

## Navigating Local and Sustainable Foods: Development of an Evidence-based Environmental Sustainability Decision-Making Framework for Institutional Food Service Providers

### Project team

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### Summary

Expanding interest in local, fresh, sustainable food production has been driving innovation and change around the globe. Many Michigan institutions have been increasing efforts to offer fresh, local foods, but are often challenged by Michigan's limited growing season. While options for producing near year-round local produce in Michigan have increased, differences in production dynamics, yields, energy demands, and other resource inputs make informed choices on the most "sustainable" option difficult. Further, defining sustainability in an institutional context and establishing quantifiable metrics for evaluating choices is often outside the operational capacity of institutional food service providers. This means that the environmental implications of the farm-to-institution movement are unknown, even as markets for local growers and fresh options for consumers are increasing.

Life Cycle Assessment (LCA) has become the *de facto* method for environmental sustainability comparisons between alternative systems. Far too often, however, insufficient data on production inputs and practices, especially of novel alternative production systems, are collected to support LCA studies. To overcome this gap in data availability, this project developed a data collection tool to support such data collection, engaged with distant production operators to gather data, and established an operational Freight Farm at the UM Campus Farm for in-house evaluation and data collection.

### Project background and approach

As interest in local and sustainable food production expands, many institutional food purchasers such as universities, hospitals and schools are challenged with integrating these priorities into their procurement strategies. Alternative production options that can offer full-season growing and "hyper-localness" – such as the Freight Farm described below – are an attractive opportunity for institutions to engage with clients on these issues. Yet, often very little data-based information is available on the environmental implications of such alternative production forms: as climate controlled systems, they typically require supplemental lighting and heating/cooling. Comparison of the impacts of such inputs on environmental indicators such as resource depletion and global warming with produce sourced through traditional channels – often shipped from the West Coast – or locally grown in lower-tech passive solar hoopouses - requires careful analysis through life cycle assessment (LCA).

The [Freight Farm](#) is a complete hydroponic growing system enclosed in a standard shipping container. Built as a turn-key growing operation, it utilizes LED lighting strips, automated temperature and humidity control, and tightly packed vertical growing cells to provide year-round production of (primarily) leafy greens and herbs. It is among an array of high-technology, controlled environment alternative growing systems receiving significant "buzz" in the maturing local food and farm-to-institution movements. While often touted as resource efficient and an environmentally sound local growing option, little to no data-driven analysis of the environmental sustainability of these systems exist. As was discovered in the course of this project, the lack of analysis may be due in part to limited availability of data sufficient to support LCA comparisons between competing production systems.

After exhausting identified potential sources of production data to perform an LCA of a Freight Farm system or similar controlled environment production systems, it became clear that we would need to generate this data ourselves. This data deficiency became the primary driver behind a change from the initial proposed scope for the project. A Freight Farm on long-term loan from a UM Dining supplier has been installed at the UM Campus Farm at Matthaei Botanical Gardens. This will be used to grow salad greens for MDining, while also collecting extensive production data including electricity and water consumption and nutrient inputs relative to produce outputs. Ideally, data will be collected over a full cycle of the seasons in order to represent the influence of external temperature on energy needs and system productivity.

To support and promote similar data collection by other operators, we have developed a Data Collection Tool aimed at identifying the data needs for an LCA of alternative food production systems. This Tool has been shared with Dining Services partners at East Carolina University (Greenville, North Carolina) that operate a Freight Farm which provides salad greens for their dining halls. This partner is enthusiastic about collaborating in our study and, with advice and support from our team, will begin their own data collection in August, 2019 when the semester (and operation of their Freight Farm) resumes. We will continue to pursue additional partnerships such as this to broaden the inquiry into the environmental sustainability of alternative food production systems.

### Findings

- Despite the growing popularity of controlled-environment production systems such as Freight Farm, very little is known about their actual environmental performance. Such systems typically can provide year-round growing potential and hyper-locality in a wide range of climates, including Michigan, but these added services should be weighed against environmental and economic costs.
- The data necessary to conduct a thorough evaluation of these environmental and economic costs is not readily available.
- There is interest on the part of operators of alternative food production systems in such environmental analyses, and we anticipate that the information will also be of value to food purveyors attempting to evaluate the sustainability of purchase options. Among the operators we interacted with in this project, however, there is limited willingness to commit to data collection. We anticipate that the Data Collection Tool created here will help in lowering that activation barrier and increasing the knowledge and data about these types of systems enabling better data based decision making on sustainably food purchasing by institutions.

### Outputs

*These are tangible products created or services delivered during or upon project completion.*

- Alternative Food Production Inventory Data Collection Tool: this formatted data log spreadsheet and accompanying descriptive documentation is intended to support data collection in order to facilitate environmental and economic assessments of alternative food production systems. The tool is available from the CSS website: <http://css.umich.edu/project/navigating-local-and-sustainable-foods-development-evidence-based-environmental-0> and notice of its availability has been communicated through the Campus Farmers Network listserv and the Association for the Advancement of Sustainability in Higher Education (AASHE) Bulletin.
- Operational Freight Farm at UM Campus Farm: on long-term loan from LaGrasso Bros. Produce, the Freight Farm is now actively producing salad greens which will be utilized through UM Dining Services. The purpose of bringing the Freight Farm to UM was to evaluate it's operational dynamics and collect the data necessary to conduct an LCA.
- Data collection of Freight Farm at UM Campus Farm: Data collection at UM Campus Farm has commenced, with the aim of supporting a future LCA of container-based production. As we are still learning the dynamics of growing in this system, it is unclear at this point how long data will need to be collected, but the current anticipation is to gather a full year's seasonal cycle.

- Supporting data collection by other operators: We are collaborating with operators of a Freight Farm at East Carolina University who will use our data collection tool to gather pertinent data on their production system beginning August, 2019. This data will be used to support a future LCA of container-based production.
- (forthcoming) Publication of LCA study: Once sufficient data has been collected, a complete LCA of Freight Farm production will be conducted, likely with comparisons to other sources of the same product (such as shipping from California). The study will be submitted to a peer-reviewed journal and findings will be disseminated to relevant stakeholders.

## **Outcomes**

Achieved project outcomes:

- Strengthened collaboration and partnership between UMSFP, UM Dining, and academic departments on campus

Anticipated project outcomes:

- Elevated conversation and deliberation across UM of the role of new or alternative technologies in the development of local, sustainable food systems, as catalyzed by the on-campus presence of an active Freight Farm.
- Catalyzed student research project - whether SEAS group masters project, individual thesis, or class project – involving data analysis and evaluation of environmental performance of Freight Farm.
- Increased public and peer reviewed information/knowledge on the environmental sustainability of emergent local food production technologies.
- Increased utilization of data driven decision making in sustainable food purchasing programs/initiatives amongst institutional food buyers.