Developing a Sustainability Roadmap for Food Service Businesses

A project submitted in fulfillment of the requirements for the Master of Science degree at the University of Michigan School for Environment and Sustainability.

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Authors:

Sarah Bibb, *School for Environment and Sustainability*

Maithilee Kanthi, *School for Environment and Sustainability and Stephen M. Ross School of Business*

Yaorong Liu, *School for Environment and Sustainability*

Miriam Megdal, *School for Environment and Sustainability*

Annika Smuts, *School for Environment and Sustainability*

Aslan Zhou, *School for Environment and Sustainability*

Advisor:

Dr. Geoffrey Lewis, *Center for Sustainable Systems*

Clients:

Jan Culbertson, *Ann Arbor/Washtenaw 2030 District*

Lissa Spitz, *Ann Arbor/Washtenaw 2030 District*

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Abstract

This project examines the barriers to implementing sustainability for food service businesses in Ann Arbor, Michigan. Data were collected in two stages: first, a survey sent out to the entire restaurant community in the city, and second, follow-up interviews with survey respondents. These two stages informed the development of a comprehensive sustainability roadmap that includes baseline knowledge modules for restaurant owners, a frequently asked question document, and a daily operations and long-term goals checklist for staff and management.

We found that time and money are the largest barriers to implementing sustainable practices for restaurant owners. Restaurant owners emphasized that they need resources to change their current operations. A commonality between the survey and interviews was an interest in becoming more energy efficient and procuring food sustainably. Data were examined in key categories affecting food service: energy efficiency, food procurement, water use, waste reduction, and employee education.

This roadmap provides the Ann Arbor/Washtenaw 2030 District to share comprehensive resources with existing and new restaurants at any point in their sustainability journey that can assist them in working towards a broader goal of county-wide decarbonization.

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Introduction

This project develops a roadmap for Ann Arbor's food service business owners to reduce their energy use, conserve water, source their food more locally, reduce waste from their operations, and involve their employees in implementing sustainability goals. Our project is conducted in cooperation with the Ann Arbor/Washtenaw 2030 District, the City of Ann Arbor's Sustainable Food Business Coalition, and in alignment with A^2ZERO, the City of Ann Arbor's plan for achieving a just transition to community-wide carbon neutrality by 2030 (*The A2 Zero Carbon Neutrality Plan*, n.d.). Our roadmap has been informed by stakeholder engagement with select food service business owners and managers as well as subject matter experts and local leaders in food procurement, waste reduction, and employee engagement.

About the Ann Arbor/Washtenaw 2030 District and the City of Ann Arbor's Office of Sustainability and Innovation

Our client for this project was the Ann Arbor/Washtenaw 2030 District (hereafter referred to as "the District")—a local chapter of the national 2030 Districts Network. The District's mission is "to reduce building related greenhouse gas emissions by 50-65% by 2030 and [eliminate] emissions by 2040 while increasing Washtenaw County's competitiveness in the business environment and increasing owners' return on investment" (*About Us*, n.d.). The District has worked closely with the City of Ann Arbor's Office of Sustainability and Innovation (OSI) to help advance the A2Zero Plan because of the alignment in mission between the two.

The City of Ann Arbor's OSI is actively implementing the A2ZERO Plan by, for example, installing solar panels, electrifying city vehicles, and launching community programs aimed at building community resilience and behavior change (Kellog, 2024).

In the food service industry, the plan acts through the Ann Arbor Area Sustainable Food Business Coalition. This network of businesses and community organizations works together to advance sustainability throughout the food system. The SFBC, facilitated by the OSI, provides a platform for food businesses to share ideas, best practices, and feedback on sustainability

initiatives. Members of the coalition, which includes restaurant owners, chefs, farmers, and grocers, meet quarterly to discuss sustainable food initiatives and align their practices with the A2ZERO goals. The coalition encourages businesses to reduce food and packaging waste, improve energy efficiency, source ingredients locally, and increase plant-based menu offerings (Markgraf, n.d.).

The District focuses largely on building energy use, with dedicated programs for houses of worship, multifamily residences, municipal buildings, and food service establishments (*About Us*, n.d.). They also offer technical support for solar installations and provide free building energy audits for their members. Their close partnership with OSI allowed the Operations Lead of the District to learn about the development of the Sustainable Food Business Coalition in the fall of 2023. As a result, the District proposed a SEAS Capstone project to support this coalition. This initiative allows the Ann Arbor/Washtenaw 2030 District to expand its focus beyond energy and the built environment to include sustainability in the food service industry and help bring the City closer to its 2030 goals by targeting a high-waste, energy intensive industry.

Past Ann Arbor/Washtenaw 2030 District Projects

The District and SEAS have collaborated on four projects addressing the goals of the 2030 Districts Network. Previous work includes: establishing water use intensity baselines, crucial for the District's goal of reducing water and energy use by 50% by 2030 (Johnson-Lane, 2021); a transportation greenhouse gas emissions baseline for Ann Arbor, considering pre- and post-pandemic differences (Fields et al., 2021); a tenant engagement toolkit for conserving electricity, energy, and water in multifamily rentals (Eis, 2022); and an energy efficiency toolkit guiding officials from cities, villages, and townships in Washtenaw County to reduce energy use in municipal buildings (Corwin et al., 2024).

Definition of Sustainability

Sustainability, in the context of this project, means efforts that can help Ann Arbor reach its carbon-neutrality by 2030 goal through reducing emissions and waste, as well as efforts that promote the resilience of our community. Our project specifically addresses the areas of energy

efficiency, water conservation, waste reduction, food procurement, and employee engagement in order to achieve these goals.

Overview of Restaurant Sustainability

The restaurant industry is environmentally demanding, generating substantial food and packaging waste while using significant amounts of energy and water (Madanguli et al., 2022). In the United States, restaurants throw away approximately 390,000 tons of edible food annually and use up to four times more energy than other commercial buildings on average (Madanguli et al., 2022; EPA, 2012). These inefficiencies contribute to high utility costs and waste production, prompting restaurant owners to explore innovative ways to reduce operational expenses while promoting sustainable practices within the restaurant industry.

Sustainability in the restaurant and bar industry is multifaceted, encompassing strategies focused on food sourcing, energy and water conservation, managing waste effectively, building design and operation, and embedded sustainability through employee behavior and supply chains. Many businesses have already made improvements, such as integrating energy-efficient appliances, implementing donation and composting programs to address food waste, and expanding plant-based menu options (Madanguli et al., 2022; Prasanna et al., 2024).

Challenges remain, especially for smaller establishments. High upfront costs, limited awareness, and a lack of resources often hinder progress, but the growing customer demand for environmentally conscious practices is driving industry-wide change (Cantele and Cassia, 2020). Resources such as the EPA's Energy Star program, the National Restaurant Association, and certifications from organizations like the Green Restaurant Association provide valuable tools and guidance (Green Restaurant Association, n.d.; National Restaurant Association, n.d.; Energy Star, n.d.). Local initiatives, such as Ann Arbor's A2ZERO program, also offer tailored support for businesses aiming to enhance their sustainability efforts.

Restaurants that have implemented sustainable practices have seen many benefits, including higher rates of customer and employee satisfaction as well as increased competitiveness in the industry (Cantele and Cassia, 2020). Customers' buying decisions are influenced by restaurants'

sustainability initiatives (Voicu, 2022). Forty-nine percent of customers say that biodegradable food packaging influences their restaurant preferences, and 54% of customers take into account if a restaurant is working to reduce food waste when choosing where to eat (Voicu, 2022). Customers are increasingly dining at more sustainably-managed restaurants, and younger generations are willing to pay more to support sustainable businesses (Voicu, 2022) - 27% of Gen Z and Millennial customers are "more likely to purchase from a brand that cares about its impact" (Kiesel, 2024). Younger generations are also dining out more frequently—with 71% of Gen Z and 68% of Millenials planning to eat out more in 2025 than in 2024—so it is imperative that restaurants respond to these trends in order to remain competitive (Industry News, 2024).

Implementing sustainable practices in restaurants can be difficult. Many restaurant owners cite lack of knowledge, resources, and time as major barriers to adoption of more sustainable strategies. Increasingly, restaurant owners are supportive of these strategies, but they are apprehensive about spending to implement them, and fully reject implementation if the cost is too high (Kasim and Ismail, 2012). Half of restaurant owners do not believe that being more sustainable will financially benefit them in the long run (Kasim and Ismail, 2012). The higher upfront costs of purchasing Energy Star and WaterSense equipment is a major deterrent for small businesses; restaurant owners are concerned the return on investment "will produce the desired results in time" given the small operating margins of the industry (Kasim and Ismail, 2012). In order to uplift small businesses and offset the burden of the initial investment in sustainability, local governments can provide tax incentives or assistance.

Literature Review

To get a comprehensive view of daily operations in restaurants and bars, we are focusing on water use, energy efficiency, food procurement, employee education, and waste management. All of these areas are intertwined and restaurants may find it difficult to implement more sustainable practices in multiple areas, so we are presenting them separately for clarity.

Water Use

Water conservation is critical to the decarbonization efforts of Ann Arbor restaurants and bars. Although Michigan is known for its abundant water resources, the importance of water conservation goes beyond scarcity. Effective water management helps reduce energy consumption because the energy used to heat and treat water is less, supporting efforts to reduce carbon footprints (Saiful and Noranai, 2024). This aligns with broader environmental goals and increases awareness of sustainability among the community and customers.
Restaurants and bars can adopt similar water conservation practices to those used in hotels, which use a lot of water in daily operations for laundry and food preparation (Deng, S.-M., & Burnett, J., 2002). Implementing technologies such as low-flow faucets and toilets and WaterSense labeled products can not only reduce water usage, but also reduce associated energy costs (Barberán et al., 2013). These interventions are particularly effective in commercial kitchens, where optimized water heating systems can improve energy and water efficiency.

Studies have demonstrated the shift toward water conservation strategies that have both environmental and economic benefits. For example, adding filtration systems to water supplies can reduce reliance on bottled water, which is consistent with sustainable development preferences and can bring economic advantages (Anguera-Torrell, O., & Arrieta-Valle, A. E., 2022). In addition, a study of Brazilian university cafeteria menus showed that vegetarian diets significantly reduced environmental impact, highlighting the potential for menu adjustments to help save water (Hathi Athanassiadou et al., 2019).

Energy Use

There is a growing trend across the food service industry towards more sustainable practices that also align with restaurant owners' need for profitability. The restaurant industry is among the most energy intensive sectors in the United States (EPA, 2012). Food service buildings are nearly four times more energy-intensive than commercial buildings on average, and use five to seven times more energy per square foot than other commercial buildings, such as office buildings and retail stores (EPA, 2012). Quick-service restaurants use up to ten times more energy per square foot than other commercial buildings (EIA, 2018; EPA, 2012). To address this high energy

consumption, restaurants need accessible and affordable interventions to increase energy efficiency and reduce operating expenses.

Several factors contribute to a restaurant's high energy use. Cooking equipment like ovens, fryers, and grills, as well as HVAC systems, lighting, and refrigeration all require significant energy (Hedrick et al., 2011). An energy audit of a fast-food restaurant found that HVAC systems accounted for 42% of total energy costs, with kitchen equipment responsible for 25%, other appliances for 22%, and 11% for lighting (Gunasegaran et al., 2022). In addition to appliances, factors such as the number of meals served, the menu, and hours of operation all have a discernible influence on energy use (Hedrick et al., 2011).

Energy Star, a program of the U.S. Environmental Protection Agency (EPA), provides educational resources and certifications for energy-efficient restaurant equipment. According to Energy Star, lighting uses on average 13% of the total energy of a restaurant, and is an accessible entry point for restaurant owners to reduce energy consumption (EPA, 2013). Using incandescent or compact fluorescent light bulbs (CFL) results in 75% more energy use than current LED lamps and can add $300 in annual electricity costs (EPA, 2013). Upgrading all lighting to LED or Energy Star rated lamps is a low cost strategy for restaurant owners to immediately reduce energy use.

Energy Star-certified appliances, such as convection ovens, fryers, and HVAC systems, offer substantial energy and cost savings over their lifespan (EPA, 2012). While Energy Star appliances can cost more upfront compared to poorer-performing appliances, the price difference is recovered through long-term, ongoing reduction in utility bills (EPA, 2012). Energy efficient equipment can save restaurant owners up $470 for gas fryers and $190 for electric griddles annually (EPA, 2012). Best practices for operational efficiency—such as reducing idle time for equipment, implementing startup and shutdown procedures, and maintaining appliances—are also crucial strategies for reducing energy use and extending equipment life (EPA, 2012). Restaurant owners can save up to $400 annually by cutting four hours of a gas fryer idle time on per day (EPA, 2012).

There are also interventions that more committed restaurant owners can take to increase energy efficiency. One high volume restaurant chain in Las Vegas, Nevada successfully retrofitted a building to accommodate a solar water heating system in order to reduce dishwashing costs (EPA, 2014). The new system is projected to save the restaurant more than $300 each month on their energy bill, and these savings will pay for the solar heating system within five years (EPA, 2014). While the economics of installing solar photovoltaic (PV) energy systems is dependent on factors like regional location and building type, this strategy is an effective way to introduce renewable electricity generation to restaurants.

Some energy efficient technology and organization strategies are less accessible for restaurants that lack the financial resources or knowledge for adoption. Expanding access to technical assistance and financial incentives could make energy conservation more achievable across the industry. In Ann Arbor specifically, there is strong municipal support to adopt more sustainable practices in homes, buildings, and restaurants. To meet the A2Zero Climate Action plan, restaurants need to work towards implementing energy efficiency measures. In Ann Arbor, the use of natural gas for space, water heating, and cooking represents over 25% of the community's greenhouse gas emissions (A2Zero Carbon Neutrality Plan, 2020). Moving from natural gas to electricity, especially from renewable sources, is a central component of A2Zero for restaurants.

DTE Energy is the primary utility provider to the Ann Arbor area, supplying electricity and natural gas to residential and commercial customers - including the city's restaurants. DTE's 2023 fuel mix predominantly consists of nonrenewable resources, including coal (39.96%), and natural gas (25.42%), but low-carbon energy resources like nuclear (22.46%) and wind (10.29%) contributing lower-impact electricity to their generation portfolio (DTE Fuel Mix, n.d). While the company has made pledges to reduce its total carbon emissions and expand renewable energy sources through the CleanVision MI Green Power initiative, a significant portion of its electricity generation remains reliant on fossil fuels (DTE MI Green Power, n.d). This reliance contributes to the overall carbon footprint of restaurants in Ann Arbor, making energy efficiency efforts critical for restaurant sustainability. An increase in DTE's renewable energy sources would support Ann Arbor's decarbonization efforts, particularly in the food service industry, by

lowering businesses' energy impacts. This effort does not, however, eliminate the economic value for food service businesses to continue improving their energy efficiency and conservation. By improving their energy use efficiency and utilizing renewable energy sources within their business, food service business owners could lower their operational costs two-fold. DTE also offers energy efficiency programs that restaurants can participate in to reduce their energy consumption. These programs include rebates for energy-efficient appliances, lighting upgrades, and HVAC equipment (DTE, *Food Service Discounts*; DTE, *Rebates for Equipment Upgrades*). Participating in these programs can help restaurants lower their energy costs and overall energy consumption.

In an effort to transition away from fossil fuel-based energy production and embrace local renewable generation, Ann Arbor has begun developing its own Sustainable Energy Utility (SEU). In the November 2024 local elections, Ann Arbor residents voted to authorize Proposal A: Creation of a Sustainable Energy Utility (City of Ann Arbor, n.d). The SEU will be an opt-in, supplemental, community-owned energy utility that provides 100% renewable energy from local solar, battery storage systems, and networked geothermal systems installed at participating homes and businesses in the city (City of Ann Arbor, n.d). The SEU is anticipated to launch in the latter half of 2026, and will provide restaurants access to clean energy at rates cheaper than current DTE costs, and offers energy storage solutions for less than the average cost of a whole-house generator - helping to make clean energy options affordable to more residents (City of Ann Arbor, n.d).

Food Procurement

The food that a restaurant purchases has a significant impact on its greenhouse gas emissions. Food procurement is responsible for 95% of total greenhouse gas emissions in bars and restaurants, indicating a major priority for reductions (Baldwin, Wilberforce, and Kapur, 2011). Currently, about a fifth of the food purchased for use in restaurants goes uneaten, and customer demand for larger portions and seasonal menus make internal tracking of ingredients more difficult due to an increase of food that needs to be accounted for, ultimately leading to more food waste (Ibtiyah et al., 2023; Charlebois, Creedy, and von Massow, 2015). Food waste is discussed in more detail below.

Customers are increasingly interested in supporting their local food system, viewing it as “more natural, fresher, healthier, and safer than globalized food products” (Roy and Ballantine, 2020). Studies have found that 60% of patrons say they are likely to choose a restaurant based on its environmental efforts and are willing to pay more for locally grown food (Baldwin, Wilberforce, and Kapur, 2011; Roy and Ballantine, 2020). But restaurants are apprehensive about buying their food locally, with restaurant owners citing “inconvenience, [uncertainty] of where to buy, lack of knowledge as what is available locally, and cost” as the main factors determining where food is purchased (Roy and Ballantine, 2020). A majority of restaurants get their ingredients from wholesalers, which are national suppliers that buy food in bulk and sell directly to restaurants at a lower price than retail. With wholesalers, food is coming from around the country, undermining the idea of a short supply chain (Morley, 2021). Restaurant owners are also concerned that local farmers will not be able to keep up with the demands of their menu and see wholesalers as more consistent, reliable, and cheap (Morley, 2021). There is currently a disconnect between customer demand and restaurant procurement practices as well as a knowledge gap between restaurants and farmers about local food availability, production capacity, and pricing schemes.

Employee Engagement

Employee engagement in restaurant sustainability refers to a broad range of initiatives aimed at improving environmental awareness, knowledge, and skills among employees. These programs are designed to provide information, develop supportive organizational cultures that prioritize sustainability, and help employees internalize green practices and develop problem-solving skills to implement more sustainable actions in their daily work routines (Wang, 2016). Restaurant leadership, owners and managers, play a critical role in promoting sustainability by embedding values of environmental sustainability into the company’s decision-making processes. Managers who actively communicate the importance of environmental sustainability inspire employees to engage more deeply with initiatives (Jang et al., 2017). As Freeman (2011) notes, clear communication of the company’s sustainability mission is key to ensuring that employees can internalize and apply these practices.

There are many benefits to educating employees on a restaurant's sustainability goals, ranging from cost savings, to increased employee satisfaction and productivity, to attracting environmentally conscious customers (Madanaguli et al., 2022; Joshua et al., 2022). While restaurant sustainability is initiated by top management, it is executed on a day-to-day basis by the employees. Restaurants seeking to reduce their energy bills or save costs by reducing food waste need employees to turn off appliances when they are not in use and forecast ingredients more accurately to reduce waste (Madanaguli et al., 2022). Despite a strong sustainability commitment from management, a lack of focus on training employees can hamper progress towards sustainability goals. In order to be successful, restaurants also need to address high turnover and limited training resources, and hire employees with pro-environmental attitudes to mitigate resistance and workload concerns (Joshua et al., 2022; Freeman, 2011; Iraldo et al., 2017).

Existing resources and tools for employee education on sustainability include a variety of structured programs, hands-on training, and integration into work processes. Many restaurants have adopted Green Human Resource Management (GHRM) practices, which integrate environmental training into recruitment, onboarding, and professional development. These programs focus on key sustainability topics such as energy conservation, waste reduction, recycling, and sustainable food sourcing, helping employees align their daily tasks with the restaurant's environmental goals (Wang, 2016).

By offering regular feedback and recognition for employees' green behaviors, restaurants can maintain high levels of engagement and ensure that sustainability is an authentic commitment as opposed to greenwashing. Integrating environmental education into onboarding processes helps establish green behaviors from the outset, while ongoing education ensures that employees stay updated on new practices and technologies (Wang, 2016).

Despite the recognized importance of employee education in promoting sustainability in restaurants, several gaps in resources and implementation exist. Namely, high employee turnover, limited time and resources, and inadequate measurement and feedback systems. The restaurant industry often experiences high turnover rates, making consistent and long-term

employee education challenging (Freeman, 2011). A training approach that ensures knowledge is passed down from long-time employees to newcomers can help maintain institutional knowledge. Furthermore, many restaurants, especially smaller establishments, may lack the time and resources to develop comprehensive sustainability education programs (Freeman, 2011). Thus, curated and relevant guidance, such as what we aim to provide through the Food Service Business Sustainability Roadmap, can help reduce those barriers to engaging employees in the restaurant's sustainability vision. Finally, many restaurants lack effective systems to measure the impact of their employee education efforts and provide feedback to reinforce learning (Wang, 2016). Guidance on useful metrics, timely checkpoints, and motivating incentives can help remove this confusion and ensure follow-through on a business' sustainability goals.

