


A 70% SHIFT? How Local Could Oberlin Go?

A collaborative project between the Oberlin Project,

The New Agrarian Center, and NEOFoodWeb.org


Written & Prepared

By Brad Masi,

December 31, 2012





70% Shift Main Navigation Page

OVERVIEW OF 70% SHIFT	70% Shift Executive Summary	Oberlin Local Foods Summary	Core Activity Area Summaries	Critical Tool Summaries	
OBERLIN LOCAL FOODS PAST, PRESENT, & FUTURE	Oberlin Foodshed Survey	Local Foods Past & Present	70% Shift in Oberlin's Future?		
CORE ACTIVITY AREAS	Local Food Hubs	Waste-to-Food and Energy	Cultivating Urban Agriculture	Carbon Cycles and Local Food	Weaving Learning Networks
CRITICAL TOOLS	Network Weaving	Local Investing	Urban Design	Strategic Points of Leverage	
ADDITIONAL RESOURCES	Details and Case-Studies	References and Acknowledgments			

Click here for detailed Table of Contents.

Whenever you see me, an inquisitive white squirrel from Oberlin's Tappan Square, just click me to access another part of the report that contains more detailed information!

TABLE OF CONTENTS

BRIEF SUMMARIES

70% SHIFT OVERVIEW

Why a 70% Shift? (Pg. 4)
About the 70% Shift Assessment Process (Pg. 4)
Executive Summary (Pg. 5)
Overview of the Oberlin Foodshed (Pg. 9)

PAST, PRESENT, AND FUTURE OF LOCAL FOODS

Looking to the Past- Oberlin's Pioneering History of Local Foods (Pg. 10)
Looking to the Future- Community Perspectives on a 70% Shift (Pg. 11)

CORE ACTIVITY AREAS

Local Food Hub (Pg. 12)
Waste-to-Food-Energy (Pg. 13)
Urban Agriculture (Pg. 14)
Carbon Management (Pg. 15)
Learning Network (Pg. 16)

CRITICAL TOOLS

Network Weaving (Pg. 17)
Community Investment (Pg. 18)
Urban Design (Pg. 19)
Leverage Points (Pg. 20)
Integrated Approach (Pg. 21)

ADDITIONAL RESOURCES

Appendices (Pg. 22)

FULL REPORT

BACKGROUND

The Oberlin Foodshed (Pg. 23)
Review of Local Purchasing and Oberlin's Local Food System (Pg. 27)

COMMUNITY PERSPECTIVES

Past and Present of Oberlin's Local Food System Efforts (Pg.33)
The Future and Community Perspectives on a 70% Shift (Pg. 87)

CORE ACTIVITY AREAS

Developing Local Food Hubs (Pg. 107)
Organizing a Waste-to-Food-Energy Hub (Pg. 120)
Cultivating Urban Agriculture (Pg. 131)
Returning Balance to Carbon Cycles (Pg. 139)
Cross-Community Learning Network (Pg. 146)

CRITICAL TOOL DEVELOPMENT

Cultivating Robust Networks (Pg. 153)
Encouraging Community Investment (Pg. 162)
Pattern Language for Urban Design and Local Foods (Pg. 173)
Identifying Strategic Points of Leverage (Pg. 146)

APPENDICES/ADDITIONAL INFORMATION

Charts and Graphs and Oberlin Foodshed Details (Pg. 206)
Local Food Hub Development Details (Pg. 248)
History of Composting in Oberlin (Pg. 265)
Oberlin Bio-Digestion Pre-Assessment Report (Pg. 270)
Urban Agriculture Case Studies from Great Lakes Cities (Pg. 321)
Urban Farming Modules for Oberlin (Pg. 325)
Leveraging the Power of Networks- Case Study of Athens, Ohio (Pg. 328)
References (Pg. 331)

Click here for graphic Table of Contents.

Introduction: Why Consider a 70% Localization of Oberlin's Food Supply?

Why a 70% Shift?

This report offers an assessment of Oberlin's current local food efforts and strategic recommendations for a significant expansion of the local food economy in and around Oberlin. This report is predicated on an inquiry into a 70% localization of Oberlin's food supply, whether a localization of this magnitude makes sense, and what it would require.

The 70% figure was chosen for the following reasons:
- as an import substitution strategy, it indicates a community that has moved the balance of its own sustenance from the global economy to the regional economy;
- as a local spending and wealth retention strategy, it considers the broader impacts and potential benefits of retaining a significant portion of the $17-20 million in annual food spending in the Oberlin community;
- as an economic development strategy, it considers the range of investments and new infrastructure that would be needed to facilitate a substantial localization;
- as a cultural and social strategy, it begins to identify what would be required of residents, students, businesses, and institutions in the Oberlin community by way of changing behavior or becoming more active participants in the local food economy;
- as an urban design strategy, it considers changes in the built environment and community services; and
- as a quality of life strategy, it considers how learning, living, or visiting Oberlin might change.

The 70% shift should not be approached as a mandate from above that requires compliance of the residents and businesses in Oberlin. Rather, it should be approached as an opportunity for cultivating a more diverse, inter-connected, democratic, prosperous, and ecologically vibrant community. The growth of local food systems nationally in the past decade represents a shift in prevailing economic attitudes. For the past 50 years, the orientation of most communities focused on how they integrate with the "global economy". The growing public support for local food systems indicates a recent shift toward investment in local and regional economies and the cultivation of place-based assets. As a part of a region that has suffered from chronic economic dis-investment, poverty, and population loss support for local food systems represents an opportunity to take stock of our assets, from fresh water and prime agricultural soils to skilled workers, under-utilized buildings, and vacant land to re-invigorate our economies and improve the quality of life of our communities.

In the end, the community itself will need to assess a level of localization that makes the most sense while promoting resilience in a future that will be increasingly affected by climatic instability, disruptive technologies, and global economic uncertainty. For now, consider fully what a 70% shift could mean for Oberlin's future and, if you find it compelling, find a spot to get involved!

About the 70% Shift Assessment Process

The 70% Shift assessment process involved a year-long inquiry into the pathways and potential for an expansion of local food activity in and around Oberlin. Fundamental to the assessment process was a complete review of historic local food activities in Oberlin, which began its local food efforts in the early 1990's. Oberlin has many established local food efforts initiated by a diverse range of community innovators that include students, recent Oberlin graduates, businesses, institutional food service providers, organizations, and community residents. This historical perspective was captured and presented in the form of a documentary film and an accompanying graphic novel. An expansion of local food activity should begin by building on the already existing networks of local food activity in the community.

Jumping from the estimated 6% of local purchasing in the community today to a 70% localization involves a fundamental transition of the systems and processes that supply reliable and sustainably produced foods to the community. The remainder of the assessment process reviewed core activities and tools that will be necessary to facilitate a shift of this magnitude. Core activities were chosen on the basis of those that would have the greatest catalytic potential for the lowest amount of community investment. The critical tools identified in the process focused on skill-sets and capacities that will be necessary if the community is to achieve a more substantial localization.

Overall, the assessment process included some of the following processes:
- documentary film and digital media to amplify inspiring local projects;
- video interviews of 20 individuals in the community most active in local food efforts to better understand what is happening today and to get initial feedback on the efficacy of a 70% localization;
- surveys of stakeholders relevant to targeted local food activities, including food buyers, area farmers, grain farmers, composting and waste, and potential users of a community kitchen;
- facilitated community meetings that helped to build collaborative networks and gather feedback on options for local food systems expansion, including a Lorain County local food summit, a composting summit, and smaller forums on topics such as local grains, community food processing, educational program development, and local food market development;
- organized public lectures and workshops featuring nationally renown local food system innovators, including Michael Shuman and June Holley;
- literature review to identify research or publications about local food projects elsewhere to inform Oberlin's efforts; and
- site visits and case-studies of model local food efforts in other communities (Cleveland, Youngstown, Chicago, Wooster, Pittsburgh, Denver) that can inform efforts in Oberlin.

Return to Table of Contents

Executive Summary

This report examines the possibilities and pathways for a significant expansion of the local food economy in and around Oberlin. A 70% shift would substantially shift the food pathways presently feeding Oberlin from the global to the regional economy.

The assessment process for a 70% shift begins with an overview of current agricultural and local purchasing trends in "the Oberlin Foodshed"- a geographic focal area that includes Lorain, Medina, Ashland, Wayne, Huron, and Erie counties.

With a 20 year history of innovation in local food systems development, a 70% Shift builds on past and present local food activity in and around Oberlin. Looking forward to the next 20 years, community members active in local food efforts generally believe that a 70% shift is possible with the development of supporting infrastructure, growth of new or transitioning farmers, widespread community participation, and considerations of community resilience.

The following critical activity areas build on current community assets while introducing new capacities and potentials:

- a **local food hub** to facilitate connections between growers, local food businesses, and markets;
- a **waste-to-food-energy hub** to utilize organic waste streams as inputs to local agriculture;
- an expansion of **urban agriculture** that mixes urban homesteading, community gardening, and urban market farming;
- an emphasis on re-integrating **healthy carbon cycles** that reduce greenhouse gas emissions in the food system while sequestering carbon in local farms; and
- a **learning network** that combines formal and informal education in all aspects of the local food system, including production, distribution, processing, consumption, and waste utilization.

An expansion of local food systems will require the cultivation of new tools in the community, including weaving diverse collaborative networks, fostering community investment, promoting new patterns of urban design and development, and identifying key leverage points for accelerated growth of local food systems.

THE OBERLIN FOODSHED

Growth of the local food economy presents new opportunities for economic development and quality of life within the Oberlin Foodshed, an area that has significant capacity for agricultural production to capture a larger share of the$1.9 billion in annual food spending in the same region. The businesses, institutions, and residents in Oberlin collectively spend between $17-20 million annually on food. Forming the bulk of Oberlin's local food spending, Oberlin College, the Oberlin Student Cooperative Association, the Black River Cafe, and City Fresh collectively spent more than $1 million annually supporting the local food economy in 2011, about 6% of total spending in the community.

Some of the factors driving Oberlin's present local food efforts include local purchasing, engaged education, neighborhood food initiatives, urban food production, and market connections to diverse, sustainably managed farms.

Community members active in local food efforts feel mixed about the possibilities of a 70% localization, with most feeling that it is possible only if it addresses a number of critical challenges, including seasonal availability of local foods, adapting to climate change, preserving agricultural land, community buy-in, equitable access, widespread community collaboration, supporting infrastructure for distribution and processing, supporting new or transitioning farmers, and a cultural shift toward greater self-reliance.

CORE ACTIVITY AREAS

Responding to these community challenges, five core activity areas have been identified to expand local food activity in the Oberlin Community: a local food hub, a waste-to-food-and-energy-hub, urban agriculture, restoring balance to carbon cycles, and a learning network.

1) Local Food Hub:
A local food hub facilitates connections between farmers, local food businesses, and buyers, making it easier for farmers to reach local markets while improving the ability of local businesses and institutions to access local food.

According to the USDA, 168 local food hubs actively operate in the United States, with a majority emerging in the past five years. Local food hubs have a variety of positive impacts on communities, including job creation, business development, healthy food access, and environmental sustainability. Food hub services include distribution and aggregation, investment in the capacity of local growers, and community and environmental services. A food hub also invests in entire local food value chains that include producers (urban and rural), local food distributors, food manufacturers or processors, restaurants and food service, consumers, and waste management. Given its geographic proximity to both urban (markets) and rural (suppliers) communities and its 20 years of local food activity, Oberlin is ideally situated to support a local food hub.

A food hub would build on the success of businesses and institutions already engaged with local purchasing while reducing barriers to entry for buyers that would like to

Return to Table of Contents

increase local purchasing. A network of area educational institutions and non-profit organizations can also assist with training, education, research, innovation, and workforce development.

It is recommended that Oberlin look at developing food hub facilities that serve three distinct purposes: regional aggregation, food processing and preservation, and neighborhood access. These functions can take place in under-utilized spaces around the community. Some key next steps include increased coordination between those already purchasing locally, outreach to potential farmers and new market partners, and securing financing for planning and development.

2) Waste-to-Food-Energy hub:
A Waste-to-Food-Energy hub offers a physical location for the collection, processing, storage, and distribution of organic waste materials that can provide energy, organic matter, or nutrient inputs to local agriculture. Like a local food hub, the waste hub would help to connect sources of organic waste (institutions and businesses) with a network of farms or gardens within or around the Oberlin community.

A community summit was organized in April of 2012 to identify assets and opportunities for the development of a community-wide waste re-utilization effort. The summit helped to identify four community clusters that can each support broader waste re-utilization in the community, including urban garden and home composting, municipal or commercial composting, bio-digestion to create energy, and collection and logistics infrastructure. Operation of a waste hub will require an organizational structure, the two top options being a cooperative or a compost facility operated on a local farm.

The next steps for the development of a waste hub include development of a small-scale farm bio-digestion pilot, a detailed waste audit of businesses in the Oberlin community, and financing for equipment and facilities to support a waste hub.

3) Urban Agriculture:
Urban agriculture involves the cultivation of food within the city limits of Oberlin, whether for the informal economy (home-use, community gardening, sharing, donating) or for the formal economy (market gardening, learning gardens, or urban-edge farm production). A variety of examples and studies of Great Lakes cities (including Cleveland, Detroit, Toronto, and Chicago) points to significant potential for increasing local food self-reliance through cultivation on urban land. Urban farming provides several benefits to surrounding communities, including increased biological diversity, stormwater mitigation, public health and access, improved social connections, re-use of organic waste, growing the local economy, and new opportunities for rural farmers.

While many of these examples point to larger cities, Oberlin has an opportunity to create a model blueprint for urban agriculture in a small town. Twelve active urban gardening or farming initiatives in Oberlin (many of which have emerged in the past five years) offer a mix of community gardening, learning or educational gardens, and market gardening. Institutions can be a driver in urban agriculture, with the majority of urban farming in Oberlin taking place on Oberlin College property, public schools, city land, or metropolitan housing. With 380 vacant acres of land within Oberlin, a template for zoning supportive of urban agriculture can be developed in the city.

Some next steps for expanding urban agriculture activity in Oberlin include a community-wide backyard farming initiative, an investment fund for the development of year-round urban farms, and a collaborative or shared network for equipment sharing and training in bio-intensive farming techniques.

4) Restoring Balance to Carbon Cycles:
Local food systems development can play a significant role in the transition to a post-fossil fuel economy. Energy, transportation, and buildings tend to be the focus of greenhouse gas emissions reduction. However, land-use and land-use changes (converting forests to farmland for example) account for 31% of the atmospheric carbon driving global climate change. Reduction of carbon emissions along all aspects of the food value chain can be fostered through alternative fuels for distribution, energy efficient food processing and storage, and utilization of renewable energy. Additionally, utilizing ecological farming techniques, local farms can store and sequester large amounts of carbon in soils and plant biomass while restoring biological diversity.

A more resilient local food system will simultaneously reduce its contributions to global climate change while developing adaptive strategies to remain resilient in the midst of an increasingly variable climate. Specific strategies include promotion of urban agriculture, banking carbon in agricultural soils, emphasizing greater utilization of woody perennials in agricultural systems, engaging in climate-friendly livestock production, protecting and restoring natural habitat, and restoring degraded watersheds. In the larger context of Oberlin's Climate Plan, local food systems development can provide a way for carbon emissions to be reduced through community investment in sustainably managed and biologically diverse local farms.

Oberlin has engaged in a number of initiatives over the past decade to promote carbon-friendly food systems, including the work of the New Agrarian Center which hosted a number of carbon-farming and broadacre permaculture trainings and construction of highly energy-efficient office and produce storage buildings that utilize strawbale construction techniques. A number of farmers in Lorain County operate climate-friendly grassfed livestock enterprises and there is interest in developing perennial cropping systems.

Oberlin can begin to introduce more proactive carbon management systems through the development of small-scale and broad-acre carbon farms to combine research and training in the context of a working farm; organization of a network of area farmers currently practicing or interested in practicing carbon farming methods; and development of a carbon fund that can provide resources for area farms to transition or expand carbon farming efforts.

Return to Table of Contents

5) Learning Network:

A 70% localization of Oberlin's food supply will only be possible if there is broad community awareness, participation, investment, and support for local food systems. The first step to growing the local food economy involves a concerted educational effort that increases the capacity for local participation in all aspects of the local food system: consumption; production; enterprises that support distribution, processing, and waste handling; and supporting services for local farms or food businesses.

As a community that values engaged education- education that integrates learning with application in the local community- Oberlin has a number of both formal and informal educational resources that can support local food systems development. Oberlin College supports local food systems through procurement policies of campus dining halls or co-operatives, academic research and coursework, community events and festivals, student organizations, community-based learning and community service by the BCSL, internships and research projects, and entrepreneurship of recent college graduates. Lorain County Community College in Elyria also supports local procurement and has recently developed a sustainable agriculture certification program for adult education and workforce development. The Joint Vocational School in Oberlin also supports a culinary arts program and is exploring further training initiatives in gardening and agriculture.

The Oberlin-based New Agrarian Center offers a regional educational asset that involves more formal collaborations with Oberlin College, the Lorain County Community College, the Joint Vocational School, and Oberlin Public Schools in addition to more informal education through workshops, community organizing, or mentoring.

A vibrant learning network will provide residents, businesses, or students with a number of pathways for engaging in the local food system. The network will thrive to the extent that it is open, accessible, and encouraging of innovation and experimentation in all aspects of the local food economy. Some key next steps for expanding a learning network in Oberlin include organization of a collaborative between formal educational institutions, leveraging the extensive knowledge resources of Oberlin College alumnae involved with local food efforts across the nation, and development of a "knowledge commons" that facilitates information transfer, encourages innovation, and replicates best practices.

CRITICAL TOOLS

The full integration and development of the five core activity areas described above will require some new tools and capacities in the Oberlin community.

Cultivating Robust Networks

The first tool involves the creation of robust networks that leverage the knowledge, passions, perspectives and assets of the diverse communities that make up Oberlin and the surrounding region. Creating open and inter-acting networks spurs innovation and accelerates the adoption of best practices. This creates a more bottom-up approach to economic development that leverages the assets within a given community rather than seeking investment from outside of the community. One of the best national models for network driven economic development resides in Athens, Ohio where the Appalachian Center for Economic Networks (ACENet) has organized diverse networks of farmers, businesses, and institutions and leveraged local food systems to create jobs and economic opportunity in one of the most impoverished regions of the United States. June Holley, founder of ACENet, came to Oberlin to lead a workshop on network leadership and facilitated a local food summit.

Overall, while Oberlin has seen a number of enterprising local food initiatives, the level of connectivity between initiatives could be stronger. Oberlin has what is termed "emergent networks" which include somewhat isolated pockets of activity. As more advanced network initiatives, the Bonner Center at Oberlin, the New Agrarian Center, and the Oberlin Underground Railroad Society (OURS) represent what are referred to as "multi-hub" networks that bring together and mix diverse elements of the local community.

Some activities that will build more robust networks include social networking events that bring together groups of people that have not previously collaborated, utilization of film and digital media to share stories and best practices, encouragement of the formation of informal collaboratives or more formal cooperatives that build greater connectivity between people, aligning core activity areas with appropriate community stakeholders, and organizing "pop-up" events as simulations or pilots of potential activities, such as a "pop-up" food hub to bring together farmers and buyers for a day.

Community Investment

Another aspect of robust networks involves a fuller utilization of the assets inherent in any community. Access to "capital" will be a critical driver for developing a more vibrant local food system. Capital comes in many forms including individual (physical skills), social (relationships), intellectual (knowledge, innovation), natural (soil, biodiversity), built (available land and buildings), financial (unencumbered financial resources), and political (collective power of groups or organizations).

Oberlin College presents an example of how multiple forms of capital can be leveraged to support local food systems. Over the past twenty years, Oberlin College's contributions include volunteerism, applied research, alumni entrepreneurs, purchasing power, utilization of idle college land, financial investments, and conversion of campus waste into inputs for local agriculture.

Michael Shuman, author of *Local Dollars, Local Sense* and lead-author of *The 25% Shift* study, returned to Oberlin in the spring of 2012 to offer a lecture and workshop on local investing. Some of the financial resources that he suggested be leveraged include: local banks and credit unions, cooperatives, accredited investors, non-securities investments, and local investment pools.
Oberlin already has a number of good examples in place for local investing, including

Return to Table of Contents

pre-selling of goods and services (community-supported agriculture), internship and fellowship support for students or alums, applied research through Environmental Studies, volunteerism through the Bonner Center for Service Learning, low-interest loans from the student cooperatives, grants from Bon Appetit or the Green Edge Fund to expand infrastructure for production and distribution (greenhouse, box truck, water collection systems, etc.), and contributions of waste assets to enhance local agricultural production.

Utilizing numbers generated by the *25% Shift* report, it is estimated that a 70% shift of Oberlin's food supply would require at least $7 million in financial investment to support a local food hub, a waste hub, year-round urban agriculture, carbon farming, and a learning network. Appropriate investment tools can be developed for each activity area, including crowdfunding, cooperative development, time banks and local currencies, investment clubs, program-related investments from area foundations, or specialized CD's from local banks or credit unions. More long-term investment options include local stock exchanges, municipal bonds, or self-directed IRA's.

Urban Design

Architect Christopher Alexander's book *Pattern Language* includes a variety of urban design techniques that improve connectivity between neighbors and community members, more mixed-use development, blurring edges between municipal boundaries and the rural countryside, supporting common spaces and resources, and fostering a more functioning local democracy. All of these elements are essential for the development of local food systems.

A number of applications of *Pattern Language* concepts can inform how food localization itself can create more sustainable patterns of urban design and development. Likewise, sustainable patterns of urban design can also encourage or facilitate the process of food localization.

Overall, urban designs conducive to local food systems can be considered and applied to the following scales: integration with the broader communities that make up Northeast Ohio's regional food systems, urban design and development, formation of self-governing micro-communities (such as cooperatives or neighborhood gardens), community network interdependence, preservation of neighborhood integrity, fluid but distinct neighborhood boundaries, clusters of housing that maintain adequate greenspace, work communities that include diverse small or independent businesses, pathways and connectivity between communities in the city, public or commonly held open-land, common gathering spaces, integration of local foods into the built environment and landscaping, considerations for architectural designs, productive utilization of spaces between buildings, gardens throughout the urban landscape, and internal gathering spaces that encourage communion and socializing around food.

Strategic Leverage Points

Local food systems are complex, including a number of diverse actors across the food value chain (farmers, restaurants, distributors, etc.). A final step in growing local food systems involves identification of and action around strategic leverage points. These are strategic actions that produce the greatest catalytic effect with the least investment of time, resources, and energy.

The identification of strategic points of leverage should be an on-going community activity that involves research, analysis, engagement, experimentation, and collective sense-making and learning.

Strategic points of leverage will include rules, incentives, feedback systems, information, integration, forecasting, and changes in mindset. Strategic leverage points will maximize their catalytic impact to the extent that strategic stakeholders can be organized around each point.

As an overall strategy, the core activity areas should not be pursued in isolation from each other. Rather the activity areas should be seen as mutually-supportive of each other. The development of one core activity area can facilitate the development of other core activity areas. For example, the businesses and farmers organized for a local food hub can be some of the same businesses and farmers to participate in a waste hub. Urban agriculture can help to reduce the carbon footprint of the city while sequestering carbon in soils or plants. The waste hub can collect food waste to make bio-gas through biodigestion which can provide energy to a local food hub or to heat greenhouses on local farms.

A final aspect of strategic leverage points involves the identification or development of concentrated activity nodes dispersed throughout the community. Six activity nodes were identified for Oberlin, including a broadacre carbon farming site north of town, a school farm and community kitchen at the Boys and Girls Club by the Oberlin High School, a cluster of urban gardens in the southwest of town, a regional food hub around the former Missler's grocery store, a neighborhood farm and small-scale kitchen and event center in the southeast part of town, and development of a waste-to-food hub and small-farm incubator at the George Jones Farm in the northeast part of town.

The resources in the appendices of the report provide more detailed information and case studies for the 70% shift: charts and graphs for the Oberlin foodshed, local food hub and kitchen incubator development details, history of composting in Oberlin, bio-digestion pre-assessment report, urban agriculture case-studies from Great Lakes cities, urban farming modules for Oberlin, and a case-study on network development in Athens, Ohio.

The 70% shift report was made possible through the support of the Oberlin Project, the New Agrarian Center, and NEOFoodWeb.org.

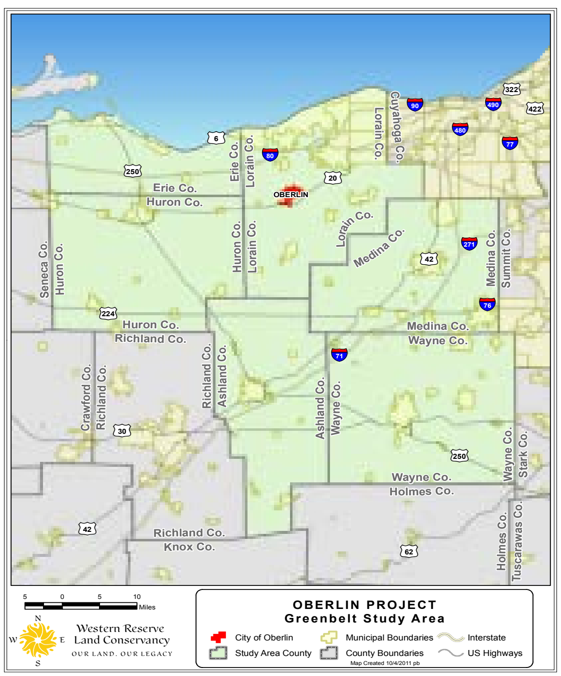
Overview of the Oberlin Foodshed

A foodshed defines a common geographic area in which food is grown, transported, stored, processed, brought to market, consumed, and disposed of. For developing a local food system, a foodshed can be thought of as an area in which sustainable farming practices, energy-efficient transportation and storage, nutritious meals, and productive utilization of food waste all occur within a defined geographic area. For the purposes of this assessment, the Oberlin Foodshed comprises a six county region that includes Lorain, Erie, Huron, Ashland, Medina, and Wayne counties. A 70% localization effort would favor infrastructure development and investment within this geographic area.

Overall, 55% of the total land area in the Oberlin foodshed contains farmland with Wayne and Huron Counties each having about 70% of their total acreage devoted to farming. By comparison, Lorain and Medina counties have only about 33% of their land area devoted to farming due to urban and suburban development.

Through an analysis of farmland statistics for the past 50 years, the six counties in the Oberlin Foodshed mirror some of the same recent national trends observed for agriculture, including: increase in concentration of agriculture overall with fewer farmers producing more output; growth in smaller farm operations engaging in direct marketing; growth in small, generally younger operations; and growth in products suitable for direct marketing (fruits, vegetables, smaller livestock, nuts).

In terms of the Oberlin foodshed, the number of farms has decreased by an average of 46% over the past 50 years, with Wayne County showing the lowest loss at 33%. However, in the past decade, the foodshed has experienced an average increase of 10% in the number of farm operations.



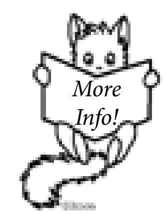
While the number of farms has declined by almost 50%, the foodshed experienced a loss of 31% of farmland acreage over the past 50 years, mostly owed to urban development in Medina and Lorain Counties. The past decade has seen a continuing, but slowing decline in overall farmland acreage, with Wayne County being the only county to increase farmland acreage by 3%.

The change in average farm size provides a measure for changes in concentration in the agricultural sector. With the exception of Medina County, there has been an overall increase in the average size of farms in the foodshed, indicating a trend toward increased concentration in farm ownership over the past 50 years. Erie and Huron counties experienced the greatest concentration at the rate of 50-80%. However, these trends have reversed in the past decade, with most counties experiencing a 10-20% reduction in average farm size over the past decade. This indicates a growth trend in smaller-acreage farm operations in the foodshed.

In terms of food consumption, businesses and consumers in the Oberlin Foodshed purchased about $1.9 billion in food annually. With the largest urbanized population, Lorain County consumes about $768 million in food each year. As a small town community, Oberlin College and the residents of the City of Oberlin spend about $17 million on food each year. Including reported business sales, Oberlin businesses spent at least $20 million in total food sales. This figure captures students buying meals off-campus, employees that eat meals in Oberlin but do not live in Oberlin, and visitors or tourists.

As a part of the assessment of the Oberlin foodshed, we identified five businesses that spend 25% or more of their food spending on local farms and local food businesses, including Oberlin College/Bon Appetit, the Oberlin Student Cooperative Association, the Black River Cafe/Agave Cafe, and City Fresh Oberlin. Combined, these businesses purchased about $1.03 million of local food in 2010, representing about 6% of the overall spending between the college and town residents. This figure will be higher if the impacts of the Oberlin Farmers Market and other local businesses that spend less than 25% on local food are included. Overall, about 42% of food is purchased directly from farmers, 34% from a local processing business, and 24% through a distributor.

Following a supply network analysis, it was determined that there exists a network of 80 local farms or local food businesses (distribution or food manufacturing) that are included in the $1 million of local spending. This spending is distributed between farmers and businesses coming from 15 counties in Northeast Ohio. The highest spending (23%) goes to Portage County where two local food distribution businesses are based. Wayne (19%) and Lorain (18%) counties include mostly direct purchasing from farmers. About 9% of the spending goes to Cuyahoga County where a number of food processing businesses are based. Only about 42% of local spending stays in the six counties that comprise the Oberlin foodshed.



