need; to avoid wasting this produce, the FireKeepers Culinary Team concocts simple recipes using the distributed items and offers samples to motivate clients to make use of all of the items they receive. FireKeepers was recently honored as a 2020–21 Food Recovery Challenge Award Winner by the EPA for its substantial strides in curbing food waste in America.<sup>54</sup>

### Community Action House

Community Action House is a Holland-based nonprofit that's working to provide local families and individuals with food, clothing, shelter, financial wellness classes, resource-navigation, and skill-building. It is a Feeding America partner, and operates their newly expanded Lakeshore Food Rescue initiative in partnership with Ottawa Food. Working across sectors, behind-the-scenes, and by utilizing the public Food Rescue Hero app, they connect with grocery stores, local government, businesses, and food pantries to solve the logistical challenges of food waste – turning excess food into food access for local families. In 2022, Lakeshore Food Rescue redirected 600 tons of food, saving 110 million gallons of water and preventing 2,995 MT CO<sub>2</sub>e. The 10 percent of food rescued that is not fit for consumption and cannot be distributed due to capacity, best-by dates, or due to USDA guidelines, is composted through a partnership with Eighth Day Farms.

### Leanpath

Leanpath is a technology company on a mission to make food waste prevention and measurement everyday practice in the world's kitchens. Since 2004, Leanpath and its foodservice partners have prevented over 90 million pounds of food from going to waste, an average of 50 percent reduction per kitchen. The platform includes data-collection tools, cloud-based analytics, and expert coaching. Each time a chef or culinary staff member throws out an item, they must weigh and record it. This data collection process helps identify patterns of food types that are frequently wasted. The collected data is analyzed to distinguish and categorize what is being wasted, and the reasoning behind the waste.<sup>55</sup> This allows kitchens to discover opportunities to prevent that waste moving forward. By making teams aware of the cost and environmental impacts of food waste, it encourages them to help change their habits. Grand Valley State University's Green Team utilizes Leanpath through monthly evaluations of campus dining spots.

### Gun Lake Casino

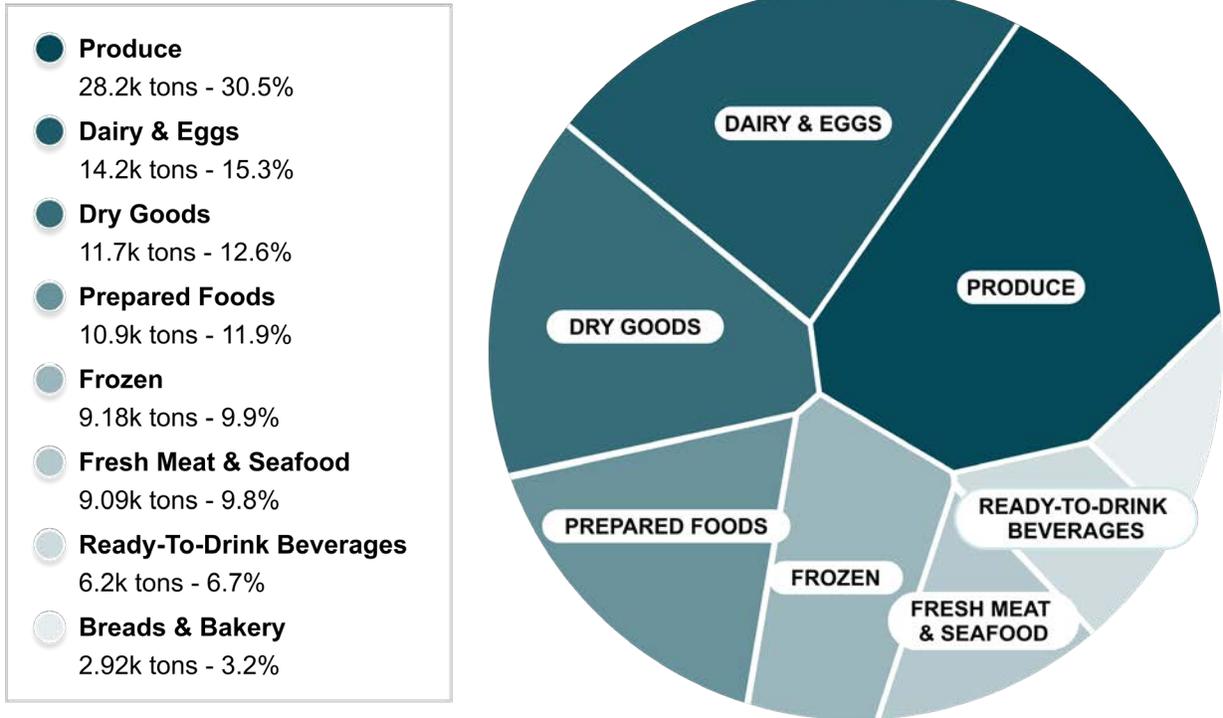
The Match-E-Be-Nash-She-Wish Band of Pottawatomi Indians operates the Gun Lake Casino in Southwest Michigan. After significant research the tribal environmental commission chose to incorporate on site aerobic digestion using a technology created by Harp Renewables, marketed in Michigan by FinitePhoenix. Aerobic digestion allows for the immediate processing of food waste through a low-odor process that reduces mass and weight by up to 80 percent. After nine months food waste had been reduced enough for casino operations to decommission a waste compactor.

### ReGrow Together

ReGrow Together in Midland leverages rescued surplus ingredients to create healthy meals for hungry families, constructed by at-risk teens and adults learning culinary skills. Meals are distributed through nonprofit hubs where people connect with other vital resources and support to keep them moving toward living their best life and thriving. This year, ReGrow Together partnered with the 2023 Dow Great Lakes Bay Invitational golf tournament to re-purpose all surplus food from the tournament into healthy meals that were distributed to non-profits throughout the region.

# Consumers

Illustration 2.11: Food Waste in Tons by Food Type in Michigan: Consumers



Source: [ReFED](#)

Table 2.10: Food Waste by Food Type: Consumers, 2016 to 2021

Food Type	FW Tons, 2016	FW Tons, 2017	FW Tons, 2018	FW Tons, 2019	FW Tons, 2020	FW Tons, 2021
Dairy & Eggs	234k	227k	259k	257k	278k	260k
Dry Goods	185k	182k	211k	213k	246k	225k
Produce	350k	347k	346k	343k	380k	363k
Ready-To-Drink Beverages	61.3k	57.1k	61.4k	60.2k	68.5k	68.6k
Frozen	131k	130k	121k	122k	146k	138k
Fresh Meat & Seafood	79.2k	76.2k	81.2k	80.9k	91.5k	83.9k
Breads & Bakery	55.4k	52.2k	43.3k	43.4k	47.8k	46.6k
Prepared Foods	142k	120k	134k	137k	147k	153k

Source: ReFED

According to ReFED, consumers, or the residential segment, were responsible for 56.2 percent of food waste by ton in Michigan in 2021, more than all the commercial segments combined. In the U.S., households contribute roughly 40 percent of all wasted food. It is estimated that a family of four wastes \$1,600 to \$2,000 a year in food that goes uneaten. Given these losses, it is imperative to engage consumers in the issue. At the same time, this sector of the food system is the most challenging to impact. Well-received campaigns, such as Ad Council's 2016 Save the Food, Oregon's 2021 Bad Apple, and the national, ongoing Food Waste Prevention Week, have not been associated with reduction in household food waste. The need for a robust consumer engagement campaign that changes consumer behavior is still critical, and many organizations and businesses continue to focus on this area.

Further, consumer behavior is a key driver of food loss and waste elsewhere in the food system. For example: high expectations for produce appearance driving rejections for farms, or expectations for large portion sizes driving waste in full service restaurants.

### Best Practices

Research shows that community based social marketing practices have a high chance of success. These practices include: targeting specific behaviors (such as eating leftovers or meal planning), conducting research to understand the barriers and benefits associated with changing the behavior, developing strategies to address the issue, piloting strategies, and rolling out proven strategies at scale. Further, it has been found that communicating with consumers in specified groups, such as college students, mothers of young children, or people living in smaller households, can have a highly positive effect. Beyond targeted social marketing campaigns, research also suggests that the use of meal kits, employing a "use first" shelf in the refrigerator, and smaller portion sizes can have positive effects.

Table 2.11 is an inventory of recommended solutions from the ReFED Solutions Database and the estimated potential benefits from large-scale adoption. Based on our stakeholder engagement, we have estimated the current adoption of each solution (High, Medium, Low or Unknown).

Based on stakeholder engagement and secondary research, this Roadmap will highlight the following solutions for specific consideration:

- **Consumer Education Campaigns** will be a necessity for the state to reach its food waste reduction goals. Such efforts will provide educational value, while also generating political support for other investments and initiatives, including legislation.
- **Markdown Alert Applications, Dynamic Pricing** and **Online Marketplace Platforms** will address market inefficiencies by allowing consumers to access products for lower prices that may otherwise spoil.
- **Standardized Date Labels** represent a low-hanging fruit opportunity to extend the useful life of food in the home and to clarify safety concerns.

### Barriers to Adoption

Consumers cite a number of reasons that food goes to waste in their homes. Lack of consumption of leftovers, lack of visibility of food in refrigerators, overpreparation, lack of time to plan and cook, confusion around date labels, and improper food storage all contribute to food waste among consumers. Home cooks also report wasting food given the packaging sizes of ingredients from grocers, i.e. buying a whole stalk of celery when only needing one rib.

Overall, consumers do not realize the impact of their household's food waste, either on the environment or their wallets. Home cooks operate according to social and cultural norms, which currently do not favor the full use of food in the home kitchen. It is recommended that any forthcoming consumer behavior change campaigns in Michigan are multi-pronged, consistent, and ongoing in order to have a meaningful impact.

Further, consumers are a uniquely intersectional segment, the end user of all commercial segments and statistically as likely to eat food away from home as in it.

Cities with more dense populations and larger foodservice operations such as hotels and arenas drive a significant amount of the state's overall food waste. As cities continue to address their role in climate change, it is critical that they

include FLWR practices in plans and actions.

Incorporating food waste reduction in cities involves action across the EPA hierarchy. Local governments should lead by example wherever possible, exercising prevention, recovery and recycling practices throughout all areas of purview. Within the public-private sector, prevention strategies include: engaging households through behavior change campaigns and working with food businesses, particularly large foodservice sites such as hotels, universities, casinos, hospitals, and arenas. For food rescue, strategies include expanding food rescue capacity through increased recovery services and infrastructure as well as ensuring broad understanding of liability protection and safe donation practices. Lastly, infrastructure for organics recycling, including

community composting, centralized composting, anaerobic and aerobic digestion should be both created and expanded. This could leverage existing yard waste infrastructure. Cities with more dense populations and larger foodservice operations such as hotels and arenas drive a significant amount of the state’s overall food waste. As cities continue to address their role in climate change, it is critical that they include FLWR practices in plans and actions.

**Support or resources requested**

- Integrate food waste reduction solutions into community climate action plans.
- Incentives for local food production and small-scale urban agriculture .
- Support for community composting.

**Table 2.11: Food Waste by Food Type: Consumers, 2016 to 2021**

Solution	Tons	Mt CO2e	Meals	Solution Scale	Mich. Adoption
Centralized Composting	346,000	195,000	0	Recycling Anything Remaining	Low
Centralized Anaerobic Digestion	113,000	67,600	0	Recycling Anything Remaining	Low
Consumer Education Campaigns	99,600	578,000	166,000,000	Reshape Consumer Environments	Low
Co-Digestion at Wastewater Treatment Plants	91,100	63,000	0	Recycling Anything Remaining	Medium
Community Composting	63,200	35,600	0	Recycling Anything Remaining	Low
Portion Sizes	56,100	300,000	93,500,000	Reshape Consumer Environments	Low
Home Composting	50,600	31,800	0	Recycling Anything Remaining	Medium
Meal Kits	39,500	189,000	65,800,000	Reshape Consumer Environments	Medium
Donation Education	36,200	29,300	60,400,000	Strengthen Food Rescue	Low
Active & Intelligent Packaging	22,400	141,000	37,400,000	Maximize Product Utilization	Unknown
Donation Transportation	20,500	26,400	34,200,000	Strengthen Food Rescue	Medium
Standardized Date Labels	19,200	109,000	31,900,000	Reshape Consumer Environments	Low
Package Design	10,400	75,700	17,300,000	Reshape Consumer Environments	Unknown
Donation Storage Handling & Capacity	8,550	8,770	14,300,000	Strengthen Food Rescue	Medium
Donation Value-Added Processing	6,770	806	11,300,000	Strengthen Food Rescue	Low
Donation Coordination & Matching	4,260	12,200	7,100,000	Strengthen Food Rescue	Medium
Gleaning	118	14	197,000	Optimize the Harvest	Medium
Direct to Consumer Channels	NA	NA	NA	Refine Product Management	Unknown
Online Advanced Grocery Sales	NA	NA	NA	Refine Product Management	Unknown
Online Marketplace Platform	NA	NA	NA	Refine Product Management	Medium
Edible Coatings	NA	NA	NA	Maximize Product Utilization	Unknown
Home Shelf-Life Extension Technologies	NA	NA	NA	Reshape Consumer Environments	Low
Smart Home Devices	NA	NA	NA	Reshape Consumer Environments	Unknown

# Food Rescue in Michigan

The prior sections discussed donation opportunities in the context of each industry segment, their current level of adoption, and barriers to participation. In this section we will briefly discuss food rescue and donation specifically. In summary, investment in food rescue will provide substantial social and environmental benefits to the state. The charitable food system, also known as the “emergency food” or hunger-relief sector, serves an important role. The food banks and agencies that ensure Michigan residents have access to essential nutrition need food sources, and rescue of surplus food (or upcycling of food byproducts) is a meaningful supply source.

It is arguably Michigan’s most successful means of managing food loss and waste, In fact, as outlined in Table 2.13, substantially more surplus food is saved through Michigan charities than is processed through its commercial compost facilities.