Waste Management

Worldwide, approximately one-third of all food produced is wasted. According to a full-cost accounting report released by the Food and Agriculture Organization (FAO) of the United Nations in 2014, the economic, environmental, and social costs of this waste totals an estimated 2.6 trillion dollars. In the food service industry, food waste and increasing reliance on take-out orders are large sources of emissions (FAO, 2014). Food waste can occur at all stages of the supply chain, including farms, processing, distribution centers, retail (including grocery stores and food service), and customer households. In high-income countries such as the United States, it is estimated that food service generates an average of 26 kilograms of waste per capita annually (UNEP, 2021). While estimates are highly variable due to poor data availability, it is clear that food waste from the restaurant and food service industry is adding significantly to waste generation in the global food supply chain. As food service is later in the supply chain, it has higher environmental, economic, and social impacts from the food waste generated as impacts accumulate with each stage along the food supply chain, through processing, labor, transportation, packaging, and storage (Stenmarck et al., 2016). Restaurants have many opportunities to reduce their overall food waste and impact by following the EPA's Food Recovery Hierarchy guidelines, which include source reduction, feeding hungry people, feeding animals, industrial uses (used cooking oil is frequently sold at bio-energy plants), and composting instead of sending to landfill. Source reduction for restaurants involves reducing purchasing and production to fit demand, incorporating surplus ingredients into temporary menu

items, and making full use of ingredients (such as using vegetable scraps for stock). Reducing food waste at the source is also valuable economically, as wasted ingredients are wasted money for restaurants.

Waste and the associated pollution created by take-out packaging products (e.g., containers, disposable cutlery, and cups) has become a significant problem. A 2023 survey found that 69% of customers reported getting take-out or delivery at the same level or higher than pre-pandemic (Chick et al., 2023). Take-out items accounted for 50% to 88% percent of litter in observed aquatic ecosystems except for the open ocean (Morales-Caselles et al., 2021). Reusable containers offer a proven way for restaurants to reduce waste and environmental impact, but implementation remains a difficult task for restaurants and customers unfamiliar with this solution (Hitt et al., 2023). City-wide cooperation provides a way for reusable container programs to appeal to both customers and food service providers, but implementation is a difficult task. Currently Ann Arbor's reusable program has yet to succeed, with only four participating restaurants. In the meantime, single use take-out packaging, be it styrofoam, plastic, paper, or compostable, all have significant downsides, especially when compared to reusable options. When considering cradle-to-grave life cycle analysis of greenhouse gas emissions associated with different single-use versus reusable polypropylene takeout containers, extruded polystyrene (EPS) is identified as the lowest impact single-use option (Gallego-Schmid et al., 2018). It is estimated that options like the typical plastic (polypropylene) takeout containers would require 3 to 39 reuses and polypropylene tupperware containers would require 16 to 208 times to be comparable to EPS (Gallego-Schmid et al., 2018). EPS, however, is not feasibly recyclable, making reuse and recycling of polypropylene options the best option for lowering the environmental impact of typical takeout container materials. Aluminum options, while recyclable, have the highest impact on emissions and energy use, only using less water than bioplastic polylactic (PLA) containers (Hitt et al., 2023). Compostable options are generally regarded to perform poorly in life cycle analysis of greenhouse gas impact when compared to polypropylene takeout containers, especially when considering reuse of polypropylene containers (Harnoto, 2013). In instances where reusable container programs are unavailable, typical polypropylene containers are the lowest impact option that is both technically feasible to reuse and recycle in most areas. If restaurants wish to opt for compostable products, sugarcane

fiber-based bagasse containers perform much better than PLA in overall environmental impact (Chiu, 2020).

Project Goals

Our team was tasked with the goal of providing an easily accessible, understandable, and comprehensive Sustainability Roadmap tailored to the needs of restaurant and food service business owners in Ann Arbor and greater Washtenaw County for the District. We aimed to collect and structure resources to provide a quick start for any food service business owner interested in beginning or advancing their sustainability journey, and to further the District's goal of improving key restaurant sustainability goals in water and energy use, local food procurement, and food and packaging waste reduction and management.

Methods and Data Collection

Overview

This project was completed in three phases. The first phase involved collecting data on restaurant sustainability through a comprehensive literature review, surveys, and interviews. In the second phase, the collected data were analyzed and synthesized into a sustainability roadmap tailored to restaurant owners. The roadmap offers actionable strategies to improve energy efficiency, water conservation, waste reduction, and other key sustainability practices. The third phase engaged an advisory committee composed of restaurant and bar owners to provide valuable feedback on the roadmap, ensuring it was both relevant and effective for real-world application.

The data collection process was rooted in outreach efforts, which included surveying local restaurants to assess current sustainability practices and conducting follow-up interviews to gain deeper insights. Surveys were sent to 138 restaurants and interviews were conducted with 10 restaurant personnel. The survey and interview questions were drafted by the team, and then revised following suggestions from Azella Markgraf at SFBC. Once feedback was incorporated, we sent the surveys to restaurant owners and conducted follow-up interviews.

Outreach

Our first step was to understand the current restaurant landscape. We created a spreadsheet of all of the bars and restaurants in the city using the Destination Ann Arbor website and Google Maps (Destination Ann Arbor, n.d.; Google, n.d.). Once all locations and contact information were compiled, we categorized restaurants and bars based on cuisine: bars, Asian, American/BBQ, Mediterranean, Italian, vegan/vegetarian/juice bar, South American, and coffee shop/bakery/dessert. All establishments were further grouped by whether they were owned by a larger restaurant group or were independently owned by looking at the "About" section on individual restaurants' websites. We used these categories because they are the most common in the area as well as to ensure that we were reaching a diverse group of restaurant and bar owners in our survey.

Once restaurant ownership structure data were collected, we collaborated with our client and the SFBC to determine how best to connect with bar and restaurant owners, starting by creating a shortlist of restaurants that the District and SFBC already had relationships with . Our first round of outreach was via an email explaining our project, the District, and including a link to our survey. After we had contacted those on the initial shortlist, our team divided up the rest of the list and reached out to restaurant and bar owners via email, call, drop-in with a business card with a QR code for our survey, and mail flyers with survey information.

We also encouraged restaurant and bar owners to take our survey through in-person tabling at meetings and public events. Members of our team attended two SFBC meetings, in May 2024 and October 2024, to connect with restaurant owners who were already interested in sustainability. We also tabled with the District during the Earth Day celebration at the Kerrytown Farmers Market on April 20, 2024.

Survey

The outreach phase began with the creation of a survey for restaurant and bar owners to help establish a baseline of restaurant sustainability practices in Ann Arbor. The survey was designed to be completed in 5 to 7 minutes, and was general enough to be informative while still being

able to be completed by a restaurant manager if the owner was not present. The goals of the survey were to 1) learn what sustainability practices restaurants are already doing, 2) understand the main obstacles that prevent restaurants and bars from implementing further sustainability practices, and 3) guide our roadmap construction to suit the stated needs of restaurant and bar owners. With a focus on the main sustainability targets - emissions reduction, water use, and food waste - we created a 23-question survey that was broken down into four sections: general information about the restaurant, energy and water efficiency, waste management, and broader sustainability interests. This survey can be found in Appendix A.

General Information

This section was designed to collect the current operational practices of the restaurant. The first question asked was the number of meals served per week, in order to understand the size and scale of the restaurant's operations. We then asked about the status of the restaurant's building occupancy. It was important for us to know if the restaurant owners rented or owned the building in which they operated, as that could impact the sustainability initiatives or building improvements that they wanted or were able to make. We then asked if the restaurant paid for its own utilities, or if these were included in the lease in any way.

Energy and Water Efficiency

This section of the survey was designed to understand the restaurant's current energy and water efficiency practices, as well as gauge the interest in increasing energy and water efficiency. We began by asking the survey taker to rate their level of interest in an assessment to identify energy and water savings on a scale of 1 (not interested) to 5 (very interested). The Ann Arbor 2030 District offers free energy audits to district members, and offers their services to restaurant owners who are interested in joining the 2030 District. Energy audits are very useful when identifying inefficiencies in a building that contribute to high energy costs. We then asked how often the refrigeration equipment was inspected for leaks (Never, Monthly, Every other month, I don't know). Nearly all traditionally used refrigerants are toxic to human and environmental health, flammable, or both (EPA, 2025). Inhalation or ingestion of refrigerants like hydrofluorocarbons (HFCs) and chlorofluorocarbons (CFCs) can cause nausea, dizziness, headaches, respiratory distress, and even asphyxiation (Adams, 2024). Chronic exposure to

certain refrigerants has also been linked to central nervous system damage, cardiovascular issues, and cognitive impairment (Adams, 2024). Refrigeration leaks not only pose health risks, but can also contribute to high energy inefficiencies and related utility costs. While inspecting refrigerators for leaks regularly can help mitigate potential health risks, the cost of inspection varies. Inspecting refrigerators oneself can be an inexpensive way to detect potential issues early, while hiring a professional is a safer but more costly option that ensures the proper handling of harmful refrigerants.

Restaurant cooking equipment is energy and water intensive, so the rest of the questions in the energy and water efficiency section revolve around energy and water efficient appliances. We asked respondents to rate their familiarity with EnergyStar and WaterSense appliances on a scale of 1 (never heard of it) to 5 (very familiar), and the prevalence, if any, of EnergyStar and WaterSense rated appliances in the restaurant (EPA Energy Star, n.d; EPA WaterSense, n.d). These appliance certifications are key indicators of energy and water-efficient products, which can significantly reduce operational costs while minimizing environmental impact (Energy Star for Small Business: Restaurants, n.d).

Lighting efficiency is a key factor in energy conservation, so we included a question about the percentage of LED lighting in the restaurant. For restaurants with lower adoption rates, this presents an opportunity to encourage a shift toward LEDs, which could yield substantial long-term cost savings (EPA, 2013).

Waste Management

This line of questioning aimed to help us understand what restaurants are doing in regard to waste generated on-site. We began by asking what type of take-out containers the restaurant uses (e.g., foam, compostable, recyclable, reusable), to assess the prevalence of sustainable packaging and identify areas where the restaurant might transition away from environmentally harmful options, such as foam, toward compostable or reusable alternatives.

We also inquired about composting programs, asking whether restaurants divert food waste from landfills and, for those who currently do not, what might encourage participation. We asked an

open-ended question about barriers to participation, hoping to uncover specific challenges restaurants face, such as cost or lack of access to municipal composting programs. The last question in this section inquired about what the restaurant does with all unsold food at the end of the day, with options like donating, composting, or sending to landfill. This question helped us evaluate how restaurants manage surplus food and identify opportunities to promote food donation programs or other waste-reduction initiatives. Responses can guide targeted recommendations to reduce food waste, such as partnerships with local food banks or composting facilities

Broader Sustainability Interests

To better understand the sustainability priorities of restaurants, we asked what aspects of sustainability are of most interest to their business, including options such as energy and water use reduction, waste reduction, local food sourcing, and reaching sustainability-minded customers. This line of questioning allowed us to tailor sustainability recommendations to the restaurant's stated interests and needs. Finally, we asked about barriers to implementing sustainability efforts—such as time, money, resources, or information—as well as an open-ended question about other sustainability practices they've implemented or considered. By understanding these barriers, we can design practical, actionable strategies to support restaurants in their sustainability journey. The survey ends by asking if the participant would be willing to be interviewed by a team member to further our understanding of their survey responses, as well as providing a space for the interviewees to discuss additional challenges and opportunities for sustainability in the restaurant industry.

Interviews

Interviews were scheduled for 45 minutes with restaurant and bar owners who took our survey and answered "yes" to our last question asking if they were interested in being interviewed as part of our research. We worked collaboratively with our client and the SFBC to draft a list of six questions, ranging from individual successes with implementing sustainability to what resources are needed to make more of an impact. The interview questions were designed to expand upon the interviewee's survey responses as well as provide the interviewee the opportunity to discuss additional sustainability topics that were not mentioned in the survey. All interviews were audio

recorded with the permission of the interviewee, and transcribed by the team. Besides tailored questions about respondents' survey answers, our team asked questions about motivation for joining the restaurant industry, individual definitions of sustainability, and barriers for implementation. Overall, we left time for dialogue about resources that are needed and how sustainability is factored into day-to-day operations.

These interview questions can be found in Appendix B - Interview Questions.

After all the interviews were conducted and transcribed, team members summarized the interviewee's responses to each question, including any follow-up questions, and added tags to the responses to analyze common themes and topics. Team members also recorded interesting quotations or ideas that emerged from the interviews. The interview topic tags used by the group were: energy efficiency, food procurement, water usage, employee education, resources needed, waste reduction, lack of time, lack of knowledge, and policy possibilities.

Results

Survey

We contacted 138 restaurants in the Ann Arbor area that are locally owned, and are not regional, national, or international restaurant chains. We received 16 responses, and we were able to conduct interviews with ten food service business owners or personnel.

Over half of the restaurants serve more than 500 meals per week, and six own their premises. Fifteen restaurants pay their own utilities, but all are interested in assessments to identify potential energy and water savings. All restaurants monitor refrigerant leaks, although the frequency varies between quarterly, annually, and whenever the refrigerator temperature rises. Eight have installed more than 50% LED lights, and compostable paper and recyclable containers dominate their take-out packaging. All 16 restaurants run recycling programs to divert packaging waste from landfills. To manage food waste, 75% of respondents said they give unsold food to employees. Additionally, all restaurants use local food sources, reflecting a strong

commitment to local sustainability. Reducing energy consumption, sourcing local food, and minimizing waste are top priorities, though time and financial constraints are major barriers to further implementation of more sustainable practices.

Interviews

Our ten interviews with food service personnel revealed valuable insights about the challenges and opportunities local food service businesses face when implementing or considering sustainability initiatives, as well as the sustainability topic areas they are most interested in. When we summarized and tagged their responses, we saw a few themes emerge. Waste reduction and food procurement were the two most common topics discussed by the interviewees, with thirteen tags on waste reduction and eleven tags on food procurement. Energy efficiency and water use were mentioned four times across all interviews, while employee education was mentioned eight times.

Interviewees identified several key challenges to implementing sustainability in their businesses. The most frequently mentioned barrier was a lack of resources (18 mentions), followed by a lack of knowledge (11 mentions), lack of time (9 mentions), and policy possibilities (9 mentions). A lack of resources referred to situations where businesses were aware of sustainable solutions but struggled to implement them due to limited access to necessary information or products. Lack of time could refer to either a lack of time to find more information about sustainability solutions or a lack of time to properly implement a change. Lack of knowledge referred to when an interviewee was not aware of a viable sustainable solution or alternative to their current practices. Policy possibilities was used as a tag when interviewees mentioned either a challenge or opportunity they faced due to policy decisions, such as municipal waste management or funding opportunities.

When we looked at only high-volume restaurants (those that serve over 500 meals a week), resources needed and waste reduction were the most common topics in interviews, over double the next most common topic of lack of knowledge. When considering only coffee shops and

bakeries, waste reduction was the most common sustainability topic of interest, while resources needed and lack of knowledge were the most common barriers.

We found that high-volume businesses (> 500 meals/week) cited waste reduction and resources most commonly during interviews, while lower-volume businesses mentioned policy possibilities and resources needed the most. Interestingly, both types of businesses mentioned policy possibilities at the same frequency.

See our interview data charts in Appendix C - Interview Data.

In addition to these commonly discussed topics, interviewees also provided insightful observations and suggestions based on their unique experiences. Some interesting points we considered worth noting include:

- One interviewee mentioned how sustainability is a value shared by the Ann Arbor community and how their sustainable practices inspire loyalty amongst some customers.
- Commercial composting is a challenge for many businesses due to the high cost of participating in the municipal composting program and the restrictions on the types of items accepted in compost. Alternative solutions explored by interviewees were partnering with a local farmer to directly send compost to a farm and contracting with a commercial composter that accepted the BPI certified compostable products used at those businesses. Desired solutions included more affordable municipal composting and/or acceptance by the city's composter to accept their compostable ware.
- For those that do not own their physical premises, cooperation and investment is required from the building landlord to retrofit or weatherize the building for energy efficiency. One interviewee mused that a city incentive or fee aimed at their landlord to retrofit their building would help address their energy challenges.
- Some interviewees mentioned the comparatively higher cost of sustainable alternatives as a barrier to implementing more sustainable practices at their business.
- Current efforts around sustainability include:
    - Maximizing use of ingredients and minimizing waste from spoilage.

- Encouraging takeaway to avoid food waste post-serving.
- Using recyclable and compostable materials whenever possible.
- Integrating sustainability into purchasing and operating decisions, such as buying energy efficient equipment, and working with procurement managers to reduce food waste and/or purchase from more sustainable vendors.
- Customer incentives in the form of discounts for bringing in reusable containers for food or drink.

Data Analysis Based on Ann Arbor Restaurants

Our quantitative analysis uses energy data from the Energy Star Portfolio Manager (ESPM). Ann Arbor/Washtenaw 2030 District provides us access to gas and electricity data for 13 restaurants and bars in the ESPM. Most of these restaurants are members of the Ann Arbor/ Washtenaw 2030 District. We downloaded these data, observed the seasonal trend in energy consumption of these restaurants, conducted a linear regression analysis, and compiled charts in Excel. We graphed the boxplots of energy consumption with and without outliers, scatterplots between site EUI (Energy Use Intensity) and kBtu of all 13 Ann Arbor restaurants, and histograms of building age and energy and water use. The key metric here is EUI, which measures the building's energy use normalized by its size or other characteristics. With this data, we charted the energy consumption and EUI (Energy Use Intensity) of the restaurants using their electricity and gas data from Oct 2021 to March 2024.

During our data inquiry, a pair of data sparked our curiosity: York and Kerrytown. By July 31, 2024, the site EUI for Kerrytown and York was very similar: York's EUI was 114.1 kBtu/sqft, and Kerrytown Shops had an EUI of 115.4 kBtu/sqft (Fig 5b). However, York, with a gross floor area of 16,750 square feet, is half of the size of Kerrytown (31,410 square feet). Kerrytown's use of efficient technologies perhaps led to higher energy efficiency. Additionally, Kerrytown's architectural design for natural lighting and air circulation may have reduced the need for fossil energy. From Figure 1 to Figure 3 we can observe an opposite pattern for electricity and gas use. The EUI for electricity peaks during summer, while the gas use reaches its maximum during the

winter. In addition, the winter gas peak is twice as much as the summer electricity peak. This is because Ann Arbor's climate leads to more energy to heat restaurants like York and Kerrytown than to cool them.