Return to Table of Contents

Looking to the Past- Oberlin's Pioneering History of Local Food Systems

At first glance, a 70% localization of Oberlin's food supply seems a distant and remote possibility. However, when considering Oberlin's 20 years of pioneering local food work, a lot of the groundwork for substantial localization has already been laid. Over the past year, the Oberlin Project worked with NEOFoodWeb.org and the New Agrarian Center to conduct video interviews with individuals active in local food efforts in the community. Interviews included individuals involved with local food efforts since the early 1990's and others who have gotten started more recently. Interviews in combination with live footage of local food work in action were assembled into a 45 minute documentary film, titled *For the Love of Food*. The film documents the many ways that people contribute to Oberlin's vibrant local food economy, from backyard homesteaders to farmers and local food businesses. The following list highlights some of the examples portrayed in the film that can easily be expanded or replicated throughout the community and region.

La Petit Farme en Ville- The Baumann family operates a small homestead on their half acre backyard that includes goats, chickens, fig trees, and vegetables. The family processes their own goat cheese and a other local foods in their home kitchen.

Backyard Polycultures- Brad Masi, author of this report, demonstrates his conversion of a 1/4 acre backyard as a permaculture space that mixes wetland habitat, native nut and fruit trees, composting, and home vegetable production.

Vermilion Valley Vineyard- David Benzing retired from a distinguished academic career in Oberlin's Biology department. After retiring, he applied his botanical expertise to the development of a grape arbor and local vineyard, demonstrating that it is never too late to become a local food entrepreneur.

Lucky Penny Farm- Goat farmer Abbe Turner worked with a network of other farmers to start a creamery in an abandoned building in downtown Kent. Her artisan goat cheese finds its way to a number of markets in Oberlin.

Black River Cafe- Entrepreneur Joesph Waltzer started the Black River after graduating from Oberlin to utilize business as a vehicle for social and environmental change. His restaurant sources about 35-40% of its ingredients from a network of about 15 local farmers and businesses, including Lucky Penny Farm.

Oberlin Student Cooperative Association (OSCA)- OSCA is Oberlin's pioneer for local food purchasing. OSCA is a student-owned and operated dining cooperative that first began its efforts in 1990 after a group of students applied their classroom project to the start of a local food buying program for the coops. Today OSCA sources about 32% of its ingredients locally.

Bon Appetit Management Company (BAMCO)- BAMCO is a national food service company based in California whose "Farm to Fork" corporate policy requires all accounts to achieve 20% local purchasing. Their Oberlin account spends about 27% on local farms and food businesses. They also engage students who manage their window-box planters and coordinate composting efforts.

City Fresh- An initiative of the Oberlin-based New Agrarian Center (NAC), City Fresh coordinates a network of over 20 farmers to improve local food access in urban neighborhoods in Cleveland and throughout Northeast Ohio. City Fresh shares are structured to improve access to lower-income residents who receive a subsidy paid by higher-income shareholders.

Village Garden- A six-year old garden on a 3/4 acre plot owned by the Lorain Metropolitan Housing Authority, this garden provides education for Eastwood Elementary School students, market gardening opportunities for high school students, and growing space for public housing residents.

Oberlin High School Farm Collaborative- Started as an effort to improve food awareness at Oberlin High School, this student run market-garden educates students and sells food to the high school cafeteria.

Oberlin Early Childhood Center (OECC)- With a meal service operated by Oberlin graduate Dave Sokoll, the OECC has worked to combine local food purchasing with improved nutrition for pre-schoolers.

George Jones Farm- This 70 acre farmstead owned by the college and leased to the New Agrarian Center (NAC) provides educational opportunities for high school and college students and adults. It sells its food to a variety of local markets and also provides a learning lab for the Lorain County Community College.

Dave Sokoll, Oberlin Graduate and Chef for the Oberlin Early Childhood Center

Looking to the Future- Community Perspectives on a 70% Shift

Given its history and small size, over the past year, the Oberlin Project began to assess the feasibility of a 70% shift in local food purchasing across the Oberlin community. A shift of this magnitude provides a challenging goal that tests the extent to which a community can go to build a local food economy, substituting a substantial amount of food imported from outside of the area. What would be the job creation or wealth retention potential? Are there risks with this level of localization in an era of climate instability? Could the region draw largely from its own resources to supply the requisite calories and nutrients for a healthy population? Does this provide a compelling option in a region where most farmland is dedicated to export-oriented commodity foods?

To assess the viability of a 70% localization, video interviews were conducted with individuals presently involved with local food efforts in and around Oberlin. This provides an effective "ground-truthing" of the 70% goal, drawing on the perspectives of those most involved with local food efforts. Interviewees included local farmers, local food manufacturers/processors, volunteers active in local food efforts, cooks and chefs, high school and college students, college professors and educators, restaurant and business owners, institutional food buyers, non-profit organizations dedicated to local food initiatives, and individuals involved with logistics or food distribution.

Overall, reactions in the community to the viability of a 70% shift were mixed, with most people expressing belief that it would be possible, but would require substantial changes before it could be realistic. Community responses were clustered around the three aspects of sustainable development: ecology, community, and economy.

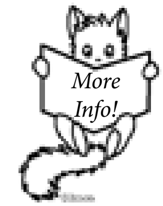
ECOLOGY

SEASONALITY: Being a cold-climate, northern region, there are significant seasonal constraints to the year-round availability of locally grown foods that would need to be overcome through a mix of changes in consumer behavior, dietary choices, and preservation options.

Kate Pilacky, Western Reserve Land Conservancy

CLIMATE CHANGE: The increasing risks of extracting fossil-based energy coupled with the de-stabilizing effects of climate change will challenge the viability of local food systems. These same forces can threaten the stability of local food systems, exposing some potential risks for too much localization.
DIVERSIFIED FARMS: Localization would require a supply-base of smaller to medium-scaled farms producing a wider variety of crops and livestock products than the commodity farms that now dominate most production.

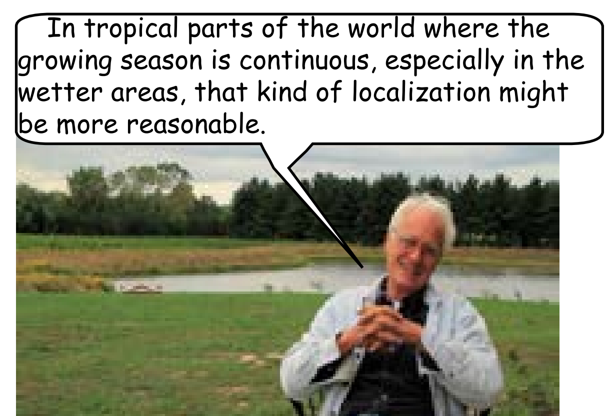
COMMUNITY



COMMUNITY BUY-IN: The buy-in of residents and businesses in the local community for food localization is key. Certainly, the high level of present activity in Oberlin can serve as a motivator, but people need to come to their own decisions as to how and why to support local food systems over other options that might be more convenient and affordable.
ACCESSIBILITY: Equity in access is a large challenge, particularly when many people perceive local food as available to a more elite market. Pricing, availability, and equity need to be built in to cross the chasm from more elite markets to more mainstream markets.
FARMER INVOLVEMENT: Certainly, market demand has driven much of the growth of local food systems, but farmers need to be well-represented in the process as they will be the primary limiting factor to possibilities for a 70% localization.
COLLABORATION: A localization will only be possible if there is a much higher degree of collaboration within groups and between groups, including farmers, businesses, institutions, and consumers. This includes greater communication, collaboration to create larger markets, and shared-use equipment and facilities that could benefit a variety of farmers and businesses that would be unable to capitalize this infrastructure on their own.

ECONOMY

INFRASTRUCTURE: Critical to expansion of the local food economy will be investments in infrastructure to support improved communications, network connections, distribution, storage, and processing.
SELF-SUFFICIENCY: A long-term indicator of success will be the extent to which local food systems can become self-reliant, including the development of viable businesses and raising the capacity for people to meet their own food needs.



David Benzing, Winemaker and Former Oberlin Professor

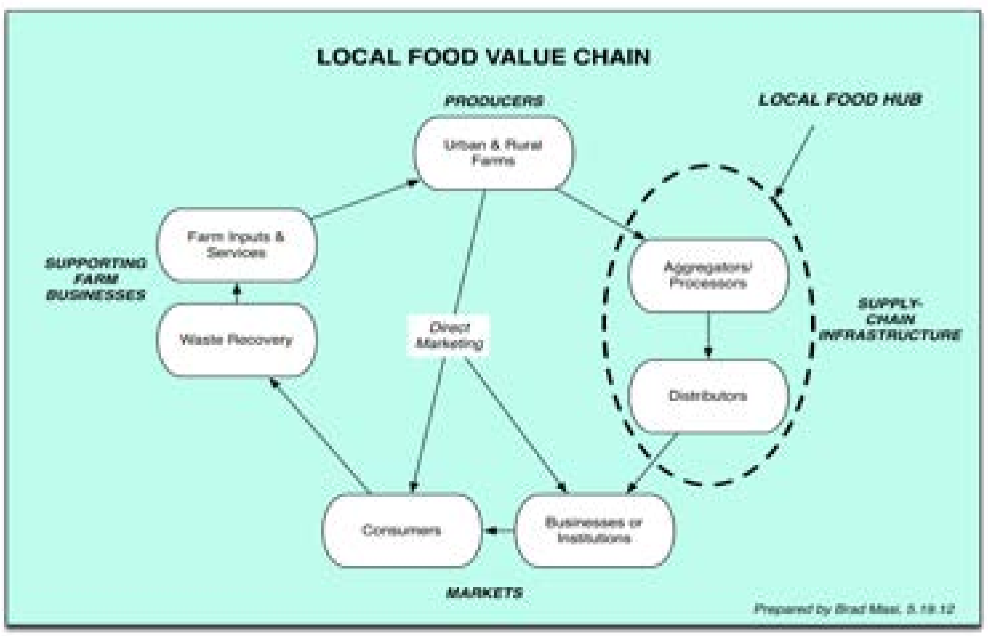
Return to Table of Contents

Core Activity Area #1: Developing a Local Food Hub

Oberlin has a long history of supporting local food systems. Investments in infrastructure to facilitate greater capacity for local food activity will be essential for the continued growth of Oberlin's local food economy. A local food hub increases the efficiency and competitiveness of local food, offering facilities for receiving, sorting, storing, processing, and distribution. Food hubs can also provide training, enterprise incubation, and cultivation of buyer and supplier networks. Oberlin has a number of under-utilized facilities that could support activities that increase the ease of local food purchasing, both in Oberlin and the broader region.

Food hubs sit at the intersection between supply and demand, facilitating more effective connections between farmers, businesses, and consumers. On the supply-side, food hubs coordinate diverse networks of local farmers, facilitate production planning and season-extension, and help with certification, food safety, and liability. On the demand side, food hubs work with distributors, wholesale buyers, institutional or commercial markets, and consumers to increase the accessibility and desirability of locally grown foods. Food hubs can also be organized to increase entrepreneurship and workforce development around local foods as well as facilitating social goals, including improving healthy food access or promoting the sustainability of the local food supply.

A food hub goes beyond direct marketing (where farmers and consumers connect directly) to promote localization along the entire food value, including production, distribution, processing, storage, wholesale and retail markets, waste recovery, and enterprises that provide services or inputs to local farmers or food businesses.



Oberlin already has a number of activities that offer valuable assets to the development of a food hub. A number of markets already exist for local food, including the college, the Oberlin Student Cooperative Association, and the Black River Cafe. A number of additional businesses and institutions in the community have stated a strong interest in increasing local food activity. The New Agrarian Center, a non-profit organization based in Oberlin, operates City Fresh, a social enterprise that connects a network of 25 area farmers with 20 urban neighborhoods in Northeast Ohio. Oberlin College, the Lorain County Community College, and the Joint Vocational School all have programs or initiatives that can provide training and support for farmers, entrepreneurs, or workers.

Over the past year, the Oberlin Project has worked with a variety of community partners to begin some initial steps to support a local food hub development. The local food committee of the Oberlin Project includes a mix of stakeholders that represent local farmers, institutional and commercial buyers, and educational institutions. The NEOFoodWeb.org organized a series of video case-studies of different local food hub activities around Northeast Ohio. The Zion CDC organized three community forums to begin discussion and network development around a local food hub, a community kitchen facility for processing, and expanded urban agriculture.

Looking to the future, the following three areas of focus can lead to further potential development of a food hub in Oberlin. First, instead of looking at one central facility, Oberlin, as a small-town, can look to a network of inter-connected facilities that support activities typical to a food hub. At this point, the Missler's Grocery Store on the south-side of Oberlin is recommended as a location to support wholesale food storage and distribution with possible limited retail. The Boys and Girls Club on the north side of town contains kitchen facilities that could serve as a local food processing hub that can support networks of urban farmers, home-based businesses, or small enterprises.

Second, seeking funding for "pre-development" will support further assessment for the creation of a local food hub, including a legal structure, better understanding of markets, viability pathways, facilities reviews, and a development plan.

Third, the local food committee is beginning to conduct a more detailed market assessment to better understand demand for different local food products and identification of potential growers or businesses to supply those products. A "meet-and-greet" networking event can enable potential buyers and sellers to connect. It is recommended that this event take place at the Missler's store to simulate how a food hub might actually work.

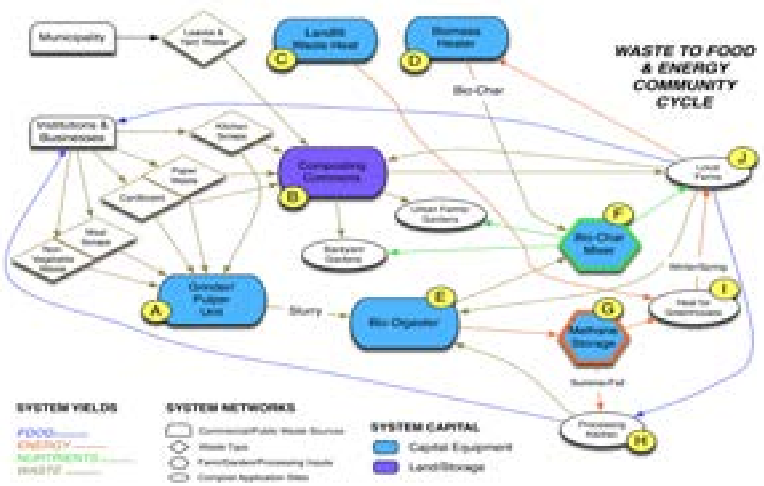
Return to Table of Contents

Core Activity Area #2: Waste-to-Food-and-Energy

For the past 20 years, Oberlin has developed a number of small-scale projects for composting and organic waste utilization. However, a comprehensive and community-wide effort is needed to optimize the utilization of organic wastes as productive inputs to local agriculture. Organic waste, when properly processed, produces a number of inputs useful to local agriculture, including nutrients, organic matter, and energy. A distributed approach to organic waste utilization matches waste streams to a number of local food applications, including heat for greenhouses, natural gas for commercial kitchens or food preparation, bio-char as a soil amendment, and recuperation of nutrients to improve soil fertility. Utilizing these local waste streams can reduce the dependency of local agriculture on imported nutrients and energy.

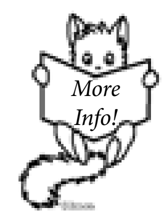
Oberlin College and the Oberlin Student Cooperative Association generate about 9,000 pounds of organic food waste every week with upwards of 135 tons produced annually. The City of Oberlin collects an estimated 500 tons of leaf and yard waste annually for its Class IV composting facility. The combined waste streams of other institutions, businesses, institutions, and households in Oberlin present an important asset that will be essential to the growth of sustainable local food systems in Oberlin. Utilizing local waste assets reduces the amount of nutrients and energy that need to be imported into the local food system. Capturing these wastes also creates a more closed-loop food system in which the waste of businesses and institutions can enhance the productivity of local soils and increase the available local food that they can then purchase.

Interest and activity to support composting in Oberlin go back at least 20 years when the Oberlin Student Cooperative Association established "coop composters" who collected, transported, and managed compost on participating farms. In 2006, the New Agrarian Center partnered with the Ohio EPA to pilot a "distributed composting system" which involves low-capital systems that distribute organic materials to a variety of smaller-scale applications in the community. Will Allen, CEO of Growing Power in Milwaukee, led a compost training at the George Jones Farm in 2006 which expanded vermicomposting (utilizing worms to process food waste) for the farm and urban gardens in Oberlin and Cleveland. In 2011, Oberlin College invested in a grinder/pulper unit which pulverizes food waste.



To expand composting and other organic waste utilization activities in the community, the Oberlin Project partnered with student recyclers at Oberlin College to organize an Organic Waste and Composting summit in March of 2012. The summit featured tours of local composting efforts, a documentary film that highlights innovative composting efforts in Oberlin and beyond, and a series of discussions between students, local farmers, city government, businesses, and residents. Summit participants identified a wide-range of local assets that could support composting, including land, facilities, sources of labor, expertise, and financing. The group identified four areas of focus for organic waste utilization in the community including: composting for home or urban gardens, municipal or commercial-scale composting facilities, logistics for collection and processing, and bio-digestion (utilizing organic materials to produce energy). As a follow-up to the summit, the Oberlin Project began to work with Republic Services to look at capturing waste-heat from land-fill gas production to heat greenhouses for local food production. They also organized a study to assess several bio-digestion scenarios to produce bio-gas for utilization by local agriculture. In conjunction with the Green Arts District, a bio-mass energy system was considered in early development plans as a way to generate heat for a green hotel and bio-char (a valuable agricultural input) as a by-product.

Looking ahead, the following three activities can help to advance opportunities to connect organic waste with local agriculture. First, to better assess organic waste utilization options, a community-wide organic waste audit should be conducted to estimate the volume and seasonal flows of organic materials produced by institutions and businesses in the Oberlin community. Second, a feasibility and viability plan for a "composting commons" should be conducted to design a space where organic materials can be aggregated and processed for a variety of applications in the local community. The area around the Wastewater Treatment Plant, the current location of Oberlin's leaf mulch composting site, was identified as a location for this activity. A Class II operating license would be necessary as a part of this. Third, a bio-digestion pilot in conjunction with the Environmental Studies Program can support development of a small-scale bio-digester that can heat a greenhouse at the George Jones Farm or the Environmental Studies Center. This would provide useful information to assess the potential of small-scale bio-digestion that could benefit local farms.

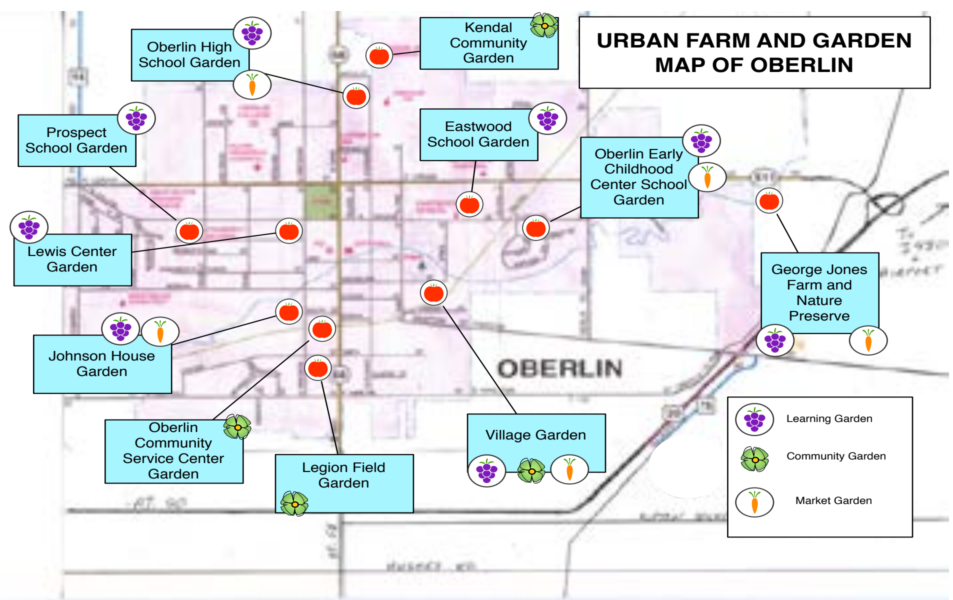


Core Activity Area #3: Urban Agriculture

In the past decade, urban agriculture has become an increasingly wide-spread practice in cities both large and small. For cities like Cleveland or Youngstown, urban agriculture has emerged as a productive utilization of large inventories of vacant land resulting from a 50% or greater loss of population since the 1950's. Even large cities like Toronto or Chicago, which have lower proportional vacant land inventories, still support significant urban agriculture activity. As a small-town with about 380 acres of vacant land, Oberlin can look to urban agriculture as the first and most important step toward achieving a 70% localization. Through a more active promotion of food cultivation within city boundaries, Oberlin can increase its supply of healthy, locally grown foods while improving quality of life on campus and in neighborhoods.

Urban agriculture involves the active cultivation and consumption of food within municipal boundaries. Urban agriculture can involve a number of applications, including backyard homesteading, rooftop agriculture, community gardening, market gardening, school or learning gardening, edible landscaping in public spaces, aquaculture, or urban farm districts which involve a concentration of urban agriculture activities, including livestock or composting, that might be less appropriate in dense residential areas. In addition to increasing the local food supply, urban agriculture positively impacts community life, increasing health and nutrition, encouraging stronger connections between neighbors, improving the quality of green space, and cultivating entrepreneurship.

Over the past five years, Oberlin has seen an uptick in urban agriculture activities with increased yard cultivation and about 13 active public gardening spaces. Gardens provide a mix of uses, including school education, food pantry distribution, market sales, or food for self-consumption. Including the George Jones Farm, which resides mostly in the city of Oberlin, about 31.5 acres of land currently is available for cultivation. Only about 21% of this available space is actively utilized, indicating significant room for growth. Oberlin College owns about 67% of the acres utilized for urban production About 20% occurs on municipal land, including the City of Oberlin or Lorain Metropolitan Housing Authority. About 11% sits on land owned by public schools. The 6.75 acres of land actively cultivated within the city represents about 0.25% of the total land acreage in the city.



Over the past year, the Zion Community Development Corporation has become more active in promoting urban agriculture, including the Legion Fields Garden both as a community garden and as a space to organize community events that promote health and local food consumption. The CDC has also been actively working to promote urban agriculture as a potential re-use of vacant land in Oberlin. The Oberlin Early Childhood Center introduced a small children's garden and utilized a greenhouse to produce seedlings that were sold to support their program. The Village Garden on Spring Street, operated by the Oberlin Underground Railroad Society (OURS), offered growing space to high school students who sell food at a road-side stand in the neighborhood. The Johnson House Garden at Oberlin and the Oberlin High School Garden each produced food that was sold to their respective dining cafeterias. The Oberlin Project began to assess the potential for urban agriculture as a part of a local food strategy for Oberlin, including a vacant land inventory for Oberlin and an estimate of the land-area required to increase self-reliance in food (based on studies in Detroit and Cleveland). It is estimated that around 76% of the vegetable needs and 42% of the fruit needs of Oberlin could be met on 121 acres utilizing standard row crop production and storage and season extension techniques. Utilization of advanced bio-intensive methods could shrink this required growing area to about 20 acres. Either scenario would be possible if a portion of the 380 acres of vacant land were utilized.

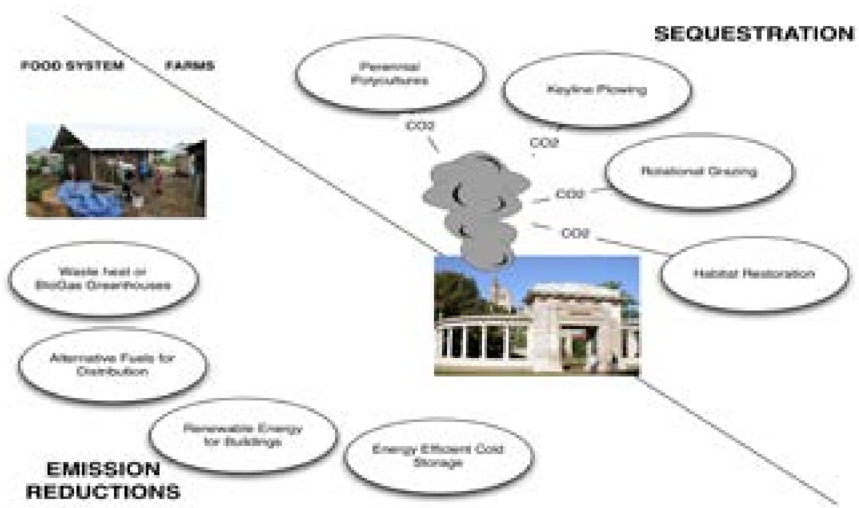
Looking ahead, the following three activities can expand urban agriculture in the city. First, land presently actively used for urban agriculture should be maximized and a city-wide effort to promote backyard gardening encouraged. Second, it is recommended that existing gardens in the community, form an education and development collaborative aimed at supporting bio-intensive and season extending food production methods in the community. These sites can also serve as neighborhood learning centers to increase backyard cultivation. Third, an investment fund should be established to increase shared infrastructure for urban farming, including greenhouse installations, compost distribution, shared equipment, skill shares, formal learning workshops, shared labor and mutual aid support, and a community kitchen for home or small-business processing.

Core Activity Area #4: Returning Balance to Carbon Cycles

Food localization efforts in Oberlin need to consider both reductions in greenhouse gases resulting from the production, processing, transport, and consumption of food in combination with maximizing the carbon storage and sequestration capacity of local soils and plant biomass. This involves approaches to food and farm production that promote efficiency of energy-use in all on-farm, transportation, and storage systems; utilize renewable energy and fuels to support food and agriculture enterprises; develop waste to energy applications, such as bio-digestion of food or animal waste or utilization of waste vegetable oil as an alternative fuel; and deploy "carbon farming" methods, which include a package of farm management techniques that maximize carbon storage and sequestration.

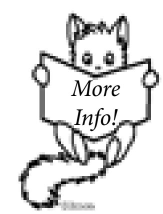
Overall, greater attention needs to be devoted to the relationship between land-use and climate change. A variety of climate change initiatives nationally and internationally focus on energy and transportation, but devote less attention to land-use which contributes an estimated 31% of the greenhouse gas emissions. The global food system contributes significant carbon to the atmosphere, including input manufacture and application, land clearing, plowing and tillage, food manufacturing, storage, transport, food preparation, and anaerobic decomposition of food waste. Resilience of food systems requires a substantial reduction in carbon releases, sequestration of carbon in biomass and soil, and the adoption of systems that can handle increased drought, flooding, and extreme weather events. Transitioning local food systems in an era of accelerating climate change will include five areas of focus: enriching soil carbon, promoting perennial forms of agriculture, climate-friendly livestock production, protection of natural habitat, and the restoration of degraded watersheds.

A number of recent initiatives and projects in Oberlin have laid some groundwork to build a broader effort to link climate change and local food systems development. The New Agrarian Center has hosted several workshops over the past five years that address carbon farming and permaculture. These workshops have involved over 60 people from around the mid-west and have included modules on perennial agriculture, keyline plowing, soil carbon formation, and intensive food production. The New Agrarian Center has also developed a number of projects that promote energy efficiency and alternative fuels for local food systems. A produce delivery truck for City Fresh utilizes waste vegetable oil for transportation and a strawbale learning center and walk-in cooler utilize agricultural waste products while promoting high efficiency for agricultural buildings. The George Jones Farm has also employed compost, cover crops, and rotational livestock to build soil carbon. Soil organic matter content has increased from about 1.7% to about 5-6% for areas under agricultural cultivation, indicating techniques that improve soil productivity and sequester carbon.



Over the past year, the Oberlin Project has included local farms as a part of a larger effort to off-set greenhouse gas emissions from the college and City of Oberlin. A study conducted by the Western Reserve Land Conservancy included an assessment of soil carbon storage potential across a six county area. The NEOFoodWeb.org has assembled a variety of interviews and video case studies on carbon farming, perennial agriculture systems, and soil organic matter. Two case-studies feature the enterprising work of Fred Magoff and Phil Rutter, two Oberlin College graduates. In February of 2013, the Oberlin Project hosted a lecture and workshop with Mark Shepard, a national expert in perennial agriculture systems.

Looking to the future, the following activities can increase efforts to align local food systems development with natural carbon cycles, reducing the contribution of the Oberlin community to climate change. First, a network of area farmers currently practicing or interested in introducing agricultural techniques that build soil carbon will be an essential first step to building communities of practice. Second, an educational collaborative to include the Environmental Studies Program at Oberlin College, the Sustainable Agriculture program of the Lorain County Community College, the New Agrarian Center, and the USDA's Natural Resource Conservation Service can organize workshops and formal curricula to provide technical training and research around carbon farming methods. Third, organization and local financing of a "carbon fund" can provide resources for equipment purchases, facilities development, and farm enterprise development that involves carbon farming techniques. The fund can be included as a part of a larger effort to off-set carbon emissions by the college and city. The fund should also be connected to educational programs, providing participants with opportunities to both learn new techniques and access resources to invest in more climate-friendly agricultural operations. A carbon fund can also be integrated into the local food hub, providing a mechanism to insure that food distributed through the food hub has a minimal climate impact.