Moreover, food rescue can advance social and environmental justice, elevating the work of this Roadmap to serve community needs. In fact, arithmetic suggests that the 4.38 billion meals theoretically wasted in Michigan each year would be more than enough to feed the 1.3 million people that face food insecurity in the state. With recent increases in grocery prices, the charitable food system should have an increased demand for donated surplus food.

However, the Roadmap must emphasize that hunger is an economic injustice, a failure in the labor market and social services. Individuals and households experiencing food insecurity deserve dignity, and should not be considered a waste reduction strategy. This is especially true under current economic conditions where so many of the state’s residents can be described as Asset Limited, Income Constrained, Employed (ALICE).<sup>56</sup> Several charitable programs that participated as Roadmap stakeholders have adopted “food club” programs that replicate a grocery environment to ensure a more dignified experience for their members.

Governor Whitmer chartered the Food Security Council via executive order in 2020 as an advisory body in the Department of Health and Human Services to inform the state’s response to food insecurity. The FSC was charged with coordinating across state government and with industry and community stakeholders to ensure a broad range of input from relevant entities, reporting on best practices to ensure safe and effective food distribution to Michiganders in need. Although the FSC had a subcommittee largely focused on recommendations that would increase the supply of food to charitable food programs, no recommendations were made to encourage an increase in donated food. It prioritized grant programs and the Michigan Agricultural Surplus System (MASS) that would allow programs to produce or purchase food.

This Roadmap affirms those recommendations, while noting that MASS and related optimization programs do not necessarily align with the ReFED or EPA understanding of food rescue. Donated food is not universally prioritized or appreciated among hunger-relief agencies. From an operational standpoint, managing rescued produce and prepared food can be more challenging than purchased food: supplies are inconsistent in composition and frequency, may not align with



member preferences or healthy food objectives, or require portioning, packaging or processing to be distributed. The rescue operations capable of recovering perishable food on short notice are uniquely qualified.

Charitable food organizations were interviewed as part of the Roadmap stakeholder engagement process, and participated in the development of recommendations. Findings were discussed in brief in the prior section, including recommended solutions and improvements, and will be outlined further in the policy recommendations to follow. As increasing the performance of the charitable food system was not an explicit focus of the Roadmap initiative, further research is needed. This might include:

- Assessment of statewide and local capacity to rescue, receive and distribute donated food, and potential for improvement.
- Share of rescue in food distributions of typical and best-in-class hunger-relief agencies.
- Specific investment needs to increase capacity to receive and distribute donated food in each region (e.g: transportation, operating funds, volunteers).
- Geographic alignment of distribution capacity with surplus food supply.
- Prevalence of food loss and waste within the charitable food system in the state.
- Potential unintended consequences from increased donation of food to healthy food policies and food business revenue, or the possibility of increased food loss and waste after donation if agencies are not prepared to manage increased volumes.
- Characterization of food currently being rescued, recovered, or received, and distributed or lost in the charitable food system, reconciling supply profile against agency demand.

As shown in Table 2.12, if Michigan were to divert just five percent of its food waste to the 4,653 hunger-relief agencies and programs served by its food banks, it would overwhelm its current distribution network, more than doubling the amount of food by ton distributed in the most recent year for which data is available. For rescue strategies to have a meaningful impact on the state's 50% food loss and waste reduction goal over the next decade, capacity to receive and distribute donated food in an efficient manner must be at least double what it is today.

For comparison, as will be outlined in the following section, Michigan must compost 100 times more material than it does today.

The Roadmap analysis estimates that 31,000 to 132,000 tons of donated food was distributed through food agencies in the most recent year for which data was available, based on publicly available reports from the state's food banks. Food banks are not the only source of food donations in the state, and most charitable food agencies also purchase at least a portion of the food that is distributed. To account for this, an estimate is shown in the table for the current capacity for food donation if members of the Food Bank Council of Michigan represent a range of 20 to 80 percent of food currently donated and distributed in the state. Based on stakeholder interviews, the Roadmap estimates that no less than 30% of distributed food is sourced from donations.

Food distribution is the best measure of the capacity for the food system to reduce food loss or food waste, as some amount of donations are typically wasted in the charitable food system. The 229,639,506 pounds of food distributed during the year ending February 2021 presumably represents peak capacity under current conditions given the influx of support associated with the COVID 19 pandemic during that time. The distribution numbers collected from the most recent reports from each food bank indicate a substantial decrease from the prior year. However, we can use that peak distribution to estimate the best-case capacity for food distribution in Michigan at between 137,000 to 575,00 tons.

**Table 2.12: Total Michigan Food Donation Capacity**

Food Bank Council of Michigan Distribution 2022/2023 Food Bank Reports (lbs Converted to Tons)	Tons Distributed	If 80% From Food Banks	If 20% from Food Banks	Total Distributed		Impact if Doubled (% of FLWR Goal)	
				If 80% From Food Banks	If 20% from Food Banks	If 80% From Food Banks	If 20% from Food Banks
State Organized by Food Bank Territory							
Food Bank of Eastern Michigan	15,000	18,000	75,000	2022/2023	105,600	440,000	NA NA
Forgotten Harvest	21,000	25,200	105,000	2022-2021*	137,760	574,000	NA NA
Gleaners Community Food Bank of Southeastern Michigan	24,000	28,800	120,000	<b>Total Donations Received (30% estimate)</b>			
South Michigan Food Bank	6,000	7,200	30,000	2022/2023	31680	132000	10% 44%
Greater Lansing Food Bank	6,000	7,200	30,000	2022-2021	41328	172200	13% 57%
Feeding America West Michigan Food Bank	12,000	14,400	60,000				
Food Gatherers	4,000	4,800	20,000				
<b>Total</b>	<b>88,000</b>	<b>105,600</b>	<b>440,000</b>				

\*229,639,506 pounds distributed  
 Source: Food Bank Council of Michigan Distribution Map and FBCM food bank web pages

Food distribution projections are based on an estimate of 30% of donated food in the charitable food system. As shown, marginal improvements will not make a meaningful contribution to the state’s food loss and waste reduction goal. The columns at right detail the contribution to the Michigan Wasted Food Goal if food rescue were to double based on the various capacity estimates.

**The Bill Emerson Good Samaritan Act<sup>58</sup>**

The Bill Emerson Good Samaritan Food Donation Act (the Emerson Act) provides a federal baseline of protection for food donors and distributing organizations. The Emerson Act covers individuals, businesses, non-profit organizations, and the officers of businesses and non-profit organizations. It also covers gleaners—individuals that harvest donated agricultural crops to the needy or to a nonprofit organization that distributes to the needy. Donating individuals and businesses are protected when they donate qualifying types of food in good faith.

- **Qualifying Food:** The donated food must be “apparently wholesome” or an “apparently fit grocery product” and meet “all quality and labeling standards imposed by Federal, State, and local laws and regulations,” even if it is not “readily marketable due to appearance, age, freshness, grade, size, surplus, or other conditions.”
- **Exception for Reconditioned Food:** Even if a food does not meet all applicable standards, the donor can be protected by the Emerson Act if (s)he follows all of the Act’s reconditioning procedures, which include: 1) The donor informs the nonprofit of the nonconforming nature of the product; 2) The nonprofit agrees to recondition the item so that it is compliant; and 3) The nonprofit knows the standards for reconditioning the item.

The Emerson Act protects most but not all donations of qualifying food. In order to get protection, the transaction must be structured such that:

1. The donor donates to a non-profit organization.
2. Non-profit organization that receives the donated food distributes it to needy populations.
3. The ultimate recipients do not pay for this donated food. However, if one nonprofit donates food to another nonprofit for distribution, the Act allows the first nonprofit to charge the distributing nonprofit a nominal fee to cover handling and processing costs.

If these criteria are met, the Emerson Act is quite protective of donors, and does not hold a donor liable unless the donor acts with gross negligence or intentional misconduct.

# Recycling Food Waste

This Roadmap prioritizes food waste prevention and rescue strategies, also known as food loss and waste reduction. However, as outlined in the goal setting section, there is a need for increased food waste diversion through recycling. In an ideal scenario, this would be limited to residuals that are not fit for human consumption.

The Michigan Department of Environment, Great Lakes, and Energy (EGLE) has a goal of increasing Michigan's recycling rate to 45 percent, growing end-use recycling markets in a circular economy framework and building the foundation for a decarbonized and thriving Michigan economy. Food waste represents by far the greatest need for improved recycling infrastructure and processing. For the state to meet its recycling goals, much less its climate goals, it will need to recycle nearly 100 times more food waste in 2030 than it did in 2021.

Based on our stakeholder engagement and analysis, the Roadmap strongly affirms that Michigan must continue to invest in the development of end-of-life strategies for organics material, especially food waste, as the infrastructure does not currently exist to divert this material from landfill.

EGLE has used a portfolio of resources created through the NextCycle Michigan Initiative (NCMI) to guide its recycling investments, including the NextCycle Gap Analysis<sup>57</sup>, a report with detailed analysis and data that can be used to guide EGLE funding priorities. The largest current investment from the EGLE Renew Michigan Fund, NCMI is an EGLE Materials Management Division initiative powered by Resource Recovery Systems, Michigan Recycling Coalition and the Centropolis Accelerator at Lawrence Technological University.

The Gap Analysis provides a roadmap for growing Michigan's circular economy, building resilience, and working towards a low carbon future. In the 2023 report, the Gap Analysis noted that in 2021, 83 facilities reported bringing organic material onto site with a total approximate estimated 309,322 tons of organics processed.

To increase Michigan's recycling rate to 45 percent, approximately 33 percent of the organics currently going to disposal will need to be captured for organics processing at composting or anaerobic digestion facilities. Of that, 46 percent should be food waste – it accounts for just one percent of composted material today. Michigan will need to increase processing capacity for food waste by approximately 500,000 tons. That is less than the food waste recycling goal recommended in this Roadmap (600,000 tons).

## **NCMI Food, Liquids, and Organic Waste Systems (FLOWS): Summary of Gaps & Opportunities**

- Access, collection, processing, and end market development for organics all present opportunities for growth in all regions of the state.
- Management options for food waste include prevention, rescue/recovery and recycling;
- Policy and education throughout the state need to support the entire value chain,
- Residential and commercial food scrap collection, processing capacity, and marketable compost development are stand-out priorities for this track.
- End market development for compost and other by-products of organics processing offer diverse and multiple opportunities, from agriculture to erosion control to roadway construction and more.
- Hemp and cannabis plant waste collection and composting opportunities for landfill diversion are being developed and are likely to grow this industry in the coming years.

ReFED has analyzed the potential impact of food waste recycling strategies in Michigan, which the Roadmap has organized by the EPA Wasted Food Scale Below.

**Illustration 2.12: ReFED Food Waste Recycling Strategies**

**Upcycle**

- Rendering
- Waste-Derived Agricultural Inputs
- Waste-Derived Bio-Plastics
- Waste-Derived Biomaterials

**Feed Animals**

- Waste-Derived Processed Animal Feed
- Livestock Feed
- Insect Farming

**Compost**

- Centralized Composting
- Home Composting
- Community Composting

**Anaerobic Digestion**

- Centralized Anaerobic Digestion
- Co-Digestion at Wastewater Treatment Plants

### Upcycling

In the context of this Roadmap, much of what we might think of as Upcycling according to the new EPA Wasted Food Scale are loss prevention activities, such as the use of byproducts or surplus food to create prepared foods or food products for human consumption. Examples include the GFT Technologies’ repurpose solution discussed on page 53 and the Make Food Not Waste Upcycling Kitchens, which use donated surplus ingredients to make meals for the food insecure in Detroit.

In a related scenario, waste from food byproducts and spoiled food no longer fit for human consumption can be used as organic feedstocks. There are a growing number of companies in Michigan working to develop food waste into plastic or textile alternatives. EGLE and other state agencies should be prepared to nurture these initiatives and their efforts to create a fossil-free circular economy.

### Feed Animals

Animal feed has been discussed in prior sections. It is a common practice with opportunity for wider adoption. Stakeholders highlighted how difficult it was to find farms to take material. There is a need for matchmaking to ensure that produce farms, processors, restaurants and retailers are able to connect with pork, cattle, and chicken farms or animal welfare organizations that can utilize their surplus or byproducts.

However, there are good reasons that these relationships are difficult to cultivate. Livestock farmers have indicated that feed supplies should be consistent and thoughtfully managed. To do otherwise will impact the health of the livestock, potentially leading to operational and welfare concerns. Animal welfare organizations (e.g.: humane society, zoos) have similar concerns, but may prove an underutilized opportunity.

## Composting

Composting is a managed, aerobic (requiring oxygen) process in which microorganisms decompose organic materials (for example; leaves, grass, brush, wood, manure, agricultural residues, food scraps, etc.) yielding carbon dioxide gas (CO<sub>2</sub>), heat, water, and a stable, soil-like product called humus or compost. In nature, dead plant and animal matter is decomposed slowly into humus primarily by microorganisms. In a compost setting, this natural process is mimicked to create a soil amendment for home or commercial use.

ReFED has organized composting into three scales: Centralized, Community and Home.

In Michigan, centralized composting is more commonly known as commercial composting, and sometimes industrial composting. The vast majority of these facilities do not currently accept food waste, as discussed in the prior section. Among those that do, there is a wide variation in materials accepted, operational logistics, and business models.

Community composting processes food waste from homes and small businesses at small, community or neighborhood facilities.

Through the NextCycle Gap Analysis, the Part 115 statute, and related products and initiatives, Michigan already has the necessary information and tools to guide investments in composting infrastructure. This Roadmap does not attempt to duplicate that work, and has sought only to summarize key solutions in this section, while limiting analysis and recommendation to concerns beyond the scope of prior efforts.

## Other Recycling or Disposal Options of Note

**Anaerobic digestion (AD)** is a sequence of biological processes by which microorganisms such as bacteria break down biodegradable material in the absence of oxygen. When organics reach their end-of-life AD can also be employed to manage waste or to produce fuels from the methane generated.