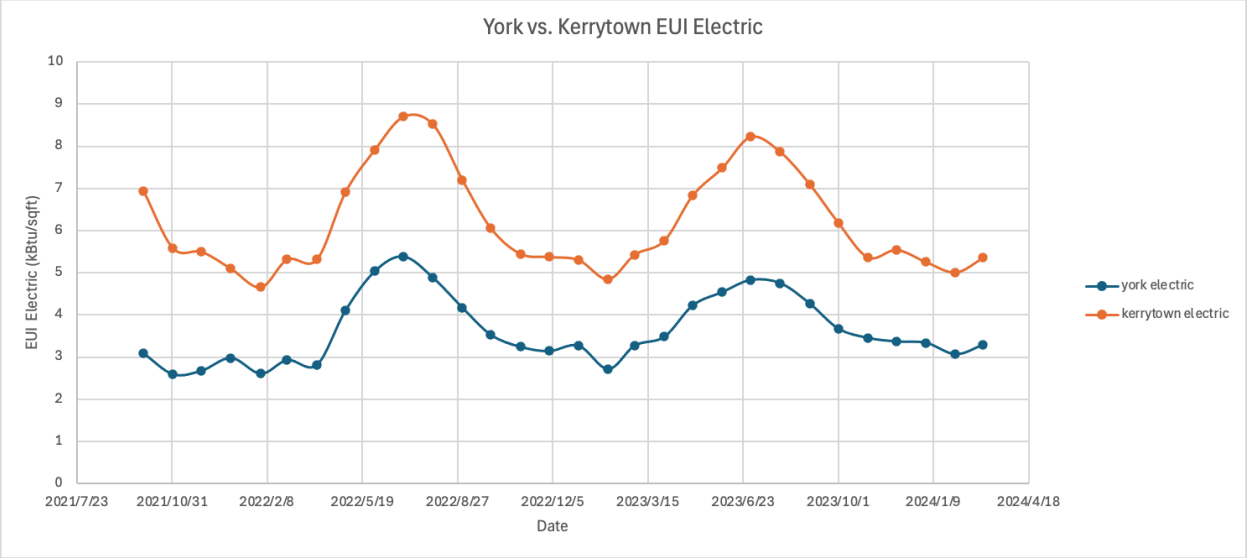

Fig 1. EUI Electric Comparison Between York and Kerrytown from 2021-2024

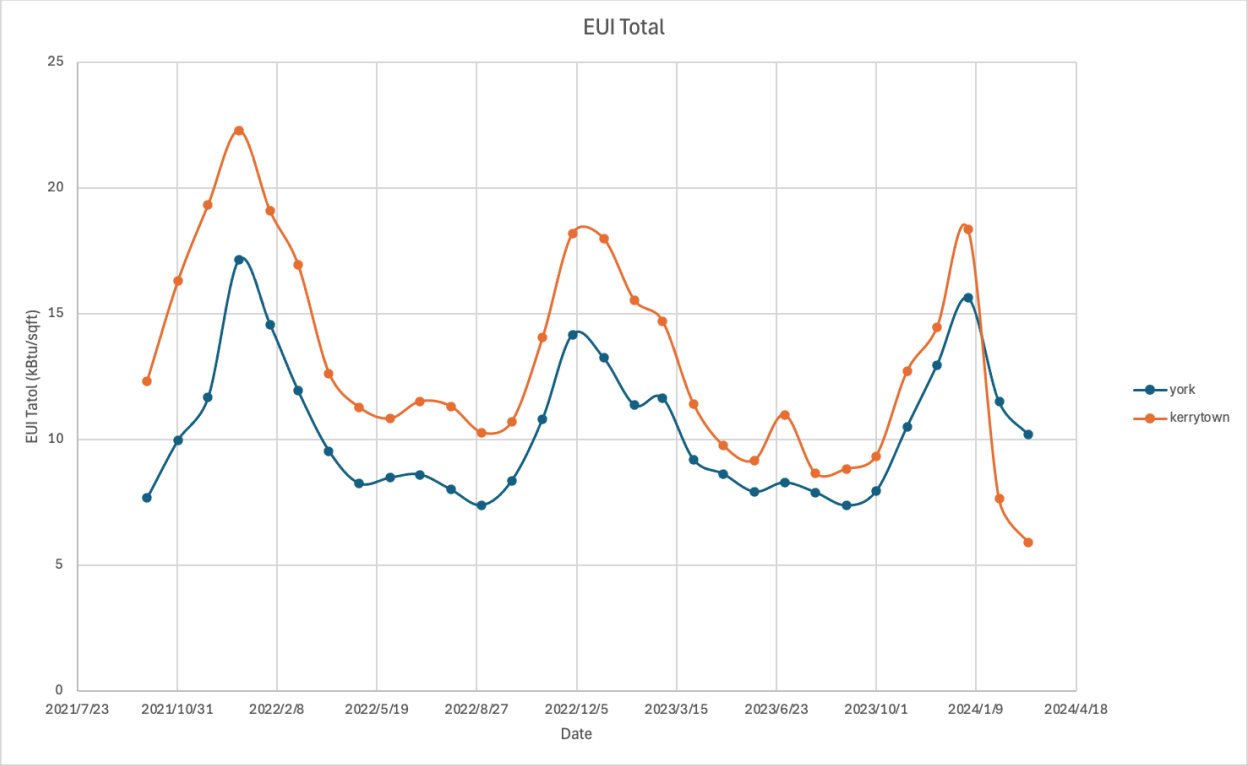

Fig 2. EUI Total Comparison Between York and Kerrytown from 2021-2024

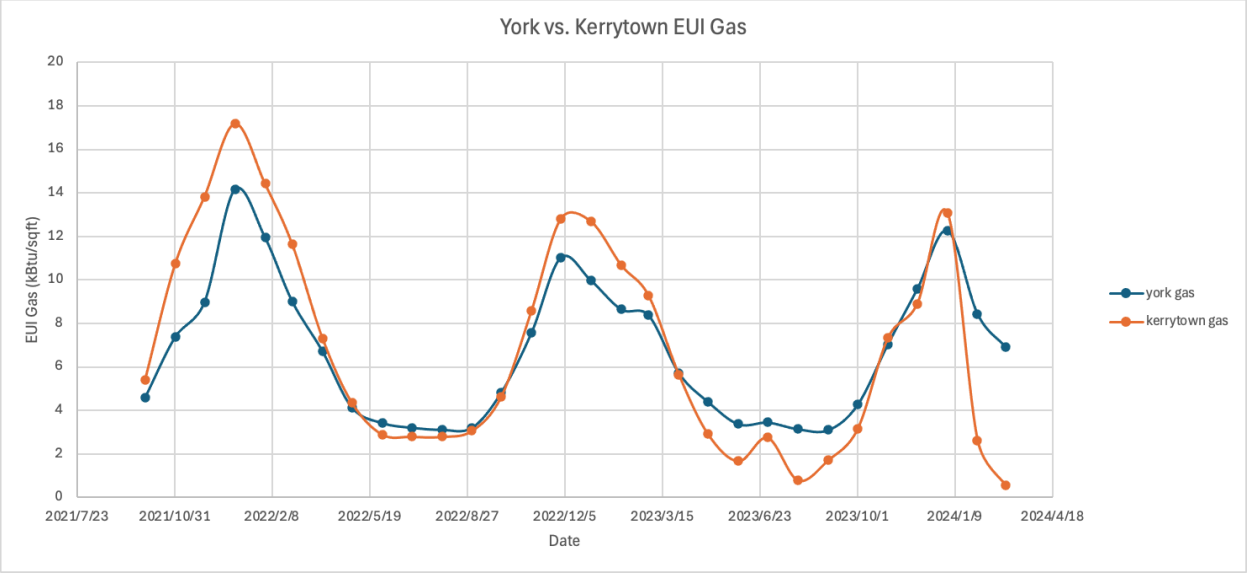

Fig 3. York and Kerrytown Gas EUI Comparison from 2021-2024

Figure 4 is a box plot that displays the site EUI in four quartiles. The minimum site EUI of these 12 restaurants is about 80 kBtu/sqft, the median is about 150, and the maximum is approximately 550. Most EUIs are between 100 kBtu per square foot and 300 kBtu per square foot. The extreme value is Zingerman's Roadhouse. The site EUI for Zingerman's Roadhouse is 2,846 kBtu/sqft. Extreme values like Zingerman's Roadhouse can affect the mean of the data we collected, making our conclusion biased. So, we have removed the extreme value when graphing the site EUI boxplot.

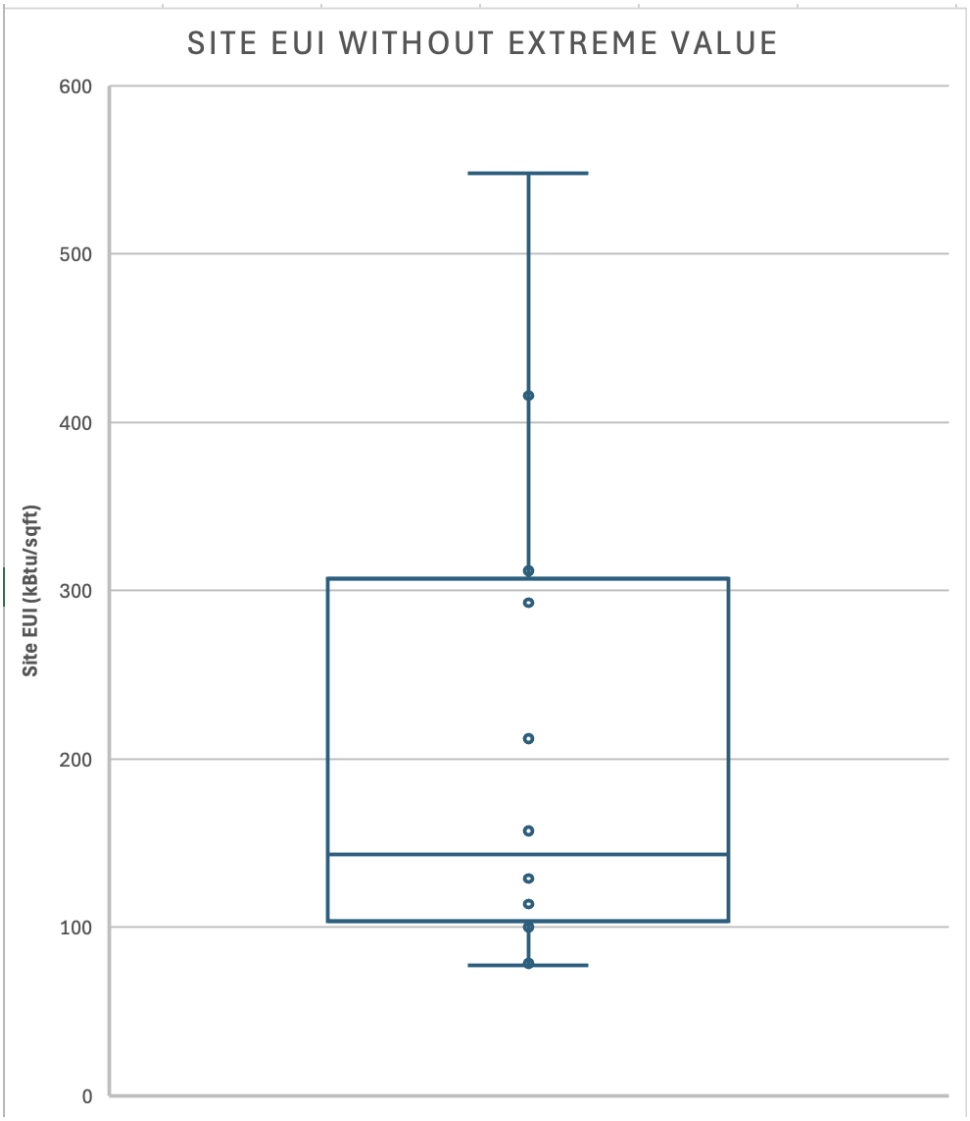

Fig 4. Boxplot of Independent Local Restaurants Site EUI in Ann Arbor Without Zingerman's Roadhouse in 2024

Figure 5a shows a histogram of 13 independent local restaurants' site energy use in ESPM from the lowest (left) to the highest (right). This graph gives a general idea of what Ann Arbor's restaurants would use in terms of energy use. It also supplements the previous boxplot about the difference between site EUI and site energy use. Zingerman's Roadhouse and Zingerman's Bakehouse stand out again in this graph with high energy use.

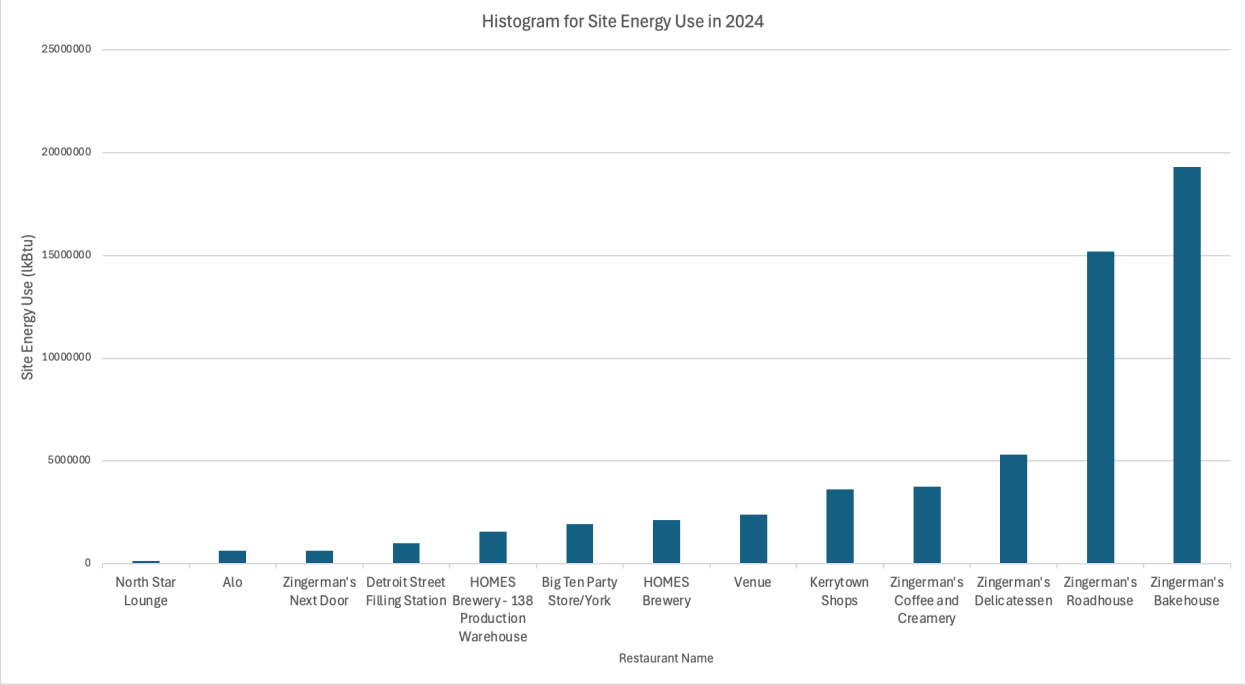

Fig 5a. Histogram of 13 Independent Local Restaurants Site Energy Use in Ann Arbor in 2024

Figure 5b shows a Histogram of 13 independent local restaurants' site energy use in ESPM from lowest (left) to highest (right). The ones highlighted in the box are the York and Kerrytown shops discussed in the previous paragraphs. York and Kerrytown shops have different floor areas and different energy use, but these two restaurants can have very similar site EUI. This graph adds to the dimension of site energy use discussed in the previous Figure 5a. The ranking by energy usage and by site EUI is very different. The restaurant with the lowest site energy use is North Star Lounge, but the restaurant with the lowest site EUI is Zingerman's Bakehouse. Detroit Filling Station stands out as the restaurant with the highest site EUI. These differences suggest the importance of selecting the appropriate metrics when it comes to measuring energy use and energy efficiency, and this metric selection will be especially important when making energy efficiency policies with regard to restaurants and bars.

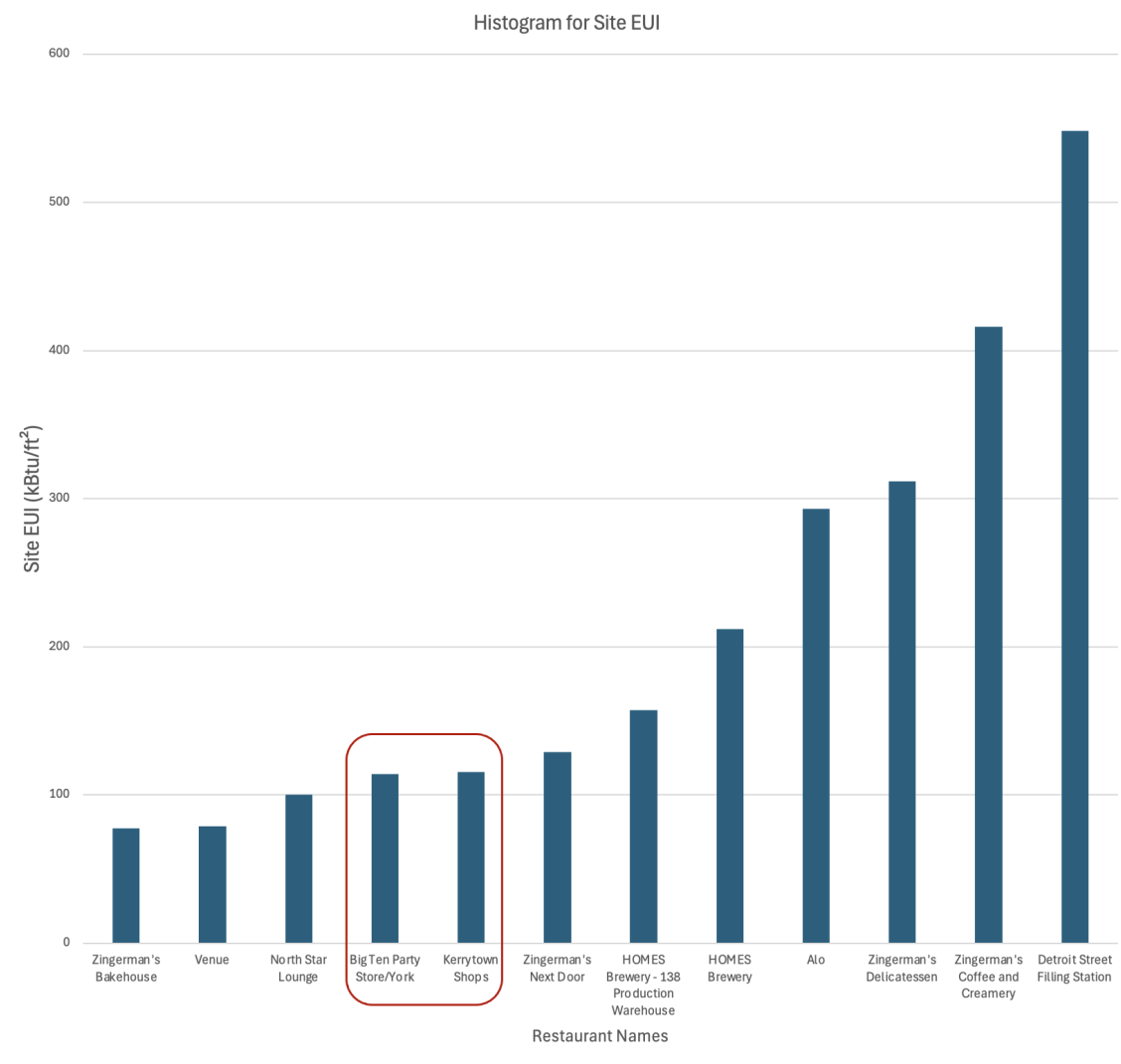

Fig 5b. Histogram of 13 Independent Local Restaurants Site Energy Use Intensity in Ann Arbor in 2024

From Figure 6a, it is evident that older buildings like "Alo" and "Detroit Street Filling Station" have lower energy usage in MBtu. The correlation coefficient is -59.953, and this indicates an increase in building age for one year decreases site energy use by 59.953 MBtu. The R square is 0.093, and this correlation indicates a weak correlation. This suggests that newer buildings do not always use less energy than older ones. One would imagine that newer buildings usually have higher energy efficiency and consume less energy. Contrary to popular belief, newer buildings, such as "Zingerman's Roadhouse" show higher energy usage than older ones like North Star Lounge.

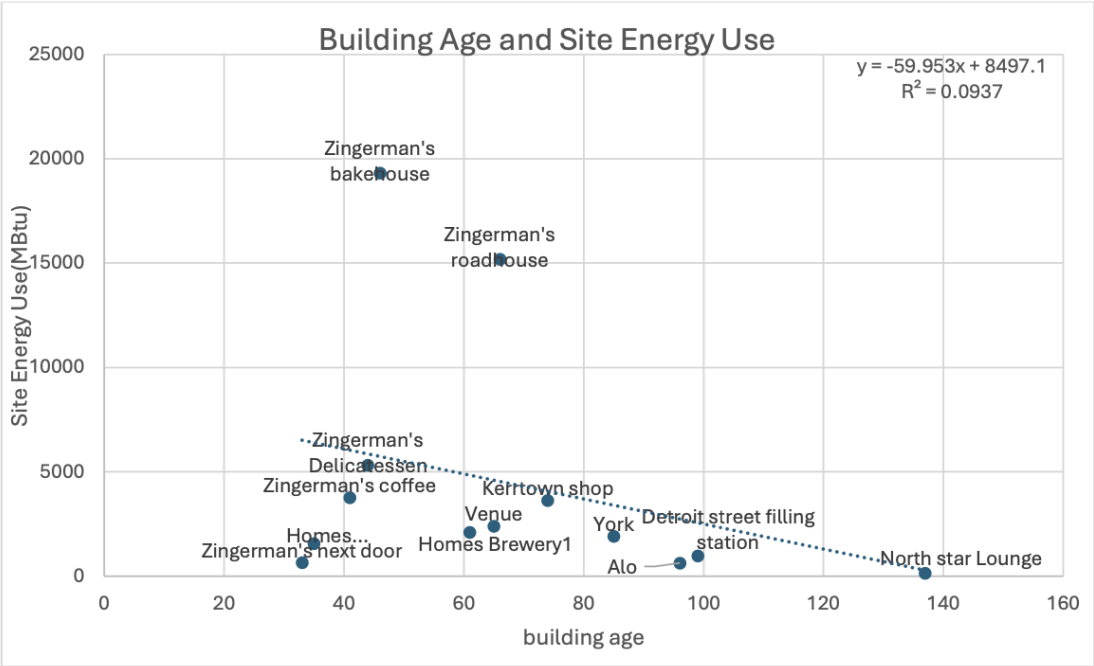

Fig 6a. The Relationship Between Site Energy Use and Building Age

From Figure 6b, we see a slight positive correlation between building age and site EUI, and this correlation suggests an increase in building age only slightly increases site EUI use. The correlation coefficient is 0.2624, and this indicates an increase in building age for one year increases site energy use by 0.2624 kBtu. The R square is 0.003, which indicates a very weak correlation. This figure demonstrates that an increase in building age does not necessarily lead to less efficient energy usage.