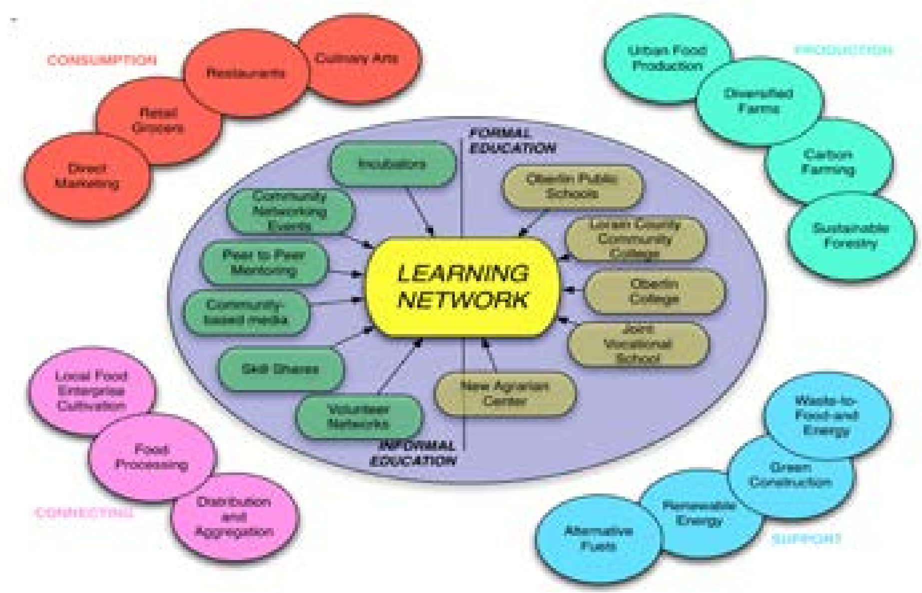
Return to Table of Contents

Core Activity Area #5: Developing a Learning Network

A 70% localization of Oberlin's food supply will only be possible if there is broad community awareness, participation, investment, and support for local food systems. The first and most important step to growing the local food economy around Oberlin is a concerted educational effort that increases the capacity for local participation in all aspects of the local food system, including consumption; production; enterprises that support distribution, processing, and waste handling; and supporting services for local farms or food businesses. The learning network includes both formal (schools, colleges) and informal learning processes (mentoring, skill-shares, workshops, etc.).

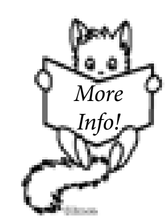
A network consists of an interconnected and complex web of individuals, groups, businesses, organizations, or agencies that leverage their collective assets (skills, time, people, financial capital, equipment, facilities, land) to change or transform an economic or social system. Network expert June Holley, co-founder of the Appalachian Center for Economic Networks (ACENet) in Athens, Ohio, describes how system change occurs when new networks supplant the old. Holley describes how extensive networks that hold the old ways in place and need to be opened up for change. Parallel to this, there are also networks of unconnected or loosely connected individuals working in their own small ways to create a healthier system. A network approach connects these individuals, helping them take action to change the system.

A historical assessment of Oberlin's local food efforts reveals that Oberlin College has played a critical role in the development of local food systems around the Oberlin community. Many initiatives began as class projects or independent studies. For example, in the early 1990's, a group of students took a class project that assessed the sustainability of meals on campus to implement a local food purchasing initiative for the student cooperatives. A number of social enterprises in the community also were initiated by Oberlin College graduates, many of whom got their start through the college. The Black River Cafe, Agave Cafe, the Oberlin Market, the New Agrarian Center, and Full Circle Fuels show five examples of local businesses or non-profit organizations that have impacted the local food economy. The college and Bon Appetit Management have also adopted policies that favor purchasing local food. The college also made 70 acres of land available for the development of the George Jones Farm, a community farm and learning center.



Over the past year, the Oberlin Project has supported several activities that have improved education in the community around local food systems. *For the Love of Food* is a feature-length documentary film that profiles Oberlin's innovation in local food systems development and can be utilized as an education and community building tool. Extended clips and interviews from the film are being posted on NEOFoodWeb.org to provide more detailed information on Oberlin's local food innovations. The Oberlin Project also partnered with the New Agrarian Center to organize a Local Food Summit at Lorain County Community College as well as an Organic Waste utilization summit, both of which combined education and community action. The project also organized public lectures and intensive workshops with network expert June Holley and local investing expert Michael Schuman.

Looking to the future, the following three actions can help to grow and expand a learning network that will spur the innovation, leadership, and entrepreneurship needed to grow the local food economy. First, a more formal educational collaborative should be formed between Oberlin College, the Joint Vocational School, the Lorain County Community College, Oberlin Public Schools, and the New Agrarian Center. This collaborative can work toward expanding curricular offerings, specialized trainings or workshops, and community projects aimed at increasing public awareness and skills for all aspects of the local food system (rural and urban production, culinary arts, local food enterprise development, etc.). Second, a more distributed network of potential learning sites can be cultivated in the community, offering physical locations that can combine education and development, including neighborhood gardens, the George Jones Farm, or a community kitchen or local food hub. These spaces can be connected to more formal educational curricula, but can also provide more grassroots network activities that encourage positive mixing between youth, college students, and residents. An investment fund can also provide seed capital for promising initiatives in the community. Third, a knowledge commons can offer a virtual space that includes a library of innovations in Oberlin and the broader Northeast Ohio region. Connected to this virtual commons can be a series of regional networking or educational events that foster learning exchanges between communities in Northeast Ohio.

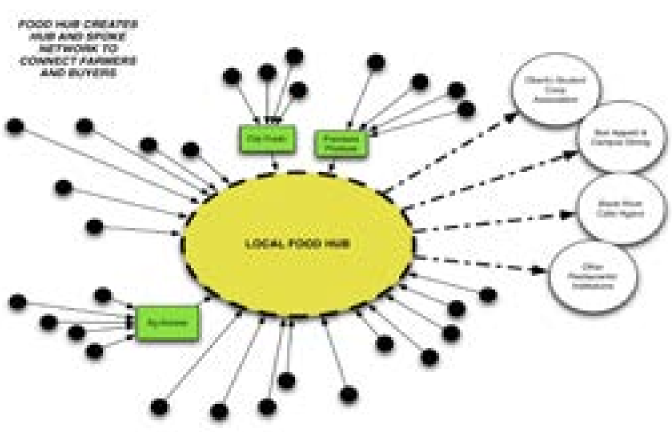


Critical Tools #1: Network Weaving

Local food systems depend upon healthy networks to function and grow. A network consists of an interconnected web of individuals, groups, businesses, organizations, or agencies leveraging their collective assets (skills, people, financial capital, equipment, facilities) to increase and strengthen social and economic connections.

One of the best examples of leveraging the power of networks to cultivate stronger local food economies is right here in Ohio. Located in the Athens, the Appalachian Center for Economic Networks (ACENet) has been cultivating the development of a sustainable local food system since its formation in the mid-1980's. Based in Southeastern Ohio, ACENet works with the 18 Ohio counties that are part of an extended Appalachian region that spans 11 states. While rich in natural resources, Appalachia has struggled with high rates of economic poverty, mostly related to the decline of coal, timber, and other extractive industries that brought a large number of short-term jobs to the region, but not long-term economic stability. This largely rural region of Ohio has among the highest poverty rates in the country, with about 35% of its residents at or below the poverty level. Over the past 20 years, ACENet has cultivated a rich network of local farmers and businesses centered in a shared-used kitchen incubator utilized by 200 unique farm and local food businesses that together reported $28 million in aggregate sales in 2011.

In 2012, the Oberlin Project collaborated with the New Agrarian Center to bring June Holley, a co-founder of ACENet and a network pioneer, to lead a one day workshop on building healthy networks. She also co-facilitated the Lorain County Local Food Summit, a gathering of 75 local food system stakeholders from Lorain County and the broader Northeast Ohio region. Her workshop involved a "network weaving" training for local food system leaders from Oberlin, Cleveland, Sandusky, Youngstown, and Wooster. Holley used the workshop to transition leaders from traditional organizational development approaches which tend to favor top-heavy management and hierarchical structures. According to Holley, network weavers "create an enabling environment that allows communication to flow and for collaborative action to self-organize."



According to Holley, Oberlin represents an early stage of network formation referred to as "scattered emergence". This pattern involves a variety of smaller networks that are active, but remain relatively isolated and disconnected. If these scattered clusters of activity do not organize further, the network remains weak and under-performing.

Some examples of scattered emergence can be seen in local purchasing and urban agriculture initiatives in the Oberlin community. Oberlin has a 20 year history of local food procurement. However, there is little collaboration or communication between Oberlin College, the Oberlin Student Cooperative Association, or the Black River Cafe, the primary local food buyers in Oberlin. Each entity independently manages their own supply networks of 15-30 vendors. Likewise, Oberlin has seen the development of 13 urban gardening or farm sites in the community over the past 5 years. Each garden has its own smaller network of participants, mostly drawn from the immediate surrounding neighborhood. However, there is little overall coordination or collaboration between urban farming sites. Expanding local purchasing or increasing the productivity of urban farming could benefit from greater collaboration. For example, local food buyers could coordinate supply networks, deliveries, storage, and processing of local foods- all functions that eventually could take place in a local food hub. Urban garden sites could collaborate around development of an investment fund for urban farm infrastructure, including greenhouses and equipment.

Ultimately, Holley describes "multi-hub networks" as necessary for the transformation of a local food system. A multi-hub network lacks a central node and offers numerous pathways for participants to connect between nodes. Network nodes could include a local food hub, an urban farmer collaborative, a food-waste aggregation and composting site, a collaboration of educational institutions and agencies, or farmers that employ carbon farming techniques and market food locally. While each of these network nodes serves a distinct purpose in the local food economy, each will also support the others. For example, the waste hub could direct a certain amount of compost to support urban farming efforts in Oberlin. Or a local food hub could provide training to supplying farmers in carbon farming techniques.

Holley recommended training and cultivation of network weavers in Oberlin that can help to connect projects and more effectively leverage assets within the community. Some activities that might also help to increase the growth of stronger networks in Oberlin include: a social network mapping exercise to identify key network nodes in Oberlin's community, combining screenings of *For the Love of Food* with local food pot-lucks and networking events, or "pop-up" events that draw diverse communities in the implementation of small experiments that can lead to longer-term change. For example, a networking event between farmers and local businesses could take place at the empty Missler's Grocery store as a form of a "pop-up" food-hub which would begin to cultivate the network connections needed to make this project a reality.

Critical Tools #2: Community Investment

The Ford Foundation publication *Wealth Creation in Rural Communities* offers a broad-based approach to capital formation that goes beyond financial capital. The report identifies seven forms of capital that can be leveraged by rural communities and small towns to support growth of local food systems. These forms include individual (skills, health), social (relationships), intellectual (knowledge, innovation), natural (natural resources, ecosystems), built (land, buildings), financial (unencumbered money), and political (grassroots, organizations, government).

All too often, communities stall potential activity if financing is not immediately available. Growth of local food systems can proceed by connecting with a range of assets that exist in a given community. In fact, the impact of financial investments will be greater and more encompassing if done after first leveraging other forms of capital in a community. Local food businesses often have difficulty attracting traditional financing but have a diverse network of farmers and individuals who can contribute other forms of capital. Local Roots provides one example of leveraging "social and political capital" to establish a retail local foods cooperative in two empty storefronts in downtown Wooster. Wayne County, which owned the empty storefronts, wanted to see activity in the space and opened the space up for the cooperative. Farmers and consumers rolled up their sleeves and pooled their tools, skills, and time to renovate the space and begin operations. Financing later supported acquisition of coolers and display shelving. The leveraging of political power, time, and talent in the community made an attractive environment for financing. The coop has since grown to include 120 farmer-vendors, over 600 consumer-members, and significant growth in sales since its start in 2009.

A "Community Investment Portfolio (CIP)", a concept developed by the Ohio Agriculture Research and Development Center in Wooster, provides a tool for individuals, businesses, or institutions to determine what forms of capital they may be able to contribute to the growth of a local food system. Oberlin College provides one example of an institution that has contributed multiple forms of capital to aid local food systems development over the past 20 years. Forms of capital include individual (alums that become entrepreneurs), social (volunteerism), knowledge (applied research), political (local purchasing policy), built (land for local food production), financial (contributions, loans, grants), and natural (food waste as local agriculture input). Forms of capital that exist in the broader Oberlin community include neighborhood social networks, empty buildings, vacant land, credit unions and community banks, yard waste, under-utilized equipment, and skilled individuals. A CIP can be developed as a matrix for identifying assets that can be leveraged within both the college and local community that can aid local food systems growth. The CIP can allow capital to be more effectively bridged between the college and community for greater catalytic impact.

The cultivation of stronger and more connected local networks is the first step toward development of a local food system. This does not, however, diminish the importance of financial capital as a fundamental driver of local food systems development. Creating an environment for local financing requires a shift in how economic development is typically approached. In April of 2012, Michael Shuman, economist and lead author of the *25 % Shift* report and the book *Local Dollars, Local Sense* came to Oberlin to recommend some mechanisms that could enable the community to leverage its own financial resources. Shuman presented about 40 tools for local investing. The list below covers some of the tools that could be realistically cultivated in Oberlin.

Short-Term Investment Strategies (strategies only limited by the lack of engaged individuals in the community implementing them) include

- Specialized CD's with local banks or credit unions that can be collateralized to support investments in buildings, facilities, or equipment to support food enterprises.
- Micro-loan program that provides small amounts of capital to support home-based businesses, urban market garden, or new enterprises on local farmers.
- Pre-payment of goods in which a business or group of individuals might pre-purchase goods or services for delivery at a later time from that farm or business. Community-supported agriculture provides one example of this kind of capital.
- Crowdsourcing or micro-financing initiatives can utilize on-line tools to leverage small contributions from networks of supporting individuals or businesses.
- Investment Clubs provide an opportunity for groups of individuals to pool their capital to invest in promising local enterprises.
- Time banks and local currencies create a barter-based system in which people pool their time and skills in an exchangeable market
- Revolving loan funds can provide investment capital for new enterprises that grows as the supporting enterprises grow.
- Program-related investments are low-interest loans offered by some foundations that can provide capital to local food enterprises with a social mission.
- Grants or loans from private foundations or state or federal government can be matched with local resources to support local food enterprise development.

Longer-Term Investment Strategies that require more sophisticated infrastructure and regional partnerships include self-directed IRA's, "slow" municipal bonds, local mutual or pension funds, or local stock exchanges.

Oberlin has an opportunity to build on an already existing network of financing that includes such local assets as the Oberlin Student Cooperative Association (low-interest loans to support local farms), the Green Edge Fund (student-operated fund that provides grants for local sustainability initiatives), fellowships (support for social enterprises initiated by alums), internships (paid opportunities for practical experience or research during the summer), and Bon Appetit Management Company (investments in season extension and local distribution capacities).

Return to Table of Contents

Critical Tools #3: Pattern Language for Local Foods and Urban Design

The third critical tool for expanding local food systems in Oberlin involves more intentional urban design that supports local food systems. Christopher Alexander's book *Pattern Language* offers an alternative approach to urban development that reinforces patterns that improve connectivity between neighbors and community members; mix and disperse the basic functions of living, working, shopping, and civic spaces to make them accessible by foot; blur the sharp edges between municipal boundaries and the surrounding rural countryside; encourage opportunities for people to commune with others from their community through more intentionally designed buildings, landscapes, neighborhoods, and common or civic areas; and introduce the elements of a functioning democracy more intentionally throughout urban space.

As we consider a 70% localization of Oberlin's food supply, a number of applications of *Pattern Language* concepts can inform how food localization itself can create more sustainable patterns of urban design and development. Likewise, sustainable patterns of urban design can also encourage or facilitate the process of food localization.

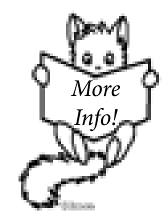
An acceleration and expansion of local food systems can actually become a positive driver for more sustainable patterns of urban development. Implementing a pattern language for local foods covers both integration with broader regional patterns and site-specific design patterns that each foster a more functional and sustainable community. As more communities follow similar patterns, broader regional transformations will take place.

The Oberlin Village Garden on Spring Street

Pattern 57- Children in the City- ***If children are not able to explore the whole of the adult world around them, they cannot become adults. But modern cities are so dangerous that children cannot be allowed to explore them freely.***
In a vibrant community, children have a number of ways to learn and pattern healthy adult behaviors through interaction with the neighborhood and larger community. Learning should not be confined only to schools, where children mostly interact with a mono-culture of other kids their exact same age.

Overall, a local foods *Pattern Language* will engage the following scales of urban design:

- **Regional Patterns**- Is there a blurred distinction between town and country? Are there rural influences within the city, such as urban farming? Does local purchasing encourage more sustainable rural land-use patterns?
- **City Patterns**- Is there a blurred distinction between places of working and places of living? Are the diverse cultures of the community able to maintain their integrity without sacrificing healthy social mixing?
- **Governing Communities**- Are the decisions that shape the community accessible widely to citizens?
- **Community Network Interdependency**- Are opportunities for learning, commerce, or socializing dispersed throughout the community?
- **Neighborhood Integrity** Is there healthy representation of the "full life-cycle" throughout the community, encouraging mixing between children, elders, and adults of different ages?
- **Neighborhood Boundaries**- Are there "connecting nodes" throughout the community that encourage healthy mixing between neighborhoods or sub-cultures (students/non-student, age, socio-economic, ethnic, etc.), such as neighborhood gardens or market stands?
- **Housing Clusters**- Are houses clustered in more defined areas to allow for increased greenspace for food production or maintenance of bio-diversity?
- **Path Networks**- Is there general connectivity between communities in the city? Do youth have adequate access to the civic affairs of the community?
- **Public Open Land**- Is there accessible common space or public land that can be utilized for farming or nature preservation?
- **Work Groups**- Are there spaces that encourage a mix of smaller entrepreneurs or cooperative workgroups, such as a local food hub or processing kitchen?
- **Local Shops and Gathering Spaces**- Do local shops or cafes provide spaces that encourage conversation, casual learning, or community gathering?
- **Built Environment**- Does the built environment encourage a blurring between indoor and outdoor spaces, encouraging productive open-space?
- **Building Design**-Does building design integrate individuals or families with the larger patterns of nature and the surrounding community while also preserving privacy?
- **Gardens**- Is gardening interspersed throughout the community, including terraced slopes, fruit trees, wild places, garden walls, greenhouses, trellised walks, vegetable gardens, and composting areas?
- **Internal Gathering Spaces**- Do internal gathering spaces encourage meal production and communion over food?



Return to Table of Contents

Critical Tools #4: Strategic Leverage Points

In her seminal essay, *Leverage Points- Places to Intervene in a System*, the late systems theorist Donella Meadows identifies critical strategies for transforming systems. Transformation of a food system requires broad changes at all levels of the community, including land-use patterns, local economies, urban development, neighborhood design, investing patterns, and the daily practices of the businesses, institutions, and residents that make up the Oberlin community. Meadows refers to "strategic points of leverage" as those points in the overall food system where the greatest catalytic change can be produced with the least expenditure of resources. Key leverage points from Meadow's essay include: rules, incentives, information, feedback, integration, forecasting, and mindset.

- **Rules** can include development of procurement policies for institutions, businesses, or public bodies (like school) that encourage a given percentage of local purchasing. A local food hub can be developed as a community-based enterprise that facilitates increased local purchasing.

- **Incentives** make it easier for individuals, farmers, businesses, or institutions to participate in the local food economy. Incentives can include highlighting businesses that purchase locally, contests for innovative local food efforts (such as garden on the month), or organization of an investment fund to build capacity for farmers to sell through a local food hub or to sequester atmospheric carbon.

- **Information** is the currency for the growth of local food systems. Developing tools that enable businesses, residents, or students to easily access information on how to participate in local food systems can facilitate participation. Information can be conveyed through traditional learning or informal learning networks that build capacity for intensive urban food production, sustainable agriculture production, local food processing, culinary arts, or effective waste utilization.

- **Feedback** provides individuals or businesses in the community with a sense of the effects of increased local food activity. For example, local food activities can be monitored to determine percentage of community purchasing that is local, flow of dollars to different rural communities, percentage of vacant land cultivated for urban food production, tonnage of carbon sequestered, or strength and diversity of social networks.

- **Integration** measures the degree to which local food initiatives form mutually supporting ties. A local food hub can coordinate its network of buyers to increase the supply of food waste going to the waste-to-food-hub. Urban market gardeners can collaborate with rural farmers to get an improved product mix for local consumption. Greenhouse gas reduction policies at the college or city can be connected to investments in soil carbon sequestration on local farms.

- **Forecasting** can address the resiliency of local food systems to significant changes, including its ability to handle extreme weather events resulting from climate change, its reliance on local energy, or its ability to adjust to price fluctuations on global markets.

- **Mindset** covers the extent to which local foods become a more regular part of daily practices. Changing mindsets often requires a cultural shift that includes more awareness about the connections between health and diet and the impacts of diet on planetary health.

Some of the following actions have been identified as strategic leverage points for the five core activity areas. Implementation of these points can insure the greatest catalytic effect for each area.

- **Local Food Hub**: greater coordination among buyers already committed to local purchasing; expanding farmer and buyer networks in the region; and development financing for a food hub facility.

- **Waste-to-Food-Hub**: piloting a small-scale bio-digestion system scaled to Oberlin's waste stream; conducting a community-wide waste audit; and development financing for a Class II waste handling facility.

- **Urban Agriculture:** encouraging an increase in urban homesteading (backyard gardening); organizing a bio-intensive training series for community members; and an urban agriculture investment fund for urban farm infrastructure (water storage, shared equipment, greenhouses)

- **Carbon Management**: development of a working farm incubator for carbon farming research and education; organization of a network of farmers committed to implementing carbon farming practices; and a carbon fund to off-set Oberlin carbon emissions through development or expansion of carbon farming enterprises.

- **Learning Network**: organizing a local foods education collaborative that includes formal schools and grassroots communities; creating an Oberlin local foods alumni network to connect national expertise with local projects; and development of an open-source knowledge commons where individuals, groups, or businesses can access best practices or information about local events or activities.

Return to Table of Contents

Putting the Pieces Together- An Integrated Plan for a Regenerative Local Food Systems

The five core activity areas should not be seen as separate projects, but as inter-related initiatives that mutually support each other. The development of one core activity area can facilitate the development of other core activity areas. Supporting networks can also support multiple initiatives as well. For example, institutions or businesses purchasing local food can also contribute food waste and develop purchasing policies that encourage agricultural methods that sequester carbon. Other examples of potential inter-locking initiatives include:

- the Local Food hub can incorporate space for intensive urban agriculture on rooftops or surrounding grounds;

- urban agriculture can be connected to the Waste-to-Food-and-Energy hub to increase access to organic materials to enhance the productivity of urban gardening or farming sites;

- the learning network can provide supporting educational programs to grow entrepreneurship or a supporting workforce for the local food system; or

- the waste-to-food-energy hub can collect organic waste materials that can feed a bio-digester that supports the local food hub or farm-based bio-digesters that reduce the need for imported fertilizers or energy.

Growth of the local food system in and around Oberlin can be accelerated by identifying network nodes in the community. These "nodes" include a convergence of supporting networks for the purposes of learning, economic exchange, or production. Based on a review of existing and potential local food activities in Oberlin, six network nodes emerge:

1) Carbon Farming Hub: this presents a potential broad-acre carbon farming node that can embed research and training around advanced carbon farming methods that can be utilized as a resource for area farmers supplying local markets.

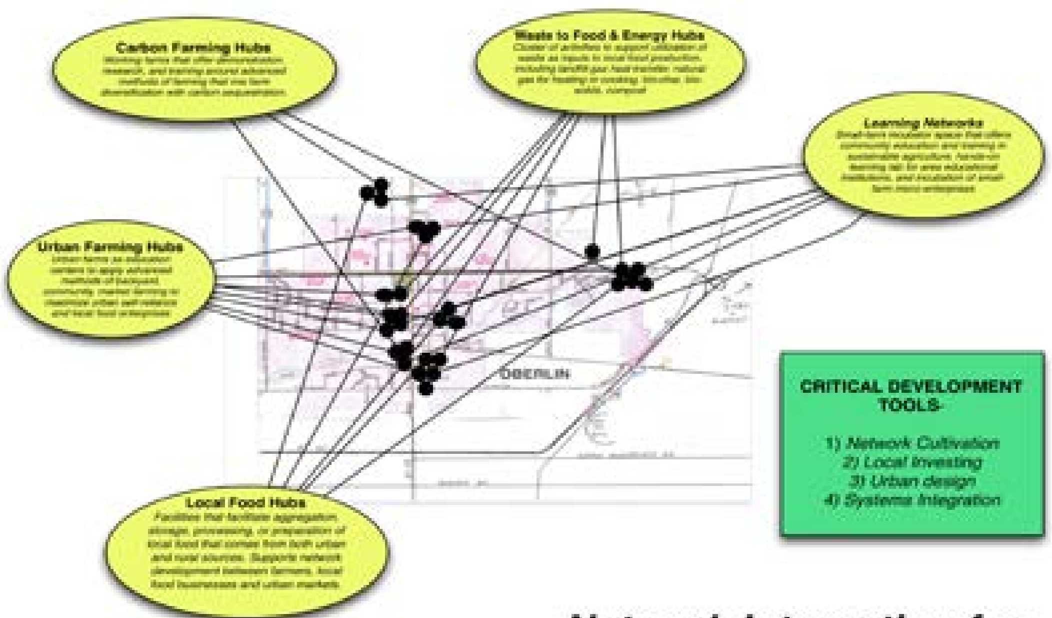
2) Urban Food Hub: this builds on the activity of the Oberlin High School Farm to expand urban agriculture and develop a community kitchen for food processing at the Boys and Girls Club facility.

3) Urban Agriculture Hub: A number of urban farms and gardens (Legion Fields, Community Service Center, Johnson House Gardens) are clustered in the southwest quadrant of Oberlin. These gardens can increase the available food supply while providing a cooperative support system for shared equipment or learning.

4) Neighborhood Food Hub: the Zion Village Garden and Masonic Hall can provide facilities to support market farming, small-scale food processing, and community art and events that connect the southeast neighborhood with the broader Oberlin community.

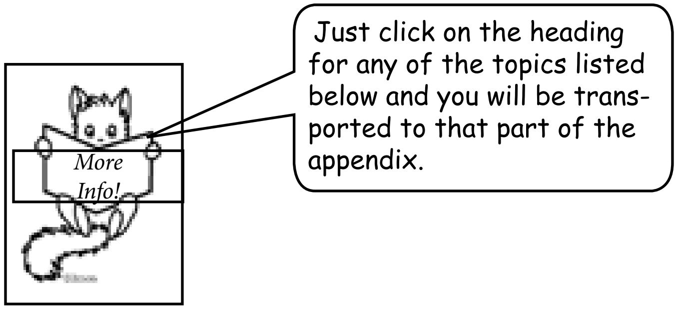
5) Regional Food Hub: the former Missler's grocery store can provide a node for connecting institutional and commercial buyers in Oberlin or broader Lorain County with a network of regional farmers. The site can also include urban agriculture and tie in with activities around the Oberlin Underground Railroad Center.

6) Urban-Edge Farm and Waste Node: This node includes the George Jones Farm as a working urban-edge farm and a waste-to-food-and-energy hub that can build on the composting facility located behind Oberlin's Waste-water treatment plant. The waste hub can facilitate transfer of organic materials to farms or gardens in and around Oberlin. The Jones Farm provides a source of local food and, building on current activities and networks, can expand as a small-farm incubator that can connect educational programs in Oberlin and broader Lorain County (JVS and LCCC) that focus on small-acre local food production.



Network Integration for Food Localization

Guide to Appendices and Additional Resources



APPENDIX ONE- OBERLIN FOODSHED DETAILS
Includes detailed charts, graphs, and written summaries that detail trends in the six county Oberlin foodshed in agricultural production, land-use, consumer demand, and business purchasing. Also contains a detailed survey of the economic impacts of Oberlin's local food purchasing and details about its current local food supply network.

APPENDIX TWO- LOCAL FOOD HUB DETAILS
Includes detailed report summaries for the development of a local food hub in or around Oberlin. Summaries include: services common to local food hubs, market models, examples of food hubs relevant to Oberlin, interactive film clips, staple foods, food hub development pathways, supporting grant or loan programs, restaurant survey results, community kitchen survey summary

APPENDIX THREE- HISTORY OF COMPOSTING IN OBERLIN
Includes more detailed summaries to accompany waste-to-food-and-energy efforts, including the history of composting at Oberlin, the 2007 distributed composting pilot project, and multiple approaches and scales for community composting.

APPENDIX FOUR- OBERLIN BIODIGESTION OPTIONS
Detailed pre-assessment survey of bio-digestion options for Oberlin food waste including an overview of the anaerobic digestion process, case studies of bio-digestion in Ohio, Vermont, and Illinois, interactive content, recommendations for anaerobic digestion development in Oberlin, and resources.

APPENDIX FIVE- URBAN AGRICULTURE CASE-STUDIES
Case-studies and summaries of reports investigating the potential for food self-reliance through urban agriculture in Great Lakes cities, including Cleveland, Detroit, Chicago, and Toronto.

APPENDIX SIX- URBAN FARMING MODULES FOR OBERLIN
Review of different urban farming modules that could be developed in Oberlin, including aquaculture, greenhouse production, row crops, perennial polyculture systems, urban-appropriate livestock.

APPENDIX 7- LEVERAGING COLLABORATIVE NETWORKS
A detailed case-study of the nationally recognized innovations in network-based economic development in southeastern Ohio, including processes for facilitating collaborative networks, and the community kitchen incubator.

REFERENCES
References for interviews, case-studies, and publications referenced for this report.