**Garbage disposals** grind food scraps into a state that can be disposed of through a sink or sewer. Approximately nine percent of food waste in Michigan is disposed of in the sewer. Insinkerator, the nation's leading manufacturer of garbage disposals, is a subsidiary of Michigan-based Whirlpool Corporation.

## Case Studies

### Wormies Vermicomposting



#### Wormies

Wormies is a 13-acre compost farm in West Michigan that practices vermicomposting, using worms to decompose organic food scraps into a nutrient-rich natural fertilizer for plants. It provides compost service to 600 residential and commercial customers through a micro hauling service for food scraps. Participants in Wormies' compost service receive a share of the worm compost, or they can opt to donate it to community gardens that Wormies partners with. The worm castings are rich in microbiological colonies and are ideal as a fertilizer or soil amendment for organic gardening and food production.<sup>59</sup>

### Hammond Farms & My Green Michigan

Hammond Farms is a commercial composter and landscape supplier that plays a significant role in managing Michigan food waste. The company collects curbside yard trimmings, year-end leaves, post-consumer and pre-consumer food scraps, and compostable products. The collected waste is processed through various steps including grinding of brush and larger material, mixing of feedstocks per recipe, and placement in windrows (composting heaps)<sup>60</sup>. Hammond Farms partners with My Green Michigan, a company that turns food scraps into soil, and Scraps to Soil, a program that collects food scraps from restaurants, coffee shops, and food processors. Hammond Farms and My Green Michigan transform food waste into valuable compost that promotes plant and turf health, binds contaminants in stormwater runoff, and reduces the need for irrigation and fertilizers<sup>61</sup>.

#### Kalsec

Kalsec, a manufacturer of natural food and beverage ingredients based in Kalamazoo, has a goal to protect 1.4 billion kilograms of food globally as part of its Food Protection Business Unit sales targets and food loss and waste prevention goals. As an example of how it is working with companies to upcycle ingredients, Kalsec collaborated with seafood product company Sweden Pelagic and an industry consortium to develop burger mince and nuggets from herring byproducts using its antioxidant solutions. In 2024 the Kalsec customer will divert 1.5 million kilograms through this innovation.

#### Organicycle

Organicycle is a company based in Grand Rapids that offers curbside composting service. Organicycle accepts food waste from households and businesses as well as residential yard waste, and the collected waste is composted at its facility.<sup>62</sup>

### Part 3: Gap Analysis and Policy Review

Center for EcoTechnology (CET) conducted a review of policies and programs currently in place in the state, and an analysis of benchmarks from neighboring states in the Great Lakes and elsewhere in the country. CET assessed standing policies in the following states: Ohio, Wisconsin, Indiana, Illinois, and Minnesota. **Its research uncovered a lack of robust policies in many of Michigan's peer states.** Wisconsin and Illinois for example have no policies in place or the policies in place create potential barriers (e.g.: Wisconsin's food donation liability protections do not protect donations made directly to needy individuals, which creates barriers for gleaning on farms). While there is a dearth of strong policies in place in Michigan's peer states, there are several programs in place nationally which CET has included as strong examples.

As such, CET concluded that **"Michigan has the opportunity to be a leader in the Great Lakes region for food waste prevention and donation policies."**

To build a robust comparison and gap analysis, MiSBF and advisors expanded the Michigan gap analysis with local knowledge and further detail. In the peer state review, CET has included examples of strong policies and programs from states beyond the Great Lakes region as applicable. The combined analysis examined the following categories:

- Outreach/Collaboration
- Grants
- Tax Incentives
- Technological / Infrastructure Improvements
- Professional Standards
- Technical Assistance
- Date Labeling
- Incentives for Secondary Markets
- Food Donation Liability Protections

This review informs the Roadmap recommendations in Part 4. A more comprehensive policy review is available on the Roadmap website at [mifoodwasteroadmap.org](http://mifoodwasteroadmap.org) courtesy of the Harvard Law School Food Law and Policy Clinic.

An additional section follows with detailed information on the Climate Pollution Reduction Grants (CPRG) and Part 115 Sustainable Materials Management Planning.

## Policy Review: Outreach/Collaboration

Collaboration between state agencies, nonprofits, and businesses serves as an important tool to showcase successes and identify roadblocks to implementing solutions. Michigan can support marketplace development by leveraging the expertise of service providers and businesses, as well as building resources and attending events. This builds cross-sector awareness for activities that need to be prioritized within the business community.

Technical assistance providers can bridge knowledge and communication gaps between generators and haulers and processors. Within the confines of its role in the public sector, EGLE has invested heavily in initiatives to foster collaboration for climate action and materials management, including the NextCycle Michigan program, the Council on Climate Solutions and similar working groups and advisory councils, the Catalyst Communities program, sponsorship of Michigan Green Communities, and dozens of webinars and conferences each year. MDARD and other state agencies provide similar opportunities for their constituents.

EGLE and other state agencies also sponsor the work of Michigan Sustainable Business Forum, Michigan Recycling Coalition, Michigan Food Security Council and other private-sector programs facilitating collaboration on materials management, food systems and climate. However, with the exception of this Roadmap initiative, no such work presently exists for food loss and waste reduction. EGLE and MDARD both have substantial investments in outreach and educational programs that overlap with FLWR interests, but limited investments to date in the topic, with notable exceptions for share table education from MDARD and the Sustainable Food Management resources managed by the EGLE compost office.

EGLE's Recycling Raccoons recycling awareness campaign has not produced FLWR content.

### Sector Applicability

- Manufacturers can participate in collaborative knowledge sharing to build cross-sector awareness of urgently needed solutions and can benefit from program implementation guidance and other forms of technical assistance.
- Effective gleaning requires collaboration between dedicated gleaning organizations, volunteers, food rescue distributors and organizations, and farms. Farms can work with state agencies driving collaboration between farms and entities such as producers and manufactures to help prevent surplus left in the fields.
- Retailers can offer their expertise to contribute to cross-sector solutions and awareness building.

Strong Policy / Program Example	Justification
<p>Nashville Tennessee ran a Food Saver Challenge in 2017 in partnership with the Natural Resources Defense Council's Nashville Food Waste Initiative. The Challenge engaged restaurants to reduce their food waste via their choice of a variety of wasted food solutions within 30 days. <sup>63</sup></p>	<p>More than 50 Nashville restaurants and hospitality businesses donated wholesome food to local nonprofits serving the food-insecure population. The challenge was relaunched the next year as an ongoing initiative. Businesses that complete the Challenge are recognized by the mayor.</p>
<p>Pacific Coast Collaborative, composed of states like California, Oregon, and Washington, along with cities and private actors, has committed to a series of goals to reduce GHG emissions.</p>	<p>PCC (Pacific Coast Collaborative) – British Columbia, Washington, Oregon, California, and the cities of Vancouver, Seattle, Portland, San Francisco, Oakland, and Los Angeles – combine policy &amp; technical expertise and share reduction strategies and work together to implement them. Case studies of their partnership are abundant.</p>
<p>The Illinois Food Scraps &amp; Composting Coalition (IFSCC)<sup>64</sup> is a not-for-profit organization that works to improve diversion and composting of organics in Illinois. While a key focus for the Coalition is composting, it is included here to showcase its policy work and its collaboration with The Wasted Food Action Alliance (WFAA)<sup>65</sup> which follows the EPA food Recovery Hierarchy to create solutions to reduce wasted food.</p>	<p>Since 2010, policies promoted by the IFSCC have expanded businesses' abilities to recover wasted food and divert it from disposal in landfills. The WFAA is based in Illinois and collaborates with the IFSCC to reduce wasted food through prevention, rescue, and recycling.</p>
<p>The Solid Waste Authority of Central Ohio (SWACO) offers resources to businesses and collaborates with organizations to conduct technical assistance services, stakeholder engagement processes, and more.</p>	<p>SWACO Resources to businesses involved in Business Recycling Champions Program:</p> <ul style="list-style-type: none"> <li>• Business Recycling Toolkit</li> <li>• Green Economy Business Park</li> <li>• Recognition Opportunities</li> <li>• Multifamily Recycling Program</li> <li>• Resources</li> <li>• Technical Assistance</li> </ul>

## Policy Review: Grants

In comparison to other states' policies, Michigan has moderately strong policies in place for providing grants to support reduction of wasted food. Michigan provides several grants and other resources to support diversion initiatives at the local level, including Recycling Market Development and Infrastructure grants, which have allocated more than \$25 million from the Renew Michigan Fund. (There is anecdotal evidence that the Renew Michigan benchmark inspired the Indiana Dept of Environment to increase its investment in recycling from \$1 million to \$4.7 million to keep pace.) The Roadmap initiative was funded through the Community Pollution Prevention Fund Grant Program and the Community Pollution Prevention Fund created by Initiated Law 1 of 1976, Section 445.573f.

In addition to other EGLE grants, MDARD offers several grants that could be deployed to support FLWR, including the Farm Innovation Grant, Food and Agriculture Investment Fund Grants, Food Safety Education Fund Grants (which have funded share table education), Rural Development Fund Grants, Rural Readiness Grants, and the Value-Added & Regional Food Systems Grant, a grant to support processing infrastructure and food systems development that was highlighted in the final report of the Michigan Food Security Council as a potential opportunity to improve supply for the charitable food system, and should be increased beyond its current \$100,000 maximum.<sup>66</sup> The Michigan Health Endowment Fund is another grant program available to improve food rescue.

With that said, none of these programs have prioritized food waste prevention or rescue. Also, the majority of the EGLE and MDARD grants have a match requirement, typically around 30%, which make the programs less attractive to businesses and organizations with limited resources.

### Sector Applicability

Government grants can support initiatives often lacking a market-based application or that do not yield direct, monetizable benefits. Manufacturers could use state-funded grants to research consumer behavior to determine the best language for labels, develop upcycling initiatives, and use more recycled material in products. Farms can use state-funded grants to support on-farm gleaning and other donation efforts that require ongoing costs. Retailers can use grants to support upcycling initiatives, wasted food diversion programs, donation programs, storage solutions, and more.

Typically, local food businesses looking to participate in upcycling lack the physical resources to properly store food until solution providers can pick it up.

Strong Policy / Program Example	Justification
<p>The Ohio Environmental Protection Agency (EPA) offers the Market Development Grant to manufacturers for creating or expanding organics recycling through new equipment.<sup>67</sup></p>	<p>The Ohio EPA Market Development Grant focuses on organics processing equipment rather than prevention or donation, but it is still supporting diversion of organics from disposal.</p>
<p>The Massachusetts Department of Environmental Protection (MassDEP) offers grant funding to businesses to expand infrastructure for reuse and composting<sup>68</sup>.</p>	<p>Although many grants focus on composting and source separation programs, Metro Oregon and MassDEP's Recycling &amp; Reuse Business Development Grants are examples of grant programs that offer incentives beyond these diversion strategies. Metro focuses on improving reuse systems in Portland, and MassDEP's RBDG program provides grants to Massachusetts businesses to expand recycling, reuse, and composting infrastructure in Massachusetts.</p>
<p>Oregon's Metro Investment and Innovation grant program offers grants to businesses, nonprofit organizations, and colleges and universities working to reduce, reuse, recycle and compost materials that would otherwise go for disposal.<sup>69</sup></p>	
<p>California's Department of Resources Recycling and Recovery (CalRecycle) administers the Edible Food Recovery Grant Program, started in 2021, and Food Waste Prevention and Rescue Grant Program, started in 2017.<sup>70</sup></p>	<p>CalRecycle's competitive grant programs support the creation of new projects or expansion of existing food waste prevention projects for food recovery or source reduction methods. CalRecycle has awarded over \$28.8 million to food rescue organizations.</p>

## Policy Review: Tax Incentives

Michigan provides no additional tax deductions or credits for the donation of food beyond those offered by the federal government. Michigan provides no incentives to businesses that operate or participate in composting programs or anaerobic digestion (AD). State tax incentives can provide an opportunity to target incentives to certain food producers, like farmers and small businesses, that often do not sufficiently benefit from federal tax incentives. (Roadmap engagement affirmed limited participation in federal grant programs among these stakeholders.)

Although not a focus within this Roadmap, it should be noted that private-sector investment in organics recycling will be critical for the state to reach its 50% recycling goal. The recent Part 115 update is encouraging this investment via statute, but incentives beyond matching grants could be impactful.

### Sector Applicability

Because standardizing date labels will not drive down costs or increase revenue, manufacturers need more incentive than the negligible cost of implementation. Manufacturers can utilize tax incentives to drive implementation of food waste reduction programs or upcycling initiatives.

Farms could use state tax incentives to support selling rejected food items on surplus food platforms. Retailers could use state tax incentives to support selling rejected food items on surplus food platforms.

Strong Policy / Program Example	Justification
Ohio does not provide a state level tax credit for food donations; however, as of January 2023, the state follows the Internal Revenue Code.	Ohio has implemented the Internal Revenue Code provisions encompassing food donation deductions which allows eligible businesses to use the deductions to reduce their taxable income for Ohio state income taxes. <sup>71</sup>
Virginia's Food Crop Donation Tax Credit was previously available to corporate entities engaged in farming food crops and donating them to nonprofit food banks	The amount of Virginia's Food Crop Donation Tax Credit was equal to 30% of the fair market value of the crops and claims were restricted at \$5,000 per year; however, this tax credit expired in 2022.
California offers a tax credit to agricultural businesses donating crops to eligible nonprofits. <sup>72</sup>	California businesses that are processing, distributing, or selling agricultural products can take advantage of a tax credit equal to 50% of transportation costs of crops donated to qualified nonprofits.
New York passed a tax credit to address the costs of donation: the credit applies to donations of agricultural products to food rescue. <sup>73</sup>	NY's tax credit allows farmers to claim 25% of the fair market value of qualified donations, with a maximum benefit of \$5,000 annually.
The Colorado Charitable Crop Donation Act (CCCDA) has been in effect since January of 2015. <sup>74</sup>	The CCCDA also allows each farmer in the state to claim 25% of the value of the donated food.