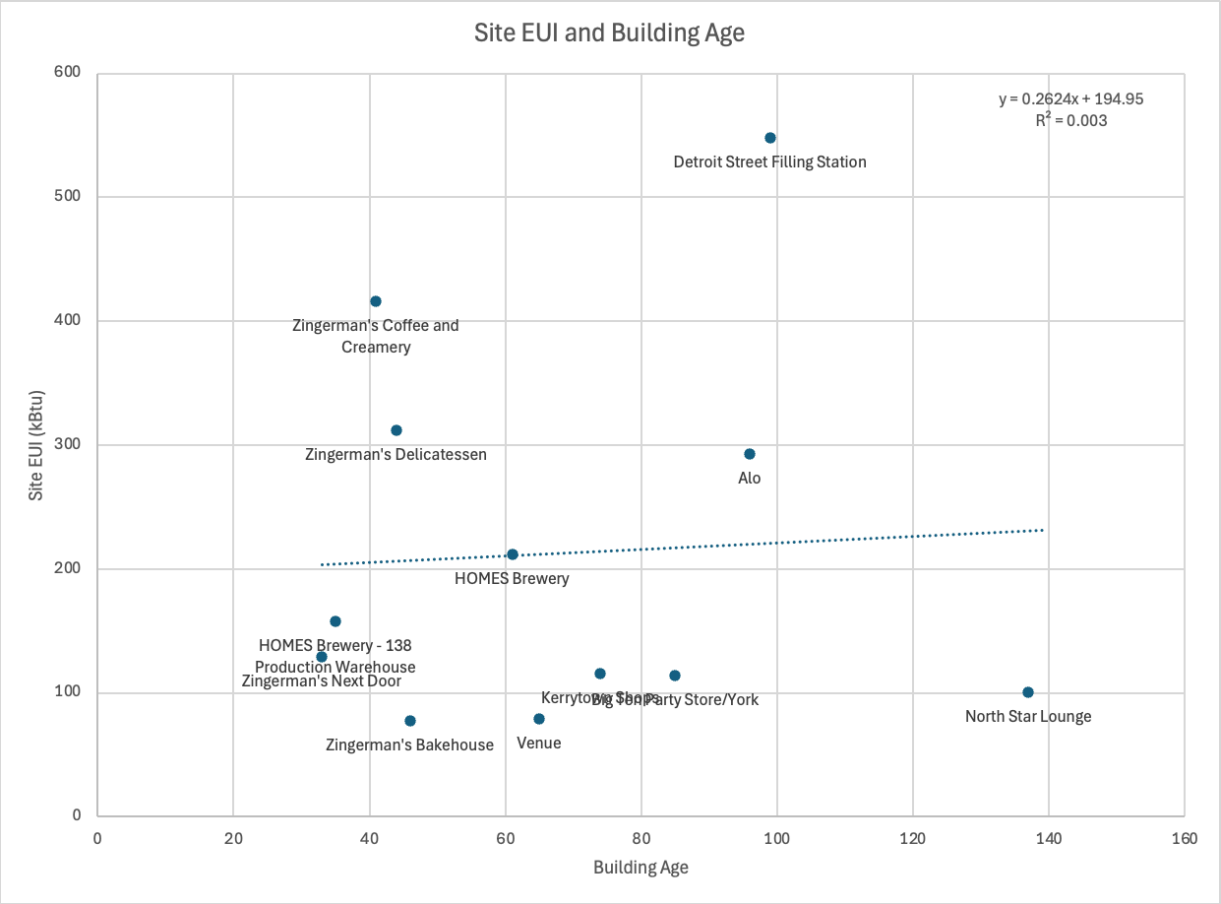

Fig 6b. The Relationship Between Site EUI and Building Age

We have combined insights from both the histogram in Figure 5 and the scatter plot from Figure 6, and we took these two histograms to make Figure 7. Figure 7 has three main components: building age, site EUI, and water use, and we want the audience to look at all these three factors within the same graph. We arranged these restaurants by increasing building age. By doing so, we want to reiterate that building age does not necessarily correlate with how efficient buildings are. While building age influences energy efficiency, operational practices, building design, and technological upgrades all impact energy consumption patterns in restaurants. Therefore, strategies to improve energy efficiency should not only focus on updating older buildings but also optimizing operations and equipment in newer buildings to achieve sustainable energy use.

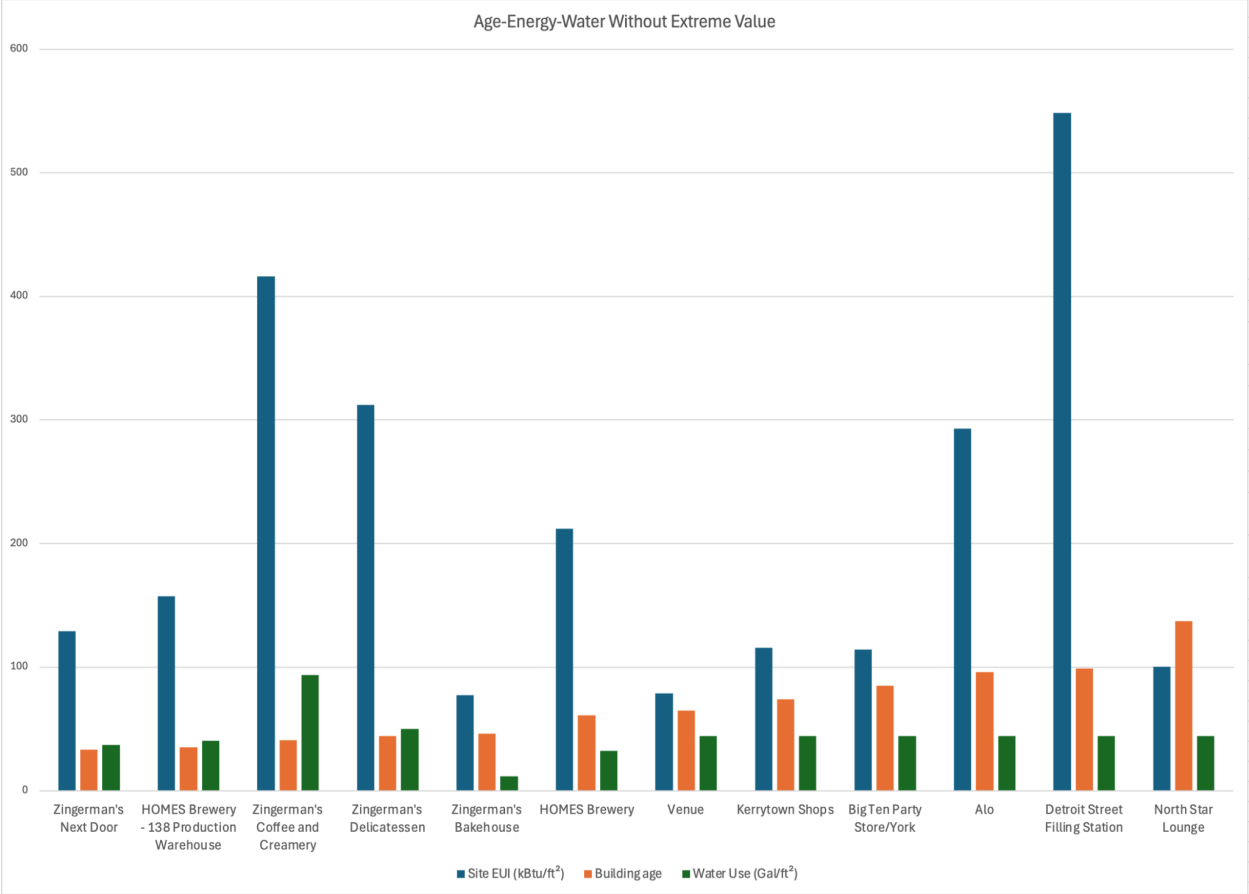

Fig 7. Histogram of Building Age, Water Consumption and Site EUI Combined in 2024

In conclusion, we have shown a pair of restaurants with similar site EUI but different gas EUI and electricity EUI. In that comparison, we found that both size and site energy use contribute to energy use intensity. In addition, we have ranked the site energy use and site EUI from the lowest to the highest. We hope to give a straightforward sense of difference when using site energy use and site EUI as different metrics when comparing the energy efficiency of restaurants. We think site EUI is a better metric because it considers both the energy use and the size of the restaurant. The most important finding from the data analysis section is that building age does not necessarily correlate with high energy use. We have found a negative relationship between site energy use and building age. Although the site EUI shows a slight positive relationship with the increase of age, we think invoking the age of the building as a reason for not improving building efficiency can be unfounded.

Discussion

As our project comes to a close, it is important to reflect on the strengths and weaknesses of our project, and evaluate whether we accomplished what we originally intended to do. The goal of the project was to partner with the SFBC to establish a roadmap that local food service businesses could utilize to begin and further their sustainability efforts. The roadmap was intended to be in alignment with the A2Zero plan and the Ann Arbor/Washtenaw 2030 District benchmarking process in an effort to further our audience and include a diverse range of stakeholders.

Our project successfully developed a sustainability roadmap for food service businesses that cover a wide range of sustainability topics - energy, water, waste, procurement, employee education, and general sustainability. A key strength of our roadmap was dividing it into three levels, making sustainable interventions more accessible based on the business' capacity. We compiled and organized resources to inform business owners of sustainability opportunities, both locally and beyond, to simplify decision making and make sustainability in food service businesses as accessible as possible. We also successfully collaborated with the Sustainable Food Business Coalition to enhance our research and broaden our audience.

It is also important to acknowledge some of the shortcomings of our report. First, our sample size of restaurants was very small compared to what we originally expected, with only 16 survey respondents and 10 interviews. Thus, our conclusions are only based on the food businesses that participated in our research process, so it may not be representative of the entire Ann Arbor community. Additionally, we did not ask food businesses about their food preparation methods (frying, roasting, smoking, etc.) which can impact their energy use. This was an oversight during initial data collection.

While our clients were originally interested in exploring strategies to help food service businesses achieve "dramatic reductions in greenhouse gas emissions," our research has expanded beyond the original scope. Our research has grown to focus on energy and water consumption, food waste, food procurement, and employee education in restaurants and bars.

While we have not discussed greenhouse gas-specific strategies to reduce emissions - we found that there is a strong positive correlation between energy intensity and greenhouse gas emissions. Thus, many of our recommendations centered around energy use reduction, energy efficiency, and electrification efforts. However, without direct emissions data, we cannot be sure whether a reduction strategy in energy intensity could be as helpful as a reduction strategy in greenhouse gas emissions. This limitation stems from the scope of our expertise, available funding, time, and other available resources.

Roadmap

Overview

Our roadmap was developed to serve as a set of turn-key materials that restaurants and bars can immediately incorporate into their businesses. Thus, to help those at different stages in their sustainability journey, we decided to break the roadmap into three levels:

- Level 1: Informational modules for restaurant management that do not have much baseline knowledge about sustainability. These will help orient the audience with background knowledge and provide an actionable set of steps one could take to begin implementing sustainability.
- Level 2: A list of frequently asked questions that restaurant and bar owners would have when first implementing sustainability. These will allow management to find resources and answers to specific questions fast.
- Level 3: A repository of additional resources to help food service businesses implement sustainability practices and go further in any of the topic areas covered in the roadmap. Resources include a set of checklist items that owners can incorporate into their daily checklist, a long-term sustainability checklist they can use to work towards larger changes, signage to guide energy conservation and waste management practices, adapted from a stakeholder, and external resources.

Level 1: Modules

Using information gathered from the literature review, through interviews with food service business owners and managers, and from web articles and resources, the team developed six modules to provide an introductory overview for food service business owners/managers to begin their sustainability journey. Below, we summarize the information shared in these modules and the sources we used.

See Appendix D for a link to the web site hosting the modules.

Start Here Module

The Start Here module orients readers to Level 1 and the roadmap as a whole.

Business Case for Sustainability: There is a common misconception that sustainability is a fringe concern for food service businesses and is costly to implement (Machipisa, n.d.). However, the truth is that sustainable practices can help save money and attract loyal customers, especially in a city like Ann Arbor (Machipisa, n.d., Meerschaert, 2024). ReFed, a national nonprofit working on food waste, calculates "the benefit-to-cost ratio of food waste reduction efforts in the restaurant industry [to be] $8 of benefit for every $1 invested" (Cochran et al., n.d.). Additionally, the EPA estimates that restaurants use 5-7 times more energy per square foot than other commercial businesses, suggesting an opportunity to reduce energy costs through energy efficiency practices (EPA, 2012). Furthermore, sustainable practices, including sourcing locally, can help attract more environmentally and socially conscious consumers, especially in a city like Ann Arbor which has long been known for having an environmentally friendly populace (National Restaurant Association, 2022). In a similar vein, displaying sustainability certifications on menus or premises could provide a competitive advantage with an environmentally conscious crowd.

Conduct an Audit: The first step is to conduct an audit to establish a baseline for your business. As the common management adage goes, you can't manage what you don't measure, so measure where your business stands in one or more areas: energy use, water use, waste generation, and/or

food procurement practices. Food service businesses can get a free energy audit through the Ann Arbor/Washtenaw 2030 District by joining the Restaurant and Bar group (Ann Arbor/Washtenaw 2030 District, n.d.), and determine their current water use through the online AquaHawk tool (American Conservation & Billing Solutions Inc. (AmCoBi), n.d.). The Commission for Environmental Cooperation's guide on measuring food loss and waste walks readers through steps to measure their food loss and waste (Commission for Environmental Cooperation, 2021). Finally, business owners can determine the level of transparency they have in their supply chain by talking to their procurement managers or suppliers and cataloging ingredients by their season and source.

Ask for Staff Feedback: Staff members often have a valuable perspective on how operations can be improved for sustainability and efficiency and can help identify gaps (ZeroWaste Tech, 2024). Example questions you can ask staff members are: How much food waste do you see everyday? What menu item(s) are the most meat heavy? Do you notice certain appliances left running longer than they should be? Have you noticed any water overuse or leaky faucets? Do you have any ideas on how our business could be more environmentally sustainable? Methods for collecting feedback include brainstorming sessions, surveys, interviews or one-on-one discussions with key staff members, and a suggestions box where staff members can anonymously leave notes with their ideas. An interactive activity to gather staff input is to organize a "sustainability scavenger hunt" in which staff members are invited to walk around the business to identify opportunities for sustainability or efficiency.

Define a Sustainability Vision: Business owners should define a sustainability vision that aligns with the business's values and mission while addressing customer and stakeholder expectations. Identify key focus areas such as energy efficiency, water conservation, food waste reduction, sustainable food procurement, and employee engagement. Consider expanding this vision to include elements like social impact, chemical use reduction, or a decarbonized menu, if applicable. The sustainability vision should communicate expectations and objectives to staff and stakeholders, generate buy-in, and integrate sustainability as a fundamental aspect of how the business operates rather than as an isolated initiative (ZeroWaste Tech, 2024).

Set Sustainability Goals: After completing the audit and gathering stakeholder feedback, set specific sustainability goals that are clear, measurable, achievable, relevant, and time-bound (SMART). Examples of such goals may include reducing energy consumption by reducing waste by 25% in the next two years through ingredient forecasting and creatively using some waste products, or reducing energy usage by $100 a month by incorporating two inexpensive energy conservation measures suggested by an energy audit within six months. Consider incorporating certifications as part of your goals or using them as inspiration for goal-setting. Look into certifications from organizations like the Green Restaurant Association, Sustainable Restaurant Association, and the Ann Arbor Green Business Challenge to guide your efforts and establish benchmarks for success (*Green Restaurant Association*, n.d., *Sustainable Restaurant Association*, n.d., *Ann Arbor Green Business Challenge*, n.d.)

Making a Plan: To make a plan, consider what you need to get from your baseline to your SMART goal. Do you need new equipment, to train any staff members, to reevaluate purchasing decisions, or to develop new procedures or processes in your operations? Get as specific as possible to help implement the plan. If you're not sure what you need to do, discuss with your chef, bar manager, procurement manager, or any other leaders. You can also refer to the sustainability standards on the previous slide for inspiration or connect with Ann Arbor/Washtenaw 2030 District for more assistance brainstorming. The other modules in the roadmap can also be helpful in making your plan more actionable.

Implement and Monitor: Set a timeline to track progress on your goals with enough checkpoints before your goal's deadline to make adjustments if you find you're not on track towards achieving your goal. For example, if the goal is to reduce food waste by 30% in two years, check in on the progress every 3-6 months. Additionally, establish at least one lead for each sustainability goal to ensure accountability and oversight for the goal. Consider using the RACI method to develop a team of support for each sustainability goal, appointing people to be responsible, accountable, consulted, and informed on the goal (Harned, 2024). Some ideas on how to measure progress are through audits, surveys, checkpoint meetings with the RACI team or sustainability goal lead, observations, reports, and/or having the lead enter data in a chart or on a calendar.

Continuous Improvement: Ask for feedback from staff, guests, and other stakeholders to identify areas for improvement and innovation and use this feedback to update training materials, adjust goals, and implement new initiatives (ZeroWaste Tech, 2024). Encourage staff to continue learning more through certifications, conferences, and networking. And, for those businesses in Ann Arbor, connect with peers, share your knowledge and experiences, and help build a sustainable food system in Ann Arbor by joining the Ann Arbor Sustainable Food Business Coalition (Markgraf, n.d.).

Water Reduction Module

1. **Introduction:** Water sustainability is critical to environmental management and is aligned with global and local decarbonization goals (EPA, 2021). This report explores the importance of water management in the hospitality industry, focusing on the benefits it brings to businesses and communities.

2. **Conduct a Water Audit:** The first step is to conduct a water audit, which is to identify inefficiencies and establish a baseline for improvement. Utilizing tools such as AquaHawk and EPA's WaterSense at Work resources can help restaurants and bars identify areas of high waste (US Water Alliance, 2021). In this process, it can help restaurants identify inefficiencies and help set more realistic water use benchmarks (EPA WaterSense, 2021).

3. **Monitor Water Usage and Set Reduction Targets:** Continuous monitoring and setting reduction targets are very important for sustainable water management. Using smart meters and IoT devices can help restaurants track water usage in real time, further facilitating immediate adjustments and long-term planning (Modern Restaurant Management, 2021). Regularly updating these goals can make it easier to ensure that they are enforceable.

4. **Employee Training and Customer Engagement:** Involving employees and customers in water conservation efforts can create a sustainability-focused consciousness. Implementing employee training programs and customer awareness programs (such as displaying water

conservation measures on menus) can increase the overall effectiveness of these programs (QSR Magazine, 2021).

5. **Replace Old and Ineffective Equipment:** Adoption of high-efficiency technologies such as low-flow faucets, toilets, and dishwashers can lead to significant reductions in water usage and utility costs, aligning with sustainable business practices. (EPA WaterSense, 2021).

6. **Reuse and Recycling of Water:** Reusing and recycling water through systems (such as reusing gray water for flushing toilets and landscaping) can significantly reduce demand on municipal water supplies and reduce utility costs (Newterra, 2021).

7. **Feedback and Continuous Improvement:** Finally, establishing a feedback loop with employees and customers is essential to continuously improve water management strategies. This process can further adjust the plan through direct feedback (Fast Casual, 2021).

Food Procurement Module

1. **Introduction to Food Waste:** The food a restaurant serves has huge impacts on their greenhouse gas emissions. This module serves as a comprehensive introduction to sustainable food procurement for bar and restaurant owners.

2. **Why it Matters:** Food procurement does not involve just the restaurant. Farmers, wholesalers, and beyond all have a role to play in our food system. It is important to understand where your food comes from when you are serving it to customers.

3. **Benefits to Sustainable Purchasing:** There are three major benefits to purchasing food sustainably: it aligns with customer preferences, reduces environmental impacts, and supports the local economy. Customers care about where their food is grown and are willing to pay more for sustainably-sourced food (Baldwin, Wilberforce, and Kapur 2011; Roy and Ballantine 2020). Food is a large part of a restaurant's greenhouse gas emissions; food procurement is responsible for 95% of total greenhouse gas emissions in bars and restaurants (Baldwin, Wilberforce, and Kapur 2011). Purchasing food sustainably is a great way to play into customers' tastes and

preferences as well as reduce greenhouse gas emissions. Finally, purchasing food locally supports the local economy and uplifts local farmers.

4. **How to Begin:** To begin purchasing food locally and sustainably you should first determine your priorities and values. It is important to think about what you value for your business. Once that is decided, talk to your current suppliers about whether or not their practices are in line with your goals. This can be done by negotiating vendor contracts and evaluating vendor relationships over time. Also remember to start small. It is very difficult and frustrating to overhaul your complete supply chain overnight. Start by identifying local suppliers for your most used ingredients and then grow from there.

5. **Considerations for Sustainability:** Some considerations for food sustainability include promoting plant based dishes, paying attention to growing practices, and prioritizing local and seasonal ingredients. Plant based dishes typically have lower greenhouse gas emissions than meat dishes, especially red meat. Having plant based dishes on the menu is a great first step to reducing emissions. Another idea is to ask your current supplier about their growing practices, namely their pesticide and chemical fertilizer use, antibiotics in meat, and if their eggs are free range. Seasonal ingredients are more likely to be grown locally, which cuts down on the distance produce has to travel—and is usually fresher.

6. **Next Steps: Develop Supplier Relations with Sustainability in Mind:** Once you have determined your food procurement goals, it is time to take action and connect with local farmers. As a first step, look to purchase food from suppliers that use growing practices that you understand and trust. This may mean that you have to work directly with farmers since distributors may not know the specifics of different growing practices, but working with local farmers helps build community and supports the local economy. Washtenaw County has over 1,200 farms, so there is ample opportunity to find a farmer that can meet your needs (United States Department of Agriculture, 2017). You can connect with farmers through the Ann Arbor Farmers Market, Argus Farm Stop, or the searchable Taste the Local Difference website (Taste the Local Difference, n.d.).