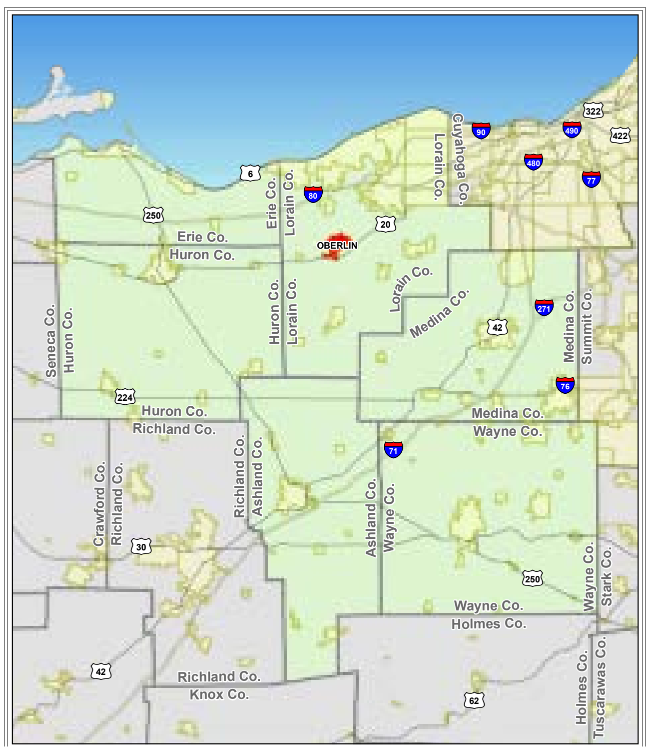
Return to Table of Contents

THE OBERLIN FOODSHED

A "foodshed" provides a geographic focus to food localization efforts. Like a watershed, a foodshed encompasses a region in which food is produced, distributed and consumed. For the purposes of a 70% localization of Oberlin's food supply, Lorain County (home to Oberlin) and five surrounding counties make up Oberlin's foodshed. The following overview looks at larger economic trends for the Oberlin foodshed, including a review of current agricultural production trends and changes in local agriculture over the past 50 years. Despite a general decline in the number of farms and an increase in the average farm size for the county, the past decade has seen the first actual increase in the number of new farms for 50 years. A reduction in average farm size also indicates a growth in small-scale agriculture.

A foodshed defines a geographic area in which food is grown, transported, stored, processed, brought to market, consumed, and disposed of. In terms of developing a local food system, a foodshed can be thought of as an area in which sustainable farming practices, energy-efficient transportation and storage, nutritious meals, and productive utilization of food waste all occur within a defined geographic area. For the purposes of this assessment, the Oberlin Foodshed comprises a six county region that includes Lorain, Erie, Huron, Ashland, Medina, and Wayne counties. A 70% localization effort would favor infrastructure development and investment within this geographic area.

Source: Western Reserve Land Conservancy



The Oberlin Foodshed includes six counties surrounding Oberlin.

The foodshed provides a framework for directly connecting farmers, businesses, and consumers within a shared geographic area, but does not exclude food purchased or investments made in other counties in Northeast Ohio or the import of sustainably produced products from foodsheds outside of Northeast Ohio. For example, given its capacity for food manufacturing, a number of locally produced products come from Cuyahoga County, home of Cleveland.

The six counties making up the Oberlin Foodshed contain a total of 2,637 square miles or 1.7 million acres of land. Wayne County covers the largest land area in the foodshed, encompassing about 21% of the total land area. Lorain, Ashland, and Huron counties cover between 16-19% of the land area and Erie and Medina counties include about 9-10%.

The total land area only tells part of the story when considering viable farmland, as suburban development is more of a factor in Lorain and Medina counties than the outlying counties west (Erie and Huron) and south (Wayne and Ashland). While Wayne County covers only 21% of the land area, it includes 27% of the farmland acreage. Conversely, Medina County and Lorain County comprise 16% and 19% of the land area, but only 10% and 14% of the farmland acreage of the foodshed due to the pressures of urbanization.

Overall, 55% of the total land area in the Oberlin foodshed contains farmland with Wayne and Huron Counties each having about 70% of their total acreage devoted to farming. By comparison, Lorain and Medina counties have only about 33% of their land area devoted to farming.

One of the first steps in developing a local food system is to expand the network of farmers that can directly supply markets in Oberlin. The percentage of farmland devoted to agriculture in each county provides a starting point, but consideration has to be given to the types of foods grown in each county. Most commodity grains, including corn, soybeans, or wheat, are intended for livestock and are not suitable for local markets. These commodities define "extensive" agriculture which requires large amounts of acreage with relatively low per-acre cash yields. Conversely, fruits and vegetables include more "intensive" agriculture which generally involves smaller acreages and significantly more labor.

Of the 921,000 crop acres in the foodshed, about 65% of the land is devoted to corn and soybean production. About 15% is devoted to feed for direct animal consumption (hay and silage corn) and about 18% are devoted

While corn and soybeans occupy the majority of productive cropland, fruits and vegetables remain a significant agricultural activity in the Oberlin Foodshed.

Return to Table of Contents

Overall, these trends indicate a continuation of two growth trajectories observed in other recent census years: an increase in number of large, mostly commodity farm operations and a growth in small, mostly direct market operations. The "farms in the middle", representing the majority of farm operations in the country, showed a continuous decline.

to grains, also mostly for animal feed. About 1% of the total land area is devoted to vegetable crops or orchards. While corn and soybeans occupy the majority of productive cropland, fruits and vegetables remain a significant agricultural activity in the Oberlin Foodshed. For example, Huron County has 48% of the total vegetable production acres in the foodshed, largely based on the prevalence of "muck soils" which lend themselves to vegetable production. For orchards, Lorain County and Erie County together comprise almost 2/3 of the orchard acres in the Oberlin Foodshed with Wayne County possessing about 20% of the orchard acres. Geography is a factor here, given the prevalence of beach ridge soils in the northern portions of Erie and Lorain Counties. These beach ridges were formed when Lake Erie's ancestral lakes occupied a much larger land area than today. The remnant beach ridges provide optimal conditions for orchards, with sandy soils and higher elevations contributing the optimal drainage conditions. Other crops that grow well in these micro-climates along Lake Erie are grapes. This accounts for the growth in wine-making enterprises in counties along the lake front.

Overall, the Oberlin Foodshed offers a fair degree of diversity of crops, compared to the state of Ohio as a whole. The foodshed has significant acreage for vegetables and orchards compared to the rest of the state as well as higher than average levels of barley, oats, and other grains. The high percentage of corn grown for silage also indicates a more localized capacity for supporting livestock (as opposed to shipping in feed grains from outside of the region). Given these fairly general numbers, you can conclude that the Oberlin Foodshed possesses the capacity for production of many of the foods needed for a complete diet:

- Strong capacity for growing grains, including barley and oats, and other grains that could be provided for direct human consumption,
- Strong base of vegetable and orchard acres indicating large supply of fruits and vegetables
- Capacity for feed and silage that could be used to support livestock.

National Trends in Agriculture

According to the national 2007 Census of Agriculture, there are about 2.2 million operating farms in the United States, representing a 4% increase from 2002. The census defines a farm as any place that produces $1,000 or more of agricultural products produced and sold during the census year. This represents a change from trends since World War II when the number of farms nationwide has steadily declined. During the last five years, a net increase of 75,810 farms has been reported.

The majority of this growth comes from smaller operations where more than 50% of the production value could not be attributed to one commodity. Additional growth occurred with large farms posting sales of more than $500,000, growing by 46,000 while operations with sales of less than $1,000 grew by 118,000. Farms reporting $250,000 or more in sales grew from 2002-2007 as did operations with less than $1,000 in sales. Farms between $1,000 to $249,000 in sales declined overall during this same time period. Overall, these trends indicate a continuation of two growth trajectories observed in other recent census years: an increase in number of large, mostly commodity farm operations and a growth in small, mostly direct market operations. The "farms in the middle", representing the majority of farm operations in the country, showed a continuous decline.

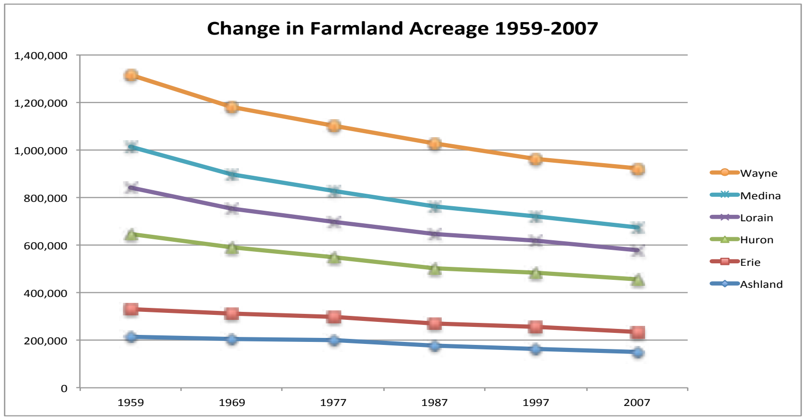
COUNTY	% Change in # of Farms in 50 Years	% Change in # of Farms in 10 Years	% Change in Farmland Acres in 50 Years	% Change in Farmland Acres in 10 Years	% Change in Average Farm Acres in 50 Years	% Change in Average Farm Acres in 10 Years
Ashland	-37%	14%	-30%	-8%	11%	-19%
Erie	-52%	6%	-26%	-6%	53%	-12%
Huron	-55%	1%	-31%	-5%	80%	-6%
Lorain	-55%	12%	-36%	-5%	42%	-15%
Medina	-43%	12%	-45%	-8%	-4%	-18%
Wayne	-33%	12%	-17%	3%	24%	-7%

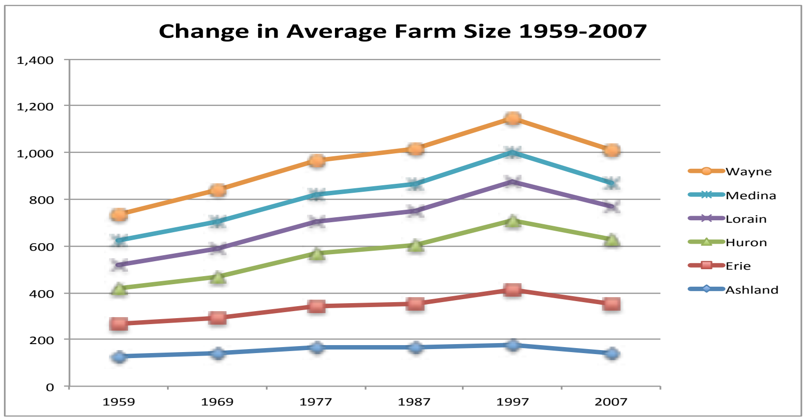
Overall, the following products showed growth from 2002-2007: hay, aquaculture, fruits and nuts, sheep and goats, poultry and eggs, and vegetables

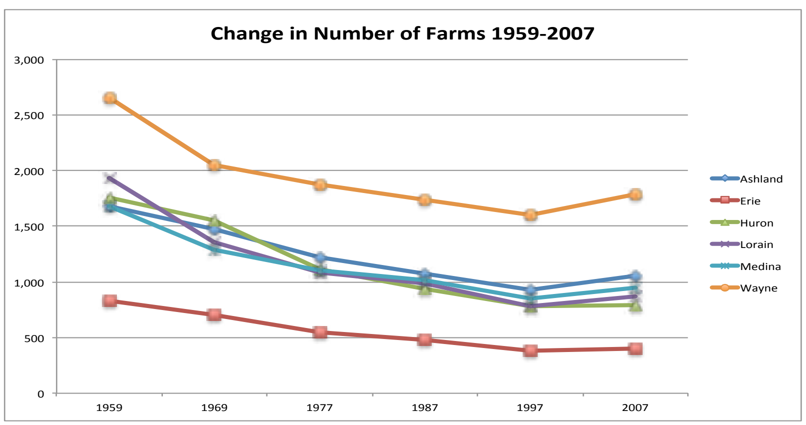
Conversely, the following products showed reduced growth from 2002-2007: cattle and calves, grains and oilseeds, milk, nursery and greenhouse crops, cattle feedlots, hogs and pigs, cotton, and tobacco

Since the 2002 census, 291,329 new farms have begun operation. According to the United States Department of Agriculture (USDA), these farms tend to be smaller and have lower than average sales compared to farms nationwide. About 13% of all farms are "new farms", initiated since 2002. The average acreage of these

Return to Table of Contents







new farms is 201 acres, compared to 418 acres nation-wide. The average value of products sold is $71,000 for new farms compared to $135,000 nation-wide. The average age of the new farmer is 48, compared to 57 nation-wide. New farmers tend to be engaged in occupations other than farming. Only 33% of new farms can claim farming as a primary occupation, compared to 45% of farmers nationwide.

Despite a notable growth in smaller farms and younger operators, concentration in the agricultural sector has continued to increase since 2002. In 2002, 144,000 farms produced 75% of the total value of agricultural production. In 2007, 125,000 farms produced 75% of the total agricultural value, representing a decline of 13% of the operations needed to generate this value in 2007. Concentration is also indicated by looking at farms which produce more than $1 million in sales. In 2007, farms in this class produced 59% of total U.S. agricultural production compared to the same class of farms producing 47% of all production in 2002.

Another sub-division can be noted in the types of farms operating. According to the census, the two largest groups of reported farms include “residential/lifestyle farms” and “retirement farms”. Together, these two farms account for 57% of all farms in the United States. Residential/lifestyle farms (36% of total) include all operations that produce less than $250,000 in sales where operators report something other than farming as a primary occupation. Retirement farms (21% of total) include all farms that produce less then $250,000 in sales and principal operators are retired. Large-scale family farms (where farming is listed as the full-time vocation) comprise only 9% of all farms, but account for 63% of the value of agricultural products sold.

Does the Oberlin Foodshed Reflect National Trends?

To summarize, nationwide, some of the following trends have demonstrated the changing face of agriculture in the past decade:

- growth of small farm operations, many engaged with direct marketing;
- increasing concentration in agriculture with fewer farmers producing more overall output;
- growth in small, generally younger operations engaged with direct marketing, and often as a secondary or supplementary business; and
- growth in products suitable for direct marketing, including hay, fruits and nuts, vegetables, and smaller livestock (goats, sheep, chickens).

Do the counties comprising the Oberlin Foodshed reflect these national trends? A review of agricultural census data from the past 30 to 50 years demonstrates that the Oberlin Foodshed mirrors these same national trends. The following summarizes the changes in the number of farmers, acreage of farmland, and average acreage of farms in the past 50 years.

Change in Number of Farms: The change in the number of farms by county shows us overall trends in the number of actual farm operators over a fifty year period of time. Overall, the Oberlin Foodshed has seen an average decline in the number of farm operations of 46%, with Wayne County losing the fewest at 33% and Huron and Lorain Counties losing the most at 55%. However, in the past 10 years, we have seen an average increase of 10% in the number of farm operations, with Huron gaining the least at 1% and Ashland gaining the most at 14%. This echoes the national trend with an overall increase in farmers for the first time in 50 years.

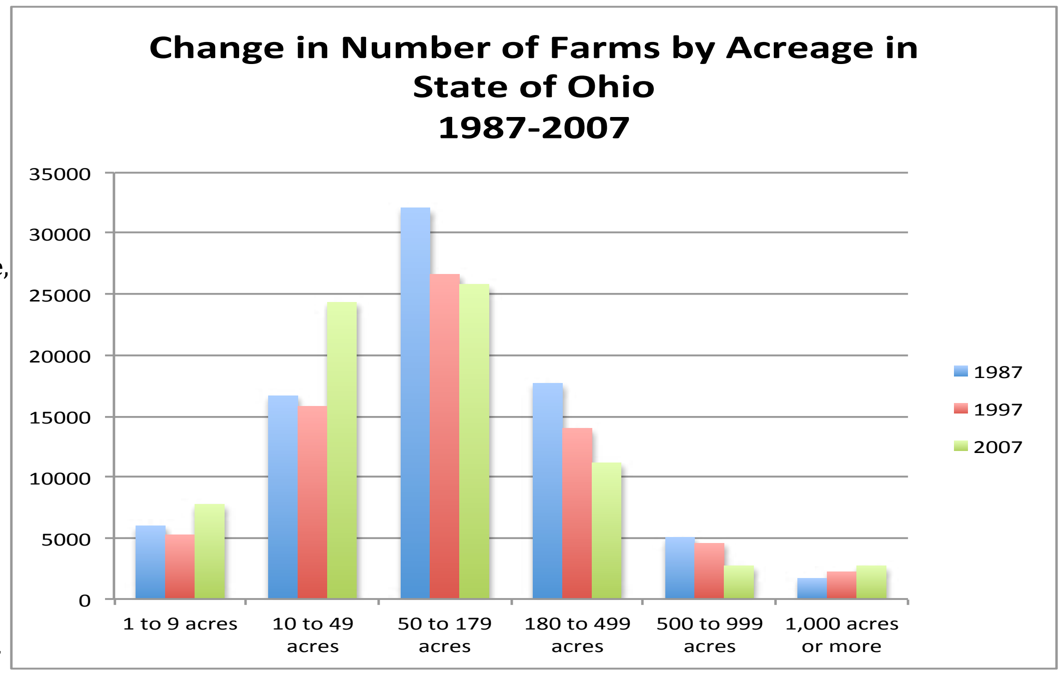
Change in Farmland Acreage: While the number of farms declined by almost 50%, the Oberlin Foodshed lost an average of about 31% of farmland acres over the past 50 years, with the greatest loss of farmland acreage (35-45%) occurring in Medina (45%) and Lorain (36%) counties. Counties losing between 25-35% include Ashland, Erie, and Huron counties. Wayne county lost about 17% of its overall farmland acreage, the lowest among the counties in the foodshed. The majority of farmland loss can be attributed to increasing urbanization and the large number of failed farming operations. The past decade has seen a continuing rate of decline in overall farmland acreage for all counties, mostly consistent with the trends of prior decades. Only Wayne County has increased (by 3%) the amount of farmland acreage. Ashland, Lorain, and Medina counties all saw rates of decline consistent with the previous decade.

Change in Average Farm Size: The change in the average size of farms provides a measure for concentration in the agriculture sector in which fewer farmers are producing on larger farms. With the exception of Medina County, there has been a general increase in the average size of farms in the Foodshed. Medina County actually experienced a reduction in average farm size. This owes in part to the significant amount of farmland converted to urban usages and the presence of sizable populations of Amish farmers in the northeastern part of the county. Erie and Huron counties experienced the greatest increase in average farm sizes with a rate of increase of 50-80% for each. Lorain County experienced a sizable increase at 42%. Wayne (24%) and Ashland (11%) counties experienced less overall change in average farmsize, indicating a stronger base of smaller or mid-scale operations. These trends have reversed in the past decade, with all counties experiencing a reduction in average farm size from 1997 to 2007. Ashland, Erie, Lorain, and Medina counties all experienced a 10-20% reduction in average farm size with Huron and Wayne counties each experiencing less than 10% reduction in farm size. It is reasonable to conclude that the change in average farm size is mostly attributable to the growth in the number of smaller acreage farms, which can be verified by reviewing more detailed census figures from the past 30 years.

The USDA sub-divides farms into different scales of operation, based on the total acreage under production. Since 1987, all counties in the Oberlin Foodshed have seen overall growth in the number of small farms producing on 1-49 acres. With the exception of Huron County, all counties in the foodshed have also seen growth in the number of large-scale farms producing on 1,000 acres or more. Mid-scale farms, ranging from 50 to 999 acres have seen significant reduction in the past 30 years for all of the foodshed. The loss of mid-sized farms is significant, ranging from 19-40% for farms between 50 to 179 acres, 25-60% for farms between 180-499 acres, and 8-72% for farms between 500 to 999 acres. This mirrors the larger national trend which indicates growth in both small and large scale farms and decline in the middle.

The same trends observed in the scale of farms is similarly reflected in the change in the value of sales by county from 1987 to 2007. Values of sales have similarly shown an across-the-board growth of farms selling less than $2,500 and growth for farms selling $100,000 or more. Farms selling between $2,500 to 99,000 for the most part have declined over the same 20 year period of time.

These figures demonstrate the recent growth of smaller-scale and diversified farms engaged in more direct marketing activities and large-acreage operations focusing mostly on commodity grain production. The "farms in the middle" have been disappearing rapidly. In many ways, the farms in the middle have the scale and capacity to feed larger populations of people. They are also ideally matched to larger institutional markets, such as universities or schools.



Return to Table of Contents

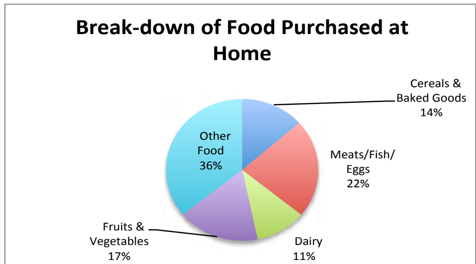
REVIEW OF OBERLIN'S LOCAL FOOD SYSTEM

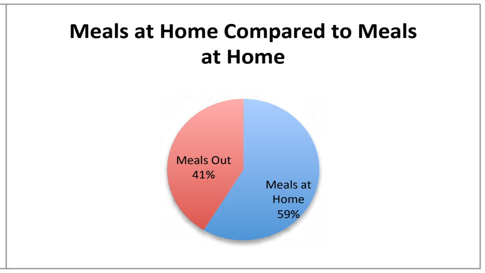
Annual food expenditures in the six counties that make up the Oberlin Foodshed total about $1.9 billion, representing a substantial market for locally-grown foods. Oberlin has been a pioneer for local food systems development in Northeast Ohio, with over $1 million spent annually supporting area farms and local food businesses. This spending makes-up about 6% of the total consumer spending in Oberlin, indicating significant room for growth.

Coming up with an exact number for food spending for a given city, county, or region would be an exhaustive process. Fortunately, the Consumer Expenditure Index (C.E.I.) provides one method for looking at overall consumer spending trends. This analysis is based on household spending. Every household will spend food dollars for meals prepared at home or meals eaten out, either in restaurants or institutional food service.

Based on the CEI, the average household will spend around $6,372 per year on food. About 41% of this spending will go to meals eaten out. The remaining 59% of spending will focus on food eaten at home. The overall distribution of spending includes:

- 8% will be spent on cereals and baked goods for at-home consumption;
- 13% will be spent on meat, fish, and eggs for at-home consumption;
- 6% will be spent on dairy products for at-home consumption;
- 10% will be spent on vegetables and fruits for at-home consumption;





- 21% will be spent on "other food" including processed, pre-packaged foods; and
- 41% will be spent on eating food out.

To magnify these household purchasing impacts to a broader area, such as a city, county, or region, the number of "consumer units" needs to be determined. This assumes that food spending occurs on the basis of a household and not by individuals within a given population. For the Cleveland-Akron and Elyria-Lorain Metropolitan Statistical Area (MSA), a consumer unit consists of 2.5 people. This accounts for households with multiple occupants, married couples or children.

According to the CEI, total spending in the six county Oberlin Foodshed area is around $1.9 billion annually. About half of this spending ($768 million) takes place in Lorain County, with Medina ($439 million) and Wayne ($291 million) also spending significant dollars on food. Naturally, these figures are driven by the density of populations around urban centers or large suburban areas. The most urbanized county in the Oberlin Foodshed (Lorain County) also has the greatest amount of spending. Neighboring Cuyahoga County, the most populous county in Northeast Ohio, spends about $3.4 billion on food, indicating a $5 billion local food market potential in the western portion of Northeast Ohio.

While those are impressive numbers, it is difficult to get traction on how more of these dollars could be spent supporting local farms or locally-owned food businesses in the Northeast Ohio region. Looking at Oberlin, a town with a population of 5,398 year-round residents and about 3,000 students provides a more tangible scale for understanding purchasing impacts and food localization opportunities. Households will spend approximately $13.5 million on food annually, with $5,654,945 million spent on meals out. College food buying includes the combined purchasing of the Oberlin Student Cooperative Association (about 25% of the student body eats meals in eight student-owned and operated dining cooperatives) and institutional dining services operated by Bon Appetit Management Company. Given these numbers, the Oberlin community spent at least $16.8 million on food in 2010. This figure is likely higher, given that the estimate does not include meals that students might eat at restaurants in the city nor does it include spending by students who do not participate in on-campus dining systems or cooperatives. It also does not include money spent by visitors, tourists, or out-of-town

	Ashland	Erie	Huron	Lorain	Wayne	Medina	TOTAL
Population	53,139	77,079	59,626	301,356	114,520	172,332	778,052
Consumer Units	21,256	30,832	23,850	120,542	45,808	68,933	311,221
Food Spending (TOTAL)	135,440,683	196,458,955	151,974,749	768,096,173	291,888,576	439,239,802	1,983,098,938
Food at Home	79,772,267	115,710,995	89,510,551	452,395,627	171,917,424	258,704,798	1,168,011,662
Cereals & Baked Goods	10,755,334	15,600,790	12,068,302	60,994,454	23,178,848	34,879,997	157,477,725
Meats/Fish/Eggs	17,875,960	25,929,376	20,058,186	101,376,158	38,524,528	57,972,485	261,736,693
Dairy	8,629,774	12,517,630	9,683,262	48,940,214	18,598,048	27,986,717	126,355,645
Fruits & Vegetables	13,943,674	20,225,530	15,645,862	79,075,814	30,050,048	45,219,917	204,160,845
Other Food	28,546,271	41,406,839	32,031,087	161,888,443	61,520,144	92,576,750	417,969,534
Food Away from Home	55,668,416	80,747,960	62,464,198	315,700,546	119,971,152	180,535,003	815,087,275

Oberlin's Local Food Purchasing History

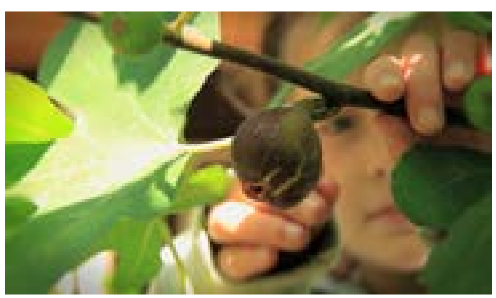
As documented in the film *For the Love of Food*, Oberlin has a long history of local food purchasing, with the earliest efforts beginning in 1988 when a group of six Oberlin students worked with David Orr through the Meadowcreek Project in Fox, Arkansas to develop feasibility studies for leveraging the buying power of student-operated cooperatives and college dining halls to support local family farmers in and around Lorain County. Orr had previously worked with Hendrix College in Arkansas to launch one of the first university-purchasing programs in the country. Oberlin became one of a handful of institutions in the early 1990's to begin local food purchasing initiatives. Others included Bates College and Carleton College. In 1990, student-members of the Oberlin Student Cooperative Association (OSCA) initiated a local food purchasing initiative that led to the permanent creation of local food coordinators. OSCA increased purchases from about $10,000 the first year to about $100,000 annually after the first ten years of their effort.

In 1998, Oberlin alumnae Sarah Kotok and Joesph Waltzer, both of whom graduated in 1998, set a new precedent for Oberlin graduates to remain in Oberlin to start businesses. Kotok, following a summer internship in 1996 in which she organized the Oberlin Farmers' Market, established the Oberlin Market as a small retail store that specialized in local and organic health foods. Waltzer took over a downtown storefront that once housed a Pizza Hut to establish the Black River Café. Waltzer did not originally intend to remain in Oberlin after graduating, but feeling dis-satisfied with his downtown dining options as a student, decided to make a go at running a restaurant. Waltzer combined his passion for local foods and sustainability to leverage his business as a vehicle for social change. Kotok ended up selling her operation to Liza Ramsey in 2002 and it remains in operation today. Waltzer continues operation of the Black River Café in addition to the Agave Café, a burrito bar and tequeleria.

The start of the millennium marked several milestone for local food efforts in Oberlin. Bon Appetit assumed the management contract for the operation of Oberlin College's dining services and faculty and community members founded the New Agrarian Center (NAC) and started the George Jones Farm. Today, Bon Appetit spends about 27% of its dining budget supporting local farmers and local food businesses. The NAC has established the George Jones Farm as a working educational farm, including 40 acres of restored habitat and a central office and learning center built with strawbales and local earthen plasters. The NAC also founded City Fresh in 2004, an initiative which connects a network of 24 local farmers to about 20 urban neighborhoods in Cleveland, Akron, Youngstown, and Lorain County.

Oberlin alumnae have impacted the local foods scene more recently through several entrepreneurial endeavors. Sam Merritt started Full Circle Fuels, a gas station which specializes in vegetable-based fuels. Merrett converted a box truck servicing City Fresh to operate on vegetable oil. Three Oberlin alumnae also formed Sustainable Community Associates (SCA), which built several thousand square feet of new retail space in downtown Oberlin. New businesses, including the Slow Train Café, Sprouts Café, and Magpie pizza all favor locally grown or prepared foods. David Sokoll, class of 2010, stayed in Oberlin to run logistics and trucking for City Fresh in 2010. He also helped to initiate the Oberlin High School Farm Collaborative and today, serves as the head chef for the Oberlin Early Childhood Center. Sokoll leveraged his City Fresh connections to establish the OECC as one of the first efforts to connect local schools with local farmers.

Oberlin clearly stands out as a model community, given its long history of local food initiatives on many levels. The college has also served as a model for engaging students in local community development efforts and many graduates have gone on to enhance the community through an array of for-profit and non-profit social enterprises. Learning networks are strong, with students, alumnae, and community members circulating between projects to share learning, ideas, and innovations. Looking ahead, what is the next level of growth for Oberlin's local food efforts? Can collaborative efforts that foster learning and volunteerism extend to economic development? Can restaurants collaborate more closely with the college and local schools to increase the pie of local food purchased within the community?

employees.