## Policy Review: Technological / Infrastructure Improvements

Michigan can facilitate resilient waste management infrastructure in several ways. CET believes that resilient waste management infrastructure has many solutions and facility types, at all levels of the EPA Food Recovery Hierarchy, capable of handling the wide variety of material types in the modern and evolving solid waste stream. CET encourages evaluating infrastructure investments for: 1) Practicality across the value chain, from source generation to processing to use of the end-product; 2) Full lifecycle carbon impacts; 3) Protecting against any health impacts; and 4) Maximizing resource recovery.

Through NextCycle Michigan and its various grant programs, EGLE is working to make investments to improve organics recycling infrastructure. EGLE and other agencies also have several replicable, innovative models to support infrastructure improvements that could be adopted to support food waste infrastructure and technology improvements, such as the cohort-based Sacred Spaces Clean Energy Grant, or the Michigan Materials Marketplace and the Emerge Knowledge Municipal Measurement Program (which are underwriting technology tools).

One of the challenges that composting and anaerobic facilities face is zoning and permitting - finding sites that are zoned to allow for composting (especially if feedstock includes food scraps) and then securing necessary permits to collect and recycle organics on-site. To support the development of composting facilities, states should make it easier to create new facilities through streamlined permitting processes and favorable local zoning rules. States don't have jurisdiction over local zoning but they could positively influence them.

Michigan just overhauled its solid waste laws with a package of eight bills (HB4454-4461) focused on recycling and reuse strategies. Previously, Michigan law had required compost facilities managing over 200 cubic yards of yard clippings and other organic materials to register with EGLE, but that commercial compost law has since been repealed.

### Sector Applicability

Manufacturers can implement more effective waste prevention measures at source generation and during processing to minimize waste and to protect against health impacts. Farms can expand and increase efficiency of gleaning programs and other donation efforts that require updated infrastructure and resources. Infrastructure development will allow food retailers to implement wasted food solutions across the EPA food recovery hierarchy. Technology and infrastructure improvements can support efforts to reduce warehouse handling, as minimizing the number of human intervention points helps prevent damages to produce.

Strong Policy / Program Example	Justification
<p>Public-private partnerships foster food recovery infrastructure.</p>	<p>CET believes public-private partnerships can be helpful in fostering source reduction and food recovery activities. Michigan can support infrastructure improvements that make these partnerships possible and foster effective food recovery. For example, Hamilton R3Source, a solid waste management district in Ohio, partnered with Winnow Solutions, a source reduction technology, to offer incentives for businesses to implement this tool at a discount.</p>
<p>Refrigeration, warehouses, temperature-controlled food distribution infrastructure, and cold-chain tracking and monitoring.</p>	<p>Coordination technologies make food donation easier by ensuring a consistent stream of food items. Expanded storage capabilities increase the capacity of relief organizations. An increase in fresh, nutritious food for donation requires expanded food distribution infrastructure such as refrigeration and warehouses. Michigan can support cold-storage infrastructure improvements and direct funding toward analyzing the best use of existing assets such as surplus refrigerator spaces in existing businesses.</p>
<p>Move for Hunger, a food recovery network organization, partnered with Commercial Fisheries Center of Rhode Island (CRCRI), Farm Fresh Rhode Island, the Rhode Island Food Policy Council, Eating with the Ecosystem, and United Natural Foods, Inc. (UNFI) to implement the Seafood Donation Program in Rhode Island.<sup>75</sup></p>	<p>California businesses that are processing, distributing, or selling agricultural products can take advantage of a tax credit equal to 50% of transportation costs of crops donated to qualified nonprofits.</p>

## Policy Review: Professional Standards

In comparison to other states' policies, Michigan has weak policy support for professional business standards or certifications. Michigan has the opportunity to build out more robust recognition programs, professional standards, and certifications.

Policy encouraging or requiring professional standards for food waste reduction can increase the efficacy of certifications, raise standards, increase participation and compliance, and elevate the competency of industry professionals. In addition to reducing harmful environmental impacts, certification benefits may include revenue enhancement. Thus, achieving a professional standard or earning a certification is a motivational tool for manufacturers, farmers, and retailers to reduce waste.

Michigan can consider health inspection and health standards or similar requirements as a platform for wasted food prevention. Existing health standards can be expanded to include a food waste reduction component. A required annual health and safety training and certifications could include wasted food prevention requirements, which could then be enforced during health inspections.

### Sector Applicability

A certification program offers manufacturers a needed roadmap to help understand what is feasible. A manufacturing industry standard certification for wasted food prevention could impart knowledge, motivate change, and catalyze concerted prevention efforts throughout the industry. Farms can work towards certifications such as the Michigan Agriculture Environmental Assurance Program (MAEAP), which helps farms prevent pollution risks.<sup>76</sup> A similar industry standard focused on wasted food prevention can illuminate what is feasible, impart knowledge, and motivate change across the farming industry. Food retailers like grocery stores can benefit from certification programs that can serve as peer-to-peer motivation, catalyzing behavior change. The certification program offers a roadmap needed to help understand what is feasible.

If wasted food prevention components are added to existing annual health and safety certifications and standards, retailers can work towards food waste reduction goals, which can be enforced or rewarded during health inspections.

Strong Policy / Program Example	Justification
The Iowa Waste Reduction Center developed the Iowa Green Brewery Certification, a free service for any Iowa brewery looking for guidance to implement sustainable practices. <sup>77</sup>	The Iowa Green Brewery Certification provides guidance on sustainable materials management and solid waste diversion from landfill.
State-wide food waste mandatory reporting for the largest generators with flexibility (quantification method and waiver availability) and support (technical assistance) motivates businesses and raises public awareness of food waste. New Jersey Department of Environmental Protection (NJDEP) requires large food waste generators to submit reporting forms if subject to the requirements of P.L. 2020, c. 24: An Act regarding food waste recycling and food waste-to-energy production. <sup>78</sup>	Improving management of wasted food requires measurement and tracking. Lack of data hinders a state's ability to implement effective policy for prevention and donation. Statewide mandatory reporting laws can help identify a baseline of surplus food generated and from which generators this surplus is created. <sup>79</sup>

## Policy Review: Technical Assistance

There are currently no state-run technical assistance programs in place. Technical assistance facilitates the necessary connections between generators of wasted food and solution providers. Michigan can support marketplace development by leveraging the expertise of technical consultants to assist businesses with implementing new or expanding existing waste diversion programs.

Systems thinking expertise facilitates loop closing connections between service providers and businesses. Technical assistance also includes advice to local governments during investment/infrastructure planning and can include marketing/outreach assistance as well.

CET was not able to identify technical assistance or incentive programs to match benchmark programs in states with strong policies to address food waste, but there are existing programs that serve overlapping objectives including NextCycle Michigan, the RESTART Program at Lawrence Technology University, the Michigan Manufacturing Technology Center and other institutional programs providing pollution prevention or manufacturing optimization services with public support.

An example of state funding leveraging technical expertise is evident in New York State's creation of funding through the governor's budget to support CET's direct assistance to businesses in the state. This budget was approved by the legislature, allowing CET to assist businesses directly with implementing programs to divert food waste tonnage from disposal at no cost to the business.

### Sector Applicability

Businesses may be motivated and incentivized, but still lack knowledge of available solutions or implementation. Manufacturers can receive assistance with hauler contracting, reducing contamination, and training employees to ensure long-lasting successful adoption of food waste reduction programs. Farms can receive assistance with hauler contracting, reducing contamination, and training employees to ensure long-lasting successful adoption of food waste reduction programs and on-farm gleaning efforts. Retailers can receive assistance with hauler contracting, reducing contamination, and training employees to ensure long-lasting successful adoption of food waste reduction programs.

## Strong Policy / Program Example

## Justification

The Center for EcoTechnology (CET) administers several technical assistance programs in various states throughout the northeast including Massachusetts, Connecticut, and New York. RecyclingWorks in Massachusetts is a program funded by MassDEP that offers no-cost technical assistance to help businesses and institutions comply with the commercial organics disposal ban and other waste disposal bans.<sup>80</sup> CET administers another Technical Assistance program fostering food recovery in New York State, under contract with New York State Department of Environmental Conservation (NYS DEC).<sup>81</sup> In Connecticut, CET is also contracted with Connecticut Department of Energy and Environmental Protection (CT DEEP) to assist businesses and institutions with waste reduction, recycling, and food recovery.<sup>82</sup>

It is not unique for a state to invest in statewide technical assistance programs. RecyclingWorks' technical assistance offers support in the presence of MassDEP's commercial organics waste disposal ban alongside state grants to support infrastructure development. MassDEP conducted an economic impact study in 2016 and found that over 900 jobs were created and that "haulers and processors handled between six and eight times as much material in 2015 as they did in 2010".<sup>83</sup> The Massachusetts program sees continued success and similar progress is being adopted in other states, including state-wide assistance programs launched in Connecticut and New York.

Additional states with strong Technical Assistance programs in place include Oregon, Minnesota, and Tennessee: Metro Oregon's "Recycle at Work" program provides free waste reduction assistance to businesses.<sup>84</sup> In Minnesota, Ramsey/Washington Recycling & Energy (R&E)<sup>85</sup> offers BizRecycling, a public program launched to help businesses implement and expand food waste collection programs. Tennessee's free technical assistance program, Get Food Smart, includes educational workshops, food waste audit planning, food waste reduction strategy assistance and more.<sup>86</sup>

Metro's Waste Reduction Specialists can help businesses set up waste reduction programs in preparation for a policy that will soon require certain businesses to divert food waste from disposal.<sup>87</sup> BizRecycling technical assistance combined with grant funding allowed 399 businesses to begin collecting organics.<sup>88</sup>

## Policy Review: Date Labeling

In comparison to other states' policies, Michigan has a weak policy for date labeling regulations. Michigan requires sell-by dates for milk and for packaged perishable food. There is no differentiation between quality-based and safety-based dates, and the state provides no clear permission to donate after the quality-based date, though the law suggests that if advertised as such, milk may be sold after the sell-by date.

Standardized date labeling on products and consistent language across the industry can help manufacturers distinguish true safety risks so they can reduce and prevent discarding of food that is still edible. Prepackaged perishable food (which includes meat) must be labeled with the recommended last day of sale. Prepackaged nonperishable food does not require a date label. Prepackaged perishable foods and nonperishable foods that are date-labeled may not be sold after the label date unless the food is wholesome and sound and is clearly identified as having passed the date.<sup>89</sup>

Milk and milk products must have a date label for the last day of sale, and sale after this date is not permitted unless clearly advertised to the final consumer in a prominent manner as being beyond the recommended last day of sale.<sup>90</sup>

### Sector Applicability

Implementing statewide standardized labeling can provide incentives for manufacturers to recover more food for donation. Because of the absence of federal law, states exercise broad discretion to regulate date label language. This leads manufacturers to use conservative dates based on optimal food freshness rather than safety.<sup>91</sup> Farms and producers currently discard wholesome food that could have been channeled to the secondary market or donated to feed hungry people if date label language was standardized statewide.

Implementing statewide standardized labeling can help retailers work with recovery organizations to explore the possibility of distributing more food for donation. Customers shopping at food retailers and grocers need assistance understanding date labeling as the labeling is not currently intended to communicate safety information. Consumers believe the dates indicate safety, and report throwing away food past the date. Date labels with common and clear language can help consumers avoid throwing away safe edible food at home.<sup>92</sup>

Strong Policy / Program Example	Justification
New York City is an example of a government choosing to eliminate unnecessary date labels. New York City used to require dates on milk, even though the state of New York imposes no date labeling requirements on any foods. The city repealed its date labeling requirement for milk in 2010 to harmonize with state regulations.	NYC recognized that its date label requirement was not necessary to protect public health because milk, if handled properly, is still safe to consume even after the date passes (and if handled improperly, the date is irrelevant).
Minnesota and Indiana have moderately effective policies in place. Minnesota requires date labeling for dairy products, eggs, shellfish, and perishables. <sup>93</sup> Indiana requires date labeling for eggs and shellfish. <sup>94</sup>	Minnesota and Indiana do not restrict the sale or donation of any past date food item.

## Policy Review: Incentives for Secondary Markets

Underutilized parts of foods or food byproducts, such as spent grains or rinds, can be converted into new ingredients. This process, known as upcycling, can help prevent large scale amounts of food waste by turning otherwise wasted food product into edible food product. Michigan can support upcycling initiatives by providing funding for storage resources that manufacturers and producers often lack. Once these larger scale upcycling initiatives are off the ground successfully, peer to peer motivation can spur action at neighboring facilities.

### Sector Applicability

Manufacturers can assess their food waste stream to identify byproducts with opportunity for upcycling in-house, as well as identify an outside service provider that could purchase the byproduct. For example, Brewer's, a Massachusetts based company, upcycles spent grains, a byproduct from the beer-making process, into crackers and chips.<sup>95</sup>

Additionally, manufacturers with products that are safe and edible, but cannot be sold due to label misprints, can utilize secondary markets. Farms can utilize support for upcycling initiatives to prevent surplus produce from going to waste. For example, Commonwealth Kitchen's Farmer-Value Program allows farmers to send surplus produce to Commonwealth Kitchen for on-demand processing into a new finished product to be sold, providing revenue to the farms.<sup>96</sup>

Retailers can identify potential upcycling opportunities to implement large scale food byproduct waste prevention that is otherwise difficult to achieve via other prevention methods like donation. For example, PCC Community Markets (PCC) based in the Greater Seattle region is implementing upcycling initiatives. After evaluating food waste volumes across products, departments, and stores, PCC worked with FareStart, Macrina Bakery, and CET to develop an upcycling program to transform surplus artisan bread products into new, high-value products for customers. These products will generate new revenue for PCC, prevent hardening loaves from being donated, and avoid the negative environmental impacts associated with food waste disposal.<sup>97</sup>

Strong Policy / Program Example	Justification
New Jersey offers liability protection even when recipients of the food pay a nominal fee to help cover transportation and operating costs.	New Jersey provides liability protections beyond those afforded by the Bill Emerson Good Samaritan Food Donation Act.
In partnership with Pacific Coast Food Waste Commitment (PCFWC) and Center for EcoTechnology (CET), New Seasons Market, a grocery chain based in Oregon, created an upcycled pilot standard operating procedure and developed new upcycling initiatives to extend the value of surplus berries and ground beef. <sup>98</sup>	The new upcycling concepts are projected to divert 3,000 pounds of berries and 750 pounds of ground beef in the three-month pilot period. Savings from this are projected to be at least \$19,000.