Waste Module

1. Reducing waste is a doubly important endeavor as it not only helps to reduce costs and help your local community, but it is vitally important to reducing your environmental impact.

2. **Sources of Food Waste:** Sources of food waste in restaurants can be divided by front and back of house sources. Food waste from the back of house, being the kitchen, can come from many sources, preparation scraps, used cooking oil, and expired ingredients from excess inventory or improper storage. Front of house waste, from customers, can come from unfinished plates or surplus catering products.

3. **How to Prioritize Reduction Strategies:** The EPA's Wasted Food Scale covers the basic hierarchy of best practices for reducing food waste or reducing the impact of food waste (Wasted Food Scale, 2024). The first step being to reduce food waste at the source, carefully managing inventory to prevent preventable waste from occurring. Donating or upcycling allows for the food to still feed people. Feeding animals or leaving food unharvested means the energy in food still partially reenters the food system and reduces a need for additional feed or fertilizer. Compost is much better than a landfill or incineration, but the process still releases greenhouse gases and is rather inefficient when compared to previously listed options.

4. **Food Waste Reduction in Action:** Food waste reduction in action starts with tracking waste and inspecting trash regularly. Along with inspecting ingredients upon delivery and ensuring proper storage, can help to begin the journey towards lowered food waste. This allows owners and managers to find the best opportunities for food waste reduction at their business. Following along the scale, selling soon to be expired products at a discount, donating excess, and upcycling excess ingredients are all great ways to reduce impact. Selling used cooking oil waste for animal feed or even industrial use is another effective step. Lastly, composting options exist in Ann Arbor to collect and make use of unavoidable waste from food service businesses in the area.

5. **Packaging Waste:** packaging waste is another less thought about aspect of food service businesses. As with food waste, reducing waste like straws, utensils, and containers at the source is the most efficient method. For example, inform customers that you provide straws or takeout

utensils upon request. Consider compostable or even reusable takeout containers as an option for customers. Recycle your own waste where possible, and use a visible guide to help customers if you offer recycling bins for public use.

Energy Efficiency and Electrification Module

1. **Energy Usage Overview:** Restaurants use five to seven times more energy per square foot than other commercial buildings, largely due to kitchen equipment, HVAC systems, and lighting. Enhancing energy efficiency reduces costs, cuts greenhouse gas emissions, and minimizes waste. By adopting strategic upgrades and operational improvements, restaurants, bars, and cafés can lower their energy footprint while boosting profitability (EPA, 2012).

2. **Start Small:** Simple changes can yield immediate energy savings. Energy audits, such as those provided by Ann Arbor's 2030 District, help pinpoint inefficiencies. Implementing a structured startup and shutdown schedule ensures appliances run only when needed, while routine maintenance prevents energy leaks. Optimizing cooking methods—such as using griddles instead of broilers or ovens instead of rotisseries—further conserves energy. Additional savings come from running high-energy equipment during off-peak hours and recalibrating thermostats on dishwashers and refrigeration units (EPA, 2012).

3. **Efficient Equipment:** Upgrading to Energy Star-certified appliances significantly reduces electricity and water use. Prioritizing electric cooking equipment, investing in high-efficiency dishwashers, and replacing pre-rinse spray valves can further cut energy waste. Financial incentives, including DTE CleanVision MIGreenPower and Ann Arbor's SEU, help offset equipment costs (EPA, 2012; DTE, n.d; City of Ann Arbor, n.d).

4. **Lighting:** Switching to LED bulbs lowers energy use by up to 75% compared to incandescent lighting. Installing motion sensors in restrooms, break rooms, and storage areas ensures lights are used only when necessary, while daylight sensors on exterior lighting prevent unnecessary nighttime use. Turning off lights in unoccupied areas and maximizing natural daylight further reduce costs (EPA, 2012).

5. **HVAC Upgrades:** HVAC systems are among the largest energy consumers in restaurants. Annual tune-ups improve efficiency, while replacing air filters every three months enhances airflow and reduces system strain. Programmable thermostats help regulate temperature when spaces are unoccupied, preventing energy waste (EPA, 2012).

6. **Water Heating:** Water heating for dishwashing and cleaning is energy-intensive, but Energy Star commercial water heaters and wastewater heat recovery systems can lower consumption. Insulating hot water pipes can also prevent heat loss, reducing overall heating demands (EPA, 2012).

7. **Efficient Education:** Incorporating energy efficiency training into staff onboarding ensures employees understand and prioritize sustainability. Reinforcing best practices—such as minimizing idle appliance time and optimizing refrigeration use—can be encouraged through incentives and team-based efficiency challenges. Smart meters help track energy use, while regular reviews of efficiency goals drive continuous improvement.

Employee Engagement

Why Engage: Restaurant sustainability starts with top management but depends on daily execution by employees (Madanaguli et al., 2022). Interviews conducted for the Sustainable Food Service Business Roadmap in Ann Arbor reveal that sustainability efforts attract dedicated employees and resonate with customers. Additional benefits include improved business reputation, enhanced customer loyalty, and potential operational efficiency gains (The Sustainable Restaurant Association, n.d.). For employees, training aligns work with personal values (Iraldo et al., 2017), helps build new skills, and enhances health and well-being (LinkedIn et al., n.d.).

Practical Guidance: After defining a sustainability vision and educating staff, provide practical tools to implement sustainable practices. Create clear procedures and standards, like checklists for energy-saving measures or guides for waste recycling. Co-create Sustainability Procedures by involving employees in creating sustainability guidelines. This collaborative approach allows

staff to explore current practices and develop innovative solutions, fostering a deeper understanding of sustainability and a sense of responsibility. Provide tools and resources - equip staff with necessary resources, such as energy-efficient appliances and reusable containers, to support their sustainability efforts (LinkedIn et al., n.d.).

Training: Interviews with long-term employees suggest integrating sustainability training into new employees' onboarding. The introductory business overview for new hires is an opportune moment to introduce the company's sustainability vision and outline how employees can contribute. During menu training, emphasize sustainably sourced ingredients, enhancing employees' ability to communicate procurement practices to customers. Ensure shadowing employees pass on sustainability procedures, such as equipment shutdown procedures to reduce energy use. Incorporate sustainability questions in onboarding quizzes to reinforce learning retention.

Recognize and Reward: Promote sustainable practices by recognizing and rewarding staff achievements. Use bonuses, certificates, or public praise linked to sustainability goals. Tie managers' bonuses to sustainability progress, and consider gift cards for hourly employees, facilitating a local culture of sustainability and easing financial burdens (Kochanaski & Insler, 2010).

Continuing Education: Encourage staff involvement in industry events, such as conferences, webinars, and workshops, that focus on sustainability topics pertinent to the hospitality sector. By promoting a culture of continuous learning, you can ensure that your employees stay at the cutting edge of sustainable practices in hospitality (ZeroWaste Tech, 2024). Encourage staff members to get involved with the A2ZERO Ambassador Program to learn more about local resources and opportunities to help with the business' and their own sustainability journey (Office of Sustainability and Innovations, n.d.). Sponsor managers to attend industry conferences or participate in associations to learn about cutting-edge sustainability practices and innovations. Support employees to learn more about restaurant sustainability and become a Green Restaurant Accredited Employee (*Green Restaurant Association Employee Accreditation*, n.d.).

Level 2: FAQs

Many restaurants and bars across the United States faced similar problems on their journey to sustainability, and the restaurants in Ann Arbor are without such exceptions. During the process of our capstone project, we have compiled useful websites, recommendations, practices, and local resources and compiled these into this frequently asked questions (FAQ) sheet. We have divided our FAQs into four sections: general information, energy efficiency, food procurement, and waste reduction. We present each question in each section into a question-and-answer style fact sheet. We have also included real-world restaurant sustainability improvement case studies at the local and national levels to prove that the improvement in sustainability does not necessarily cost more money. We aim for this FAQ to be a guide for food service business owners who wish to include sustainability into their operations or business model.

See Appendix E for the text version of the FAQ section.

Level 3: Restaurant Sustainability Checklist and Repository of Resources

Finally, Level 3 aims to provide a few plug-and-play resources as well as additional information if readers want to go deeper into any topic.

In terms of plug-and-play resources, the team developed a list of short-term and long-term actions in the five topic areas for food service businesses to incorporate into their daily checklists and long-term planning. Readers can copy and paste the checklist items most relevant to their needs into their existing checklists or work flow. The team also adapted some materials from one of their interviewees, Jim Saborio, owner of Comet Coffee. These included a list of barista-specific sustainability checklist items, signs that can be placed next to HVAC controls advising on energy efficient practices in different seasons, a sign to display next to an ice machine with energy efficient instructions, and a list detailing what can be composed, recycled, and landfilled.

Finally, additional external resources were shared in most of the topic areas - namely, the Ann Arbor Green Business Challenge Toolkit, a guide from WaterSense about best practices, ReFed’s

Restaurant Food Waste Reduction Guide, the Food Service Playbook for Promoting Sustainable Food Choices, and a map of farms in nearby Scio Township. These resources were all chosen because they allowed readers to dive deeper into a sustainability topic and learn more specific, nuanced information that went beyond the scope of this project.

See Appendix F for Level 3 Resources.

Advisory Committee

Once the team had put together a rough draft of the roadmap, they sought feedback from an "advisory committee." The goal of this engagement was to validate whether the team's approach was relevant to the needs and realities of food service businesses and to seek advice on how to improve the roadmap to be more useful and clear to the intended audience. Each section was required to be reviewed by at least one advisory committee member.

The advisory committee was composed of people we had already interviewed, as well as additional trusted resources, such as servers, baristas, and staff members with experience in the food service industry, our client (Culbertson and Spitz), advisor (Lewis) and Azella Markgraf. The full list of advisory committee members can be found in this report's Acknowledgements section.

Each capstone team member set up a meeting with one to three advisory committee members to talk them through selected modules, the FAQ, and/or the checklist and ask targeted questions for feedback. The goal of this engagement was to validate whether the team's approach was relevant to the needs and realities of food service businesses and to seek advice on how to improve the roadmap to be more useful and clear to the intended audience.

On a high level, the team was advised to present their ideas in the order that the target audience was most likely to undertake the recommendations rather than in a chronological order. The team decided to take this to mean arranging recommendations in the order of no cost to low cost to high cost strategies, whenever possible. Additionally, the team was told to include a background slide in each module to state the problem and ground the audience in an understanding of why

there is a need to address each topic. For example, while the team might take for granted that food service businesses tend to be more energy intensive than other commercial businesses, it was recommended to lead with information such as that to help orient the audience towards the need for the following recommendations. Finally, an advisor also pointed out that managers are the ones most likely to implement the recommendations, not the owner, and to therefore make sure that our language throughout the modules reflects this difference in decision making ability.

For the "Start Here" module, advisory committee members shared ideas on how to highlight the benefits of sustainable practices for food service businesses. The three main suggestions were to emphasize the cost-savings from reducing inventory waste, the chance to appeal to consumer preferences, especially in a place like Ann Arbor where customers and employees (anecdotally) seem to care more about dining at and working with places that align with personal values for sustainability, and the opportunity to gain a competitive advantage through certifications that showcase the business' sustainable practices, such as the Michelin Green Star and Ann Arbor's Green Business Challenge.

In terms of the energy efficiency module, our faculty advisor shared a number of suggestions, such as changing the order of recommendations to begin with low to no-cost strategies and building our way up to the higher cost suggestions, adding a call to electrify everything that can possibly be electrified at the business (i.e., induction stovetops instead of gas-fired open flames), and adding information about heat pumps and wastewater heat systems. Additionally, an advisory committee member and owner of a cafe mentioned that he was unfamiliar with heat pumps and wastewater heat systems and so recommended including images and descriptions for new technologies. A different advisory committee member recommended inclusion of a rooftop energy sensor, Eyedro, for use in tracking HVAC energy use as a low-cost strategy to reduce energy use. They also recommended looking into DTE rebates and working with a DTE representative to find inefficiencies at the business. They mentioned that not only did their energy efficiency measures result in tangible, substantial cost savings for their business but that it also earned them goodwill from customers who noticed and appreciated the business' sustainability practices. Finally, a third advisory committee member flagged some barriers for implementation she faces at her business; namely, that certain health department requirements

don’t allow for powering down the exhaust fan and number of lights in the kitchen and that, without cooperation with their landlord, they are unable to implement changes to their equipment or building that would result in energy and cost savings.

In the water conservation module, the need for water conservation was highlighted as a topic that needs to be addressed early on, because while people may understand how water conservation is an environmental topic, they may not see its relevance to Michigan where the Great Lakes are seen as an abundant and accessible resource. Additionally, information about grants and rebates to help with water conservation efforts was flagged as a way to make the recommendations more actionable for business owners, while the Ann Arbor Green Business Challenge was brought up as a potential resource for business owners to receive an audit and utilize an existing resource in their sustainability journey. In terms of format, our advisor recommended we clarify how a business can perform a water audit, and to re-evaluate the order of the slides to make sure the information built on previous slides.

For the food procurement module, Markgraf recommended a slide at the beginning describing the relationship between procurement and the carbon footprint of a business, such as by articulating the impact of meat versus plant-based foods. Additionally, a food products supplier suggested discussing seasonality as a gateway into making more sustainable food procurement choices. They highlighted a few local businesses that focus on seasonality, local produce, and using a short list of ingredients for their whole menus as examples of places that are succeeding due to their focus on sustainable food procurement. They mentioned that they’ve noticed that customers in the Ann Arbor area tend to go out of their way to support local businesses that source locally even if the price is a little higher, because of both their values and a growing focus on agro-tourism. This competitive advantage was highlighted as a way to help chefs understand the benefits of focusing on local, seasonal produce. Additionally, they suggested a strategy of encouraging chefs to go to local farms to better understand the kinds of ingredients available nearby as a form of inspiration, and then to establish relationships with local farmers to gain exclusive deals. While this may be a more time-intensive process, the expert we spoke to said they have seen this be a highly profitable path for both parties, resulting in major cost-savings for the food service business and a stable revenue stream for the local farmer. Finally, the expert also

mentioned that changes like this need to be driven from both the top (management and owners) and from the bottom (customers and employees) to have the best chance at success. This approach was suggested to be an important way for restaurants to deal with the upcoming uncertainty of tariffs, inflation and broader supply chain issues that may face the food system. The waste module was a particular source of interest for advisory committee members due to the significant need and opportunities in reducing food and packaging waste in the food service industry. Employees at food service businesses described how some businesses measure waste mid-day and end-of-day to understand how much of their inventory is being thrown away, as inventory is closely monitored by managers as a cost-saving measure. Thus, any interventions that take advantage of the practice of measuring waste and the need for trimming inventory costs has a higher likelihood of success. Additionally, our advisor recommended we focus more on concrete strategies a business can use to reduce waste rather than discussing the state of the problem too much. Suggestions for how to do this include plugging local resources and opportunities, explaining how to recycle and compost correctly, and describing how a business can integrate the EPA's Food Waste Pyramid in their decision-making.

Finally, in the Employee Engagement module, current and past employees of food service businesses suggested key touchpoints in which sustainability could be woven into new employee training and onboarding. For example, they recommended including the restaurants' sustainability vision into the first overview of the restaurant discussion one has when joining a restaurant staff, then discussing the business' sustainable food procurement choices during menu training to help the employee discuss it with customers, and ensuring that new employees learn energy and water conservation practices and waste reduction strategies during their shadowing shifts with existing employees. However, they also mentioned that training only goes so far and learning by doing is the most effective way new employees learn the ropes, and so making sure that managers are aware of and monitoring how sustainability is being integrated into the business operations consistently will help make it part of employees' daily operations. Additionally, a couple advisors mentioned how tying managers' bonuses to progress on a business' sustainability goals can be effective while offering gift cards to star employees that lead or help achieve those goals is a fair incentive. One interesting idea that was suggested was for food service businesses in the Sustainable Food Business Coalition to offer one another gift

cards to reward employees once a quarter. Finally, in terms of the content of the slides, trimming down the number of slides and providing more concrete guidance instead of conceptual advice was noted as being the most effective way to deliver this content.

While a few new questions arose during the advisory committee process for Level 2: FAQs, most advisors did not have any additional questions or suggestions for this section. The major recommendation, however, was to focus on the delivery of this section. The way it looked at the time of the advisory committee process was a long, 14 page document with bullet points and hyperlinks. This was deemed too busy and complicated to navigate, and so the team was advised to find a way to streamline the presentation and reduce reader fatigue. The way the team decided to execute this suggestion was to have the answer to each question appear as a dropdown box, allowing readers to scan all the questions at once and navigate only to the answers for questions they have. Additionally, similar to the modules, the team was advised to order the content from low-cost to high-cost within each section of the FAQ.

Finally, for Level 3: Resources, the team received validation that their idea to develop a set of daily and long-term checklist options for each topic of the roadmap was a good idea because every single food service business uses checklists on a regular basis. That said, the team was warned not to add too much "side work" to these checklists, focusing on just a few actions for each topic for highest impact. Additional work could be added to the long-term checklist as inspiration for bigger projects the business could take on, but daily checklists needed to be short and actionable within the context of daily operations. An advisor told the team that managers typically review the checklists every day and so that was the audience to gear the language of the checklists towards. Finally, many advisory committee members suggested additional resources and documents that could be helpful for other businesses, such as reminders to turn off the ice machine or additional online resources that can supplement a business' sustainability journey. Therefore, the team was inspired to expand Level 3 from just being a set of checklists to being a repository of other curated resources for businesses to use as they consider additional inspiration for sustainability.

Ultimately, the advisory committee process was incredibly helpful in validating the team's approach and gathering a host of actionable feedback and recommendations on how to improve the roadmap. The team made a list of all the feedback they received, organized by topic and section of the roadmap, and implemented as much of the feedback as possible during the second and third round of edits.

Conclusion

Our research sought out to create an accessible and comprehensive roadmap for food business owners at any point in their sustainability journey. Through our survey and interviews with food business professionals in the Ann Arbor area, we identified that time, financial resources, and knowledge were primary barriers to implementing sustainability. Furthermore, food business owners were primarily interested in waste reduction and local food procurement. Our research indicated that a list of resources was wanted by members of the food business community and informed our approach to the roadmap.

Our roadmap includes educational modules, a document of frequently asked questions and answers, and daily operation sustainability checklist accompanied by a repository of other resources. The aim is for the modules to be for someone that is at the beginning of their sustainability journey without time to do external research—addressing the lack of knowledge and time. The frequently asked questions address audiences that understand sustainability, but have remaining questions about where to go and local vendors or funding that can help—addressing the lack of knowledge, time, and financial resources. Finally, the sustainability checklist and repository of resources serve as turn-key resources and ideas for daily implementation of sustainability.

This study was limited primarily by our small sample size of survey respondents and interviewees. Many of our survey respondents already had sustainability initiatives in their businesses, and notably, all respondents already sourced at least some of their food locally. Furthermore, though we sought out to be all encompassing—with all roadmap materials focusing on energy efficiency, water usage, waste reduction, food procurement, and employee

engagement—due to capacity constraints we chose not to examine the direct impacts of transportation and cooking methods on greenhouse gas emissions. Furthermore, interviewees said that they had guidance on how to speak with their landlords about how to retrofit their building or upgrade to energy efficient equipment, which led us to not pursue the topic in depth in our roadmap. Finally, we came across frustration with the city of Ann Arbor's municipal composting program and a desire for policy reform in collaboration with food service professions.

Based on these limitations, future efforts should focus on aligning municipal support and incentives—like composting programs—with local needs to ensure wider adoption of sustainability initiatives. Along with further resources to facilitate dialogue between landlords and tenants to enable equipment upgrades or building retrofits for energy efficiency and weatherization.

In conclusion, we hope that our roadmap serves as a guide for food business owners interested in sustainability. Though this roadmap is tailored to Ann Arbor and Washtenaw County specifically, it can be easily adaptable for other members of the 2030 District Network. The Ann Arbor community values sustainability, and implementing more sustainable practices helps appeal to a broader customer base while helping the environment.