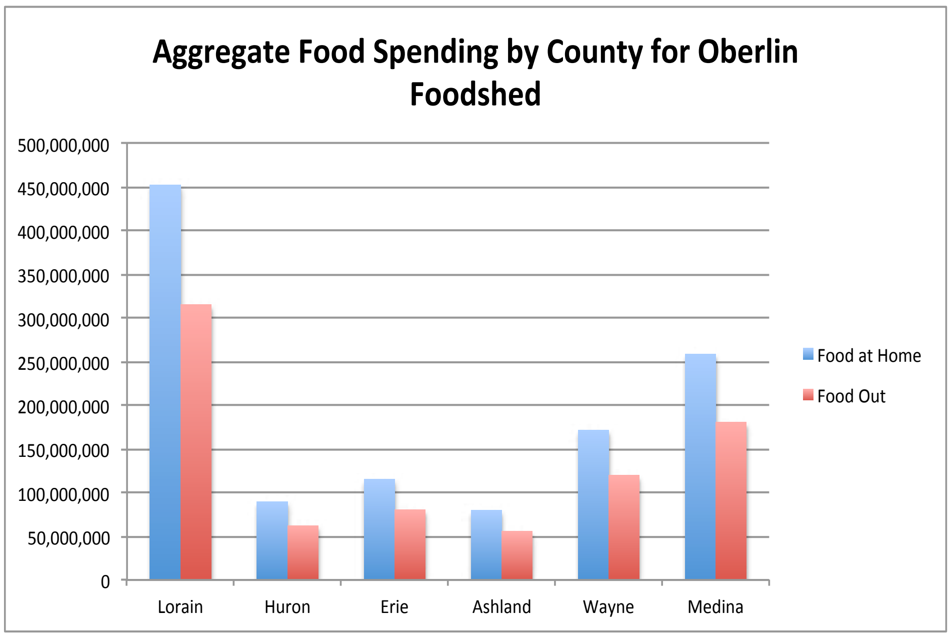
Aggregate Business Spending in the Oberlin Foodshed

A way to check the accuracy of food spending based on the Consumer Expenditure Index is to look at business spending in the same targeted counties or regions. This provides the aggregate sales of food items posted by grocery stores, restaurants, and other business outlets that primarily sell food items. This data is based on the Economic Census from 2007.

The chart below shows overall sales reported by businesses specializing in the sale of foodstuff. The first part of the chart, which includes supermarkets, convenience stores, and specialty food stores comprises mostly food purchased for at-home consumption. Food purchased at full-service (sit-down) restaurants, limited service (fast food) restaurants, food service contractors, and cafeterias/snack bars.

Most counties show between 39-46% of total food purchasing eaten out, with the exception of Erie County which shows 67% of meals eaten out. Most of this is attributable to the large presence of tourism-oriented businesses at Cedar Point relative to the smaller overall population of Erie County. In aggregate, these numbers show about 41% of all food sales taking place where people go out to eat, corresponding with the 41% reported for the Consumer Expenditure Index.

Looking at the aggregate distribution of food sales provides a better guide for consumer spending behavior.



Within the Oberlin Foodshed:
- 55% of food sales are in supermarkets;
- 2% of food sales are in are in specialty food stores;
- 2% of food sales are in are in convenience stores;
- 12% of food sales are in are in full-service restaurants
- 19% of food sales are in are in limited-service restaurants
- 10% of food sales are in food service or cafeteria establishments

Within Lorain County, these numbers are a bit different:
- 48% of food sales are in supermarkets;
- 1% of food sales are in are in specialty food stores;
- 5% of food sales are in are in convenience stores;
- 14% of food sales are in are in full-service restaurants
- 20% of food sales are in are in limited-service restaurants
- 12% of food sales are in food service or cafeteria establishments

Overall food sales reported by businesses in the Oberlin Foodshed total $1.9 billion, which mirrors the $1.9 billion reported through the CEI.

There might be a small discrepancy, given that food sales were reported for the 2007 Economic Census and the CEI analysis considered 2010 census figures. However, the time period is close-enough to be fairly accurate. Overall, we can say with a reasonable amount of confidence that $1.9 billion is spent on food each year in the six counties comprising the Oberlin Foodshed.

Grocery Stores		**Special Food Stores**	
All establishments	4	All establishments	7
Est for year-round	4	Est for year-round	7
$250-$499,000 sales	1	$250-$499,000 sales	3
$500-999,000 sales	**1**	$500-999,000 sales	2
$1 million + sales	2	$1 million + sales	2
Full-Service Restaurants		**Food Service Contractors**	
All establishments	9	All establishments	7
Est for year-round	8	Est for year-round	7
$250-$499,000 sales	1	$250-$499,000 sales	3
$500-999,000 sales	2	$500-999,000 sales	2
$1 million + sales	4	$1 million + sales	2
Limited Serivce Restaurants		**Snack & Beverage Bars**	
All establishments	13	All establishments	3
Est for year-round	8	Est for year-round	1
$250-$499,000 sales	2	$250-$499,000 sales	1
$500-999,000 sales	5	$500-999,000 sales	0
$1 million + sales	1	$1 million + sales	0

What can be determined about business spending in Oberlin? Because of Oberlin's small

Return to Table of Contents

size, specific spending figures for food-related sectors are suppressed to protect private financial information. The chart below shows the number of establishments, organized by gross sales.

According to this chart, we know a minimum of $20 million is spent each year collectively by the businesses and institutions in Oberlin. There are seven listed food service contractors, most likely providing meal services to Oberlin College, public schools, the hospital, Kendal of Oberlin, and the FAA control center. Of the 9 full-service restaurants

OBERLIN SPENDING DETAIL

At-Home Food Spending	8,103,478
Food Out Spending	5,654,945
College Food Purchases	3,048,709
TOTAL	**16,807,131**
Local Food Purchasing	1,029,028
% Total Purchasing that's local	6.12%

in 2007, 4 reported sales of $1 million or more. Full-service restaurants do not include fast-food establishments. These sales figures exceed the $16 million of spending estimated by the CEI index and capture the additional spending of students eating off-campus, visitors or tourists, and commuting employees. Thus, it is fair to estimate that total annual food spending in Oberlin ranges from between $16.8 to $20 million per year.

The $1.03 million spent by the five largest purchasers of local food in Oberlin (Agave Café, Black River Café, City Fresh, Oberlin College, and the Oberlin Student Cooperative Association) comprise roughly 6% of the total annual food spending among year-round residents and students at Oberlin College (based on the CEI analysis). The six percent spending figure captures only those accounts that spend 25% or more on local food. Given activities such as the farmers' market or businesses that spend less than 25% on local food, this number will be higher.

Oberlin Supply Network Analysis

To get a better sense of how local food spending circulates in the regional economy, we did an analysis of the local farms and businesses supplying Oberlin now. The supply network analysis considers the current distribution of local food purchasing activities stimulated by the directed purchasing of five establishments in Oberlin, including: Agave Café, The Black River Café, City Fresh CSA, Oberlin College/Bon Appetit Management Company, Oberlin Student Cooperative Association.

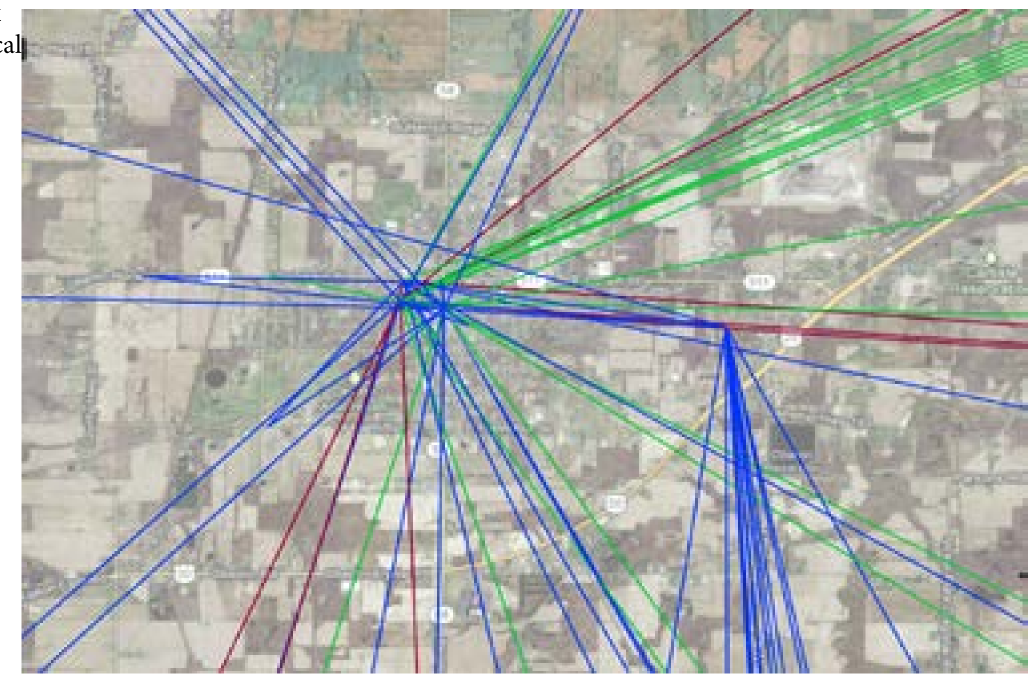
These five establishments were selected on the basis of the following criteria:

- purchasing at least 25% local foods for 5 years or more;
- stated business or organizational policy favoring local purchasing;
- diverse network of local farmers and local food businesses based in Northeast Ohio supplying food; and
- representation of diverse markets (community supported agriculture initiative, student-run cooperative, for profit restaurant businesses, institutional dining services).

The supply network analysis was initially conducted on a specialized web-site developed through localfoodsystems.org, an initiative of the Ohio Agriculture Research and Development Center (OARDC), a research campus affiliated with Ohio State University. A special group was established on the web-site, titled "Oberlin Supply Chain Mapping". The group was kept as a private group to protect confidential purchasing information shared by each of the participants in the study. The web-site geo-references address information for all suppliers of local food to the above-mentioned markets in Oberlin with the address of each purchasing agent. Local food suppliers are further categorized as:

- Farmer (direct sales from farm to market)
- Distributor (sales of farm products facilitated by a third-party distributor)
- Processor (foods that are locally processed, but may or may not contain local ingredients, such as coffee)

The overall goal of the supply-network analysis is three-fold. First, it establishes the geographic patterns of local food purchasing and provides a better sense of how local food flows into Oberlin markets and from where it originates. Second, it provides a sense of the mix of local products provided with an ability to determine how much originates through direct farmer relationships versus how much is facilitated through distribution companies. Third, it pinpoints counties in Northeast and north-central Ohio to look at overall trends in terms of types of products affiliated with different parts of the region as well as where dollars tend to flow. Finally, it provides an overall map that will determine if there is significant overlap of supply networks between buyers or if they are relative-



Return to Table of Contents

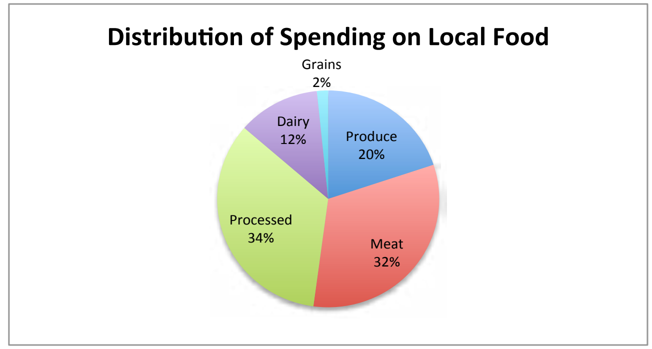
ly distinct. This can provide a basis for more collaborative purchasing efforts between local food buyers, although market differentiation will remain a key challenge. Smaller restaurants might require smaller volumes and therefore be ideally suited to connections with smaller growers. Comparatively, institutional markets might require more prepared or pre-cut foods at higher volumes.
As of 2011, there are 80 total operations coming from 14 different counties, most of which are located in Northeast Ohio. Of the operators, 10% provide dairy products, 30% offer processed foods, 10% offer meat, and 50% offer produce.

Of the operators, 60% of them come from counties targeted in the Oberlin Foodshed with 40% coming from counties outside of the Oberlin Foodshed. Cuyahoga County has about 18 operations that supply Oberlin markets. Most other counties outside of the Oberlin Foodshed include only 1-2 operators.

The below list captures the range of products purchased from local suppliers.

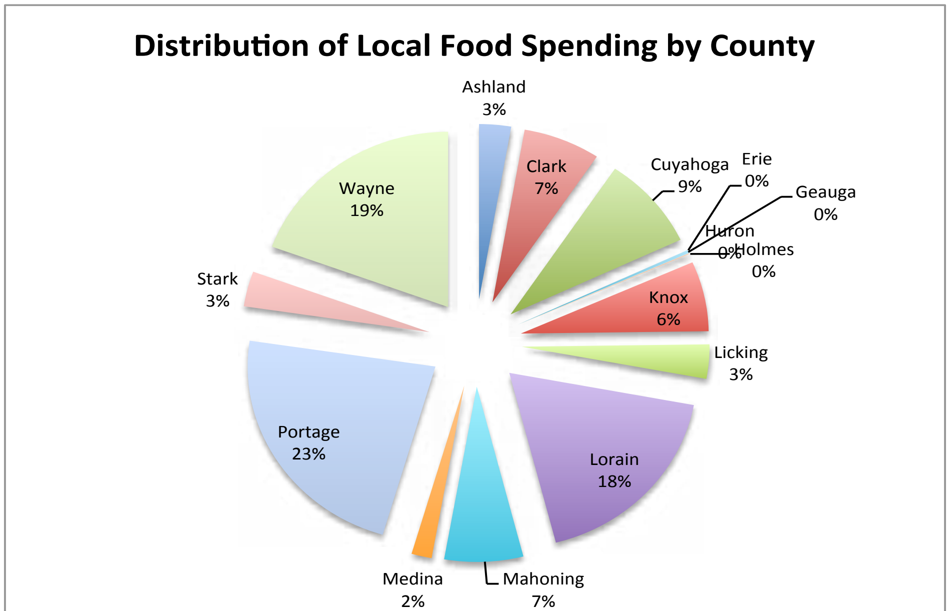
- **Produce**- Includes fruits, vegetables, nuts, and specialty items like honey or syrup.
- **Meat**- Includes meats processed in USDA certified facilities, including beef, pork, turkey, chicken, and lamb.
- **Dairy**- Includes milk, cheese, yogurt, and eggs.
- **Processed**- Includes breads, pastas, coffee, beer, tortilla, pita, and other locally manufactured items that may or may not feature locally grown ingredients.

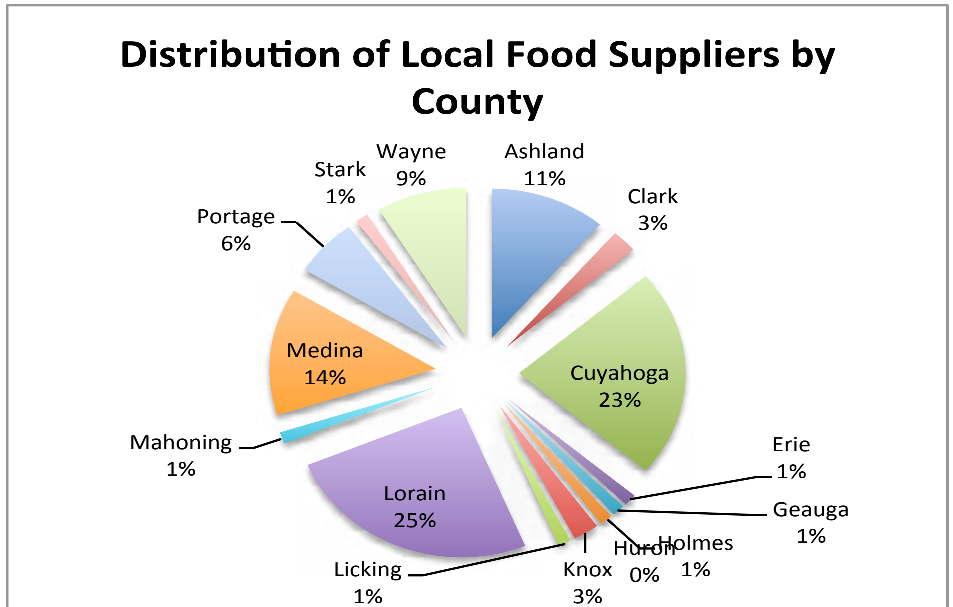
In terms of product clusters, Lorain, Medina, and Ashland counties provide the majority of produce to Oberlin markets. Clark, Lorain, and Wayne counties provide most of the meats. Processed products primarily originate from Cuyahoga County with Lorain County also providing processed goods. Wayne county provides much of the dairy with dairy operators coming from five other counties as well.



While a majority of operations supplying Oberlin markets come from within the Oberlin Foodshed, when you look at volume of sales, a different picture emerges. Overall, of the $900,000 of local spending analyzed for purchasing (excluding the Oberlin Student Cooperative Association), 30% of spending went toward produce, 29% went to meat, 29% went to processed products, and 12% went to dairy.

According to this chart, about 58% of purchases originate from counties outside of the Oberlin Foodshed, with the majority of non-foodshed spending going to Portage County (23%) and Cuyahoga County (9%) and Mahoning County (7%). All Cuyahoga County sales include processed foods, such as roasted coffee, baked goods, pasta, tortillas, and pita. Also, Portage County provides the base of operations for Surna and Sons and Ag Access, two distribution companies that work with a large number of local farmers. While the spending was tagged to Portage County, distribution includes farmers from multiple counties in Northeast Ohio. It is not possible at this time to determine how



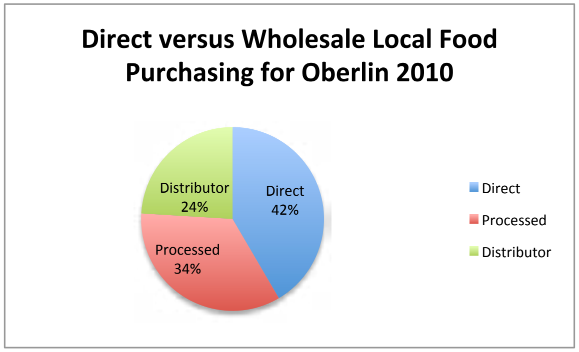


Return to Table of Contents

their spending splits between counties, but it would provide useful information to further clarify where local food originates.

It is also important to know whether food is purchased directly from farmers, purchased from food manufacturers, or conveyed through a third-party distributor. Typically, distributors will consolidate inventories from a larger number of farms, reducing the transaction costs to the buyer. Food that is purchased directly from farmers incur higher transaction costs for the buyer, since they have to manage ordering, delivery schedules, and invoicing for a greater number of smaller suppliers.

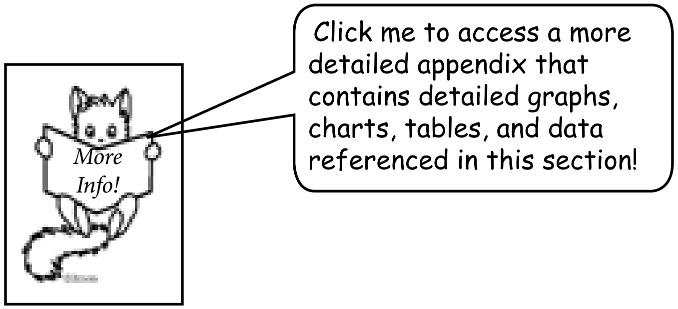
According to a further analysis of spending, the following contacts methods are used for getting food to markets:
- 42% of food comes directly from farmers or food businesses
- 34% of food comes directly from a manufacturer



- 24% of food purchasing comes through a distributor

In terms of the overall structure of food purchasing, a significant amount of food is still purchased directly from farmers or manufacturers with a little less than a quarter coming from third-party distributors. This was confirmed through interviews with each of the establishments who purchase local. All mentioned that they like to see more dollars going directly to farmers and all mentioned that they manage a large number of smaller accounts individually. However, all local food buyers also acknowledged the inefficiency of managing a number of smaller accounts and favored third-party distributors or aggregators as a way to increase the amount of local food purchased. A local food hub in Oberlin, for example, could provide this aggregation and distribution function.

We can draw the following conclusions from the supply-network analysis:
- The majority of local food entering into Oberlin markets comes from south, east, and northeast of the town. Most of the processed items come from Northeast (Cuyahoga County) and most produce, meats, and dairy come from south of the town. Very little food comes in from the west, despite significant growing capacity west of town. Spanning supply networks west into Erie and Huron counties could greatly increase available local foods, especially given the higher than average fruit and vegetable production that occurs in these counties.
- Consideration should be given to including Cuyahoga County as a part of the “Oberlin Foodshed” given the large amount of local spending and processed products that originate from Cleveland.
- Distributors play a role in facilitating local food transport to Oberlin markets, but most of the current transactions occur directly with farmers or food manufacturers.
- There is relatively little overlap between entities purchasing local food, with only a small number of farmers of local food businesses supplying more than one account to Oberlin.
- Oberlin markets exhibit significant differentiation, with some markets favoring higher volume and more pre-processed foods and others favoring more raw ingredients or smaller volume orders.
- Consideration should be given to a third party distribution and aggregation system that can supply multiple markets in Oberlin. However, it would need to be nimble in terms of volume and quantities of food, given the differentiated nature of Oberlin markets.
- Cooperatives could also cluster larger numbers of farmers to achieve aggregation and distribution efficiencies, ease ordering and invoicing, and keep more dollars going directly to farmers.



Return to Table of Contents

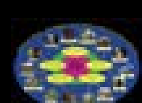

OBERLIN LOCAL FOOD WEB- CLICK ANYWHERE TO ENTER OR PROCEED TO THE NEXT PAGE TO READ THE WHOLE STORY
OBERLIN LOCAL FOOD DRIVERS
LOCAL SPENDING
NEIGHBORHOOD FOOD ACCESS
ENGAGED EDUCATION
URBAN FOOD PRODUCTION
DIVERSIFIED FARMS
Black River Cafe
Bon Appetit Management Company
Oberlin Student Coop Association
Oberlin Early Childhood Center
Lorain County Community College
City Fresh
Village Garden
Oberlin College
Oberlin High School Farm Collaborative
George Jones Farm
Backyard Polycultures
La Petit Ferme en Ville
Vermilion Valley Vineyards
Lucky Penny Farm and Creamery

FOR THE LOVE OF FOOD

(A graphic adaptation of the film)

By Brad Masi

Oberlin, a small college town in Ohio, has worked for the past 20 years to localize its food system. Through the many small acts of backyard gardeners, entrepreneurial farmers, large and small businesses, and grassroots communities, Oberlin's local food web has grown increasingly interconnected, abundant, and diverse.



Click here to return to FoodWeb

Return to Table of Contents

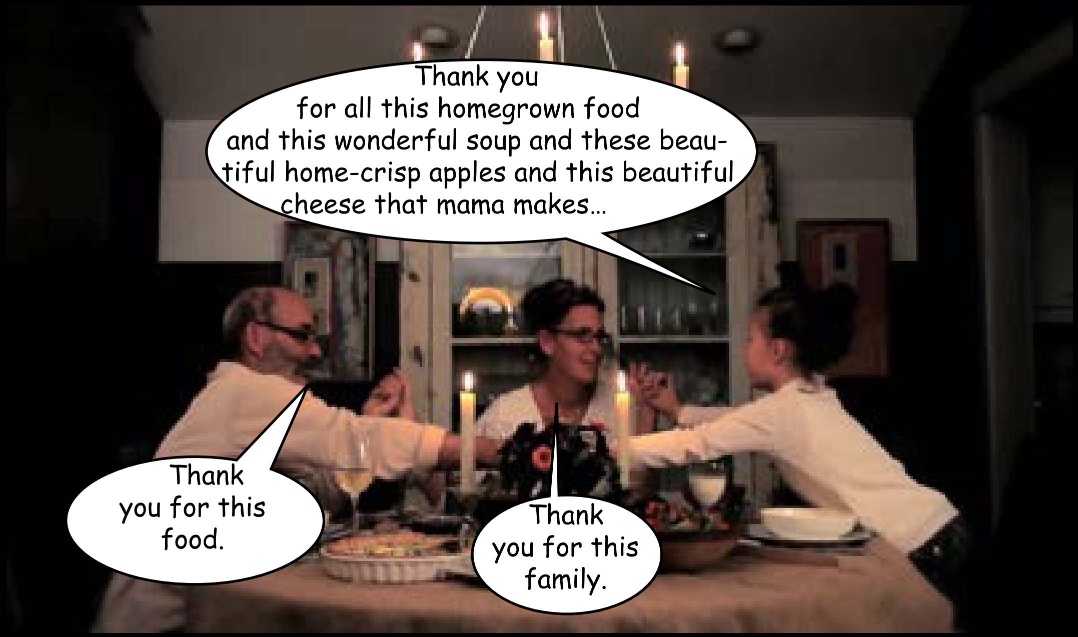
La Petit Farme en Ville

We begin at an urban homestead in a neighborhood which includes goats, chickens, figs, and a lot of vegetables for home consumption.

Click here to return to FoodWeb

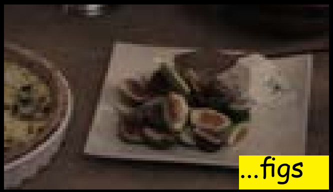
Return to Table of Contents

The Baumann-Lopcher family sits down to a home-cooked meal made almost entirely from their backyard.



All from the homestead...

...goat cheese

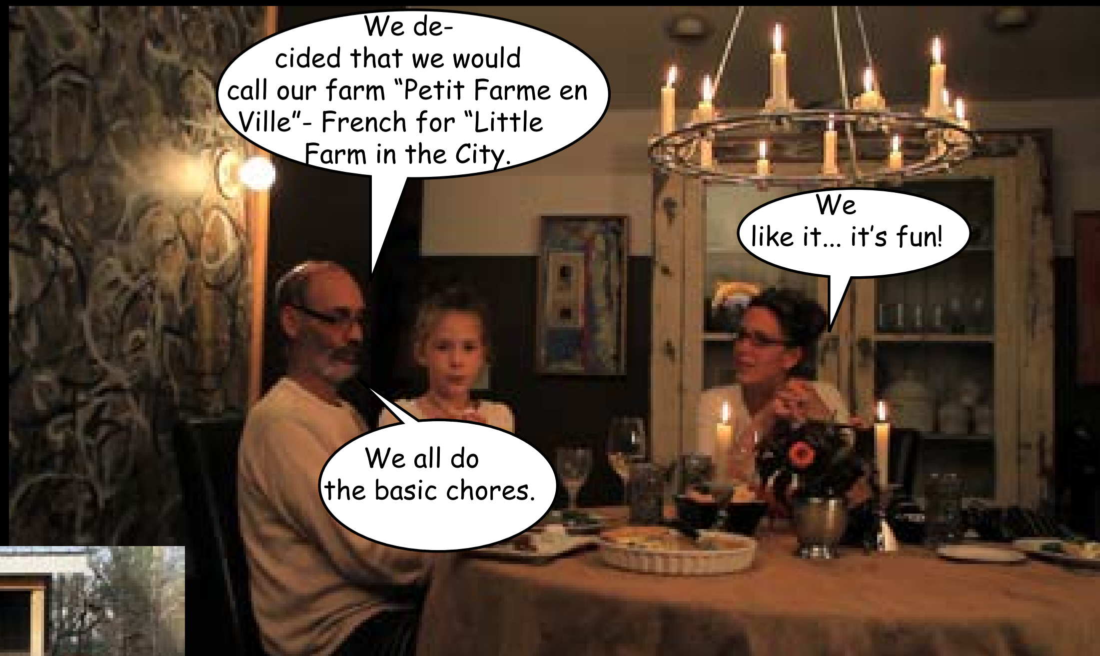


...figs

...mixed salad

...quiche

...goat milk



Click here to return to FoodWeb

Return to Table of Contents

Click here to return to FoodWeb

Return to Table of Contents

Backyard PolyCultures

"Permaculture" stands for permanent agriculture. It provides a framework for making land more fertile and abundant through the restoration of its supporting ecology. Here local food activist Brad Masi slowly converts lawn to productive gardens to provide a source of local food.

Masi uses a mobile composting system that utilizes kitchen and yard waste to restore his soil.

I have what I like to call a mobile composting system in my backyard. In this method, I have a wooden crate that has no bottom. This becomes a movable compost crate that I can move around the yard. The crate originally contained some pond stones that I had delivered to my house. I've since repurposed it as my mobile compost container.