## Policy Review: Food Donation Liability Protections

In comparison to other states' policies, Michigan has moderately strong policies in place to support Food Donation Liability Protections. Michigan provides liability protection for food donors and food recovery organizations and includes a presumption of good faith. Liability protection seems to cover donations that are eventually supplied for a small fee; the law does not mandate that food donations be distributed for free and does allow food donations to be sold for a small fee. However, liability protections do not cover food donated directly to needy individuals. Michigan could enact protections that are more protective of food donors than those outlined by the Emerson Act. Corporate legal departments lack a precedent to follow that would allow them to fully support food donation because the federal Good Samaritan Food Donation Act remains unproven and untested in court.

Michigan provides no incentives for selling rejected, off-grade, near-expiration, or surplus food items at a discounted price. This food could be distributed through alternative retail channels or directly to consumers.<sup>99</sup>

Michigan law offers civil liability protection for individuals and organizations that donate food or distribute donated food in good faith.<sup>100</sup>

### Sector Applicability

A liability education campaign could support manufacturers' ability to scale existing trainings to increase employee awareness.<sup>101</sup> Selling imperfect produce or underutilized produce parts directly to customers removes the barrier of in-store choice where customers would compare the goods with the perfect options, often choosing the cosmetically perfect under the assumption that appearance corresponds with quality.<sup>102</sup>

Farms could feel more secure with stronger protections from the state to start working in earnest with gleaning organizations directly to recover edible, unharvested crops. Liability protection can remove one of the main barriers to gleaning. The farm is a crucial spot on the supply chain where variations are selected out. The ability for farms to sell rejected food items at a discounted price reduces discarding of food that is still safe and edible.

Retailers can lean on state liability protections to donate directly to needy individuals, which would reduce premature discarding of food that is still safe and edible. Retailers can partner with secondary markets to distribute safe surplus food at a discounted price both to consumer or business-to-business, reducing discarding of food that is still safe for consumption.<sup>103</sup>

Selling directly to customers prevents customers from making comparisons with perfect options and assuming that appearance indicates quality.<sup>104</sup> Consumer-facing retailers often lack adequate space and equipment to store food properly for donation. There is a need for retailers to have proper facilities to correctly process and handle food available for donation, such as surplus items that cannot be sold.<sup>105</sup> Retail spaces can utilize technology like Flashfood to sell items near their expiration date at a discounted price that, at full price, would otherwise not be purchased.

Strong Policy / Program Example	Justification
<p>Ohio offers strong liability protections to businesses that donate surplus edible food products.</p>	<p>Ohio provides liability protections beyond those afforded by the Bill Emerson Good Samaritan Food Donation Act. Ohio provides liability protections that include a presumption of good faith, cover donations made directly to individuals, and allow distributors to charge a small fee for donated food. Ohio also notes explicitly that a presumption of liability does not arise merely because a sell-by date has passed.</p>
<p>Rhode Island Good Samaritan Laws protect businesses donating in good faith.<sup>106</sup></p>	<p>Rhode Island laws protect good-faith donors from criminal penalty or civil damages arising from the condition of the food, except where injury is caused by gross negligence, recklessness, or intentional misconduct of the donor.<sup>107</sup></p>

## Analysis: Opportunities to Improve Community Sustainability Planning

Several communities in Michigan have adopted climate or waste reduction goals that mirror those of the MI Healthy Climate Plan. As these efforts accelerate to capture state and federal investments, respond to new regulatory requirements, or appease citizens, there will be increased opportunity to promote food loss and waste reduction.

The City of Ann Arbor's A2ZERO Action Plan, arguably the most comprehensive of the state's local and regional climate action plans, included six circular economy recommendations when it was published in 2020, leading with the expansion of its food waste composting program.<sup>108</sup> It did not include an FLWR recommendation or goal. The 2019 Detroit Sustainability Action Agenda also included compost actions, and also omitted FLWR.<sup>109</sup> As does the Michigan Green Communities Challenge, which provides sustainability guidance and benchmarks for local municipalities.<sup>110</sup>

Examples such as the Oakland County Equitable Climate Action Plan, which includes a food rescue recommendation among its 30 actions<sup>111</sup>, are not common at this time. This creates a substantial opportunity to build upon existing investments to promote climate action and sustainability among local communities, and to leverage new investments from communities that are beginning or updating plans.

Although FLWR should be a part of any climate or materials management plan, there are two immediate opportunities available requiring action within the next six to 12 months: Climate Pollution Reduction Grants and Part 115 Sustainable Materials Management Planning.

### Climate Pollution Reduction Grants

The Inflation Reduction Act's Climate Pollution Reduction Grant (CPRG) program administered by the EPA will be providing \$4.6 billion in competitive grants to implement climate action plans. At present, state and regional governments are developing these plans through formula grants that must be completed by March 2024 to ensure local communities are eligible to compete for implementation funding.



In Michigan, three agencies received grants to create a Priority Climate Action Plan (PCAP):

- Grand Valley Metropolitan Council (GVMC) for West Michigan
- Southeast Michigan Council of Governments for Southeast Michigan (SEMCOG)
- Michigan Office of Climate and Energy for everywhere else

PCAPs must focus on “near-term, high-priority, implementation-ready measures,” which could include FLWR solutions. The Rocky Mountain Institute and Industrious Labs collaborated with several other national partners to create guidelines for PCAP to reduce greenhouse gas emissions through organic waste and landfill methane reductions, including food loss and waste reduction. The guide walks through the PCAP's required elements with a focus on: 1) the importance of addressing methane emissions; 2) opportunities for GHG reductions in the waste sector; 3) community benefits of waste sector measures; and 4) specific measures to include with examples from leading states and local governments.<sup>112</sup>

This guide is available in full at [mifoodwaste.org](http://mifoodwaste.org). The following pages are an excerpt highlighting key findings.

### Key Takeaways for CPRG Planning Grant Recipients:

- **Focus on methane in your GHG inventory:** Methane emissions alone are responsible for about a third of the warming impacts millions of Americans are experiencing right now – from record heat waves to flash flooding and intense hurricanes. In the inventory, model methane emissions on a 20-year timeframe to accurately represent methane’s warming power – and the benefits of mitigation – in this critical window.
- **Include the waste sector in your GHG reduction measures:** Communities across the country struggle with the adverse consequences of landfilling and incineration. From planet-warming methane emissions to hazardous air pollutants and odors, traditional disposal methods impact air quality, health, and quality of life for nearby residents. Waste sector GHG reduction measures cut methane emissions and protect communities. These popular, cost-effective measures also deliver many co-benefits, such as helping to address food insecurity, create circular economy jobs, and produce value-added products, like compost, that improve soil health and sequester carbon.
- **Address landfill methane:** Reducing organic waste disposal – through waste prevention, food donation, and organics recycling – is the most effective way to prevent methane generation. At the same time, strengthening landfill emissions controls can achieve near-term methane reductions from previously buried waste and protect landfill-adjacent communities. Incorporate upstream and downstream language in your PCAP, advancing policies, programs, and rulemakings that:
  - Reduce organic waste generation
  - Promote food donation
  - Phase out organic waste disposal in landfills and incinerators
  - Support source-separated organics collection, processing, and recycling infrastructure
  - Develop end markets for products made from organic waste
  - Strengthen methane controls to reduce fugitive emissions at the landfill
- **Implementation can be speedy:** State and local governments have broad authority and responsibility for waste management, and there are many existing programs and policies to reduce organic waste disposal and strengthen landfill emissions controls. By including waste actions in the PCAP, State, Tribal, and local governments can slash harmful emissions and deliver powerful co-benefits, fast.

Here are a few climate action plans from across the United States with GHG reduction measures that tackle organic waste and landfill emissions, upstream and downstream:

- **State:** [California Air Resources Board Scoping Plan for Achieving Carbon Neutrality](#); [New York State Climate Action Council Scoping Plan](#); [Maryland’s Climate Pathway](#)
- **MSA:** [City of Chicago Climate Action Plan](#); [Memphis Area Climate Action Plan](#); [King County, WA Climate Action Plan](#); [City of San Diego Climate Action Plan](#)
- **Tribal:** [Sault Ste. Marie Tribe of Chippewa Indians, Tribal Energy Systems: Climate Preparedness and Resiliency](#)

## Materials Management Planning (Part 115)

Every county in Michigan currently has a Solid Waste Management Plan as part of existing Part 115 requirements. Part 115 is the Solid Waste Management component of Michigan's Natural Resources and Environmental Protection Act (Act 451 of 1994). Its purpose is to regulate the proper management of solid wastes in Michigan, which includes everything from planning and permitting to disposal, recycling, and composting. In 2022, the Michigan legislature approved and Governor Whitmer signed into law a package of eight bills focused on updating Michigan's solid waste law, which went into effect in March 2023. As part of this package, all Michigan counties will be required to complete a Materials Management Plan that includes among other requirements, the management of organic material. It will be critical to include prevention, recovery and recycling initiatives that go beyond minimum standards to better meet community and business needs, to reach large food waste generators in each area, and support local municipalities..

### Requirement of Materials Management Plan

- Identify all materials management facilities and available capacity
- Focus on utilization capacity
- Determine a Municipal Solid Waste recycling rate
- Develop materials management goals for utilization and recycling
- Organics, recyclables, and other diversion activities
- Benchmark Recycling Standards
- Contains an enforceable mechanism and responsible parties for implementing the MMP
- Ensures materials management facilities that are needed can be developed and provides avenue for siting of new facilities (MUFs; Waste Diversion Centers; etc.)
- Includes an overview of the transportation infrastructure for all managed materials
- Documents an implementation strategy

Although FLWR is not a statutory MMP requirement, its inclusion will make plans relevant to a larger group of stakeholders, improve materials management performance overall, and promote social and economic benefits that may not otherwise be readily evident in the plan, such as investments to address food insecurity.

Materials Management Plans (MMPs) will not necessarily be the purview of each of the 83 counties in the state. Many will be created through multicounty regional collaborations. In either case, MMPs will be led by a committee appointed by county commissioners to include the following rolls:

- A solid waste disposal facility operator.
- A representative of a hauler of managed material.
- A materials recovery facility operator.
- A composting facility or anaerobic digester operator.
- A waste diversion, reuse, or reduction facility operator.
- A representative of an environmental interest group that has members residing in the planning area.
- An elected official of the county.
- An elected official of a township.
- An elected official of a city or village.
- A representative of a business that generates a managed material.
- A representative of the regional planning agency whose territory includes the planning area.

FLWR is not explicitly represented in these criteria, but efforts can and should be made to educate the committee as a whole on its benefits. There is also opportunity for resources and guidelines on FLWR to be distributed through the EGLE Materials Management Planning Workgroup or related channels to support the planning process. FLWR may also target committee members for direct education and engagement, and/or participate in the planning process as stakeholders.

Each county will receive five years of grants that can be applied to planning activities, engagement and education, and/or program execution. Each county will receive \$60,000, plus \$.50 per capita (not to exceed \$300,000) per year for the first three years, with smaller grants available for an additional two years after. Although it is unknown how restrictive EGLE will be in its interpretation of the grant program, FLWR activities could be eligible investments.

## Part 4: Roadmap to Reduce Food Waste in Michigan by 50% by 2030

In the earlier sections, the Roadmap introduced food waste as a concern for Michigan and defined the issue (Part 1). It then reported the results of the stakeholder engagement efforts and outlined current levels of awareness, best practice and barriers (Part 2), and presented an analysis of current policy related to food waste in Michigan and its peer states (Part 3). In this final section, the Roadmap will make public policy recommendations that will provide the state the means to reduce food waste by half by 2030.

These recommendations were developed from interviews with industry and community leaders over a six-month period, informed by national research products and reviewed through a series of stakeholder sessions in the summer and fall of 2023. These have been vetted by an advisory council representative of the industries and communities that will be impacted by the actions proposed, with enthusiastic or qualified support. The Roadmap recommendations will be available for comment to solicit interest and inform collective action, but it is unlikely an updated version will be published this year. When necessary, an addendum may be created highlighting progress (or challenges) and updating recommendations accordingly.

The Roadmap makes public policy recommendations in three areas:

- 1. Grants, Technical Assistance and Programs** are actions that can be led by EGLE through grants or programs.
- 2. Agency Leadership and Collaboration** requires coordination or leadership from other agencies in state government, and/or federal or local partners.
- 3. Legislation** would require action from the legislature.

The Roadmap assumes a more substantial investment in time and resources from EGLE and its sister agencies in the state and federal government than what has historically occurred. EGLE should be applauded for initiating this process.

The Roadmap project team, its advisory council, and the stakeholders engaged were universally invested in the growth of this work. EGLE should expect support and allies from industry and local communities, the environmental and charitable food movements, academia and national partner organizations. There will be an external community advocating for food loss and waste reduction to be prioritized, and for the legislature to provide the agency funding appropriate to the need.

## **Community Engagement and Collaboration**

Michigan has an opportunity to take a leadership position among Great Lakes states on food loss and waste, and further demonstrate national leadership on climate and sustainable materials management. The advisory council met to review these recommendations in September 2023. Key findings from the discussion were as follows:

- Michigan must act with a sense of urgency to leverage opportunities created by federal funding to address climate change and the state's new materials management planning mandates. Decisions are being made at this time which could impact its ability to fully invest in food loss and waste reduction, which is paramount to a robust emissions reduction strategy.
- Food waste will not be addressed strictly through environmental regulation or sustainable business practices, but a broad coalition of interests, disciplines, scales, and public and private-sector partners.
- In the first year, assuming limited funding is available, EGLE should prioritize education and movement building, with minimal infrastructure investments, working to create public awareness and build capacity among local organizations.
- Near term efforts should focus on developing industry and community champions to create momentum for food loss and waste reduction actions. Michigan needs FLWR leaders and educators, mutually beneficial partnerships with trusted agencies, and opportunities to celebrate innovative ideas and accomplishments. There is also a need to conceptualize practices in a way that will reach consumers and homes.