Contributions

SB

- Outreach: 16.7% of restaurants listed for contact, 38% of outreach responses.
- Interviews: 30% interviewed (10% of which in collaboration with Maithilee Kanthi)
- Literature Review - Waste Management (Food and Packaging) - 100%
- Report: Project Goals - 100%, Waste Module write up - 100%
- Roadmap Content: Level 1: Waste Management Module - 100%, Level 2: Waste Management Section - 100%, Level 3: Waste Management Section - 100%
- Design: Editing - 33%
- Roadmap Website: Level 1 Module Page - 70%

MK

- Outreach: Sending surveys to businesses - 15%
- Interviews: 20%
- Report: Introduction - 100%; Literature review for employee engagement – 100%; Interview results section (in collaboration with Annie) – 60%; Roadmap: "Start here" module write up – 100%; Roadmap: Employee engagement module write up – 100%; Roadmap: Level 3 writeup – 100%; Advisory committee write up – 100%
- Other deliverables: 2030 District conference presentation – 50% (in collaboration with Miriam)
- Advisory Committee Process – 30%
- Roadmap: Level 1: Start Here module – 100%; Level 2: General Knowledge questions – 100%; Level 1: Employee Engagement module; Level 2: Employee Engagement questions; Level 3: gathering external data sources – 60% (in collaboration with Annie); adapting Comet Coffee resources – 40% (in collaboration with Annie)
- Roadmap editing – 25% (in collaboration with team)
- Administrative tasks (i.e. communicating with client and external partners, scheduling meetings, setting agendas and deadlines, developing – 33% (in collaboration with Annie and Miriam)
- Transferring roadmap to website – 30%

YL

- Outreach: Interviews - 33%
- Report: Qualitative analysis - 50%, Quantitative analysis - 50%, Energy Efficiency Write up - 20%, Water Module write up - 30%, Interview analysis - 50%, Literature analysis (Energy Efficiency) - 20%, Survey result section - 50%, Roadmap (FAQ) writeup - 40%, Discussion - 33%
- Data Analysis: EnergyStar Portfolio Management: Data analysis, making graphs, writeup, communication with client - 50%

- Roadmap Content: Energy Efficiency Module - 25%, FAQ cleanup - 100% Level 3 Presentation - 30%, Water Module - 30%

MM

- Outreach: Sending surveys to businesses - 20%
- Interviews - 33%
- Report - Literature review for energy efficiency - 80% (in collaboration with Leon), Methods and data collection- Overview - 50% (in collaboration with Annie), Survey: General Info, Water and Energy Efficiency, Waste, Broader Sustainability Goals sections - 100%, Roadmap - Energy Efficiency and Electrification module write up - 80% (in collaboration with Leon), Discussion - 33% (in collaboration with Annie and Leon)
- Other deliverables: 2030 District conference presentation – 50% (in collaboration with Maithilee)
- Administrative tasks (i.e. communicating with client and external partners, scheduling meetings, setting agendas and deadlines, developing – 33% (in collaboration with Annie and Maithilee)
- Transferring roadmap to website – 30%

AS

- Research - Restaurant Ownership structure - 75%
- Outreach: Outreach - 30%, Interviews - 20%
- Report: Abstract - 100%, Overview of Restaurant Sustainability - 50%, Literature Review - Food Procurement - 100%, Methods and Data Collection - Outreach and Interviews - 50%, Discussion - 33%, Conclusions - 100%, Food procurement module write up - 100%
- Roadmap Content: Food Procurement module - 100%, FAQs - 20%, Checklist - 20%
- Food procurement module write up - 100%
- Roadmap Design: Template - 100%
- Roadmap Website: Level 1 Module Page - 30%, Level 3 Repository of Resources Page - 100%

ZZ

- Research: Survey - 20%
- Report: Qualitative Analysis - 50%, Quantitative Analysis - 50%, Water Module Write Up - 70%, Interview Analysis - 20%, Literature Review - Water Conservation - 100%, Results - 60%
- Data Analysis: Data collection & cleaning, graphs, communication with Jan, All restaurants analysis, York & Kerrytown data analysis, water bill data analysis. 50%
- Roadmap Content: Water Module - 70%, Water FAQ 80 %

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Appendix A - Survey

University of Michigan School for Environment and Sustainability: Ann Arbor 2030 District Master's Project Restaurant Survey

Hi! We are a team of six graduate students at UMich SEAS. We're working with the Ann Arbor/Washtenaw 2030 District, who supports local businesses on saving money, energy, and water. Survey responses will begin the collaboration with restaurants to design programs and resources to assist with sustainability efforts.

This survey will take 5 - 7 minutes to complete. We appreciate you taking the time to fill this out. If you have any questions or concerns please contact our team through this email: a22030team@umich.edu.

* Indicates required question

1. Name of bar/restaurant *

2. Survey taker's name and relationship to bar/restaurant *

3. Contact Information (email or phone number) *

4. How many meals do you serve per week? *

Mark only one oval.

- ◯ Less than 500
- ◯ About 500
- ◯ More than 500
- ◯ Other: _____

5. Do you own the building in which your business is located? *

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Other: _____

6. Do you pay your own utilities? *

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Prorated into lease
- ◯ Only pay for electricity
- ◯ Only pay water
- ◯ Only pay gas
- ◯ Other: _____

Energy Efficiency

7. Please rate your level of interest in an assessment to identify energy and water savings. *

Mark only one oval.

	1	2	3	4	5	
No i	◯	◯	◯	◯	◯	Very interested

8. How often does your business inspect your refrigerants for leaks?

Mark only one oval.

- ◯ Monthly
- ◯ Every other month
- ◯ I don't know
- ◯ Other: _____

9. To what extent are EnergyStar and/or WaterSense rated appliances utilized?

Mark only one oval.

- ◯ No EnergyStar or WaterSense rated appliances
- ◯ Some
- ◯ Most
- ◯ All
- ◯ N/A
- ◯ I don't know

10. Approximately what percentage of your business' lighting is LED? Dropdown

Mark only one oval.

- I do not know
- 0-20%
- 21-40%
- 41-60%
- 61-80%
- 81-100%

Waste

11. What type of takeout containers do you use?

Check all that apply.

- Foam
- Compostable Bioplastic
- Compostable Paper Products
- Reusable
- Recyclable
- N/A
- Other: _____

12. Do you have a composting program to divert food waste from landfills? *

Mark only one oval.

- Yes
- No

13. If you don't already participate in municipal composting, what would encourage your participation?

14. Do you have a recycling program to divert recyclable waste from the landfill?" *

Mark only one oval.

- Yes
- No

15. If you don't already participate in recycling, what would encourage your participation?

16. What do you do with unsold food at the end of the day that can't be resold the next day?

Check all that apply.

- [ ] Donate for animal use
- [ ] Donate for human use
- [ ] Give to employees
- [ ] Sell at a discount
- [ ] Send to landfill
- [ ] Compost
- [ ] Other: _____

General Sustainability Interest

17. What aspects of sustainability are of most interest to your business? *

Check all that apply.

- [ ] Reducing energy consumption
- [ ] Reducing water use
- [ ] Reducing waste
- [ ] Local food sourcing
- [ ] Promoting alternative transportation use
- [ ] Reaching sustainability-minded customers
- [ ] Promoting lower greenhouse gas emission food options (increasing plant-based meal options)
- [ ] Not interested in sustainability
- [ ] Other: _____

18. Do you currently purchase foods from local sources (farms, farmers market, etc)? *

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ I do not know

19. If you do not currently purchase foods from local sources (farms, farmers market, etc), why not?

20. Are there any other sustainability efforts that you have implemented or considered in your business?

21. What are some barriers that your business experiences to implementing sustainability efforts?

Check all that apply.

- [ ] Time
- [ ] Money
- [ ] Resources
- [ ] Information
- [ ] Space
- [ ] Other: _____

22. Would you be willing to have our research team contact you for a one hour follow-up interview? *

If so, please schedule a time for you to meet with one of our team members here.

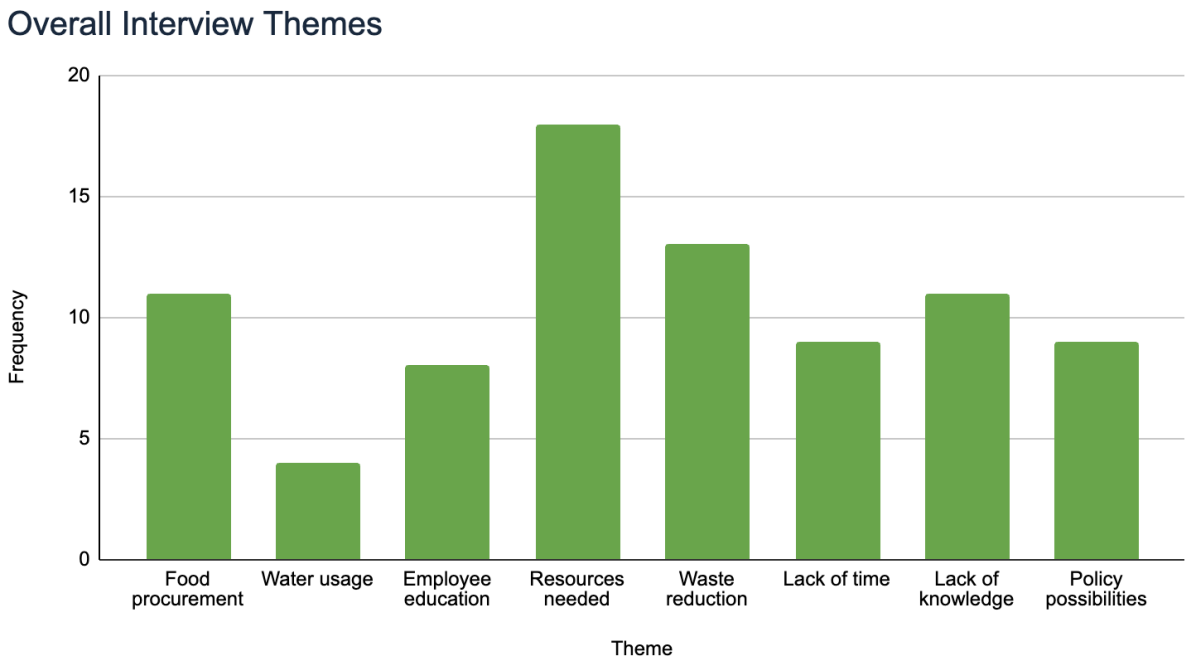
Mark only one oval.

- ◯ Yes
- ◯ No

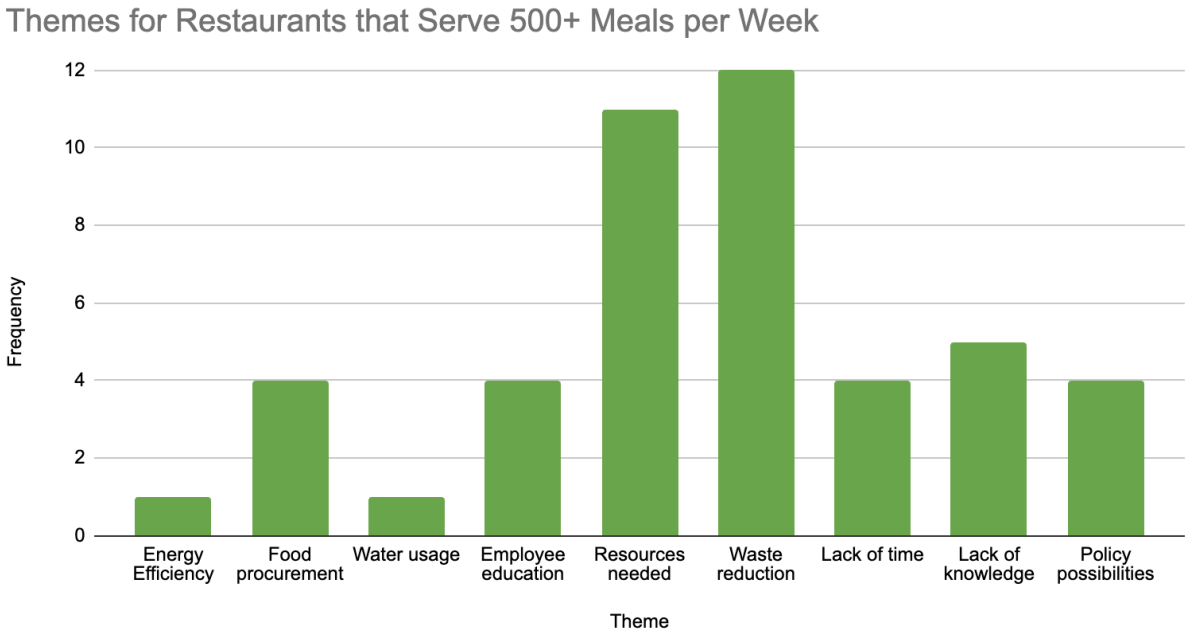
Appendix B - Interview Questions

1. What motivated you to get into the restaurant business?
2. In your own words, how would you define "sustainability"?
3. Can you describe any successes / hardships that the restaurant has experienced in achieving progress towards its sustainability goals?
4. It looks like you've indicated _____ and _____ as the primary barriers that keep you from being more sustainable in your business when you completed our survey. Can you talk more about how those factors influence your ability to advance sustainability?
5. Can you talk a bit about how sustainability factors into your decision making processes in your business? When evaluating an upcoming decision, how highly would you rank sustainability when compared with other factors, like finances, convenience for staff/customers, etc...?
6. Some for watersense?
7. Is there anything that you can think of that would help you achieve your business's sustainability goals?
8. Have you engaged your customers and/or staff to get their opinion?

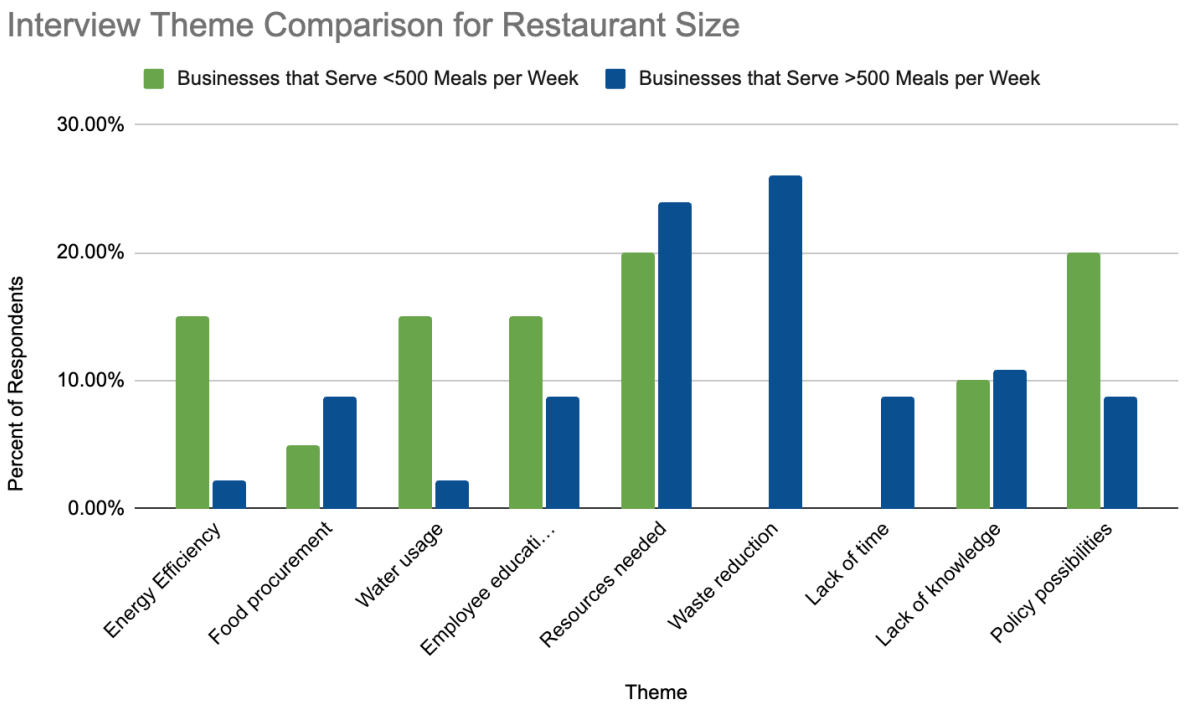
Appendix C - Interview Data



Frequency of each theme across all interviews.



Interview themes for restaurants that serve 500+ meals per week.



A comparison of interview themes for restaurants that serve less than 500 meals per week and more than 500 meals per week.

Appendix D - Link to Food Service Business Sustainability Roadmap on Ann Arbor/Washtenaw 2030 District Website:

The full roadmap can be accessed here:
https://2030districts.org/annarbor/food-service-business-sustainability-roadmap

Appendix E - Level 2: FAQ's

Section I: General Questions

1. **Are there any standards or certifications I can learn from or qualify for?**
    - Green Restaurant Association Standards
        - The Green Restaurant Association (GRA) is an international nonprofit organization promoting environmentally sustainable practices for restaurants. It uses a science-based certification standard that covers multiple categories, including energy, water, waste, and more, and is used by thousands of restaurants in 47 U.S. states and Canada to improve their sustainability. Restaurants earn GreenPoints™ in these categories to achieve one of four certification levels, each with specific point requirements. Through collaborations with restaurants, manufacturers, and distributors, the GRA aims to advance sustainability across the restaurant industry. Additionally, restaurants can also earn six badges: Near-Zero Waste, Clean Chemicals, Vegan, Vegetarian, Sustainable Seafood, and Sustaina-build. Learn more here.
        - 

    - Sustainable Restaurant Association: Food Made Good Standards
        - The Sustainable Restaurant Association's Food Made Good Standards take a holistic approach to sustainability efforts in the hospitality industry. This comprehensive framework prioritizes sustainability across every aspect of a foodservice business, going beyond simple metrics like carbon tracking or water use. It evaluates efforts in three main pillars: sourcing, society, and environment, focusing on key impact areas within each. This promotes integration of sustainable practices at all operational levels..

- ■
- ○ Ann Arbor Green Business Challenge
  - ■ The Ann Arbor Green Business Challenge is a program designed to help local businesses in Ann Arbor improve their sustainability practices. Through this initiative, businesses are awarded points for implementing environmentally friendly operations in areas such as energy efficiency, waste reduction, water conservation, and more. The challenge offers tools, resources, and support to participants, fostering a collaborative community that shares best practices. By recognizing and rewarding businesses that make significant strides in sustainability, the program aims to help businesses become more environmentally friendly and align with the city's net zero plan. To schedule a free consultation, learn more about how to get certified, or explore further resources, go to the Green Business Challenge website here.

- ■

2. What funding opportunities are available to help me in my sustainability journey?

- ○ Ann Arbor SPARK
  - ■ Ann Arbor SPARK has compiled a list of state and local incentives, programs, and resources for commercial businesses starting, relocating, or expanding their operations. The business development team at Ann Arbor SPARK also offers personalized assistance to help businesses navigate the opportunities.

- EGLE grants for small businesses
  - The Michigan Department of Environment, Great Lakes, and Energy (EGLE) offers federal and state-level funding for various pollution prevention projects, including a food waste reduction implementation program for businesses implementing solutions from the Food Waste Reduction Roadmap and a small business P2 loan program to implement projects that eliminate or reduce waste through source reduction or recycling, and includes energy and water conservation projects.
- Ann Arbor/Washtenaw 2030 District
  - The Ann Arbor/Washtenaw 2030 District helps connect local businesses with funding opportunities and resources.
  - They also provide grants from $2500-$5000 toward Building Energy Audits or other energy saving measures. Apply for the energy audit here.
- PACE suggest (for building owners)
  - Property Assessed Clean Energy (PACE) financing allows property owners to fund energy-efficient and eco-friendly projects with no upfront costs. It offers long-term financing for up to 25 years or the lifespan of the project, providing immediate positive cash flow as savings typically exceed repayment costs. The financing is tied to the property, meaning it transfers to a new owner if the property is sold. Interest rates are fixed and negotiated individually. This type of financing not only upgrades local buildings and increases property values but also supports the local economy by creating jobs and making buildings more comfortable. Learn more here.

- DTE Energy Efficiency Program for Businesses
  - DTE offers a number of rebates to small businesses for new energy-efficient improvements including lighting, HVAC, equipment, process and more.

3. **What do I do if certain sustainability purchases or upgrades are still too expensive for my business?**
   - While many of the sustainability solutions shared throughout this roadmap are low- to no-cost, there may be times when a more sustainable alternative carries a higher price tag than a conventional alternative. If you are still interested in making the sustainable choice work, some of the ways you can deal with these added costs are:
     - Apply to grants or rebates. You'll find many in the question above, as well as on the 2030 District website.

- Pass some of the cost on to customers. While raising prices is a dicey affair, research shows that some consumers are willing to spend a little extra money to shop at a business that aligns with their values. Weave your sustainability vision and sustainable choices into your business' story through displaying certifications, highlighting sustainable ingredients on your menu, adding a page to your website detailing your sustainability journey, and other forms of marketing.

4. **How does this align with Ann Arbor's net zero goals (the A2Zero Plan)?**
    - According to the City of Ann Arbor, "A²ZERO envisions a food system that ensures high-quality, nutritious food is accessible to all, promotes healthy communities, supports fair and sustainable production methods, remains resilient in the face of disruptions, and contributes to a more diverse and equitable society." The City's Sustainable Food Programs webpage describes how residents and businesses can get involved with various programs aimed at advancing this vision for a sustainable, equitable, and resilient food system.

Section II: Energy Efficiency

1. **What are some of the simplest ways to reduce energy consumption?**

Remember the 4 T's:

Turn Off: Turn off unnecessary appliances.

Turn Down: Turn down water faucet and dimmer lights.

Turn Up: Make sure maintenance is completed regularly.

Tear Out: Consider the return on investment of a retrofit that might outweigh the savings of using old equipment.

2. **Where can I find specialized Energy Star certified equipment?**

Energy Star Product Finder: https://www.energystar.gov/productfinder/.