Click here to return to FoodWeb

Return to Table of Contents

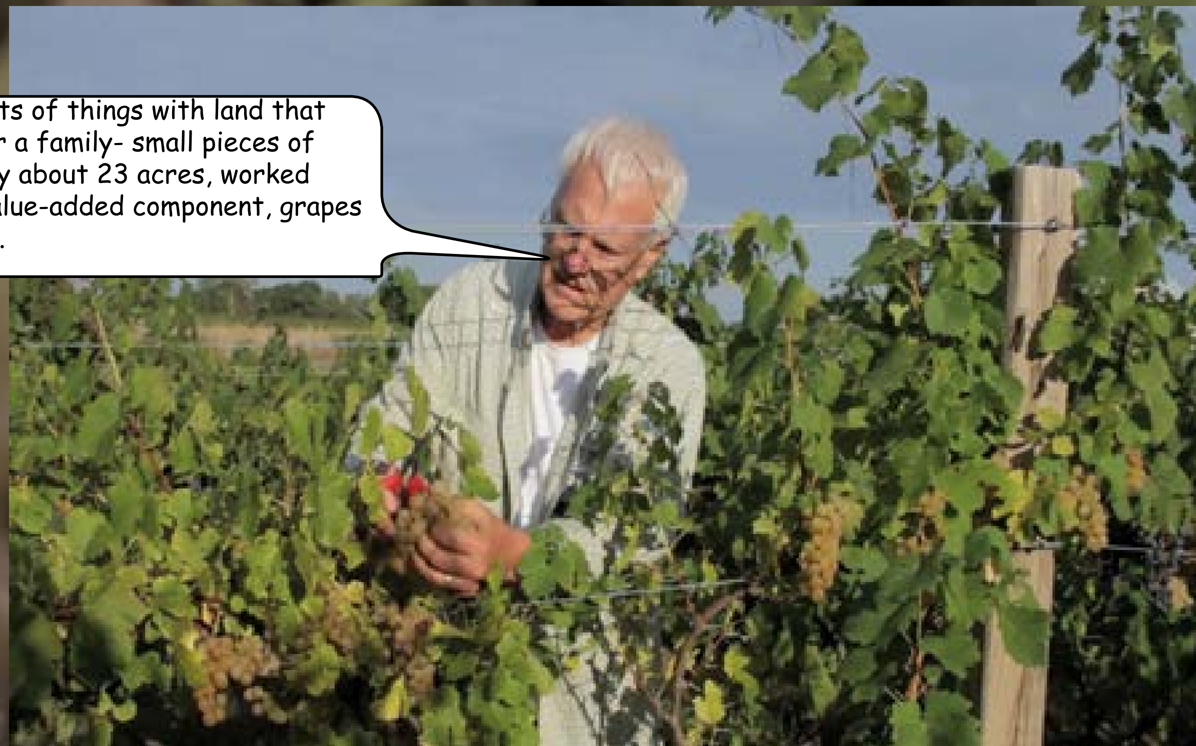

Pesto is a very simple, very basic, but very delicious way to use basil. It's a combination of basil and garlic. I also mix in other things that you can grow in the garden- parsley, garlic scapes, or arugula. I mix that up some Parmesan cheese, ideally coming from a local cheese producer, and some olive oil. If you want to keep it in the community, you can use locally pressed sunflower oil instead.
-Brad Masi, Curator of NEOFoodWeb.org
I alway look forward to the summer because that's when I know the pesto is going to be a part of my life for a couple of months.
If more backyards get converted in this way, if more farms looking at these diversification strategies and connecting to local communities to market their food, you can really see how you can start to shift whole economies and whole ways that people connect with each and other and with nature.

We leave behind Oberlin's verdant backyards and look at a 23 acre farmstead 8 miles west of Oberlin.

Vermilion Valley Vineyard

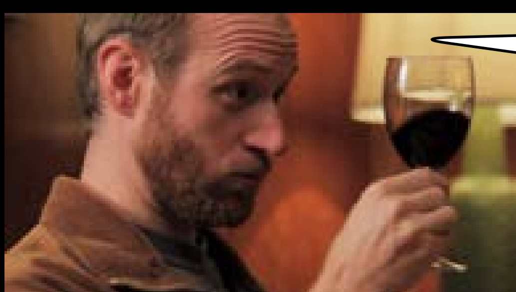
David Benzing, Winemaker and Former Oberlin Professor of Biology

David Benzing, retired from a distinguished, 35 year research and teaching career at Oberlin's Department of Biology in 2006. After retiring, some of his side-interests became central to his next line of work as a local food entrepreneur.


You can do all sorts of things with land that can make a living for a family- small pieces of land, in the case only about 23 acres, worked intensively with a value-added component, grapes to wine for example.


A lot of people can be gainfully employed in production of local food and related things, and you've got an investment in the land, you possess something, you aren't working for somebody else. A lot of people find that an appealing way to live. I certainly do.

Three good friends gather over local food and enjoy David Benzing's wine while they chat about their experiences with the local food movement around Oberlin. Bruce Comings was one of the early founders of the George Jones Farm in Oberlin, a 70 acre community farm. Maurice Small was a co-founder of City Fresh, an initiative to improve healthy food access in urban neighborhoods through gardening and food distribution. Brad Masi founded the New Agrarian Center and worked with Bruce to start the Jones Farm and Maurice to initiate City Fresh.



Lucky Penny Farm and Creamery

I was raised by a scientist and always taught to explore and research and when we moved out to the farm, that gave us many opportunities to do that. And work with land that, luckily, hadn't had pesticides applied since 1995.

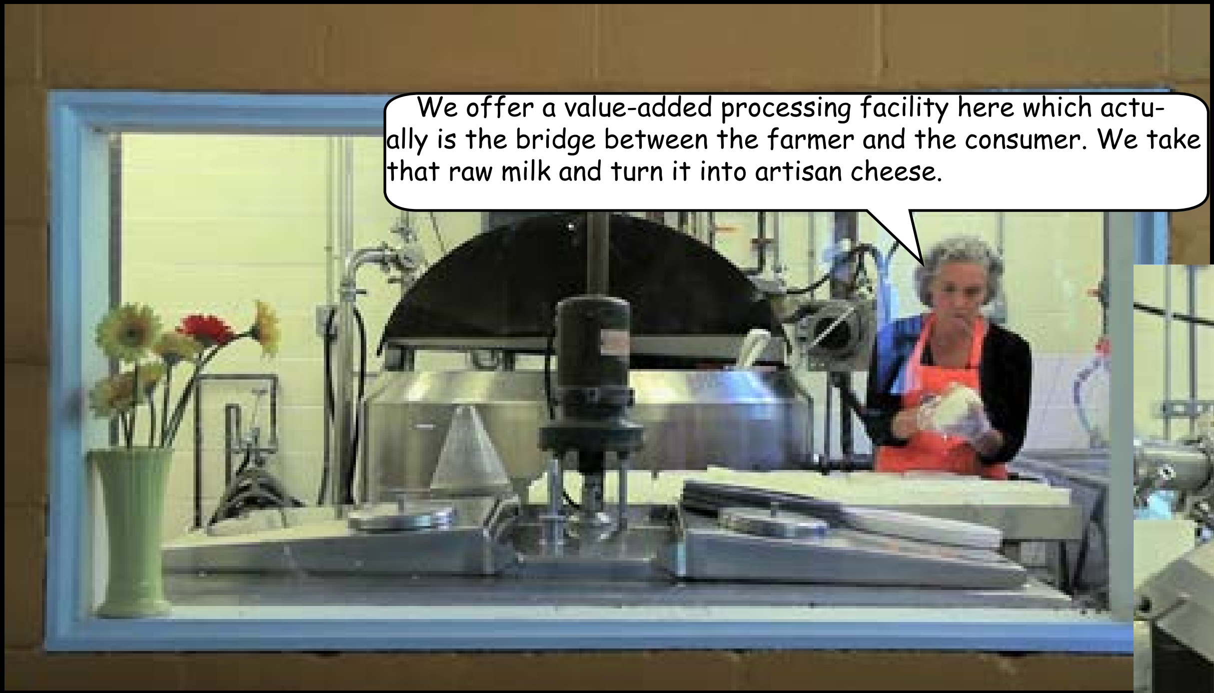
So we were blessed with an opportunity to do some really neat things and farm in a way that we wanted to which involved protecting the land, the soil and the water for generations to come.

Abbe Turner is a dairy goat farmer who also operates a creamery in downtown Kent, located in a building that was abandoned on the edge of town. She sells her artisan goat cheese products to the Black River Cafe in Oberlin.

Click here to return to FoodWeb

Return to Table of Contents

Abbe Turner, Local Farmer and Cheese Producer


We offer a value-added processing facility here which actually is the bridge between the farmer and the consumer. We take that raw milk and turn it into artisan cheese.

Black River Cafe

One of Abbe's clients is the Black River Cafe in downtown Oberlin. Started by Joseph Waltzer graduated from Oberlin College in 1998 and built on his experiences as a student to open the Black River Cafe. He named the restaurant after the river that defines the watershed in which Oberlin resides.

We are lucky to work with a number of chefs that understand the work and effort that goes into producing a high-quality dairy product.

Restaurants that are particular about their offerings, such as Black River Cafe in Oberlin, want to make sure that what they serve not only tastes good, but is produced in a manner that meets their integrity standards.

Click here to return to FoodWeb

Return to Table of Contents

I opened up because I was really passionate about local foods and sustainable agriculture. I wanted to use business as a vehicle for social and environmental change.

Being upset about the dining choices available when I was an Oberlin student in the late 1990's, I decided that the way to solve the problem was to offer a solution and a better way for people to eat.

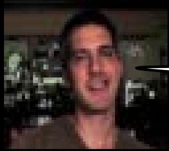
Joesph Waltzer, Owner of the Black River Café

I named it the Black River Cafe because we are actually in the Black River watershed.

The name was a tribute to my commitment to purchasing from as many regional and local producers as possible

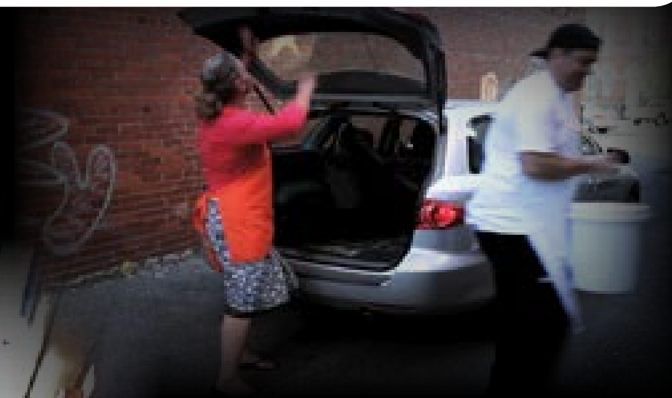
Click here to return to FoodWeb

Return to Table of Contents

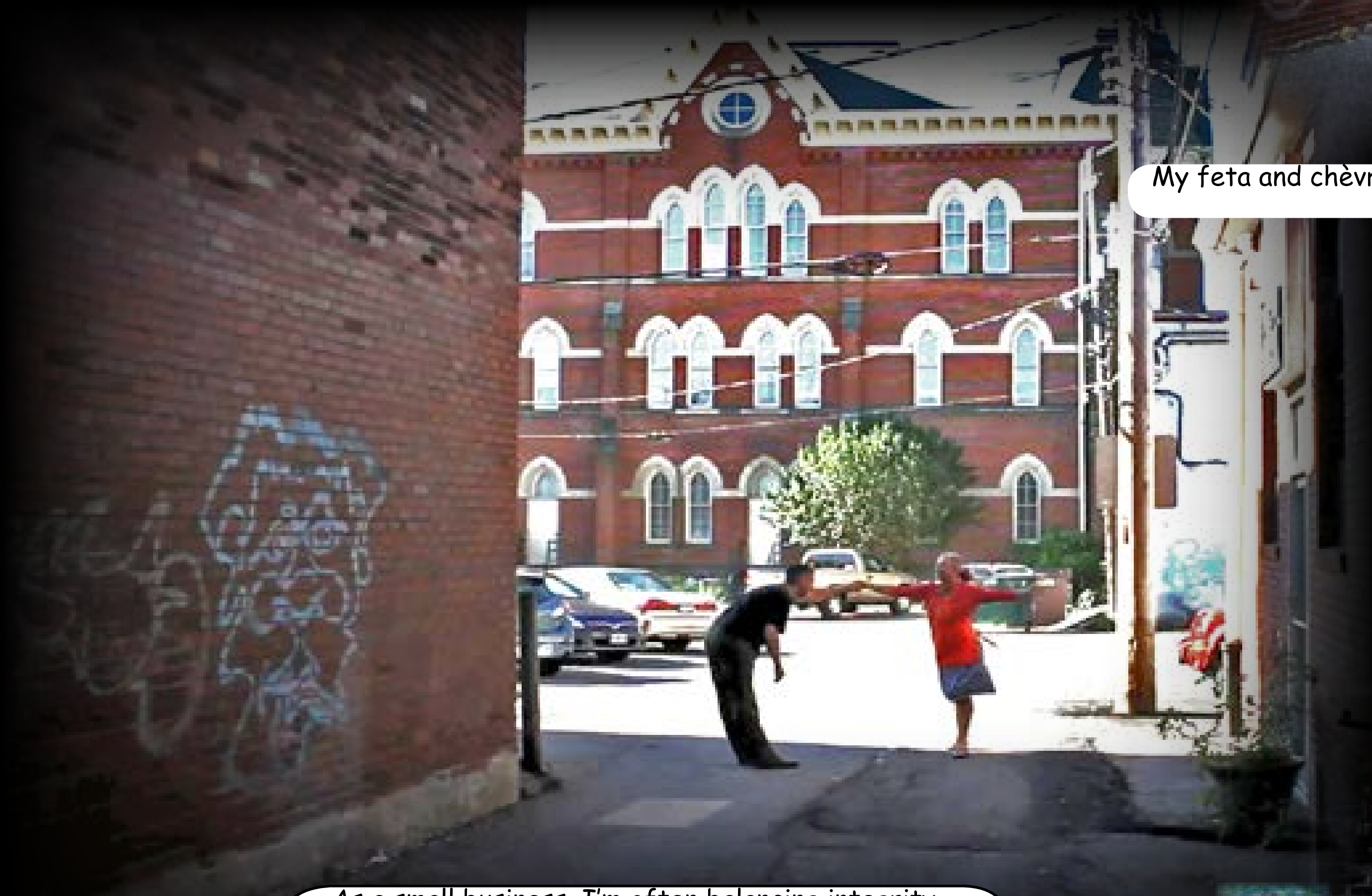


And I probably get 10-15 deliveries per week from different people. My eggs come from one person, my syrup from another.

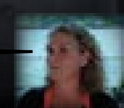
I have a mix of suppliers for my meat my milk, and different seasonal produce suppliers. I don't work with just one supplier; I have a lot of different people that I work with.



My feta and chèvre comes from Abbe Turner's creamery.



As a small business, I'm often balancing integrity and efficiency with profitability. And like Joe Waltzer at Black River Cafe, these are constant challenges that we face as small business producers.



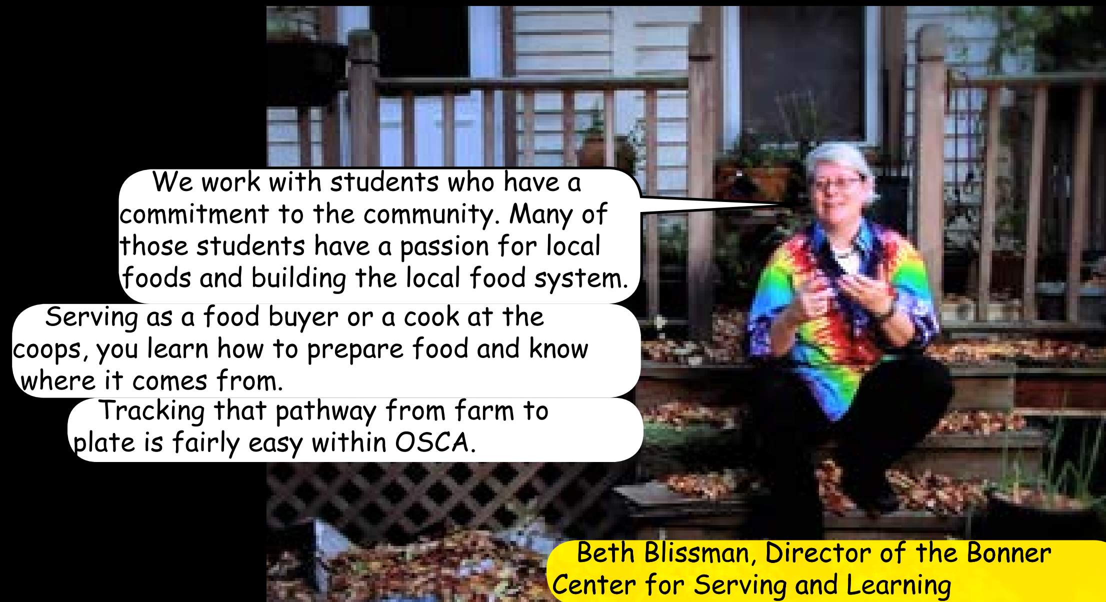
The Oberlin Student Cooperative Association

The Black River Cafe stands out as an Oberlin business dedicated to local purchasing. On the Oberlin College campus, there is a similar commitment to local purchasing. The Oberlin Student Cooperative Association (OSCA) is Oberlin's pioneer for local food purchasing. The coops instituted a local food policy in 1990, long before this was popular nationally. As a student-owned and operated cooperative with 650 members, they had the ability to quickly change their food buying policies and today about 32% of their purchases support local farmers.

Brad Masi, NEOFoodWEb.org

Emily Kennedy, Oberlin Student and Local Food Coordinator for OSCA

Laura Rose Brylowski, Oberlin Student and Local Food Coordinator for OSCA



Beth Blissman, Director of the Bonner Center for Serving and Learning

-Taylor, Oberlin Student and Cook for Tank Cooperative

Every student-member of OSCA has do contribute 4-6 hours per week for the cooperative. Coop jobs include cooking, cleaning, food ordering, coop administration, and composting. Students end-up saving 1000's of dollars per year on their board bills by contributing their labor to the four housing and eight dining coops that OSCA operates. And every student gets to participate in the decision-making and operations for all aspects of the cooperative system, from where to buy food to how to invest savings.

Click here to return to FoodWeb

Return to Table of Contents

Similar to OSCA, the Bon Appetit Management Company, which operates Oberlin's dining services, also has a commitment to local food purchasing.

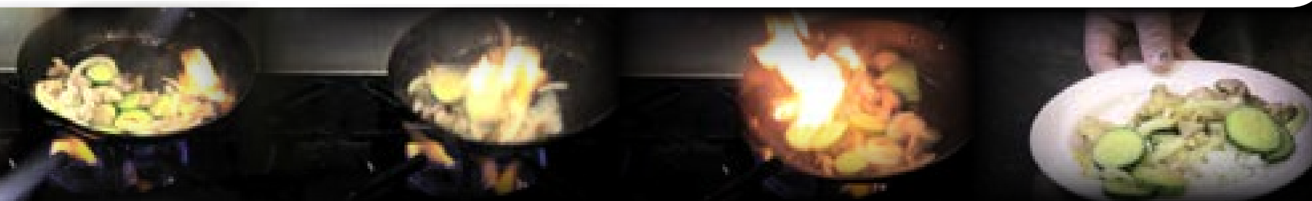
Bon Appetit Management Company

Oberlin has a population of 2800 students. We have four dining halls, a bakery, a coffee shop, and a convenience store. Across campus we do somewhere around 3,000 meals a day.

Dean Holiday, Executive Chef for Bon Appetit

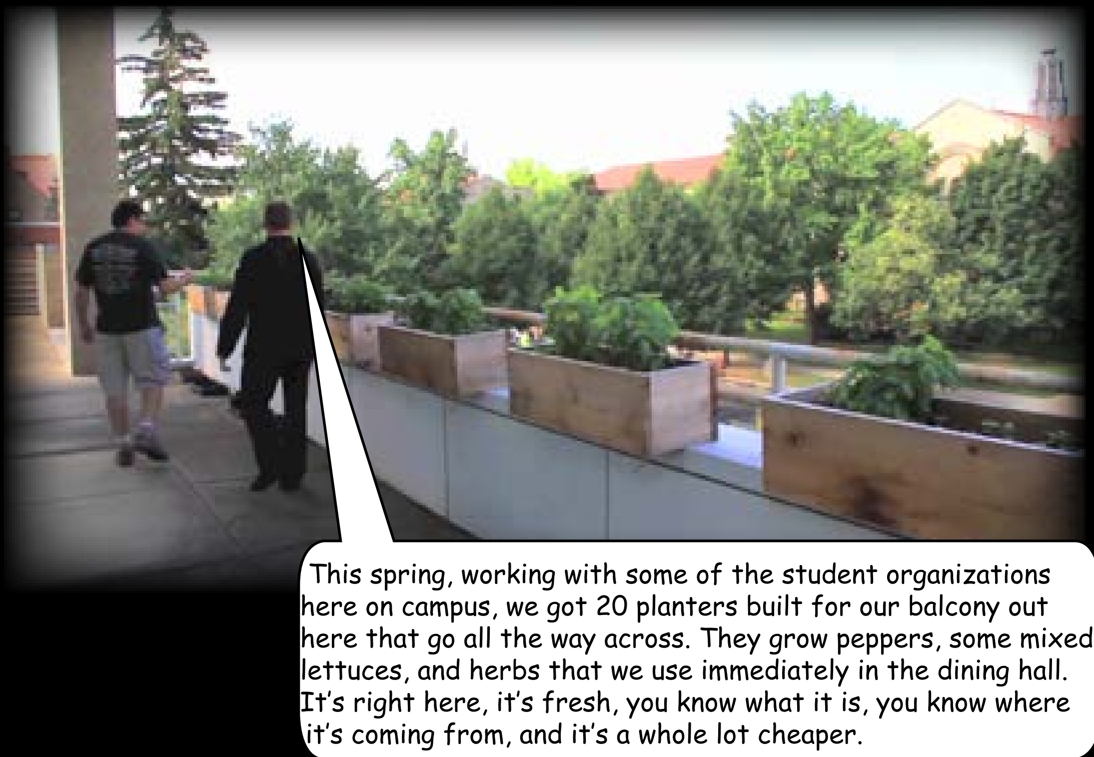
Bon Appetit Management Company, a national food service company based in California, has a "Farm to Fork" corporate policy which seeks to insure that 20% of the food spending for every account comes from local sources. Bon Appetit became Oberlin's provider in 2000 and presently spends about 27% of their food budget on local farms or locally-owned food businesses.

Oberlin College hired Bon Appetit because they shared a lot of philosophies- promoting local business, supporting the local economy, cooking food from scratch, serving healthy foods, and keeping the students educated and aware of what they're eating, and where it comes from.



Click here to return to FoodWeb

Return to Table of Contents


This spring, working with some of the student organizations here on campus, we got 20 planters built for our balcony out here that go all the way across. They grow peppers, some mixed lettuces, and herbs that we use immediately in the dining hall. It's right here, it's fresh, you know what it is, you know where it's coming from, and it's a whole lot cheaper.

In 2010, the Oberlin Student Cooperative Association, Black River Cafe, and Oberlin College spent around 30% of their food budgets supporting local farmers and local food businesses.

Combined, all three circulated more than $1 million of spending in the local economy.

Click here to return to FoodWeb

Return to Table of Contents

City Fresh

In addition to local businesses, Oberlin also has a vibrant grassroots scene committed to a number of local food efforts in the community, including City Fresh.

City Fresh began as an initiative of the New Agrarian Center (NAC), an Oberlin-based non-profit organization working to promote a more sustainable and just food system in Northeast Ohio. City Fresh began in Cleveland with a focus on improving local food access in urban neighborhoods. City Fresh included a wide range of partners, from extension services and the Cleveland Department of public health to farmer organizations, such as Innovative Farmers of Ohio and the Ohio Farmers' Union. City Fresh initiated a market garden training program with OSU Extension in 2006 to encourage Cleveland residents to utilize vacant lots to start market gardens, increasing both income earning opportunity and healthy food access. City Fresh continues to operate a network of about 18 "Fresh Stops" in neighborhoods across Northeast Ohio, including here in Oberlin. Fresh Stops are volunteer operated distribution points where individuals can access locally grown food at affordable prices.

Dave Sokoll, City Fresh Volunteer

Sandy Kish-Jordan, Executive Director of the New Agrarian Center

Anna Oberlin Student and City Fresh Volunteer

-City Fresh Shareholder

Randall James, City Fresh Shareholder


And we're all about getting food to the community, so it's good to be out here feeding people and enjoying produce.


When you begin to in your own right bring people together around food, around beverage, around community, there's nothing that will stop you.
Maurice Small, Urban Farmer and Educator

Click here to return to FoodWeb

Return to Table of Contents

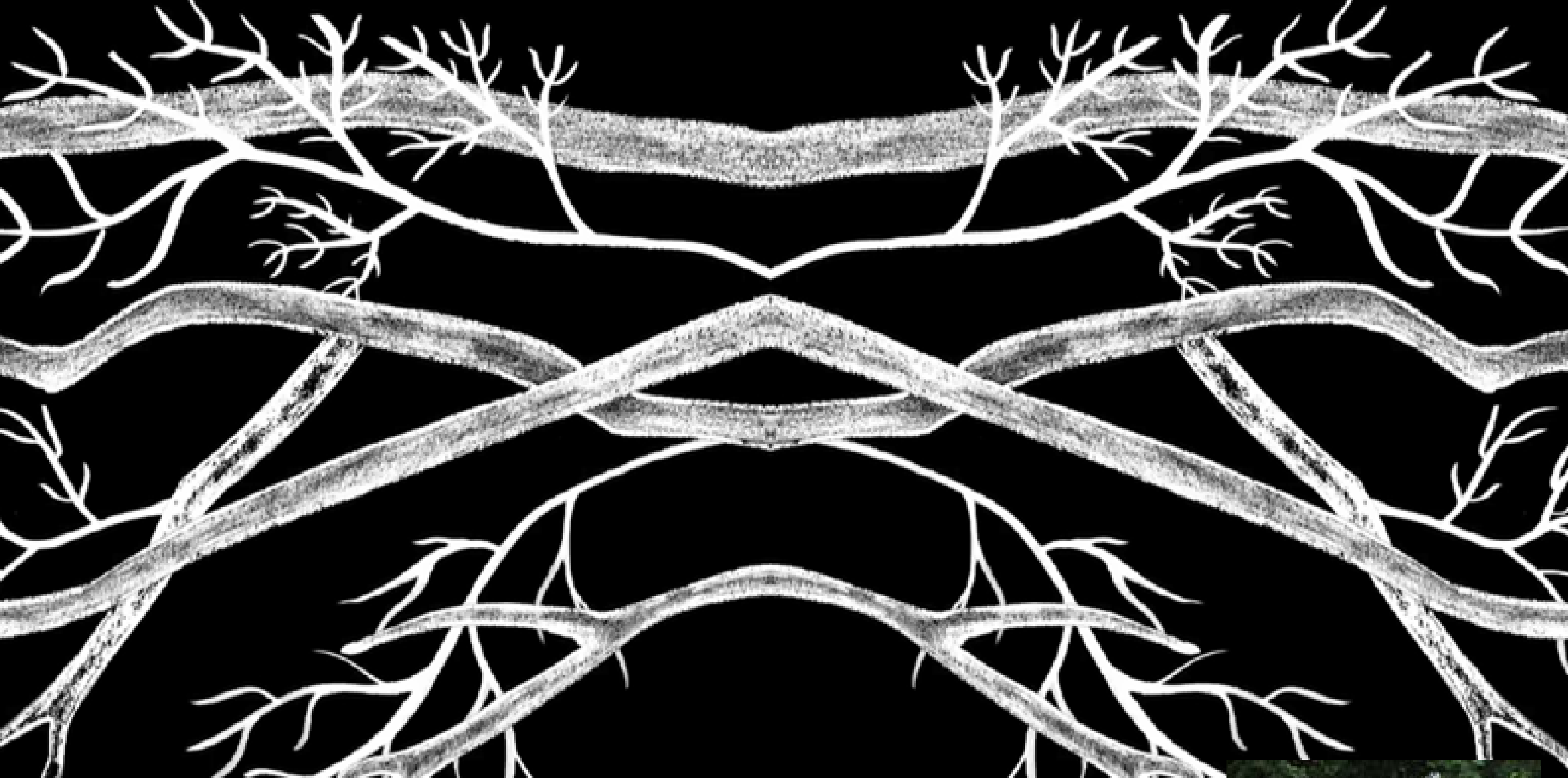
Click here to return to FoodWeb

Return to Table of Contents


It took you all working in community... who was it that just passed away this week, planted a million trees?
The Zimbabwean woman... Chungarai... she passed away at age seventy-five...


Yeah, she was put in jail, she was by her government, the men said you can't do this, you can't do this, you can't do this... she went ahead and she did it and she started to build community. She planted a million plus trees and her generation is still planting trees.
You all began to plant trees and create these locations of access in the community. As you all create those locations of access, people began to watch... and duplicate in their community and take the information back.

Grassroots Growth

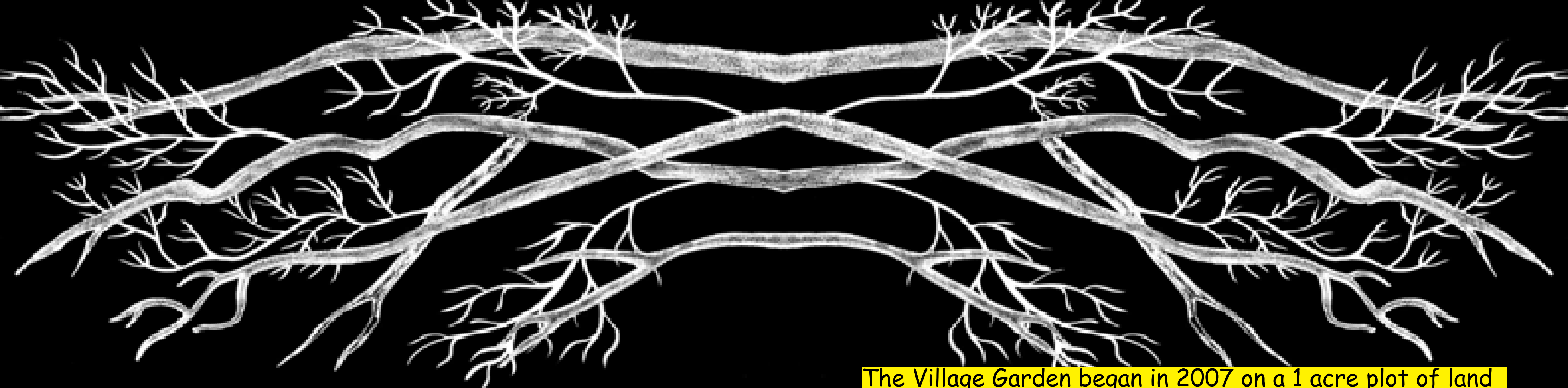


Dave Hopkins, Urban Farmer at the Village Garden

Blythe Coleman Mumford, High School Student and Garden Coordinator

Click here to return to FoodWeb

Return to Table of Contents



The Village Garden began in 2007 on a 1 acre plot of land owned by the Lorain Metropolitan Housing Authority. The garden provides a space for neighboring public housing residents to grow food and for neighborhood youth to produce food for sale. A partnership with Eastwood Elementary School also utilizes the garden for education.