### **Recommended Actions: Grants, Technical Assistance and Programs**

**Provide grant support to develop capacity for community and industry engagement, and to conduct educational campaigns on the prevalence of food waste in Michigan and opportunities to reduce emissions, lower household or business expenses, save money, address food insecurity and other outcomes through adoption of prevention strategies or donation of surplus food, including but not limited to date label interpretation and donation liability.**

First-year investments should prioritize publicity and movement building activities that will raise the profile of the issue and encourage buy-in for the 50% Michigan Wasted Food Goal. This will provide resources to organizations most likely to support an ongoing coalition, most willing to share their work and advocate for additional investment, and best prepared to promote new resources and programs to constituents and stakeholders as they become available. It will also leverage existing resources and increase the impact of existing local and national initiatives.

All grants should respect EGLE's Justice40 commitment in spirit and practice through engagement of disadvantaged communities and a commitment to invest 40% of funds into projects serving those communities.

### **Designate the Community Pollution Prevention Fund Grant for Food Loss and Waste Reduction.**

The Roadmap initiative was funded through the Community Pollution Prevention Fund Grant Program. The CP2 grant program provides matching grants to county governments, local health departments, municipalities, and regional planning agencies for endeavors that will further the goal of the program. The goal of CP2 is to promote local P2 initiatives that foster partnerships and advance sustainability. Typically, the maximum grant funding amount per application is \$100,000. Grantees are required to provide matching funds (cash or in-kind) of at least 25 percent of the total project. Grants are paid through a reimbursement process.

The CP2 grant program should fund FLWR exclusively. In addition to providing a designated funding path, this provides allies and advocates an identifiable program for which funding can be increased in subsequent budget years. Unless otherwise noted, it is presumed that grants recommended on the following pages will be made through this program.

### **Increase Community Pollution Prevention Fund Grant.**

Increase the maximum grant amount and total allocation to the Community Pollution Prevention Fund Grant program to a level equal to the need to reduce wasted food in the state by half by 2030.

### **Provide grant support and/or technical assistance to develop local or regional action plans that incorporate food loss waste reduction into climate action plans or to develop pilot projects to advance existing FLWR goals in local climate action plans.**

Local climate plans provide the best opportunity for stakeholder alignment around food waste, leveraging an existing planning infrastructure, stakeholder networks, platform and funding sources. It ensures ownership of food waste reduction within climate programs, while promoting interagency collaboration by ensuring that motivated materials management and food security stakeholders align their interests with climate plans.



### **Technical support and administrative guidance for the inclusion of FLWR in CPRG grants.**

The Roadmap policy review highlights the immediate opportunity that has been created by the Inflation Reduction Act, specifically Climate Pollution Reduction Grants, on page 92. EGLE and private and public-sector allies should provide technical assistance to the three agencies developing Priority Climate Action Plans to ensure inclusion of FLWR, and to municipalities for the development of FLWR initiatives as part of CPRG execution grant applications.

### **Technical support and administrative guidance for the inclusion of FLWR in Part 115 sustainable materials management plans.**

The Roadmap policy review highlights the immediate opportunity that has been created by the Part 115 materials management planning process on page 94. EGLE must provide resources and technical guidance to planning agencies on the voluntary inclusion of FLWR in Materials Management Plans. At minimum, this would include the distribution of a fact sheet or planning guide, formal interpretation on the eligibility of FLWR activities for MMP planning grants, and a presentation from the Roadmap team and/or national expertise partners to the EGLE Materials Management Planning Workgroup.

### **Deploy existing EGLE educational and outreach campaigns in support of FLWR.**

As one example, the ongoing EGLE Recycling Racoons educational campaign could be used for FLWR awareness and education. Content on this matter would be consistent with the tone and style of its current creative direction, and will leverage the existing platform and its performance measurements with limited additional investment. It will also reinforce the value of the campaign, demonstrating extended utility.

### **Support the continuation of the Michigan Food Waste Roadmap initiative through sponsorship of a Michigan Wasted Food Network.**

The initiative project team convened more than 100 stakeholders in the development of this Roadmap. It includes professional associations, leading brands, educational institutions, national experts, nonprofit organizations, and other stakeholders from across the food system. There is enthusiasm for the continuation of this work and support for the establishment of a permanent network that would promote cross-sector collaboration. EGLE should sponsor the continuation of this initiative, in collaboration with other funders, for a minimum of two years. Further, this network or an initiative serving a similar function is necessary to ensure consistency of information and a shared language on key issues.

### **Ensure clear, accessible, and consistent information is available for all stakeholders.**

Stakeholders regularly cited a need to address confusion and misinformation on donation liability, date labeling, tax incentives, characterization and program performance data, and other concerns. There is a need to improve data and availability of information.

### **Host a statewide or Great Lakes regional summit on food waste in 2024.**

Although the Roadmap and food waste will be well represented at EGLE and industry conferences and events in 2024 and 2025, including EGLE's flagship Michigan Sustainability Conference, there currently exists no convening for the diverse community of stakeholders represented in the Roadmap. As there are substantial pockets of activity in Illinois and Ohio, a regional summit could be organized in collaboration with other states and hosted in Michigan. This would attract additional national and global support, while announcing the state's intention to serve as the Midwest hub for food loss and waste reduction.

### **Elevate and celebrate success stories.**

Through any or all of the means highlighted above, successful initiatives or "fail-forward" lessons must be regularly uplifted and communicated. Among other opportunities, this could include case studies, social media campaigns, placement of news stories in media, or an award program.

### **Fund U.S. Food Waste Commitment pilot projects for Michigan businesses.**

This year the Pacific Coast Food Waste Commitment will expand to a national footprint. The program of the Pacific Coast Collaborative is generally considered the nation's proving ground for food loss and waste reduction projects. The program has historically been funded by cap and trade dollars from the California Department of Resources Recycling and Recovery, requiring project partners to have a footprint in California. The expansion of this initiative is an opportunity for Michigan food businesses to co-create impactful solutions with global subject matter experts.

### **Create an EGLE or other State of Michigan staff position to support food loss and waste prevention.**

## **Recommended Actions: Agency Leadership and Collaboration**

### **Create a multi-agency task force or council within the State of Michigan to support industry improvements and ensure funding opportunities are leveraged for improvements in food waste diversion.**

Establish a coordinating council for food loss and waste reduction composed of the various state departments with regulatory authority, programs, personnel and resources, or other means to directly or indirectly influence the reduction of food waste in Michigan. At minimum, this should include representation from one or more divisions of EGLE, Michigan Department of Agriculture and Rural Development, Michigan Department of Health & Human Services, and Michigan Economic



Development Corp. EGLE has several divisions and sections with relevant personnel that should be represented. It is important that food waste does not exist within a silo of the sustainability or recycling units.

**Coordinate efforts with federal and local agencies to ensure flow of knowledge and data, access to funding, collaboration for shared capacity initiatives, and to support champions in local government and partner agencies. Provide support for agencies to collaborate with county health departments, action agencies, food policy councils, colleges and universities, and municipalities on educational programs.**

Either through the direct leadership of EGLE, or in collaboration with external partners such as the network that will soon emerge from the Roadmap initiative process, the coordinating council, public-private network, or a designated agency liaison must ensure meaningful collaboration with the EPA and USDA joint and respective food loss and waste initiatives, especially those active in Region 5. As federal agencies execute educational campaigns or grant programs, Michigan will be well-positioned to collaborate.

This coordinating infrastructure must also serve state and local agencies through electronic newsletters, quarterly meetings, and/or direct correspondence with key stakeholder groups. The Michigan Food Policy Council Network could serve as a regular touchpoint, given its overlap with local organizations advancing public policy for sustainable food systems.

**Through executive order, affirm support for the 50% food loss and waste reduction goal.**

The order will publicly define the parameters of the 50% Michigan Wasted Food Goal as recommended in this Roadmap. It should note the need to improve rescue and recycling capacity, and uplift the work of existing champions.

**Charter a “Michigan Food Waste Council” with representative appointments.**

This council would provide guidance to EGLE and other state agencies working to advance food loss and waste, and establish the issue as a priority for the state government. It would establish a recognizable political center for state agencies, ideally providing infrastructure and capacity for interagency collaboration, including the coordinating council role recommended in the prior section.

**Appoint industry-representative FLWR champions to Michigan councils and commissions.**

Political will for food loss and waste reduction investments will accelerate through the proliferation of champions across stakeholder groups in the state. This can be accelerated through appointments to relevant councils and commissions, or by cultivating champions among current appointees through educational presentations or direct outreach. Table 3.1 is an inventory of nearly three dozen councils and commissions that could have direct or indirect influence on Roadmap objectives.

**Table 3.1 State of Michigan Councils and Commissions Relevant to Food Waste**

<b>Council</b>	<b>Department</b>
Agricultural Preservation Fund Board	Agriculture and Rural Development
Commission on Community Action and Economic Opportunity	Health and Human Services
Council on Climate Solutions	Environment, Great Lakes, and Energy
Detroit Regional Convention Facility Authority	Miscellaneous
Health Endowment Fund Board	Miscellaneous
Farm Produce Insurance Authority	Agriculture and Rural Development
Hispanic/Latino Commission of Michigan	Labor and Economic Opportunity
Large Carnivore Breeding Advisory Committee	Agriculture and Rural Development
Michigan Advisory Council on Environmental Justice (MAC-EJ)	Environment, Great Lakes, and Energy
Michigan Apple Committee	Agriculture and Rural Development
Michigan Asparagus Marketing Advisory Board	Agriculture and Rural Development
Michigan Bean Commission	Agriculture and Rural Development
Michigan Beef Industry Commission	Agriculture and Rural Development
Michigan Blueberry Commission	Agriculture and Rural Development
Michigan Carrot Commission	Agriculture and Rural Development
Michigan Cherry Committee	Agriculture and Rural Development
Michigan Commission of Agriculture and Rural Development	Agriculture and Rural Development
Michigan Community Service Commission	Labor and Economic Opportunity
Michigan Corn Marketing Program Committee	Agriculture and Rural Development
Michigan Craft Beverage Council	Agriculture and Rural Development
Michigan Dairy Market Program Committee	Agriculture and Rural Development
Michigan Natural Resources Commission	Natural Resources (DNR)
Michigan Onion Committee	Agriculture and Rural Development
Michigan Potato Industry Commission	Agriculture and Rural Development
Michigan Public Service Commission	Licensing and Regulatory Affairs
Michigan Soybean Committee	Agriculture and Rural Development
Michigan Tree Fruit Commission	Agriculture and Rural Development
Michigan Wheat Promotion Committee	Agriculture and Rural Development
MI-STEM Council	Labor and Economic Opportunity
Rural Development Fund Board	Agriculture and Rural Development
The Grand Rapids-Kent County Convention/Arena Authority	Miscellaneous
Utility Consumer Participation Board	Licensing and Regulatory Affairs
Wayne County Airport Authority	Miscellaneous

Source: State of Michigan Appointments<sup>113</sup>

### **Update the Michigan Green Communities Challenge to include FLWR.**

The Michigan Green Communities Challenge is the product of the collaboration and partnership of MEDC, EGLE, MDHHS and other state agencies and non-profit partners to advance environmental sustainability in municipal government through prescriptive checklists of sustainability accomplishments. Food waste prevention and food rescue are not included in the protocol (it does promote composting).

For the next available challenge year, EGLE should use its influence to revise the checklist to include FLWR.

### **Require all State of Michigan sustainable business programs to cross-promote FLWR.**

Michigan agencies underwrite several sustainable business campaigns that are regularly engaging with food businesses. These initiatives should be required to cross-promote FLWR educational opportunities and resources that do not enrich competitor programs or conflict with their missions. Example programs include the Michigan Green Communities Challenge, Good for Michigan, and the Michigan Materials Marketplace.

Although the work of some programs are arguably out-of-scope for FLWR, such as the 2030 Districts in Ann Arbor, Detroit and Grand Rapids, and other energy efficiency programs, it is a reasonable expectation for partners to promote FLWR to relevant audiences at a minimal level. State agencies engaging with food businesses should be asked to do the same. Examples would include the Michigan Coastal Management Program, Office of Outdoor Recreation Industry, and MEDC.

### **Through grants and/or technical assistance, promote “zero-waste cafeterias” in K-12 schools.**

School cafeterias are an ideal space to promote FLWR.

## **Recommended Actions: Legislation**

### **Educate legislators on the need to invest in food loss and waste reduction.**

The Roadmap and associated objectives should be presented to relevant House and Senate committees in the Michigan Legislature. This would include some combination of the following:

In addition, ongoing education and/or visits with stakeholders from their districts should be available to all members and their staff.

<b>House</b>	<b>Senate</b>
<ul style="list-style-type: none"><li>• Agriculture</li><li>• EGLE Appropriations Subcommittee</li><li>• MDARD Appropriations Subcommittee</li><li>• HHS Appropriations Subcommittee</li><li>• Natural Resources, Environment, Tourism and Outdoor Recreation</li><li>• Tax Policy</li></ul>	<ul style="list-style-type: none"><li>• Agriculture and Natural Resources Appropriations Subcommittee</li><li>• DHHS Appropriations Subcommittee</li><li>• EGLE Subcommittee</li><li>• Energy and Environment</li><li>• Housing and Human Services</li><li>• Natural Resources and Agriculture</li></ul>

## Prevention: Technology and Infrastructure

Through targeted investments enabled by collaboration and private sector leadership, and favorable policy improvements for local investment in organics management, Michigan could prevent a substantial amount of wasted food from its municipal and commercial waste streams, and retain greater value in the food system. In this section, we will focus exclusively on technology and infrastructure for food loss and waste prevention, such as processing, storage, distribution, and other investments. Recommendations for food rescue and recycling are found in their respective sections in the following pages.