Commercial Food Service Equipment

- Commercial Coffee Brewers
- Commercial Dishwashers
- Commercial Electric Cooktops
- Commercial Fryers
- Commercial Griddles
- Commercial Hot Food Holding Cabinets
- Commercial Ice Machines
- Commercial Ovens
- Commercial Refrigerators and Freezers
- Commercial Steam Cookers

3. **How can I conserve energy over the summer?**

20°C to 22°C is the ideal temperature in the bar. If you set the temperature too low, it will force the air conditioning system to work hard. In addition, keeping the windows clean will help you save energy on lighting. Use natural refrigerants instead of synthetic refrigerants to save about 17-38% on energy, and natural refrigerants have a longer life span. Check out this guide for more information.

4. **How to improve the refrigeration efficiency of your restaurants or bars?**

Keep the fridge or freezer as full as possible, because an empty machine will have to work much harder to maintain temperature. Avoid overstocking your refrigerator or freezer, because when the items are too crowded, it becomes harder to cool them.

Use walk-in coolers and upgrade to high-efficiency fan motors. You can also install fan speed controllers and smart defrost systems. Learn more here.

5. **What are some real–world examples of integrating all the energy-saving tips that we have talked about so far?**

Ann Arbor's example:

BLØM is an independent meadery based in Ann Arbor. They specialize in selling mead—a type of wine made from honey. BLØM is deeply committed to sustainability. For example, they source honey and other ingredients from across Michigan whenever possible. During the construction of their meadery, they prioritized the use of reusable materials—such as glassware and plates—over disposable ones. Their sustainability efforts also extend to utility management:

they reduce HVAC use during non-public hours and invest in large-format stainless steel tanks that require less frequent cleaning. Despite their eco-conscious practices, BLØM remains profitable while staying true to their sustainability values.

Shari's Cafe & Pies is another real-world example—this time on a national level—that incorporates numerous energy-saving practices into its restaurant operations. It is the largest full-service restaurant chain in the Pacific Northwest, with 100 locations operating 24/7 across six states. Shari's has retrofitted gas boilers, installed automatic door closers and LED lighting, deployed heated dipper wells, and introduced demand-control ventilation systems in their kitchens. Additionally, they have invested in energy-efficient equipment and management systems. As a result of these efforts, the company has reduced gas usage by more than 7%, generated 19% less waste, and achieved water savings of over 37% compared to its 2012 baseline. These sustainable initiatives have led to significant savings on electricity and water bills.

While Shari's Cafe & Pies is not an independently owned business, its experience in implementing sustainable HVAC systems can serve as an inspiration for locally owned restaurants in Ann Arbor.

Section III: Water conservation

1. **How do I conduct a water use audit?**

The first step in conducting a water use audit is to track and analyze current water usage using tools like AquaHawk. This includes checking water meter readings, detecting leaks, and assessing the efficiency of water-using appliances.

For more information, refer to the EPA's WaterSense at Work resources.

2. **How do I set water reduction targets?**

Based on the results of the water use audit, you can set specific water reduction targets. Use smart meters and Internet of Things (IoT) devices to monitor water usage in real-time, set achievable short-term and long-term reduction targets based on initial audit data, and adjust these targets as technology and practices improve.

3. **What water-efficient technologies are suitable?**

You can find some WaterSense products in the DTE marketplace (aerator, faucets) https://www.dtemarketplace.com/collections/water

4. **Real–world examples of water conservation?**

BLØM

- According to their Sustainability page, BLØM uses large-format stainless serving tanks, alongside their traditional kegs, that require less frequent cleaning due to their small size, thus saving water. And their HVAC is programmed to run less frequently during non-public hours and use on demand hot water heaters so energy isn't used to store hot water.

Section IV: Waste Reduction

1. **How to reduce food waste in the back of the house?**

- Try to find uses for food scraps, such as stocks.
- Keep track of what foods are getting frequently thrown away before they can be used.
    - Try using a helpful tool like the EPA's Food Waste Logbook to track what gets thrown away.
- Consider adjusting menu offerings to reduce use of frequently expiring, unused, or uneaten ingredients
- Consider offering smaller plate options of entrees
- Look through your trash to get a better idea of your restaurant's food waste. Find creative uses for ingredients that are approaching their expiration.
- Always check your shipments to make sure your ingredients are properly stored and to your quality standards.
- Ensure proper storage of ingredients.

2. **Where can I donate food?**

- Ann Arbor's Food Gatherers accepts food donations and distributes food to a large network of organizations that feed the hungry in our community.
    - Drop Off is available Monday-Friday, 9:00 a.m. – 4:45 p.m. at 1 Carrot Way, Ann Arbor, MI 48105.
    - Phone: 734-761-2796. Email: info@foodgatherers.org.
- Or you can partner with local faith based organizations to donate excess catering supplies.

3. **What can I do with excess prepared foods?**

Too Good To Go is a simple app that allows you to list "surprise bags" of excess products or items near their expiration date like prepared foods, baked goods, or packaged drinks for a discounted price. You can set pick-up times and can choose to list whenever works for you!

4. **Is there a service that can help me track and implement waste reduction strategies?**

Leanpath is a company that provides technology solutions to help food service operations track and reduce food waste. Founded in 2004, Leanpath offers tools and software that allow kitchens in restaurants, hotels, universities, hospitals, and other food service venues to measure and analyze their food waste. The information gathered helps organizations identify key areas where waste can be minimized, leading to cost savings and improved sustainability efforts.

5. **What are some alternative [environmentally friendly] supplies I can buy?**

If you are looking for compostable wares that are accepted by Ann Arbor's composting program, stick to compostable products made of fiber or paper. Please follow their comprehensive list here where you also find a downloadable purchasing guide. For example, World Centric provides compostable plant fiber clamshell containers that can be composted in the Ann Arbor system.

6. **What can be composted in Ann Arbor?**

If you choose to compost with the city of Ann Arbor, the quick list of accepted materials is as follows:

a. Plate scrapings
b. Spoiled or expired food
c. Fruits and vegetables (including pits & peels)

For the most updated information check the city of Ann Arbor Commercial Compost Collection for Food Scraps page.

7. **What makes compostable ware compostable?**

In addition to organic matter and paper based packaging, commercial composting facilities accept certain plant-based plastics depending on the facility. Certain items like bioplastics are more difficult to compost and require specialized facilities, so availability varies by the service provider.

- Check out this site for a full list of approved manufactured compostable products and a purchasing guide to help business owners.

8. **How can I sign up for the Ann Arbor composting program?**

See the city of Ann Arbor's commercial composting program for a monthly cost breakdown depending on the number of carts needed by your business and the frequency of pick-up. Also on the page is the form to request commercial compost collection services.

9. **Where can I commercially compost in Ann Arbor?**

You can sign up for Ann Arbor's commercial composting program or you can partner with a private commercial composting collection service. Businesses that service the Ann Arbor community include:

- My Green Michigan
- Denali
- OR: consider having a conversation about composting with your local farm suppliers.

10. **What can I do with cooking oil?**

Liquid oils and fats are not accepted by Ann Arbor composting services. Cooking oil is a valuable product that can be used by many industries after your kitchen is done with it. Thumb BioEnergy pays for used cooking oil, and local farms are also interested in picking up used cooking oil for use in feed.

Section V: Food Procurement

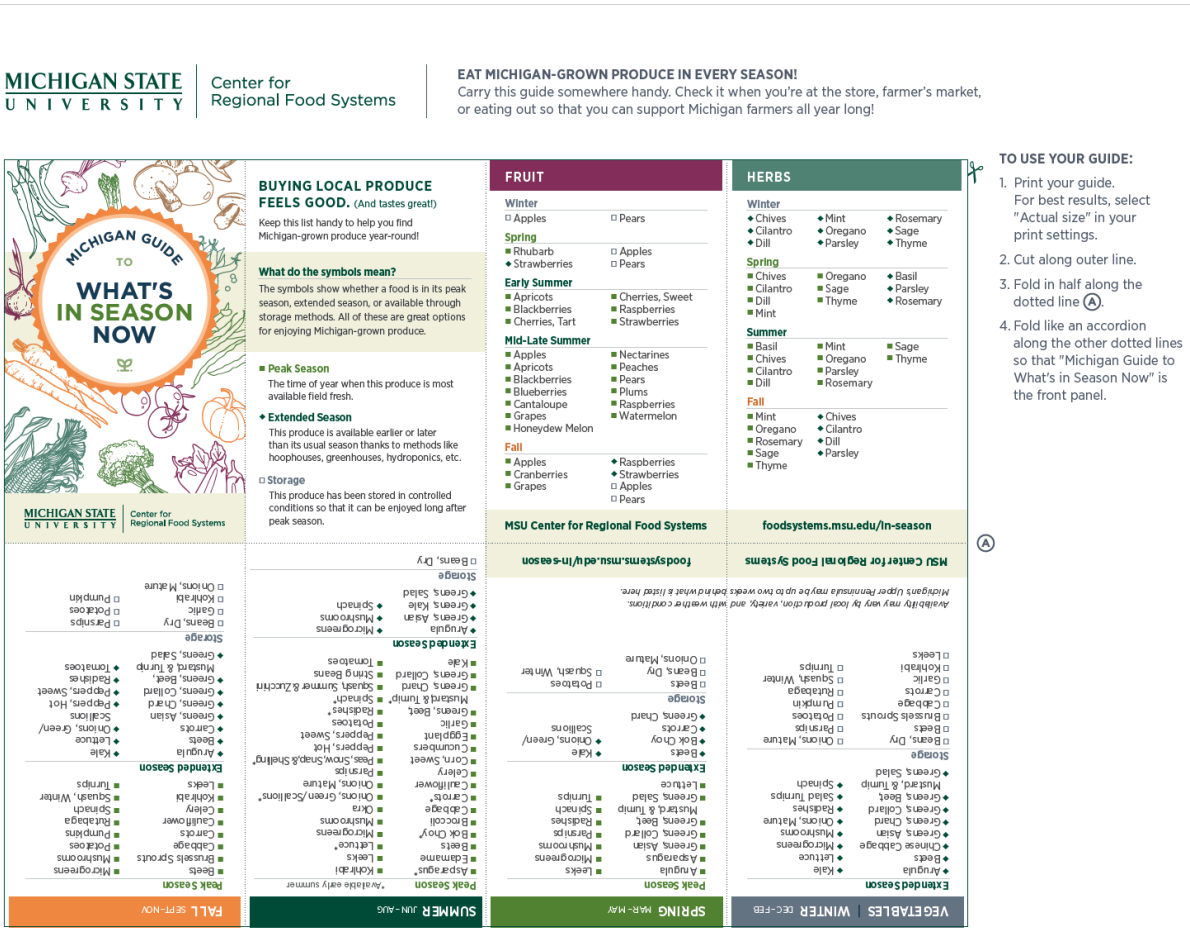
1. **What is the most important way to reduce greenhouse gas emissions related to food procurement?**

In-season produce is more likely to be grown locally, meaning that it travels a shorter distance to get to your restaurant. This reduces the greenhouse gas emissions associated with procuring food.

2. **Are there costs associated with sustainable food sourcing?**

Sourcing food locally can be more expensive, but it does not have to be. Often, food that is growing plentifully in-season is less expensive than purchasing the same food from the commodity market out-of-season. In addition, some consumers have expressed that they are willing to pay more for sustainably sourced food and visit restaurants that are taking steps to reduce greenhouse gas emissions.

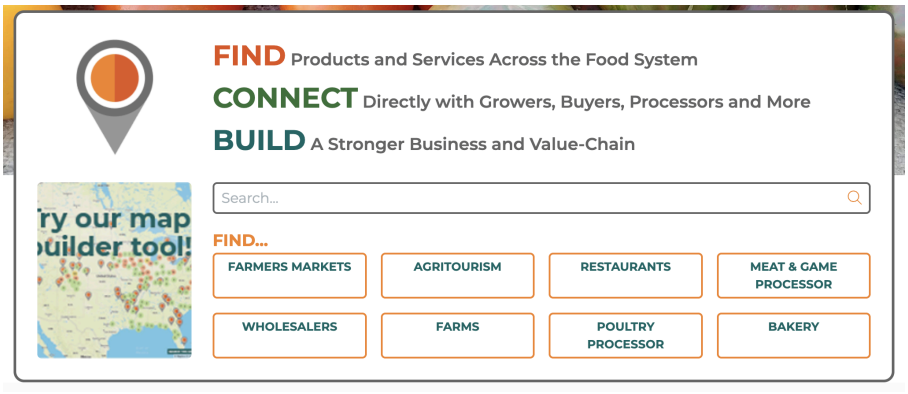
3. **What is in season?**
    - Here is a resource from Michigan State University about what is in season and when.
    - You can also print this foldable guide listing seasonal produce:



4. **What are some barriers to sourcing food locally?**

Some restaurant owners find that it takes a considerable amount of time to identify farmers, communicate orders, and then coordinate delivery. Also, local farmers are subject to seasonality and fluctuations due to weather and other factors, so menus featuring local and seasonal food need to be flexible to make the most of what is available and accommodate the natural fluctuations of the growing season.

5. **How do I connect with Ann Arbor's local farmers?**
    - Organizations such as Argus Farm Stop and The Hungry Locavore can connect businesses with local farmers.
    - Meet and buy directly from local farmers at the Ann Arbor Farmers Market.
    - Taste the Local Difference has a directory of local farmers, distilleries, breweries, fisheries, food hubs, and wineries that is searchable by zip code and country. The organization also provides services and resources to help local food businesses.

- [Michigan Market Maker](), organized by staff at the Michigan State University Product Center, is an online interactive mapping resource linking agricultural product businesses with markets across Michigan.
  - 

6. **What are some examples of Ann Arbor restaurants that have overcome the above mentioned barriers to source locally?**
   - Local restaurants such as Spencer, Spiedo, Echelon, the University of Michigan dining halls, and Salt Springs Brewery are procuring their food locally and sustainably in Ann Arbor. he [Sustainable Food Business Coalition]() provides an avenue to connect with peer businesses who are seeing success with local sourcing.
   - [Here is a case study about Burgerville](), a fast-casual chain in the Pacific Northwest that prides itself on locally sourcing 75% of all food served. They originally saw significant issues with their beef, berry, and chicken suppliers and were able to overcome them.

Section VI: Employee Engagement

1. **Are there any ready-made training resources I can use to train my staff on sustainability practices?**
   - Level 1 of this roadmap is a great place to send employees to become familiar with sustainability topics!
   - Encourage (or even, incentivize) employees to become a [Green Restaurant Accredited Employee](). Employees learn about the need for restaurant sustainability in six environmental categories and tangible actions businesses can take to reduce their environmental impact and become Green Restaurant Certified. They can help lead or execute sustainability initiatives at your business.

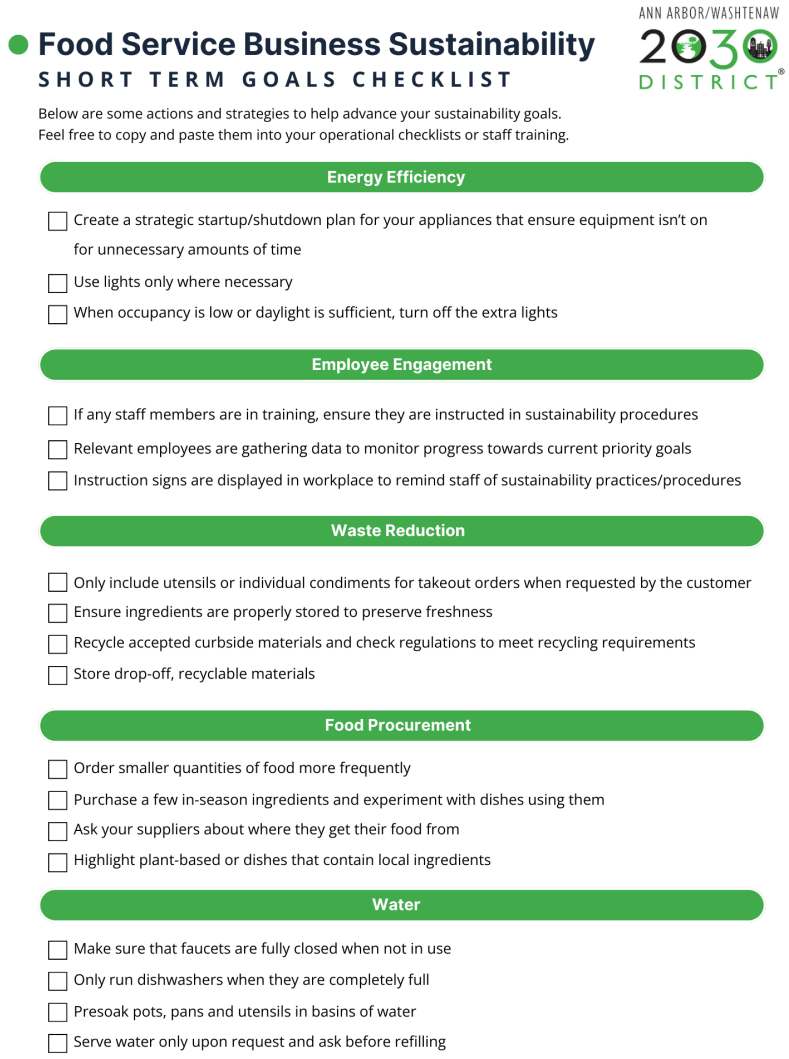
2. **What conferences, workshops, and association events can I attend to learn more about sustainability solutions in the food service industry?**
    - Ann Arbor Sustainable Food Business Coalition
        - The Ann Arbor Sustainable Food Business Coalition (SFBC) hosts quarterly all-member meetings to network, share best practices, brainstorm solutions to common restaurant sustainability challenges, and collaborate to build a more resilient, sustainable, and equitable local food system.
    - ReFED Food Waste Solutions Summit
        - Typically happens in early summer (May-June)
        - Hosted by ReFED, a nonprofit focused on reducing food waste in the U.S., the summit brings together a diverse group of stakeholders, including businesses, policymakers, nonprofits, investors, and other leaders in the food system. The goal is to share knowledge, explore strategies, and promote scalable solutions to reduce food waste across the supply chain.
    - Food + Beverage Environmental Conference
        - FBEC is the premier and most comprehensive environmental event for the food and beverage industry in the United States. This event discovers the latest trends and innovations affecting sustainability, water resource management, supply chain, air quality, environmental compliance, professional training and many more, while priding itself on a platform that promotes networking and like-minded individuals within the industry.
    - Menus of Change
        - Over the last 12+ years, Menus of Change, jointly led by The Culinary Institute of America and Harvard T.H. Chan School of Public Health - Department of Nutrition, has shifted the way chefs and foodservice professionals approach public health, environmental stewardship, and social responsibility.
        - The Menus of Change Leadership Summit features over 50 presenters, including nutrition and environmental scientists, consumer insight experts, chefs and culinary entrepreneurs, CIA faculty, business leaders and investment analysts, industry sector innovators, and other food systems changemakers. The topics addressed are critically relevant to chefs and operators working to secure the financial viability of their restaurants and foodservice operations while also advancing healthy, sustainable, delicious foods and menus.
    - National Restaurant Association Show
        - Typically held in Chicago, IL in the fall.
        - The National Restaurant Association Show is a large annual event that serves as a comprehensive trade show for the foodservice industry. It brings together restaurant owners, operators, suppliers, distributors, and other professionals from the foodservice sector and is one of the largest of its kind in the world. Past conferences have hosted over a dozen sessions about sustainability in the restaurant industry.

- Tales of the Cocktails
    - Typically occurs in the summer in New Orleans, LA
    - This global cocktail conference, organized by the nonprofit organization Tales of the Cocktail Foundation, aims to educate, advance, and support cocktail professionals and enthusiasts. Past conference sessions have covered topics relating to sustainable ingredient procurement and zero-waste solutions.
- Speciality Coffee Expo
    - Speciality Coffee Expo is the largest B2B speciality coffee trade show in North America. Past workshop sessions have covered topics about sustainable coffee procurement, the impact of climate change on the industry, and operational improvements for sustainability.

Appendix F - Level 3: Repository of Resources

Original Resources:

Short-Term Goals:



Food Service Business Sustainability

SHORT TERM GOALS CHECKLIST

ANN ARBOR/WASHTENAW 2030 DISTRICT®

Below are some actions and strategies to help advance your sustainability goals.
Feel free to copy and paste them into your operational checklists or staff training.