I'm a type I diabetic, so food has always been a big part of my life. Last year, I paid attention to the idea of eating more local food and I volunteered at the Jones Farm and learned about farming and realized that I could do this here at the high school.

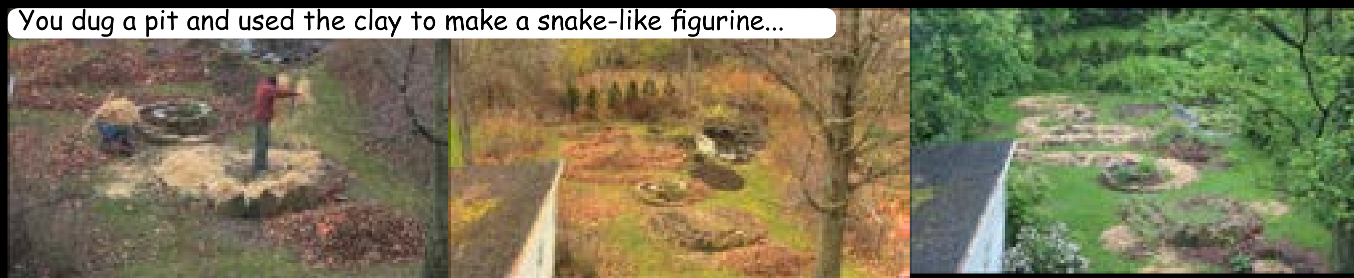
This is the kale that I started from seed. I have pictures of it when I started it in my south window. Just a couple of seeds and it turned into this. I'm pretty proud of it. It's my prized kale at the moment.

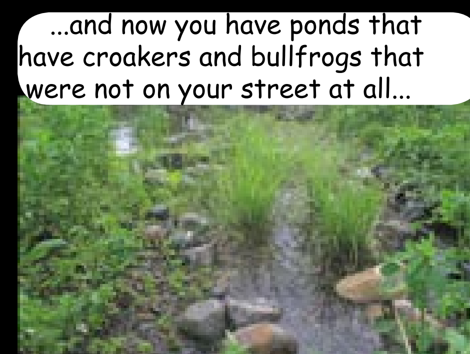
As for actual plants, I haven't had much experience gardening before and I'm glad I have that experience now and I really have an appreciation for what farmers do.

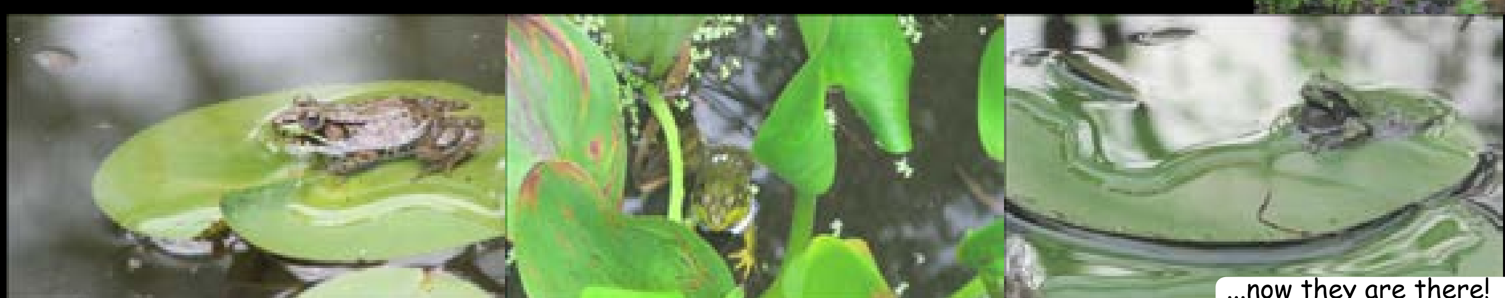
The Oberlin High School Farm Collaborative operates on a one acre parcel owned by the Oberlin Public School system. The garden, initiated by Blythe Coleman Mumford, a high school student, and some Oberlin College students is a part of a Food Awareness Club at the high school. The club works to raise awareness about nutrition and diet at the high school. The food grown by the garden is sold to the high school cafeteria.

Students in Oberlin's Conservatory of Music formed a jazz ensemble that provided a live concert as a part of an Indigenous People's celebration at the Village Garden.

There's a community aspect to the soil food web, there's a community aspect to the natural ecosystem in our backyards and our own towns like Oberlin and beyond. All we have to do is invite the players in.







Click here to return to FoodWeb

Return to Table of Contents

Oberlin Early Childhood Center

Like the Oberlin High School, the involvement of pre-school children is critical to the growth of local food systems as well as healthier diets.

We're here in the Oberlin Early Childhood Center making lunch for today. We're serving some chicken and cheese quesadillas, vegetarians are getting some cheese and caramelized onions, and with one lactose-free kid that's just going to get chicken and onions.

For this summer, we've been doing all City Fresh produce, so it's Amish organic produce. We've gotten probably 70-80% of our fruits and vegetables from there.

Dave Sokoll, Oberlin Graduate and Chef for the Oberlin Early Childhood Center

We are also serving some watermelon and cantaloupe mixed in a fruit salad and, just to try it, a cup of cold gazpacho soup to go with their lunch.

They've tried gazpacho. The first time we served it, we went around with a trey of cups and a dollop of sour cream on each one and the kids were so excited when I walked in and said "Hey we're going to try something new!"

And then, slowly the ripple of confusion about what is was went out to the class. Some kids tried it/ One girl said that she loved it and one kid said he doesn't try any new dips.

The Oberlin Early Childhood Center (OECC) is a pre-school that serves young children in Oberlin. Dave Sokoll operates as the head chef for the school, combining local food with healthier meals for the kids. Sokoll is an Oberlin College graduate who got introduced to local foods as a student and through a job as City Fresh truck driver after he graduated.

Click here to return to FoodWeb

Return to Table of Contents

They're at least trying it, nibbling on things and giving things a chance. There are a lot of kids that, right when we started, wouldn't even touch fresh cucumbers, fresh fruit, wouldn't even go near it.

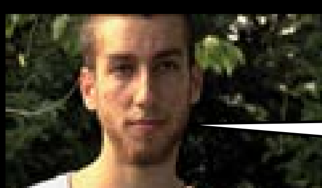
But I talked to a pediatrician who said it takes 5-15 times for a kid seeing, touching, feeling, tasting, smelling, just experiencing a new food before they can connect to it and feel comfortable with it.

Click here to return to FoodWeb

Return to Table of Contents

George Jones Farm

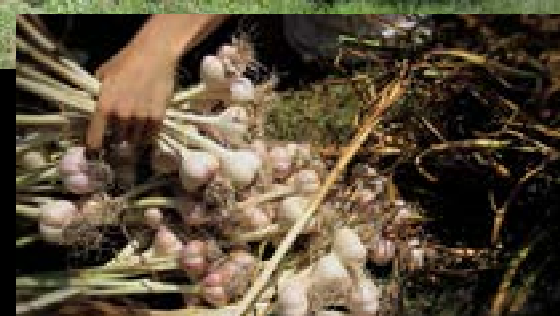
Down the street from OECC sits the George Jones Farm, a 70 acre farmstead owned by Oberlin College and leased to the New Agrarian Center (NAC). The NAC operates a working farm that combines education and commercial sales. The farm also includes 40 acres of restored wetland, prairie, and woodland habitat as well as a highly energy efficient learning building and produce cooler built with strawbales.



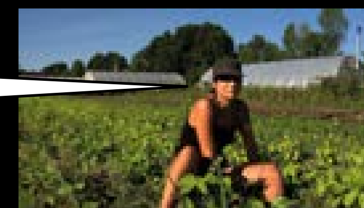
Rafe Scobey-Thal, Oberlin Student and AmeriCorps Vista Volunteer

I think the connection between farming and food needs to be made early with children. Food is one of the most important and foundational relationships to something that we have.

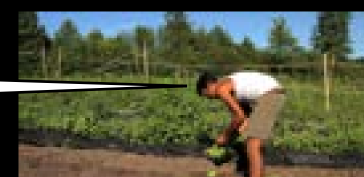
If by the time a child is 7 or 8, they've worked in a garden and they've eaten carrots that they've grown in their backyard, they'll understand much more about the food system.



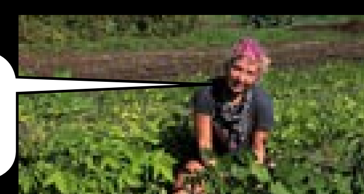
In addition to its work with City Fresh, the NAC utilizes the Jones Farm as an educational resource.



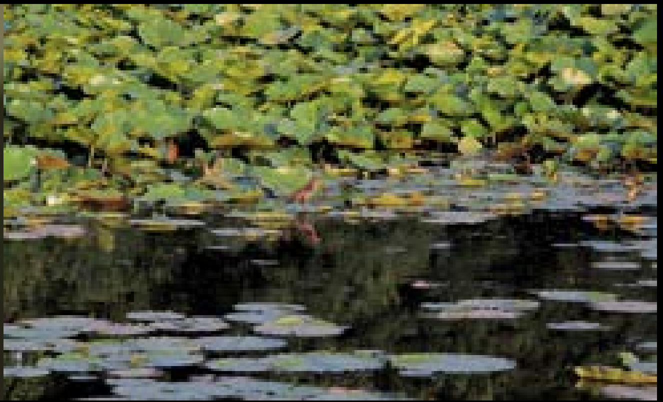
Viviana Gentry, **College Intern**



Tucker Kelly, High School Apprentice



Victoria Cox, **College Intern**



Right now this building that we are in is a strawbale building that was built to be a place for us to work, and a place to have workshops and classes.

Raise your hand if you've had basil. The taste of basil when it's really good should be really sweet and nice. So you just tear a little off and try it!

The farm doesn't just benefit young children. It also provides opportunities for college students, even setting some unconventional career directions.

John Petersen, Homesteader and Professor of Environmental Studies

Lucian Eisenhauer, Oberlin Graduate and Local Food Entrepreneur

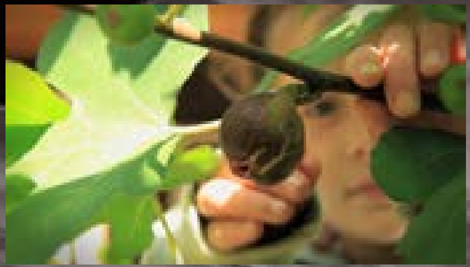
Click here to return to FoodWeb

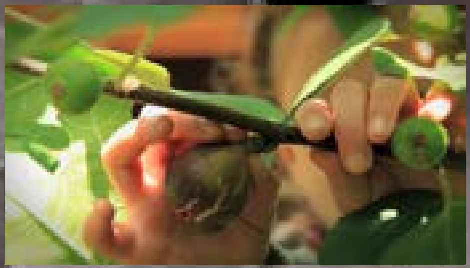
Return to Table of Contents

Ruby Beil, Professor at Lorain County Community College

Meanwhile, back at La Petit Ferme en Ville, we discover the deep roots of local food.

The Fig Tree





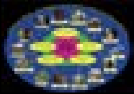
So over the years at the family homestead in Cleveland, the figs continued to propagate until there was really a whole thicket behind their house in Cleveland. My friends grandparents had passed on and the family decided they were going to sell the house and he asked if I was interested in having a fig tree!

Click here to return to FoodWeb

Return to Table of Contents

Click here to return to FoodWeb

The End!



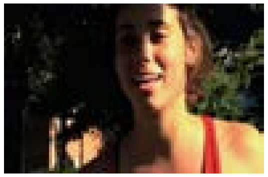
Click here to return to FoodWeb

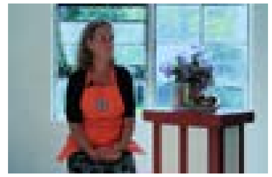
Return to Table of Contents













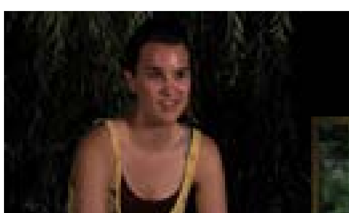


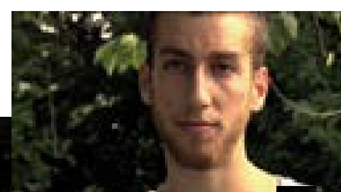
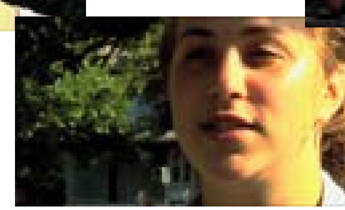
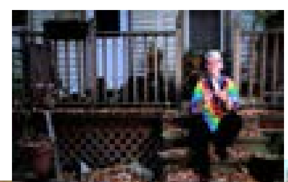
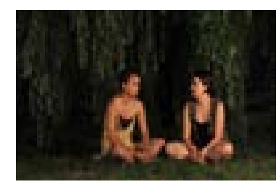




COMMUNITY PERSPECTIVES ON A 70% SHIFT






Return to Table of Contents

COMMUNITY PERSPECTIVES ON A 70% LOCALIZATION OF THE FOOD SUPPLY

In 2010, a regional food study commissioned by the Cleveland Foundation estimated that a 25% localization of food purchasing in Northeast Ohio could create $4.5 billion of new economic activity, produce upwards of 27,000 new jobs, and generate $126 million in new tax revenues for local government. The study included a variety of recommendations and mechanisms that would support a shift of this magnitude, including policy changes, community investment, rural-urban relations, and supporting infrastructure.

A 25% shift is within the realm of possibility. A number of institutions and businesses in Northeast Ohio have already achieved or exceeded this level of localization. Oberlin College and several other local businesses spend about 30% of their annual food budgets supporting local farms and locally-owned food businesses and circulating more than $1 million annually in the local economy.

The 25% Shift study identified four communities that showed high levels of innovation and support for local food systems, including Cleveland, Youngstown, Wooster, and Oberlin. Oberlin's inclusion stems from its history as a long-time pioneer in local food systems, having been among the first colleges in the United States to organize an active local food procurement program, beginning in 1988. The town features a variety of local food initiatives, including community farms, urban agriculture, local food businesses, and a variety of education and entrepreneurship initiatives.

Given its history and small size, the Oberlin Project sought to assess the feasibility of a 70% shift in community-wide purchasing. A shift of this magnitude provides a challenging goal that tests the extent to which a community can go to build a local food economy, substituting a substantial amount of food presently imported from outside of the Northeast Ohio region. What would be the job creation or wealth retention potential? Are there risks with this level of localization in an era of climate instability? Could the region draw largely from its own resources to supply the requisite calories and nutrients for a healthy population? Does this compete with the large area of land in Northeast Ohio dedicated to export-oriented commodity foods?

In assessing the viability of a 70% localization of Oberlin's food supply, we wanted to get some reactions from local community members that are most actively involved with current local food efforts in Oberlin. We figured that those most active would provide a good gauge as to how realistic a 70% shift would be.

To gather this information, we conducted 25 video interviews which focused on three primary perspectives:

a) What is the current state of Oberlin's local food efforts?
b) What pathways led to this current state of activity?
c) What is the viability of a substantial future localization for the community?

These interviews were shortened to about 700 short clips and also assembled into a 45 minute documentary film called *For the Love of Food*, a chronicle of Oberlin's current and past local food efforts and some speculation as to where things are heading in the future. The content of this film was covered in the preceding section.

The interviews that we conducted included a diverse number of perspectives, including:

- Local farmers
- Local food manufacturers (wine and cheese)
- Volunteers active in local food efforts
- Cooks and chefs
- High school and college students active with local food efforts
- Professors and educators
- Restaurant and business owners
- Individuals involved with logistics or distribution of local food
- Institutional food buyers
- Non-profit organizations

As the pages that follow, reactions in the community to the viability of a 70% shift were mixed, with most people expressing belief that it would be possible, but would require some substantial changes before it could be considered.

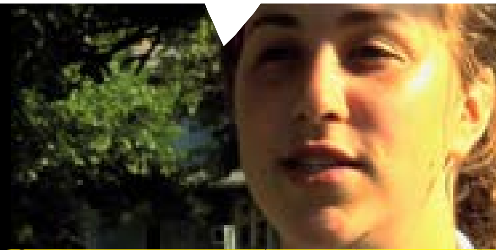
Return to Table of Contents

70% Shift Initial Reactions

70% Is a fantastic goal. Just the discussion alone will help people consider more about their meal choices…

Abbe Turner, Local Farmer and Cheese Producer

I'm optimistic that the whole town, including the college, could reach up to 70%. There are plenty of farms around here that would be willing to sell to all of the businesses and the college.



Erica Turrett, Oberlin Student and City Fresh Volunteer

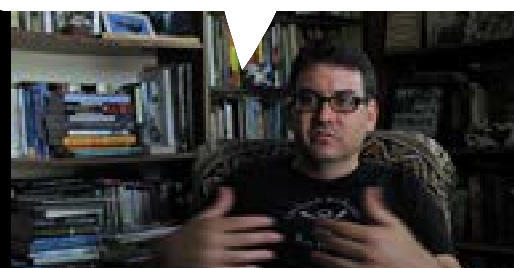
When we first moved out to the farm, we wanted to try to live in the 100 mile diet and produce an increasing percentage of food for our family, and it's a very difficult task.

Abbe Turner, Local Farmer and Cheese Producer

The community can do it. This is the kind of community where, if it were to be done, it would be done here.

Anna Oberlin Student and City Fresh Volunteer

When you talk about a 70% shift, Oberlin is a really good place to look at that. It's a small town and college community with about 10,000 people, so it's at a scale where you could really start to look at something like that without it becoming extremely overwhelming.



-Brad Masi, Curator of NEOFoodWeb.org

In tropical parts of the world where the growing season is continuous, especially in the wetter areas, that kind of localization might be more reasonable.

David Benzing, Winemaker and Former Oberlin Professor

70% Shift- Initial Reactions

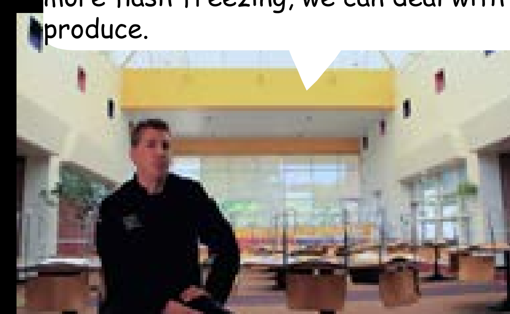
It would be really difficult for Oberlin to get to 70%. We are in northern Ohio and a lot of the year, there's not much produce.

-City Fresh Shareholder

I think there's a very high potential for Oberlin to reach 70% because of its location. We are surrounded on all sides by farming communities with Amish communities in close proximity. There's no reason why the majority of food in Oberlin couldn't be sourced locally.

-Roger Himmelright , Trucker and Farmer Liaison for City Fresh

It would take a lot to reach 70%. One challenge is the short growing season. Things like dairy are easy to maintain all year. With more flash freezing, we can deal with the produce.



-Dean Holiday, Executive Chef for Bon Appetit

Return to Table of Contents

ECOLOGY

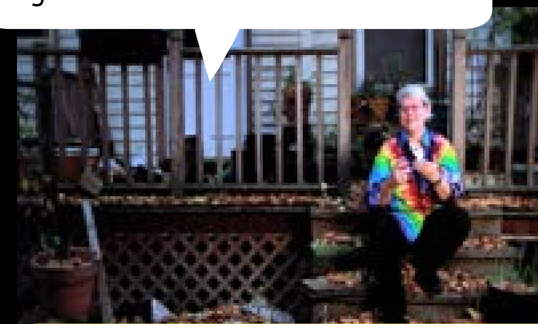
Can land and climate support a 70% localization in Oberlin?

Return to Table of Contents

SEASONALITY

Being a cold-climate, northern region, there are significant seasonal constraints to the year-round availability of locally grown foods that would need to be overcome through a mix of changes in consumer behavior, dietary choices, and preservation options.

What are the ways that people can prepare the winter or find those places that are growing 12 months out of the year? The west side of Cleveland used to be an amazing greenhouse area. Could we bring that back?

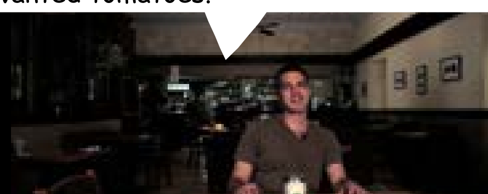


Beth Blissman, Director of the Bonner Center for Serving and Learning

Abbe Turner, Local Farmer and Cheese Producer

That's what we need to focus on, eating seasonally. With a small paradigm shift, it's a wonderful thing. But it will take a little bit of digging in and eating canned green beans, that you canned yourself of course, one more evening in February.

To be that local, it's going to require that people learn to eat very seasonal dishes. In the winter, for a while, I didn't serve tomatoes on my sandwiches. Even here, in a restaurant where people really care about that, people weren't happy about that and they just really wanted tomatoes.



Joesph Waltzer, Owner of the Black River Café

If we are eating 70% local, are we canning a lot of food in the summer and eating them in the winter?

Emily Kennedy, Oberlin Student and Local Food Coordinator for OSCA

You'll need a cultural change, in the sense that you can't have everything on demand. I frankly think that looking forward to certain things and getting them in season is a good thing. Shipped foods are just not as good as food that is ripened locally…you have to decide, let's look forward to fresh sweet corn when it's in season. But you're still going to have to level that out a little bit and not go back to the way grandma and grandpa lived.

David Benzing, Local Winemaker and Former Oberlin Professor

We live in a cold climate region and we have a 6 month growing season, so we'd have to find a way to feed ourselves 12 months out of the year.

Brad Masi, Curator of NEOFoodWeb.org

CLIMATE CHANGE

The increasing scarcity and cost of extracting fossil-based energy coupled with the de-stabilizing effects of climate change will challenge the viability of local food systems. However, these same forces can also threaten the stability of local food systems, exposing some of the risks of too much localization.

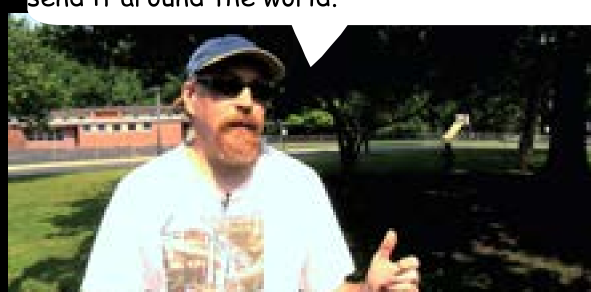
We're seeing more extreme events. The storm of the century is becoming the storm of the decade… for this region, they are calling for an intensification of extreme weather events- both extremes- floods, heavy rains, and droughts.

David Benzing, Winemaker and Former Oberlin Professor

When people think about climate change, they think of this directed change toward warmer temperatures when, in fact, what we are really experiencing is increased variability. Given future climate variability, there will be areas that experience extreme events. We are going to experience situations where a given local food system might be wiped out for a season, beyond a single crop. Figuring out how to integrate a heavy emphasis on localization with the necessary connections between communities is a really crucial part of the puzzle to deal with.

John Petersen, Homesteader and Professor of Environmental Studies

Eating local foods is an absolute necessity in today's world. The sun provides a lot of energy that we need to be using. We need to not pull coal and oil out of the ground to fertilize our foods and send it around the world.



Randall James, City Fresh Shareholder

Return to Table of Contents

DIVERSIFIED FARMS

Localization would require a supply-base of smaller to medium-scaled farms producing a wider variety of crops and livestock products than the commodity farms that now dominate most production.

The proteins are the biggest challenge. For the past year we have been looking for local beef or pork providers. We are requiring that they become humanely certified and 100% natural. It's hard to find the small meat farmers, because everything is so commercial and industrialized in that business. And especially with the meat, trying to compete on the dollar, it's really hard. But we're trying.

Dean Holiday, Executive Chef for Bon Appetit

One of the key ecological principals is the idea that diversity provides your opportunity to respond to change. Diversity gives the system resilience. A lot of the species that we've engineered to be perfect under certain circumstances are really quite non-ideal under highly variable circumstances.

John Petersen, Homesteader and Professor of Environmental Studies

Lucian Eisenhauer, Oberlin Graduate and Local Food Entrepreneur

I worked on the Jones Farm as a college student. It was a great experience to be working outside all day. One of the more humbling aspects of that work was working with the heavy clay soils in Northeast Ohio. It's either like a brick or sloppy with mud. Those clay soils need organic matter to build up the tilth and allow them to be workable in different conditions. I started to think of the college as a place that produces large amounts of food waste. How can we create organics recycling systems on an institutional or community scale to re-invest in our soils and close the loop in that way- the back-end of local foods production and that re-investment.

Return to Table of Contents

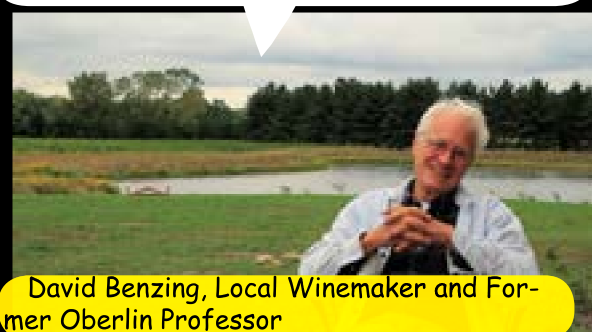
LAND

The Great Lakes basin possesses the land and water resources to support a vibrant agricultural system. The land resources to sustain a healthy local agriculture should be conserved and protected.

Kate Pilacky, Western Reserve Land Conservancy

Farmers are very smart people and if they understand that this is not only about having local food, but it's about national security, it's about being near the largest water source with the Great Lakes. This is the ideal farming region as far as I'm concerned, even if you don't believe in global warming, being near the Great Lakes is the place to be as far as I'm concerned if you're considering farming into the next century. It's just not going to make sense to be carting our tomatoes from California and our squash and our lettuce when we're perfectly able to grow them here in Ohio.

Think about how different it would be if it were a checkerboard of small farms, maybe 25-75 acres each. With homesteads on them, with a great variety of crops, many of them perennial crops with many individuals doing value-added activity and selling local.



David Benzing, Local Winemaker and Former Oberlin Professor

Farmland prices have actually gone up in value, which is a good thing for farmers to continue farming. Developers aren't knocking on the door trying to convince them not to farm as much. It certainly helps relieve some of the pressure on land. Developers are not building houses anymore. A lot of developers are coming to us, asking us to take some land off their hands for conservation

COMMUNITY

What pathways can lead to more widespread community participation?

Return to Table of Contents

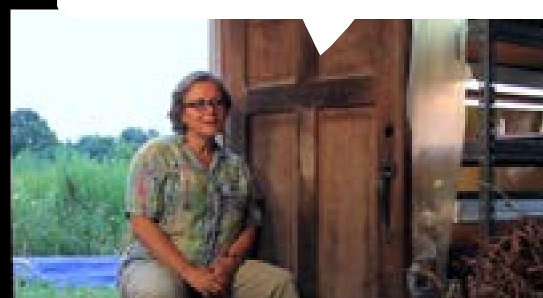
Farmer Involvement

Certainly, market demand has driven much of the growth of local food systems, but farmers need to be well-represented in the process as they will be the primary limiting factor to possibilities for a 70% localization.

You need to talk about better planning. The challenge is connecting all kinds of growers to local markets so that the idea of providing a lot more local food within a given radius would be feasibility. It's not realistic under the current circumstances that all food would be provided locally or that people would accept that food has to be grown in a 10 mile radius. It takes a lot more planning between growers, and consumers, and businesses. It takes a lot to establish those networks and connections to make that feasible.

Jeff Baumann, Homesteader

Very close to hear is a very large Amish community which has a number of farmers that are very willing to expand what they do to meet the needs of the area.



As long as the farmers are part of the mix in the beginning and we're working with them and they feel like they have a voice in this, I see how we can do this.

Kate Pilacky, Western Reserve Land Conservancy

One of the things that struck me is creating a better and more direct connection between farmers and growers and restaurants and cafeterias and cut out the middlemen. Putting in some of those more direct pathways is a trend.

Ruby Beil, Professor at Lorain County Community College

COMMUNITY BUY-IN

The flip side of farmer involvement is the buy-in of residents and businesses in the local community. Certainly, the high level of activity in Oberlin can serve as a motivator, but people need to come to their own decisions as to how and why to support local food systems over other options that might be more convenient or affordable.

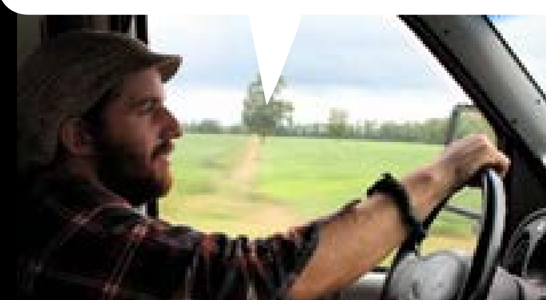
The 30% local purchasing that we do at OSCA, it is a conscious and concerted effort that would be difficult for the general population to make. It's difficult to get people to do anything. We know that we should turn our lights off, but people still don't turn their lights off, and that's such a simple thing.