The advisory council met to review these recommendations in September 2023. Key findings from the discussion were as follows:

- During peak years of production, produce is wasted on Michigan farms due to unmet infrastructure needs, such as climate-controlled storage, and meat and produce are wasted due to shortages in processing or logistical capacity.
- Already a leader in logistics, agriculture and sustainable business, Michigan has an opportunity to emerge as a national leader in the development of food waste prevention innovation through investments in optimized handling and routing technology, demand planning and measurement, and acceleration of entrepreneurial ideas.
- There are already technology applications delivering substantial and well-documented impacts for Michigan food businesses.
- There is substantial opportunity to leverage existing funding mechanisms from other state and federal agencies, especially the Michigan Department of Agriculture and Rural Development.
- Availability of workers is a contributing factor to food loss, especially on farms, and there are opportunities for infrastructure improvements to alleviate labor shortages.
- Certain specialty crops can also be impacted by dumping of cheap imports into domestic markets (asparagus, tart cherries, in particular).

### Recommended Actions: Grants, Technical Assistance and Programs

#### **Create a grant program to underwrite the cost of wasted food technology applications and associated appliances for food businesses in Michigan.**

Retailers and food-service operations have reduced loss and created savings through investments in products such as Flashfood and Leanpath that are not readily accessible to small or medium-sized businesses (e.g.: Flashfood) or to campuses and enterprises with institutional resistance to funding efficiency programs (e.g: Leanpath).

This does not appear to be a tidy fit with current grant programs, but precedence does exist for EGLE and its sister agencies to underwrite such investments. If a non-profit organization or industry association were to administer a program, it could be funded through the Community Pollution Prevention Grant program.

#### **Commission an assessment of regional and/or industry capacity gaps for climate-controlled storage, and pending analysis, dedicate a grant program to fund initiatives that explicitly focus on temperature-controlled food distribution and storage infrastructure.**

Information to reliably quantify the need for climate or temperature-controlled food distribution and storage infrastructure is not readily available. However, stakeholders have frequently indicated that there is an unmet need for refrigeration warehouses, climate-controlled transportation options, cold-chain tracking, and similar infrastructure.

Further, it is unclear whether public assistance to fund this infrastructure should be the purview of EGLE or MDARD.

**Clarify to applicable planning agencies whether FLWR qualifies for Part 115 sustainable materials management execution grants.**

Communities may have an interest in supporting infrastructure or technology applications.

**Provide financial support for infrastructure investments for food storage equipment and transportation, and pilot projects. Provide seed funding for national programs.**

Grants for infrastructure improvements and pilot projects could be made through the Community Pollution Prevention Grant Program. Potential investments could include solar refrigerated trucks that can be parked and moved easily to provide additional capacity for donation organizations, food hub facilities that receive surplus and determine the best channel based on its condition/specs (processing, donation, upcycling); on-farm or near-farm cooler storage to take bumper/surplus and provide flexibility to then (like a food hub) determine the best channel for growers. Many additional solutions can be found in Part 2.

**Execute an educational and engagement campaign to make food businesses aware of the potential for technology applications and infrastructure improvements to reduce loss and waste, and to maximize profits.**

Stakeholder engagement efforts suggest that food businesses in all segments underestimate the opportunity to reduce loss and waste in their operations. These organizations are less likely to be aware of potential benefits from new technology and investments in the tools outlined in the respective stakeholder engagement sections of this report. Based on current findings, there should be a near-term emphasis on developing prospects for technology and infrastructure investments than on awarding grants.

In a similar vein, EGLE should work with private or public-sector programs such as NextCycle Michigan, Seamless at Start Garden, Centrepolis Accelerator, Pure Michigan Business Connect, Michigan Sustainable Business Forum and other sustainable business and technology advocates and accelerators to spotlight best practices, new innovations and applications, startups and case studies from around the state, country and globe, to ensure that Michigan food businesses are aware of available opportunities.

**Increase participation of food loss and waste projects in NextCycle Michigan.**

NextCycle Michigan has successfully supported wasted food prevention, food rescue, and organics recycling initiatives, providing needed technical support and advancing readiness for funding from public and private sources, including EGLE grants.

**Recommended Actions: Agency Leadership and Collaboration**

**Publish and regularly update an inventory of grant programs that could be leveraged for food loss and waste infrastructure investments across state and federal agencies, including the expansion of processing capacity, temperature-controlled storage, or site-specific equipment and technology upgrades.**

MDARD and the USDA have grant programs currently available to support increased processing and climate-controlled storage capacity, as well as other FLWR initiatives. For example, the Value-Added & Regional Food Systems Grant is a matching grant that provides up to \$100,000 annually to support processing infrastructure and food systems development.

**Create development or business retention positions within MDARD and MEDC respectively to seek opportunities for investment among food businesses, deploying available job creation incentives to spur FLWR investment.**

MDARD and MEDC are well-prepared to support farms and manufacturing businesses through

incentive programs for facility expansion. Personnel should be designated at both agencies to seek opportunities within their respective networks.

**Increase Value-Added & Regional Food Systems Grant and decrease match requirements.**

The Value-Added & Regional Food Systems Grant is a matching grant that provides up to \$100,000 annually to support processing infrastructure and food systems development. The amount and total funding for this grant should be increased, and match requirements eliminated to improve access to small farms and businesses. This recommendation was also included in the final report of the Michigan Food Security Council in 2022.

**Provide grants and technical support to improve housing and transportation for H2A migrant farmworkers.**

Farmworker labor shortages have been frequently highlighted by farms as a reason crops have not been harvested over the past decade, either due to availability of H2A farmworkers or the rising hourly cost of workers. Grants to improve housing and transportation infrastructure could lower the costs of labor while providing a social benefit.

**Support efforts to improve the marketing of Michigan agricultural products and to improve reliability and utility of commodity data.**

As the majority of surplus food on Michigan farms is not harvested, any effort to increase the marketability of Michigan agricultural products would be beneficial to the Michigan Wasted Food Goal. Further, engagement efforts have suggested that Michigan farms will find the means to harvest crops that can be profitably sold. Farms requested education and more predictive tools and technologies to better anticipate market demands.

**Recommended Actions: Legislation**

**Create a funding mechanism for infrastructure investments that advance wasted food prevention.**

EGLE and MDARD both have grant programs that could be utilized to support infrastructure investments with limited or no statutory changes. The Community Pollution Prevention Fund Grant and the Value Added & Regional Food Systems Grant should be increased to a level appropriate to reduction of wasted food in the state by half.

**Allow undocumented migrants and immigrants to obtain driver's licenses.**

With reliable transportation, undocumented immigrants will be able to secure better jobs, work more hours, and travel farther to meet employers' labor needs. This will increase productivity of Michigan farms and reduce loss to unharvested food. Legislation was introduced previously in 2021.

## **Prevention: Technical Assistance, Practice Improvements and Employee Training**

Michigan businesses, institutions and local governments can decrease the prevalence of wasted food in the food system through improvements in business practices and procedures, employee training, and public policy, with limited investment in capital improvements. To capture this opportunity, organizations require onsite or remote direct technical assistance, educational programs, and networks for peer learning and partner identification.

The advisory council met to review these recommendations in August 2023. Key findings from the discussion were as follows:

- Michigan has long provided successful pollution prevention and environmental conservation technical assistance to farms, manufacturers and commercial businesses.
- Although many businesses now have sustainability initiatives, they generally lack the time or know-how to valorize food loss prevention solutions.
- Data collection was highlighted as a top priority among all stakeholders.
- Technical assistance is needed to deploy new technology applications (such as food waste tracking software) or practice improvements such as demand planning and measurement methods.
- Employee engagement and training improves employee satisfaction while reducing food loss and waste.

### **Recommended Actions: Grants, Technical Assistance and Programs**

**Grant support and technical assistance for data collection and characterization of surplus food supplies and food scraps within industry sectors and local communities, and/or promotion of standardized metrics for food waste.**

Industry stakeholders engaged through our efforts have consistently highlighted measurement as a key barrier in creating or meeting food waste reduction targets. These findings are consistent with recommendations from national groups. This would also incentivize investment from national organizations in Michigan partners and collaborations.

Potential grants could include:

- Engagement with industry associations or coalitions to develop food waste data collection initiatives, or support trials of data management tools, such as the REFED Insights Engine or LeanPath.
- Development and promotion of guidelines for metrics in Michigan grocery stores, restaurants, institutional food service (e.g.: hotels, casinos), schools, food processors, farms, or municipal governments.
- Support for food waste audits for local businesses or municipalities.

### **Develop a voluntary incentive for food businesses to measure wasted food.**

Food businesses need incentive to overcome barriers to the implementation of tracking technology and processes. EGLE could incentivize participation through an awards program or direct technical support coupled with grants, or discounted access to technology solutions such as Leanpath.

**Grants to provide technical assistance and develop resources for food businesses and local communities to advance food waste prevention initiatives and improve access to secondary markets and donation channels for surplus food.**

Although EGLE has a number of existing technical support contracts (e.g.: NextCycle, RESTART, MSU Extension, Michigan Materials Marketplace) that could be used to meet some of these needs, there are substantial opportunities for additional approaches and entrants that can supplement existing programs with offerings catered to specific verticals, communities, and/or with unique expertise. Further, this will provide an opportunity for programs that have demonstrated effectiveness to scale, such as The PLEDGE on Food Waste(TM).

Manufacturing stakeholders specifically requested technical assistance for line improvements or byproduct solution development and valorization.

### **Leverage investments in existing technical support programs, coupling objectives with other programs currently or potentially facing food businesses. Seed new programs.**

Ensure that NextCycle, RESTART, MSU Extension, Materials Marketplace and other existing and new technical support contracts are supporting FLWR. Expand scope of the Michigan Materials Management Gap Analysis (NextCycle) to include food rescue operations and encourage counties to incorporate food rescue into Part 115 planning requirements as part of EGLE guidance documents. Through grants or new contracts, support additional technical assistance.

### **Couple grant offerings with on-site technical assistance programs.**

Grants for infrastructure, technology investment or pilot projects should be streamlined to support the execution of recommendations from on-site technical assistance programs.

## **Recommended Actions: Agency Leadership and Collaboration**

### **Require applicants to MDARD Food Safety Training and Education Grants to include consideration for food donation or share tables in their proposals.**

The Food Safety Education Fund grants program is funded through assessments of \$3 to \$5 from each licensed Michigan food establishment to provide food safety training and education to consumers; and training and education to food service establishment employees and agents who enforce Michigan's food regulations (i.e., local health department sanitarians and MDARD food safety inspectors).

Listing one additional item on the published selection criteria would encourage programs to include applicable information on food donation liability and/or share tables in the conferences, workshops and other educational events and training sponsored through this grant program. These programs serve key influencers on food donation liability.

### **Encourage or require certification, credential and license programs facing food businesses to provide applicable information on food loss and waste prevention.**

Although a complete inventory is not available at this time, Michigan departments or their agents (e.g.: conservation districts, third-party trainers), provide a variety of certification and credentials to food businesses in the state. Programs such as the Michigan Agriculture Environmental Assurance Program (MAEAP), Certified Food Manager/ServSafe programs, and licensed compost facility permits could be encouraged to incorporate a brief module on food loss and waste reduction into credential curriculum or certification requirements.

## **Recommended Actions: Legislation**

No recommendations for legislative action.

## **Prevention: Date Labeling and Packaging**

Food packaging can have a tremendous impact on food waste, especially later in the supply chain. Date labels are a particular concern, and may prove a low-hanging fruit opportunity to improve public policy in the state in collaboration with industry. The advisory council met to review these recommendations in August 2023. Key findings from the discussion were as follows:

- Packaging is an under-utilized solution that could significantly reduce food waste.
- Additional data is needed to demonstrate how packaging prevents food waste.
- Collaboration between industry and government will be key to preventing waste.
- Date label confusion and misinformation is a well-documented vector for food waste.
- Date labels primarily communicate quality and provide stores an indicator for when to rotate stock; it is not necessarily a safety measure.
- Food businesses currently discard wholesome food that could have been channeled to the secondary market or donated to feed hungry people if date label language was standardized statewide.

Actions relevant to date labels that have been recommended and described in prior sections are not included in the list below.

### **Recommended Actions: Grants, Technical Assistance and Programs**

**Launch education campaigns and guidance documents that promote consumer awareness and education on the meaning of date labels, and provide support for food businesses to improve standardization of date labels.**

Consumers believe the dates indicate safety, and report throwing away food past the date. Date labels with common and clear language can help consumers avoid throwing away safe edible food at home. Education has been proven to lower discards dramatically.

**Provide grants for pilot projects to manufacturers, retailers, producers to implement new packaging, labeling standards and processes.**

Food businesses are more likely to invest in date labeling improvements with an incentive to do so.

**Fund industry and/or university efforts to make Michigan a center of excellence for food production standards, including the development of packaging to extend the life of food.**

The packaging industry has multiple industry clusters in the state of Michigan, and a strong academic ecosystem supporting that industry. Research institutions and champions within the state's packaging schools should be recruited to support FLWR practice development.

### **Recommended Actions: Agency Leadership and Collaboration**

**Establish guidelines explicitly allowing the donation or freezing of food after a quality-based date.**

MDARD should develop and publish guidelines to this effect.

### **Recommended Actions: Legislation**

**Amend Michigan law and/or its interpretation to differentiate between quality and safety labels, and provide further clarity and standardization on required labels.**

As detailed in the policy review on Page 88, implementing statewide standards would have a substantial impact on food loss and waste in Michigan. Updates to date labeling policy should be aligned with federal guidance. According to Ohio State University, pushing back the date by one day cuts discards by half.<sup>14</sup>

## Prevention: Promote Secondary Markets

Upcycling and strategies to market surplus food and food byproducts are an opportunity for Michigan to retain economic value in the food system, promoting a circular economy built around innovation and waste prevention. The advisory council met to review these recommendations in July 2023. Key findings from the discussion were as follows:

- Michigan can reduce surplus food through the creation of dedicated markets to sell discounted food or groceries sourced directly from food producers, manufacturers, or retailers.
- Secondary markets help increase value chain resilience, keep materials in use longer, and help direct food toward those who need it most.
- Support should identify channels for food surplus, examine best practices for measurement and transport of food, analyze price impact concerns, and discuss education and communication tools for industry sectors and the public.
- Michigan can support upcycling initiatives by providing funding for storage resources that manufacturers and producers often lack.