Energy Efficiency

- ☐ Create a strategic startup/shutdown plan for your appliances that ensure equipment isn't on for unnecessary amounts of time
- ☐ Use lights only where necessary
- ☐ When occupancy is low or daylight is sufficient, turn off the extra lights

Employee Engagement

- ☐ If any staff members are in training, ensure they are instructed in sustainability procedures
- ☐ Relevant employees are gathering data to monitor progress towards current priority goals
- ☐ Instruction signs are displayed in workplace to remind staff of sustainability practices/procedures

Waste Reduction

- ☐ Only include utensils or individual condiments for takeout orders when requested by the customer
- ☐ Ensure ingredients are properly stored to preserve freshness
- ☐ Recycle accepted curbside materials and check regulations to meet recycling requirements
- ☐ Store drop-off, recyclable materials

Food Procurement

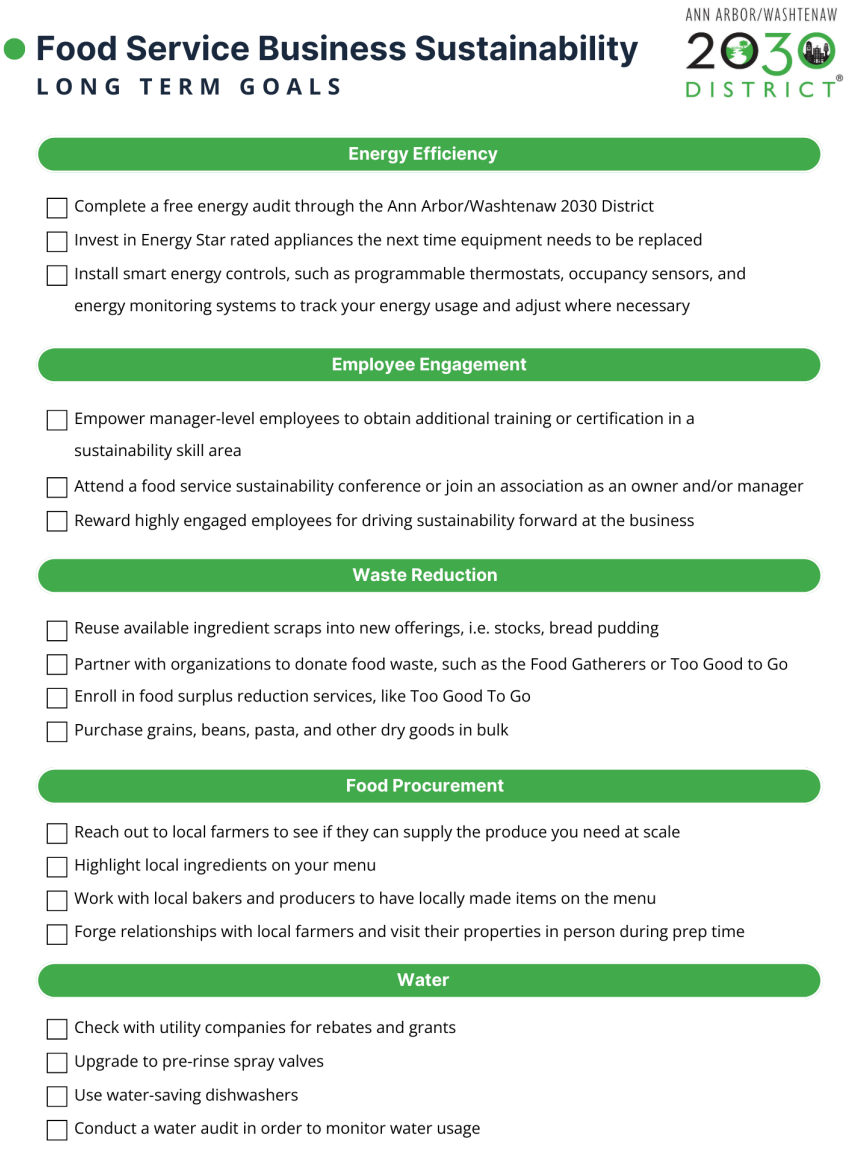
- ☐ Order smaller quantities of food more frequently
- ☐ Purchase a few in-season ingredients and experiment with dishes using them
- ☐ Ask your suppliers about where they get their food from
- ☐ Highlight plant-based or dishes that contain local ingredients

Water

- ☐ Make sure that faucets are fully closed when not in use
- ☐ Only run dishwashers when they are completely full
- ☐ Presoak pots, pans and utensils in basins of water
- ☐ Serve water only upon request and ask before refilling

Description: You can copy and paste the actions and goals that are most relevant to your sustainability goals into your operational checklists or staff training.

Long-term Goals:

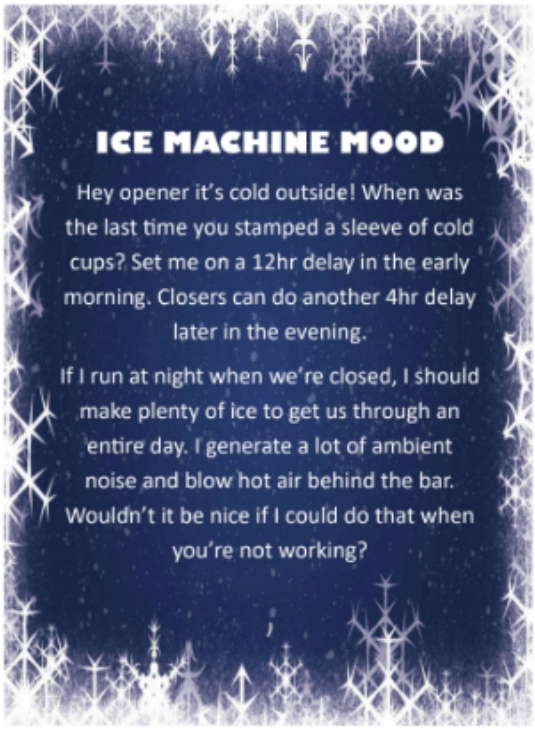


Reducing Energy Use from Ice Machines:

ANN ARBOR/WASHTENAW 2030 DISTRICT

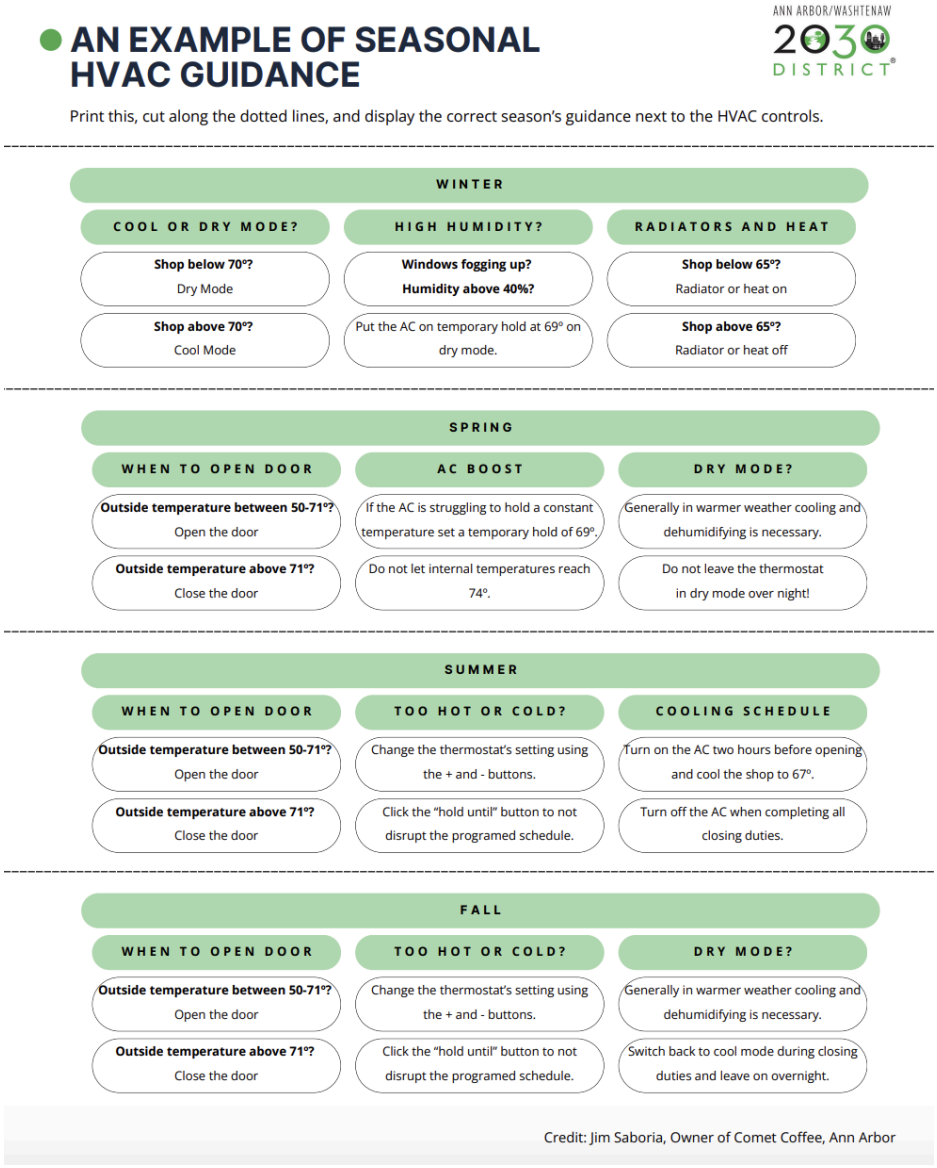
REDUCING ENERGY USE FROM ICE MACHINES

Print this and display next to your ice machine, if applicable.



Credit: Jim Saboria, Owner of Comet Coffee, Ann Arbor

An Example of Seasonal HVAC Guidance:



AN EXAMPLE OF SEASONAL HVAC GUIDANCE

ANN ARBOR/WASHTENAW 2030 DISTRICT

Print this, cut along the dotted lines, and display the correct season's guidance next to the HVAC controls.

WINTER

COOL OR DRY MODE?	HIGH HUMIDITY?	RADIATORS AND HEAT
Shop below 70°? Dry Mode	**Windows fogging up? Humidity above 40%?**	**Shop below 65°?** Radiator or heat on
Shop above 70°? Cool Mode	Put the AC on temporary hold at 69° on dry mode.	**Shop above 65°?** Radiator or heat off

SPRING

WHEN TO OPEN DOOR	AC BOOST	DRY MODE?
Outside temperature between 50-71°? Open the door	If the AC is struggling to hold a constant temperature set a temporary hold of 69°.	Generally in warmer weather cooling and dehumidifying is necessary.
Outside temperature above 71°? Close the door	Do not let internal temperatures reach 74°.	Do not leave the thermostat in dry mode over night!

SUMMER

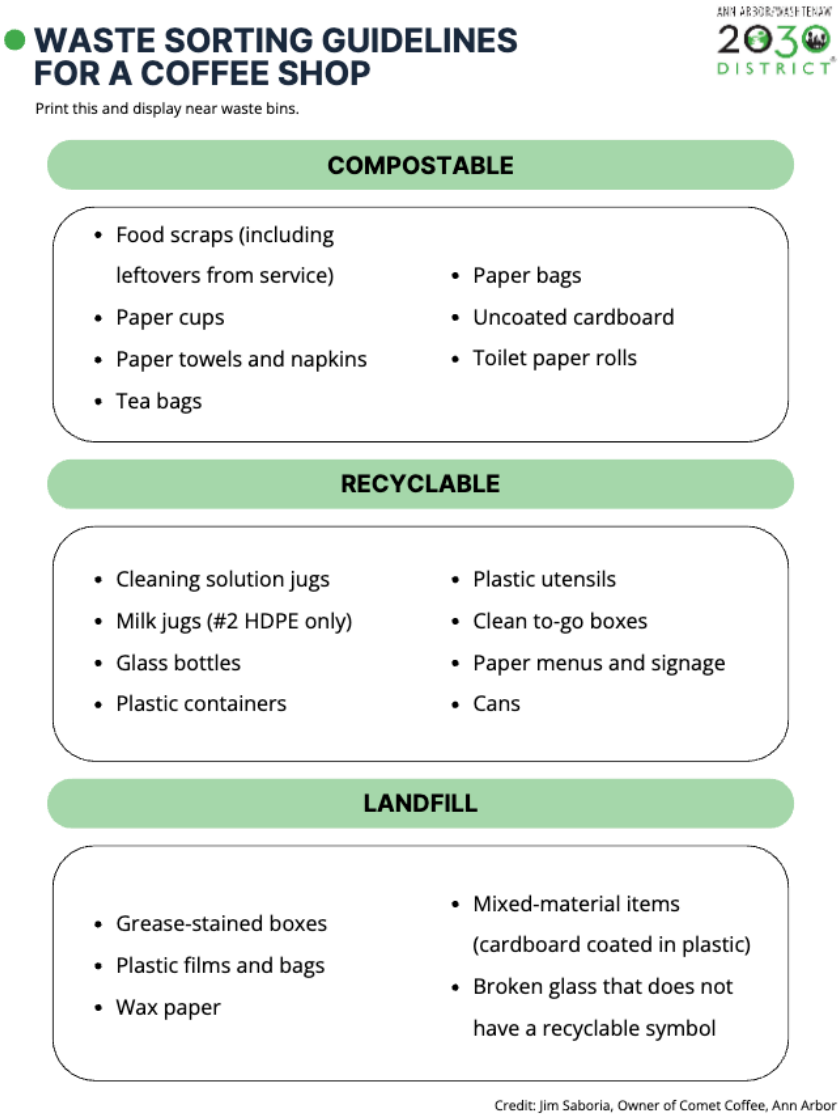
WHEN TO OPEN DOOR	TOO HOT OR COLD?	COOLING SCHEDULE
Outside temperature between 50-71°? Open the door	Change the thermostat's setting using the + and - buttons.	Turn on the AC two hours before opening and cool the shop to 67°.
Outside temperature above 71°? Close the door	Click the "hold until" button to not disrupt the programed schedule.	Turn off the AC when completing all closing duties.

FALL

WHEN TO OPEN DOOR	TOO HOT OR COLD?	DRY MODE?
Outside temperature between 50-71°? Open the door	Change the thermostat's setting using the + and - buttons.	Generally in warmer weather cooling and dehumidifying is necessary.
Outside temperature above 71°? Close the door	Click the "hold until" button to not disrupt the programed schedule.	Switch back to cool mode during closing duties and leave on overnight.

Credit: Jim Saboria, Owner of Comet Coffee, Ann Arbor

Waste Sorting Guidelines for a Coffee Shop:



WASTE SORTING GUIDELINES FOR A COFFEE SHOP

ANN ARBOR/WASHTENAW 2030 DISTRICT

Print this and display near waste bins.

COMPOSTABLE

- Food scraps (including leftovers from service)
- Paper cups
- Paper towels and napkins
- Tea bags
- Paper bags
- Uncoated cardboard
- Toilet paper rolls

RECYCLABLE

- Cleaning solution jugs
- Milk jugs (#2 HDPE only)
- Glass bottles
- Plastic containers
- Plastic utensils
- Clean to-go boxes
- Paper menus and signage
- Cans

LANDFILL

- Grease-stained boxes
- Plastic films and bags
- Wax paper
- Mixed-material items (cardboard coated in plastic)
- Broken glass that does not have a recyclable symbol

Credit: Jim Saboria, Owner of Comet Coffee, Ann Arbor

A Barista's Guide to Sustainability: An Example from Comet Coffee About Ways that Owners and Managers Can Provide Concrete Actions for Staff

A BARISTA'S GUIDE TO SUSTAINABILITY: AN EXAMPLE OF HOW OWNERS AND MANAGERS CAN PROVIDE CONCRETE ACTIONS FOR STAFF

ANN ARBOR/WASHTENAW 2030 DISTRICT

Milk Waste

- Be aware of the amount of waste milk that goes down the pitcher rinser. Try to minimize this whenever possible.

Heated and Refrigerated Water Waste

- Reuse filtered water when making pour-overs at least three times.
- Monitor the ice machine (more information below) and use the delay button when fresh ice is not immediately needed.
- Tell management if faucets are dripping or cannot be fully closed.

Shut Off Equipment at the End of the Night

- Ensure that espresso grinders that have automatic cooling fans are turned off when your business is closed.

Compost and Recycling

- A lot of what is thrown away can be recycled and composted.
- Remember that food scraps are compostable, including what employees bring in their packed lunches.

Credit: Jim Saboria, Owner of Comet Coffee, Ann Arbor

Additional resources (included as PDFs on the website):

Green Business Challenge toolkit:

Link: https://storage.googleapis.com/msgsndr/t8sZbTVRd2Wu31SplbVF/media/672d0389eb0f2363f9086a06.pdf

Description: Designed to cover seven core areas of sustainability, the A2 Green Business Challenge creates a unique opportunity to grow and build lasting sustainable business practices. This toolkit outlines the details of the Challenge, including support resources available to help you on your sustainability journey.

WaterSense At Work: Best Management Practices for Commercial and Institutional Facilities

Link: https://www.epa.gov/sites/default/files/2017-02/documents/watersense-at-work_final_508c3.pdf

Description: This document serves as a step by step guide, starting with goal setting, for business owners to reduce their water usage. Information about sanitary fixtures and equipment, commercial kitchen equipment, outdoor water use, and mechanical systems are included.

ReFed Restaurant Food Waste Reduction Guide:

Link: https://refed.org/downloads/Restaurant_Guide_Web.pdf

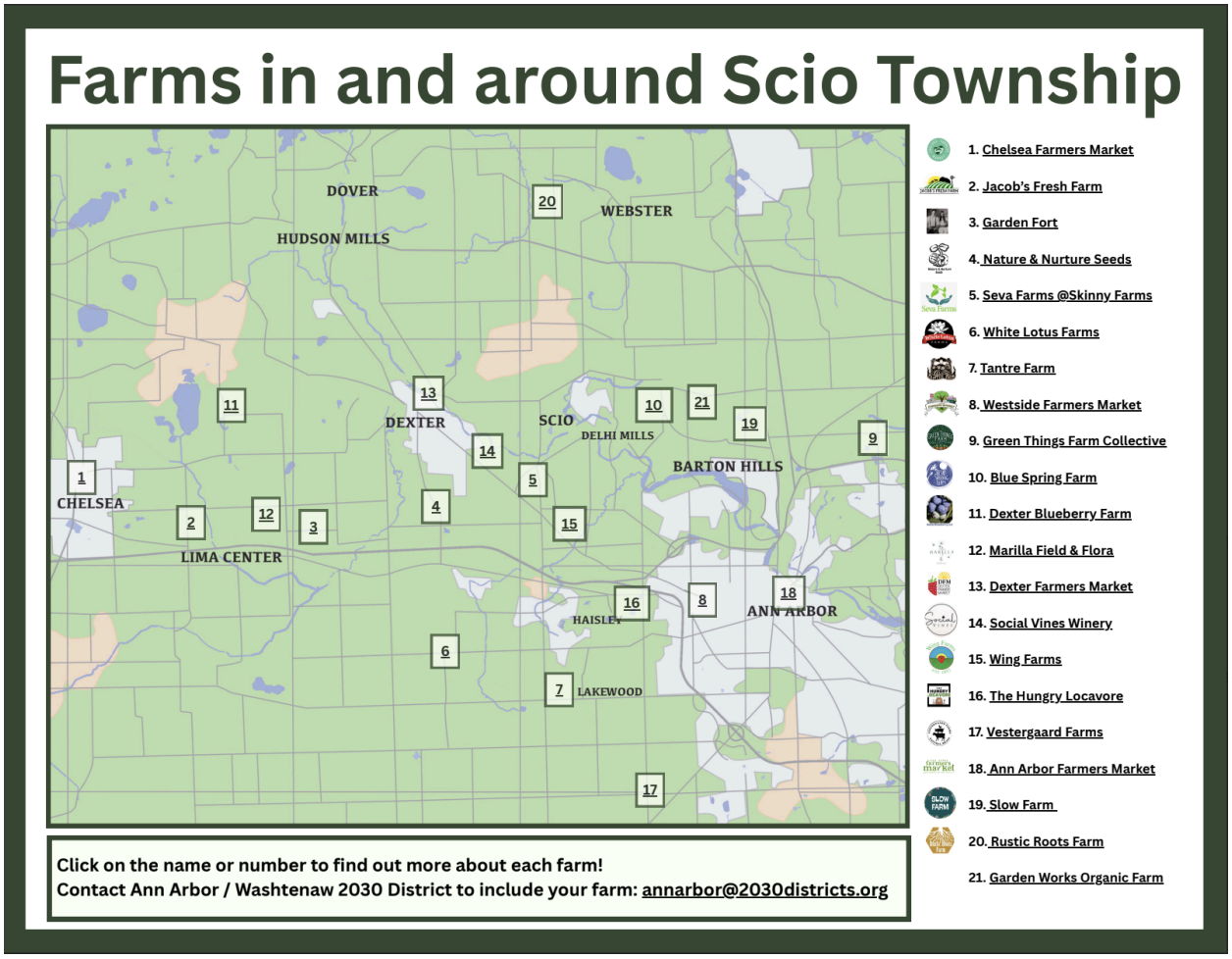
Description: This guide is a how-to resource designed for restaurant sustainability directors, owners, and others in leadership roles in the U.S. restaurant industry who are involved in creating or monitoring food waste reduction strategies. It provides an overview of the national food waste challenge, presents opportunities for companies to address it while improving business outcomes, and identifies action-oriented solutions, tools, and best practices.

The Food Service Playbook for Promoting Sustainable Food Choices

Link: https://www.wri.org/research/food-service-playbook-promoting-sustainable-food-choices

Description: This serves as a guide for restaurant owners to respond to consumer demand for healthy and plant-rich meal choices. Strategies include examining the following: price, placement, promotion, presentation, promotion, and people.

Scio Township Farm Map:



Developed by Laurel Petrides for Ann Arbor/Washtenaw 2030 District.