Actions relevant to secondary markets that have been recommended and described in prior sections are not included in the list below.

### Recommended Actions: Grants, Technical Assistance and Programs

**Provide technical assistance, grant support and shared resources to manufacturers for research and development of upcycled product lines, or to support participation in upcycling by food businesses lacking storage space, expertise, or other resources.**

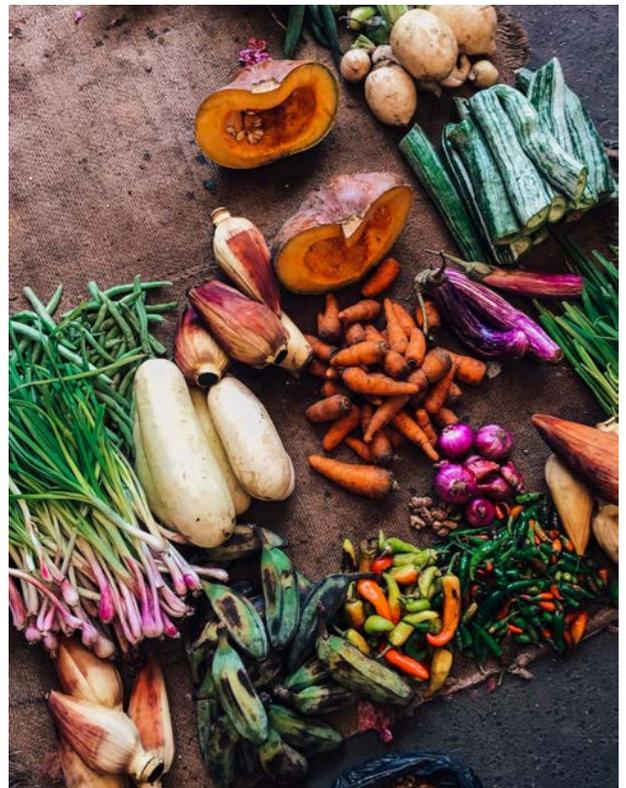
Stakeholder engagement has highlighted R&D and storage as key barriers to participation in upcycling initiatives. Grants or loans could also encourage retailers to expand imperfect and surplus produce sales to lower-income neighborhoods with less access to fresh foods.

**Provide grants to non-profit organizations and schools to develop upcycling demonstration projects and pilot programs.**

Investment in upcycling initiatives will raise awareness and engagement for FLWR and potentially innovative new program models. It will also allow charitable food organizations to use byproducts and ingredients in service of their missions.

**Expand the Michigan Materials Marketplace program to include surplus food from farms, manufacturers, restaurants, retail, and other food businesses, and provide concierge support to solution providers, animal farms, food banks, rescues and other agencies seeking new supply sources.**

Stakeholders across all sectors frequently cited information and network gaps as a barrier to solution adoption. A matchmaking service or application was requested. Michigan Materials Marketplace could serve this need.



## **Recommended Actions: Agency Leadership and Collaboration**

**Identify opportunities for surplus food and byproducts through MDARD's International Marketing Program, expanding the value of Michigan's exported food and agriculture products.**

Michigan exported \$335 million of brewing waste and animal feed in 2022<sup>15</sup> Stakeholder engagement efforts highlighted the importance of the international market for less marketable cuts and commodities.

## **Recommended Actions: Legislation**

**Continue funding Michigan Agricultural Surplus System (MASS) at \$20 million or above, while maintaining focus on "seconds" that could not be marketed through normal channels.**

A recommendation of the Michigan Food Security Council and a sizable number of stakeholders engaged, MASS funding allows food banks to purchase surplus local food and agricultural products.

## **Rescue: Increasing Donations**

Through improvements in matchmaking and logistics, clear communication on liability protections and tax incentives, and increased funding for grant programs and technical support, Michigan could promote higher-value use of edible surplus food through donation programs. The advisory council met to review these recommendations in July 2023. Key findings from the discussion were as follows:

- Improving understanding of liability protection for food donation is a low-cost means to reduce barriers for the donation of surplus food.
- On the federal level, the Bill Emerson Good Samaritan Food Donation Act provides comprehensive liability protections for food donors and recipient nonprofit organizations. The law was strengthened through the Food Donation Improvement Act of 2022. Michigan law provided additional, though limited, protections.
- Although food security is among the state's most-resourced public benefit activities, there are targeted investment opportunities to improve rescue and recovery, address logistical barriers, or extend the shelf life of donated product.
- There are opportunities to reduce barriers to donation through regulatory tweaks, new tax credits and other levers likely to receive bipartisan support.

### **Recommended Actions: Grants, Technical Assistance and Programs**

**Provide financial support for educational campaigns on donation liability, infrastructure investments for food storage equipment and refrigeration capacity, transportation and vehicles, and pilot projects.**

The results of the Roadmap's stakeholder engagement campaign demonstrated an interest from every industry sector in technical support and/or infrastructure investments to improve food rescue and make donation of surplus food practical for businesses. Food donation can be costly and difficult, but there is a stated interest among businesses to donate surplus food that is otherwise safe to eat.

**Conduct further research on the potential for the charitable food organizations to positively impact food loss and waste reduction.**

The Food Rescue section on Page 69 highlighted several potential areas of interest for assessment of the charitable food system in the state and its potential contributions to food loss and waste reduction. Additional research is necessary to test this Roadmap's estimate that capacity to receive and distribute donated food must double for rescue efforts to contribute to the Michigan Wasted Food Goal.

**Leveraging infrastructure created by Sacred Spaces Clean Energy Grant program, mobilize food pantries housed in congregations to improve efficiencies and invest in storage and refrigeration capacity through targeted grants.**

The Sacred Spaces collaboration was developed as a means to fund energy efficiency improvements for houses of worship, most of which have a charitable food component. With additional funds deployed through the same network, EGLE could potentially mobilize food pantries to expand efforts and incorporate best practices.

## **Recommended Actions: Agency Leadership and Collaboration**

**Execute an aggressive, multi-agency effort to educate businesses and the general public on liability protections and food safety for food donations and share tables: Require training for health inspectors on liability protection. Require county health departments to include information on food donation on their web sites and as leave-behind materials during inspections and educational events. Require local health departments to publish clear guidance on share tables.**

A specific section on the MDARD or MDHHS websites, with connecting links from other departments, should include all relevant safety rules and an outline of liability protections. It should provide guidance documents and require training for health inspectors. Guidelines should explicitly outline what foods may not be donated, and in what scenarios.

If current statute does not permit this level of clarity, the law must be amended to do so.

## **Recommended Actions: Legislation**

**Amend law to explicitly provide permission to donate after the quality-based date, and potentially, provide reasonable liability protections for doing so. Clarify law (eg: Food Safety Modernization Act) to indicate what foods can and can not be donated, and to execute recommendations in the section above that are not permissible by current law.**

See above.

**Establish a Michigan tax credit for donation of surplus food and associated costs. Ensure that this is structured as a tax credit (versus a deduction) with no more than a reasonable limit, and that it is based on fair market value. Offer additional tax credits for transportation and processing costs**

Stakeholders predominantly indicated that the federal tax incentives for donation were not worth the effort to apply. The federal government offers tax deductions for food donations, but a deduction may not be a sufficient incentive as it generally favors large, wealthy producers. State level tax incentives are a cost-effective tool to encourage food donation and expand the reach of existing federal deductions.

The Harvard Food Law and Policy Clinic provided the Roadmap an analysis on how best to structure a tax incentive for Michigan. This is in addition to the policy review on Page 90, and excerpted on the following page.

### A Michigan Tax Credit for Donations<sup>17</sup>

Michigan currently does not have a state-level food donation tax incentive. However, the state has a relatively large agricultural output, with agriculture contributing \$104.7 billion to the economy annually. Farmers and food producers across the state would likely benefit from a tax incentive offsetting their food donation costs. Michigan can take advantage of this opportunity to increase food donation across the state by implementing a tax incentive for food donation that includes the following best practices:

- **Structure as a tax credit (rather than a deduction):** A tax credit is a dollar-for-dollar reduction in tax burden, regardless of tax bracket. Deductions, on the other hand, reduce taxable income, which is then used to determine taxes owed. A deduction provides little or no benefit to low-margin businesses, which have less income and fall into lower tax brackets. Many farms and food retailers fall into lower brackets, so a tax credit is a more effective way to tailor the policy to their needs.
- **Tailor the tax incentive to meet Michigan's needs:** State tax incentives can vary significantly in terms of the types of foods covered and the entities eligible to claim the incentives.
- **Place only reasonable limits on the amount of tax incentives each year:** Michigan may limit the size of its tax incentives by setting a limit on the percentage of the value of the donated food that can be claimed or setting a cap on the annual amount that can be claimed by a business. Michigan should consider its fiscal situation when creating a tax incentive, but limits should be reasonable to ensure that the tax incentive is effective at encouraging more donations.
- **Base credit value on fair market value:** The basis value of food is the business's cost of producing or acquiring food. The fair market value of food is both more generous and easier to calculate than basis value.
- **Permit tax incentives when end recipients pay for food:** Some food banks and non-profit organizations charge end users a small fee for food to cover handling costs. Michigan should still allow tax incentives to cover donations in these cases. This will promote the reach of the tax incentive, to ensure that even those organizations who must charge a nominal fee to offset food recovery costs can still benefit.
- **Offer an additional tax credit for transportation and processing costs:** Another significant barrier to food donation is transporting the food. To create the most effective tax incentive, state tax credits should specifically target transportation costs in addition to covering the value of the food.

## **Big Bold Actions to Reduce Wasted Food by 50%**

The Roadmap will end here with an idea that may invite debate, but has been generally or reluctantly supported by the more than 100 stakeholders engaged through this initiative, its advisory council, and extensive secondary research.

### **Ban disposal of surplus food and food scraps in municipal and industrial solid waste through a phased approach.**

For Michigan to achieve its goals, and keep pace with the nation, a regulatory barrier to the disposal of surplus food and food scraps in municipal and or industrial solid waste will likely be necessary, and we should begin evaluating how to implement such a strategy in a phased approach supported by several years (perhaps 10 or more) of investment in education and infrastructure.

Fewer than 10 percent of the facilities currently accepting organic material for processing accept food waste. The practical economic challenges, regulatory requirements, and lower demand from constituents for recycling food waste have made it a less attractive investment for local communities than other recycling opportunities.

Five states have passed laws to keep food out of landfills (California, Connecticut, Massachusetts, Rhode Island, and Vermont). This may prove necessary for Michigan to reduce food waste in half. Approximately 96 percent of yard waste is currently recovered for recycling in some form, demonstrating the success of Michigan's yard waste landfill ban in promoting yard waste collection and diversion.

The scientific case is strong: While total methane emissions from MSW landfills are decreasing due to improvements in landfill gas collection systems, methane emissions from landfilled food waste are increasing. Because food waste decays relatively quickly, its emissions often occur before landfill gas collection systems are installed or expanded. An estimated 61 percent of methane generated by landfilled food waste is not captured by landfill gas collection systems and is released to the atmosphere.<sup>116</sup>

States and localities with food waste bans in place are seeing some of the highest market penetration for solutions and diversion activity, along with private investment at all levels of the wasted food scale to support the bans. Massachusetts and Connecticut deployed these strategies: When the bans took effect there was little to no resistance from the regulated community because much of the industry was already taking at least some action on the topic.

The strategies highlighted in this Roadmap will increase activity and prepare the state for a phased approach to a landfill ban on wasted food, if it were to eventually enact such a law.

## Glossary

**Anaerobic digestion (AD):** A series of biological processes in which microorganisms break down biodegradable material in the absence of oxygen resulting in two end products: biogas and digestate.

**Charitable food system/emergency food system:** Places where people can obtain groceries and other food at no or little cost.

**Commercial Composting:** Compost service that picks up municipal solid waste from business and residential customers and processes at a composting facility.

**Composting Facility:** A facility where composting occurs (House Bill 4454 2022).

**Compostable Products:** Utensils, food service containers, and other packaging and products that are certified by the Biodegradable Products Institute, or an equivalent recognized third-party verification body.

**Consumer-facing businesses:** Retail grocers, restaurants, foodservice providers, and institutions. Distributors are also added to this category for this report.

**Diversion:** The process of diverting food waste from landfills or farmland tillage for a higher value and more productive purpose, like prevention, recovery, animal feed, or composting.

**Economic Value:** The annual aggregate financial benefits to society (consumers, businesses, governments, and other stakeholders) of a solution minus the costs.

**Food loss:** Generally refers to unintended loss of food during harvesting, post-harvest handling, processing, and distribution; included as part of “food waste” as defined in this report.

**Food rescue organization:** An organization that seeks to alleviate hunger through the distribution of recovered food.

**Food scraps:** Generally used to refer to food that is no longer fit for human consumption

**Food waste:** Food grown and produced for human consumption but not eaten. This includes food still safe to eat — surplus, damaged, or expired — as well as unavoidable waste, such as bones or rinds.

**Institutions:** Hospitals, schools, prisons, government buildings, and military bases.

**Landfill:** A place to dispose of refuse and other waste material by burying it and covering it with soil; as used in this report, also includes incineration.

**Meals recovered:** Wasted food recovered for human consumption, using a conversion of one meal equal to 1.2 pounds.

**Municipal Solid Waste (MSW):** MSW refers to household waste, commercial waste, waste generated by other nonindustrial locations, waste with characteristics similar to that generated at a household or commercial business, or any combination thereof. MSW does not include municipal wastewater treatment sludges, industrial process wastes, automobile bodies, combustion ash, or construction and demolition debris (Act 451 1994).

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