-Taylor, Oberlin Student and Cook for Oberlin Student Coop Association

I think if I get more high school students to be interested in local food, they'll tell their parents. And parents knowing that they have local foods in the schools, will think, "if my child can do it, I can do it too". They'll be more aware of what's available here in the community and more local farmers will get involved.

Blythe Coleman Mumford, High School Student and Garden Coordinator

A main obstacle is personal choice. Current spending habits are part of the reason that more food is not locally sourced. People still choose to eat food that isn't natural or sustainably produced or local to our climate or environment. All of our nutritional needs could be met locally, but it all comes down to the personal choice of where you spend your dollar. As people choose to buy locally more often, there's more dollars in the system to bring more local food and support more local farmers.



Roger Himmelright, Trucker and Farmer Liason for City Fresh

I think people really need to know what's available, there need to be more community meetings, and more people will be inclined to come-free festivals for local foods, people will be more inclined to see there are things out there for them to tap into.

Blythe Coleman Mumford, High School Student and Garden Coordinator

Oberlin and the ground it sits on is really rich, though there is a lot of clay, but I'm sure between the community and the outside of the town it would be possible to produce that much food. The big hump to get over is selling this idea as a focus for the community.

Tucker Kelly, Jones Farm High School Apprentice

Return to Table of Contents

ACCESSIBILITY

Equity in access is a large challenge, particularly when many people perceive local food as available only to more elite markets. Pricing, availability, and equity need to be built in to cross the chasm from more elite markets to more mainstream markets.

Most students in Oberlin eat free and reduced lunch, which is really unfortunate. Oberlin is not really a prosperous community. People aren't really inclined to eat any healthy foods. It's a taboo for some people, who see local food as part of an elite class. It doesn't just have to be for people of a certain economic level. It can be for everyone, especially if local foods become less of an economic issue and it becomes more of an availability and transportation issue.

-Blythe Coleman-Mumford, Oberlin High School Student and Garden Coordinator

Hopefully the cost of buying local wouldn't be astronomical, so high that your average person trying to feed their two kids on a limited income wouldn't be able to afford it.

Kate Pilacky, Western Reserve Land Conservancy

I feel like how it is now, it's seen as a luxury good for elite food classes and not available to everyone. I know personally with the income I make, I wouldn't be able to purchase produce from the farm that I'm working on.

Victoria Cox, Oberlin Student and Jones Farm Intern

Return to Table of Contents

Community Collaboration

A localization will only be possible if there is a much higher degree of collaboration within groups and between groups, including farmers, businesses, institutions, and consumers. This includes greater communication, collaboration to create larger markets, and shared-use equipment and facilities that could benefit a variety of farmers and businesses that would be unable to capitalize this infrastructure on their own.

Collaboration is a very important part of our business model. Not only do we work with other farmers, we work with other cheese makers as well, sharing equipment, sharing knowledge, and physically working in each other's facilities when more labor is needed for big orders… I don't see competitors. What I see is the ability to work with folks to increase that pie of local food consumed. The more that we share, the better off it will work for everybody… there comes a point where competition is detrimental and cooperation is beneficial.

-Abbe Turner, Local Farmer and Cheese Producer

Until we reach a point of sustainable living in our community, people need to continue to work together to provide food for schools and community services. Community members need to come together to do canning projects, planting projects, converting un-used urban spaces into food forests or productive pieces of land. Too much is left to be mowed down weekly by gas consuming lawn mowers and these are places where production could be happening.

-Roger Himmelright, Trucker and Farmer Liason for City Fresh

We've got to re-tool ourselves. Everyone's got to embrace each other again equally. We have to reveal the lost respect that we used to have for ourselves and then we can look at the environment. Local food is a challenging animal because we don't often include everyone at the table. We've got to include everyone at the table.

Maurice Small, Urban Farmer and Educator

Return to Table of Contents

LOCAL ECONOMY

How do we re-tool our local economy to make a 70% shift possible?

Return to Table of Contents

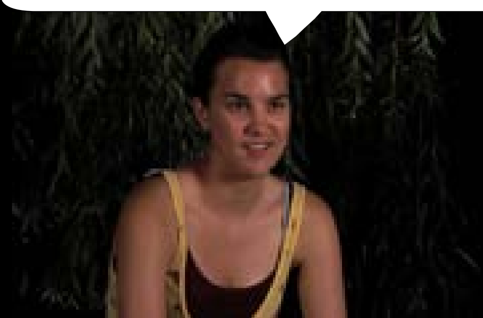
Infrastructure

In order for local food to become competitive with food shipped in from outside of the region, there needs to be improved infrastructure to support communications, network cultivation, storage and distribution, and season extension through food processing.

We have about 40,000 pounds of produce that we will be picking at its peak, cryogenically freezing it so that we'll have it available in the winter. This year, we're doing raspberries, blackberries, strawberries, peas, green beans, corn on the cob, and brussel sprouts.

Dean Holiday, Executive Chef at Bon Appetit

If there was a connecting system, a distribution system that made it possible for local food to be brought to the Oberlin community, that would be ideal.



Laura Rose Brylowski, Oberlin Student Cooperative Association

Back to the preserving question, the state said they do not know of institutions canning in house to serve in house. Could Oberlin be a model for that? The college does the flash freezing where farmers send their berries to get flash frozen, so those loops are starting to pop up. It's just a matter of getting more people in on it.

Dave Sokoll, Oberlin Graduate and Chef for the Oberlin Early Childhood Center

One of the things I'm interested in seeing is the aggregation of more farmers and taking the legwork out of it so that it's easier for businesses to make the connection.

-Joseph Waltzer, Owner of the Black River Café

How do we preserve more food? Can it, dehydrate it, freeze it, but really create more value-added production opportunities. When we start getting into that preservation, are we talking about more jobs, more opportunities for local businesses to do that preservation?

-Brad Masi, NEOFoodWeb.org

I'd like to see more spaces that offer small farmers the ability to come in and produce or preserve food in a safe manner.

-Abbe Turner, Local Farmer and Cheese Producer

Return to Table of Contents

Self-Sufficiency

A long-term indicator of success will be the extent to which local food systems can become self-reliant, including the development of viable businesses and raising the capacity for people to meet their own food needs.

A real central piece that's been both important with universities and in the private sector is the need to draw out a business plan and determine if a venture is profitable and can sustain itself… I feel like I'm learning more and more whether you are in a non-profit, working for government, or with a foundation, people want to see how quickly initiatives can stand on their own two legs. Everything is a business model.

Lucian Eisenhauer, Oberlin Graduate and Local Food Entrepreneur

This is where it starts. We can save a lot of resources if we value the food we eat. It shouldn't cost $2-3 dollars for a tomato when you can grow several for the same $2-3 dollars. We have to show people that they can save a lot of money. Let's save some money, grow some produce, and let the produce reach the people to lighten the load a little bit. That's what I'm trying to provide.

Dave Hopkins, Urban Farmer at the Village Garden

With people out of work, on the brink of poverty, they can supplement their income by simply growing some of their own food. It's a way to be healthier, be happier by producing food on your own land that might supplement whatever income you might have. In addition to encouraging people to grow their own, we also hope to start some new entrepreneurs and small farm businesses.

Ruby Beil, Professor at Lorain County Community College

Return to Table of Contents

Key Considerations for 70% Localization

Reviewing input from some of Oberlin's most active local food supporters, the following key issues need to be addressed to consider a substantial increase in local food activity.

• **How do we overcome seasonal constraints in a cold-climate region?** The most often sited challenge to a major shift in food localization was tied to the limited growing season in Northeast Ohio. This one factor more than any generated the most doubt among people interviewed. Many suggested a move to more seasonal eating, favoring certain products when they are available locally rather than expecting them year-round. But as Joe Waltzer with the Black River Café noted, he stopped serving sliced tomatoes on sandwiches during the off-season, but his clientele, many of whom are active local food supporters, resisted this change.

• **How do we create more economic opportunities through local food preservation or season extension?** Connected to seasonality is an acknowledgment that food localization will only be possible with increased investment in infrastructure for extending the seasonal availability of local food. This can include investments in high-performance greenhouses on-farm or the development of facilities that can provide long-term storage, canning, freezing, dehydration, fermentation, or baking that increases the seasonal availability of food. As Brad Masi noted, as food becomes more available year-round, so do potential job or income-earning opportunities.

• **Can we organize more efficient systems of distribution?** Another common challenge is around distribution. At this point, there are several successful local food procurement efforts in Oberlin, but there is no coordination between them. Each purchaser (Oberlin College, OSCA, Black River Café) has to manage upwards of 20-30 individual vendors. A more efficient system of distribution would reduce the time and labor involved with each account managing their own unique supply network. More efficient distribution will increase the competitiveness of local food compared to outside imports and will reduce barriers to entry for local businesses that might want to devote more spending to the local food economy. As Laura Rose Brylowski with the Oberlin Student Cooperative Association noted, this will require more communication and collaboration between people engaged with local food purchasing.

• **Is food localization an effective response to climate change?** Climate change presents perhaps the greatest threat to the stability of agriculture and local food systems. Climate change presents two challenges to which local food development efforts must respond. First, can local food systems become more resilient to greater variations in weather and increased extreme events (drought, flooding, severe storms)? Second, can local food systems become a part of the climate change solution, reducing carbon emissions through changes in farming methods while storing and sequestering carbon in the soil. But John Petersen, Professor of Environmental Studies at Oberlin, offers a cautionary note: what happens if a climatic event wipes out our local food system for one season? Does this present a risk to too much localization?

• **Will there be significant community buy-in to grow local food systems?** We can certainly tick off a long list of benefits to local food systems, but will there ultimately be sufficient community buy-in to support a large-scale transition in the local food economy? Beyond a committed set of locavores willing to take the extra steps to localize their food supply, will people be willing to sacrifice their current diets for more local ones? Will local food be equitable and accessible to lower-income residents who lack time to frequently prepare their own meals or extra dollars to pay more? Will local food always be more expensive or will increases in fuel prices or improved efficiencies in distribution make it more cost-competitive. As Victoria Cox, Jones Farm intern noted, she was unable to afford to purchase the food that she was growing on the very farm where she worked.

• **How do we create new avenues for community collaboration in local food systems?** The lynch-pin for a successful local food system will be in finding new avenues for collaboration and cooperation within the community. No one person has the economic or political power to change an entire food system. It will have to be changed through thousands of small acts happening in concert throughout the community. It will require new connections between food system sectors up and down the food value-chain, from consumers, businesses, farmers, distributors, warehousers, manufacturers, supplying businesses, or waste recyclers. There are also economic advantages to cooperation. A number of farmers or entrepreneurs can share the facilities for canning or processing local foods, spreading out the capital costs over a wider pool of users. Abbe Turner, local farmer and cheese producer, notes that rather than seeing other local farmers as competitors, she sees them as collaborators, working to grow the overall pie of local food consumed which ultimately benefits us all.

On the basis of this input, the following five principals will need to be included in any effort to expand local food efforts in the Oberlin community:

- **Equitable**- Is healthy local food accessible to community members, regardless of socio-economic standing?
- **Resilient**- Is the local food system resilient and able to adapt to or bounce back from extreme weather events (droughts, floods, destructive storms)?
- **Collaborative**- Are individuals, businesses, and agencies identifying avenues for economic partnerships, shared learning, and connecting across diverse communities?
- **Democratic**- Is there wide-spread leadership, entrepreneurship, and innovation driving the development of the local food system?
- **Viable**- Are businesses and social enterprises financially viable and ecologically sustainable? Are they able to exist without continuous outside subsidy?

Using this input as a springboard for prioritizing the community investments that will be needed to grow the local food economy, five areas of development emerge that will provide the greatest leverage for growing a sustainable local food system that embodies the principals described above.

• **Local Food Hub**- Creating a facility or network of facilities in the community that support more effective storage, distribution, and processing of local foods, enabling consumers and businesses to more efficiently access locally grown foods.

• **Waste to Food/Energy**- A number of resources already exist within the Oberlin community that people consider waste, like food scraps or yard refuse. How do these wastes become energy, nutrient, or organic matter inputs that increase the productivity of local urban or rural farms?

• **Urban Agriculture**- Maximizing the food production potential of under-utilized vacant lots, rooftops, backyards, school-yards, campus-grounds, or green spaces in the city can immediately boost the available food supply while engaging residents directly in the production of their own food, whether for self-consumption or for sale to local markets.

• **Climate Mitigation**- Organizing food production and distribution systems that simultaneously reduce greenhouse gas emissions while increasing the capacity for sequestration and storage of carbon in soils or biomass (off-setting emissions from the city and college).

• **Open Learning Networks**- Creating open networks that encourage a number of pathways for people in the community to learn about, teach, and participate in local food systems, whether as consumers, farmers, government employees, new or existing enterprises owners, or educators.

Return to Table of Contents

Oberlin has achieved a large degree of success in local food system efforts, with much of its activity occurring before local food systems became a growing nation-wide trend. Based upon a review of past and current local food efforts in Oberlin, the following pathways of innovation can be highlighted and emphasized as key to Oberlin's success and growth of the local food economy going forward:

POWER OF NETWORKS- The success of local food efforts in Oberlin has been predicated on relationships built on trust. On-going local food efforts such as the college dining services, the student cooperatives, and restaurants have supply-networks built on continuous communication with growers and local food businesses. The continuing growth of local food systems will require further network collaboration and increased connectivity between local food buyers and the businesses and farmers that supply them.

LATERAL MOBILITY- The network density at the core of Oberlin's local food efforts continues to grow. This enables significant "lateral mobility" in which students, college graduates, or residents find increasing points of access that enable them to leverage one experience to lead to another opportunity. For example, David Benzing, a retired Oberlin Biology professor, leveraged his botanical knowledge and years of experience with backyard farming and winemaking to move to the establishment of a new winery. David Sokoll moved from a student at Oberlin who leveraged his experience of local foods through the student cooperatives to become a truck-driver for City Fresh after graduating. As he got to know local farmers, he brought that supply network to a new job as chef of the Oberlin Early Childhood Center which now sources much of the food for its lunches and snacks locally. Local foods activity will accelerate to the extent that numerous points of access remain available to members of the Oberlin college and town communities.

SOCIAL ENTREPRENEURSHIP- The first major local food initiative came from the Oberlin Student Cooperative Association which began its local food efforts in 1990. As a cooperative, student-owners had a high degree of autonomy to shift supply networks through their own initiative. A group of students used the cooperative truck one Saturday to meet local farmers and fill the truck with food for their coops and thus the local food program was born through that one small act. Joesph Waltzer started the Black River Cafe following graduation because he was not pleased with the dining options in town available to him as student. Sarah Kotok got a small stipend as an Oberlin student to start the Oberlin Farmers Market in 1996. She graduated from Oberlin and started an organic and local foods grocer in Oberlin that built on her experience with starting the farmers market. City Fresh adopted its box truck to run off of vegetable oil through Full Circle Fuels, an alternative fuel gas station started by Oberlin graduate Sam Merrett who built a bike-powered bio-diesel processor for a January term project. A group of community residents and church members got together to start the Village Garden on Spring Street on a vacant one-acre lot behind public housing units to start a community market garden that provides entrepreneurial opportunities for neighborhood youth. In all of these examples, projects that have had an on-going impact on Oberlin's local food system began through the initiative and entrepreneurship of individuals and small groups of people working collaboratively.

CORE ACTIVITY AREA ONE- LOCAL FOOD HUB

Oberlin has a long history of supporting local food systems. Investments in infrastructure to facilitate greater capacity for local food activity will be essential for the continued growth of Oberlin's local food economy. A local food hub increases the efficiency and competitiveness of local food, offering facilities for receiving, sorting, storing, processing, and distributing local food. Food hubs can also provide training, enterprise incubation, and cultivation of buyer and supplier networks. Oberlin has a number of under-utilized facilities that could support food hubs that can increase local food purchasing both in Oberlin and the broader region.

The term "local foods" often invokes images of farmers' markets, neighbors buying shares in a nearby farm, or restaurants listing the names of farms supplying ingredients on menus. The growth of local food systems has largely been connected to direct marketing where a farmer sells to consumers or businesses without intermediaries. This process fosters a "relationship-based" food economy in which consumers know and interact with the individuals and families that produce their food. For the farmer, direct marketing cuts out the middlemen, insuring a greater share of each food dollar spent. Given that only about 7 cents on average of every food dollar spent through conventional distribution goes to the farmer, direct marketing reduces the costs of the transportation, refrigeration, warehousing, and processing needed to support the typical 1,500-2,500 mile journey that food travels. Direct marketing also empowers farmers to reclaim market share in an increasingly vertically integrated food system that reduces options for smaller to mid-scale producers.

Despite its benefits, direct marketing has a number of costs. For many farmers, the workload of maintaining a viable farm is considerable. Direct marketing requires significant additional work in marketing, transportation time, and coordination of multiple accounts. For commercial buyers, direct marketing avenues have a much higher transaction cost. Instead of typical distributors which allow for one-stop shopping for a range of products, direct marketing requires coordination of upwards of 20 or 30 suppliers, each with their own delivery schedules, invoicing systems, and fluctuating availability.

Local food hubs have emerged recently in a number of regions throughout the United States as one way of establishing infrastructure that can aggregate and store local food, lower transaction costs, and increase market share for farmers.

In the past decade, consumer demand for local and sustainably produced foods has grown considerably. Meeting this growing consumer demand and making local food competitive with imported foods will require new tools, more efficient systems of delivery, and lower transaction costs for buyers.

Local food hubs have emerged recently in a number of regions as one way of aggregating and storing local food, lowering transaction costs, and increasing market share for small to medium-scale farmers. Many food hubs also provide training, support, and even investment in participating farms.

According to the United States Department of Agriculture (USDA), there are about 168 local food hubs in the United States today, many of which have started within the past 5-10 years. Unlike food grown for long-distance shipment, local food hubs minimize the number of hands that food passes through. They work with farmers as business partners rather than as interchangeable parts of an international market place, where the lowest prices and highest profits typically drive purchasing. Some food hubs are even owned by farmers, with 20% operating as farmer cooperatives or hybrid cooperatives that include both buyers and farmers.

What is a Food Hub?

Given the regional nature of food hubs, their function and purpose varies according to local circumstances and needs. A number of "healthy food hubs" have emerged in urban centers that aim to improve the affordability and accessibility of local food in "food desert" neighborhoods where residents lack access to healthy foods. For community development, food hubs can provide a "co-location" of retail food stores, wholesale distribution, and related social or financial services. The National Food Hub Collaboration, a nation-wide network of food hub stakeholders, describes a regional food hub as "a business or organization that actively manages the aggregation, distribution, and marketing of source-identified food products from local and regional producers to strengthen their ability to satisfy wholesale, retail, and institutional demand."

Food hubs sit at the intersection between supply and demand, facilitating more effective connections between farmers, businesses, and consumers. On the supply-side, food hubs coordinate diverse networks of local farmers, facilitate production planning and season-extension, and help with certification, food safety, and liability. On the demand side, food hubs work with distributors, wholesale buyers, institutional or commercial markets, and consumers to increase the accessibility and desirability of locally grown food.

According to the USDA Food Hub Guide, some common characteristics that many food hubs share include:

- *Coordination of **aggregation, distribution, and marketing** of locally or regionally produced foods from multiple producers to multiple markets.* This allows for greater differentiation in the local food value-chain, enabling farmers to focus on production while working with a trusted partner (in which they might have an ownership stake) that handles distribution and marketing.
- ***Producers as valued business partners** instead of inter-changeable parts of a globalized system*. As is the case with direct marketing, food hubs function through relationships based-on trust with local farmers. Contrary to businesses that float through the market in search of the best deal, food hubs cultivate direct partnerships, with particular emphasis on smaller or mid-scale operations.
- *Working closely with producers, particularly **small-scale operations***. Many small-scale producers are sealed out of larger commercial or institutional markets because they might lack the capacity to meet buyer preferences or food safety requirements. Food hubs can provide technical and facility support to more effectively enable smaller producers to meet buyer demands.
- *Utilizing **product differentiation** to identify foods as locally grown in the market place.* Some tactics include group branding, knowing the farm where the product came from, or certifying sustainable production practices.
- *Pursuing **financial viability** while having positive economic, social, and environmental impacts within community.* Food hubs, whether organized as non-profit organizations, cooperatives, or for-profit businesses all operate with the goal of achieving financial viability in which operating costs are covered through the sale of products. Food hubs also typically follow a triple-bottom-line orientation that addresses ecological sustainability, economic viability, and social value.

Food hubs sit at the intersection between supply and demand, facilitating more effective connections between farmers, businesses, and consumers.

The USDA mostly defines food hubs in economic development terms. In “Toward a More Expansive Understanding of Food Hubs”, an article recently published in *The Journal of Agriculture, Food Systems, and Community Development*, the authors argue for a more expansive understanding of food hubs that goes beyond the USDA’s more strict market definitions. The authors identify three common orientations of local food hubs: market efficiency, public health and food access, and place-based community development.

Food hubs oriented toward **market-efficiency** tend to have a stronger orientation toward producers, allowing farmers interested in reaching local markets to more effectively compete through centralized distribution, agglomeration of food products from multiple sources, and reduction of transaction costs in wholesale markets. The second orientation tends to focus on **community health** and improved access to healthy, locally grown foods. Many of these food hubs combine wholesale food access with a retail or community market component, aimed at expanding direct community ownership and participation. For these food hubs, the function is “to provide easy access, opportunity, and viability for small producers and low-income consumers, contributing to a healthier, more vibrant, and equitable system”. A third orientation looks at the **place-making potential** of food hubs and the improvement of surrounding neighborhoods and urban centers. This orientation draws from the perspective set forth in the book *Agricultural Urbanism* by Janine de la Salle and Mark Holland and focuses on the experience of people with the food hub’s physical environment. Their definition of a food hub is “a place that brings together a wide spectrum of land-uses, design strategies, and programs focused on food in order to increase access, visibility, and experience of sustainable urban and regional food systems within a city.” This orientation highlights the urban design elements of food hubs and the influence they can have on the pattern of food production, processing, and enjoyment within both urban centers and surrounding regions.

They summarize the general purposes for each orientation as:

- **Market Efficiency-** “increase small and mid-sized producers’ access to wholesale market channels”
- **Public Health and Access-** “contribute to a healthier, more vibrant, and equitable food system”
- **Place-based Community Development**- “enhance the visibility and experience of local food systems within a city; connect food access to land-use and design”.

The authors further develop a typology of food hubs, emphasizing the range of forms that food hubs can assume. The following list identifies some of the common typologies which reflect the diversity of community needs and economic niches that food hubs can fulfill:

- **Boutique/Ethnic/Artisanal Food Hubs** feature a focus on artisanal, craft, or specialty foods and beverages oriented more toward niche markets, with emphasis on local producers, artisan or craft foods, and ethnic or cultural foods. *Local example would be Local Roots in Wooster which is a producer/consumer cooperative in a downtown storefront that favors local foods and artisan products.*

- **Consumer-Cooperative Models** are organized by a group or association of consumers who purchase items in wholesale quantities from local producers and then package or prepare them for redistribution to individuals. *Local example would be City Fresh which works with a network of farmers and packages locally purchased foods into weekly share bags*.
- **Destination Food Hubs** are large-scale facilities or sets of facilities that typically have a variety of food-related retail businesses. These facilities tend to attract large numbers of local residents as well as tourists. *Local example would be the West Side Market which features a wide-range of locally-owned and operated food vendors, although food is often not sourced from local producers.*
- **Education and Human Service-Focused Food Hubs** provide a mix of community services in one location, including community education and training, processing facilities, cooking demonstration kitchens, community gardens, or support of agricultural micro-enterprise development. *Local example would be the Kinsman Farm Incubator in Cleveland which incubates urban market garden production is connected to a community cafe and demonstration kitchen to teach residents about healthy meal preparation.*
- **Neighborhood-Based Food Hubs** cover multiple contiguous city blocks with a high concentration of wholesale and retail food outlets that cater to both households and businesses. This is more of a district- style food hub and provides access to diverse food options for residents of varying levels of income. *Local example would be the Ohio City local food cluster that includes a 6 acre farm, the Great Lakes Brewing Company, and a number of locavore restaurants.*
- **On-Line Food Hub Networks** are virtual spaces that include on-line marketplaces; use of software programs to coordinate supply, inventory, and sales; and coordination of connections between food producers, consumers, and businesses. *Local example would be Fresh Fork in Cleveland which utilizes an on-line system to coordinate sales from local farmers to consumers and area businesses.*
- **Regional Aggregation Food Hubs** feature a centrally located facility that services a broad range of markets within a given region. These food hubs tend to focus on regional aggregation, packing facilities, wholesale distribution, and higher volume sales to retail, institutional, or commercial markets. *Local Example would be the Lake to River Food Hub and Incubator in Youngstown which is serving a variety of markets, beginning with schools, in the Mahoning Valley and facilities to support small-scale food businesses.*
- **Rural Town Food Hubs** focus on small towns that feature an agglomeration of inter-related businesses servicing a local food economy. *Local example would be the City of Oberlin which has a long history of local food purchasing activity and includes a mix of local food initiatives, including non-profit, for-profit businesses, and educational institutions*.
- **Hybrid Food Hubs** combine elements from many of the typologies listed above, making it difficult to pin them to a specific type. *Local example would be the Eastern Market in Detroit, described as a "local food district" that combines 250 independent vendors that retail, process, and wholesale food in the space, meeting many of the above descriptions in one location.*

A food hub can include an entire town in which relationships and strong connections between producers and businesses create a thriving local food economy with a high proportion of local residents and businesses involved in promoting alternatives to the global food system.

When considering a food-hub development, it is important to identify the orientation and typology of the food hub within a given community location. The following questions can provide a guide to determining food hub development options appropriate to a given locale:

- Is it primarily urban or rural?
- Is it to be located within a more residential neighborhood or a designated commercial or industrial district?
- What are the primary markets being served?
- Is the intended geographic scope a neighborhood, a city, or a broader region?
- Who will be the primary stakeholders who will have an ownership stake in the venture?
- Are the outcomes focused more on raising the economic competitiveness of local food for wholesale markets or for meeting improved health outcomes within an urban community?

Community Development Impacts

The recently published 25*% Shift- Benefits of Food Localization to Northeast Ohio and How to Realize Them*, utilized IMPLAN economic data analysis to determine the potential impacts of a 25% food localization for the 16 county Northeast Ohio region. According to the report, 25% food localization scenario could produce almost 28,000 new jobs, providing employment for 1 in 8 unemployed residents in Northeast Ohio while generating $4.2 billion of additional economic output and $126 million in local and state taxes. The report concluded that one of the top gaps preventing more wide-spread localization was the lack of infrastructure for storage, processing, and distribution. Food hubs can play a significant role in facilitating localization across a wider region.

Even though many local food hubs are in the early stages of development, based on a National Food Hub Collaboration survey, food hubs gross nearly $1 million in annual sales while showing double or even triple digit annual sales growth. Food hubs employ an average of 13 full-time individuals.

According to the USDA, some of the specific ways that food hubs can impact local economies include:

- **Job Creation-** These are just jobs created for the operation of the food hub itself. The existence of the food hub also multiplies impacts for participating farmers and businesses who can leverage increased sales to also create additional jobs.
- **Business Development-** By making farming more profitable, food hubs can help to retain local farm enterprises. By keeping spending within the regional economy, food hubs help to increase the sales capacity of local food and farm enterprises. Many food hubs also help to incubate new food businesses, ranging from supplying local food for local food manufacturers or processors, helping to start new farm enterprises, or cultivating supporting businesses in distribution or waste recovery.
- **Rural or Urban Workforce Development-** Food hubs on average report working with a median of 40 suppliers, creating a steadier and more diversified source of revenue for local food and farm businesses. Food hubs also provide formal and informal training and mentoring activities set-up to assist producers at a variety of scales. More than 50% of food hubs provided production and post-harvest training or crop planning and season extension training for producers. About 40% of food hubs reported offering both kinds of trainings.
- **Healthy Food Access-** The proliferation of "food deserts" in low-income urban and rural communities represents a significant market failure. Limited healthy food access increases health costs and reduces workplace productivity. Food hubs provide support for insurance, quality control, and distribution- barriers facing many producers that make it difficult for them to supply wholesale buyers in low-income communities, including schools, hospitals, or corner retail stores.
- **Sustainable Practices-** Many food hubs encourage sustainable production practices among suppliers, with some even requiring that farmers conform to a given set of practices that reduce soil loss, pollution, use of chemicals, or greenhouse gas emissions. Food hubs also partner directly with producers to provide technical training and, in some cases, financial resources to improve the sustainability of farming practices. To that end, food hubs can promote the sustainability of local farms, reducing contributions to water pollution, soil erosion, or climate change and improving environmental quality in the surrounding watershed.

Food hubs often provide training and mentoring activities, including post-harvest handling, season extension, or food safety. Trainings can also include support for adoption of sustainable production methods.

Services Typical of Food Hubs

Food hubs present a new form of social enterprise, combining elements of economic development, education, and network cultivation. The USDA guide to food hubs lists the types of services and activities typically conducted in local food hubs that combine business operations, producer services, and community or environmental services:

Business Operations:
Food hubs can combine any of the below activities as a part of their business operation:

- **Distribution-** managing transportation of food products from food hubs to local or regional market outlets or partnering with distribution businesses to facilitate transportation.
- **Aggregation-** combining food products from a number of different sources to create capacity for higher-volume sales and to ease fluctuations in supply.
- **Product Storage-** providing dry, cold, or frozen storage facilities for inventorying local food products, including long-term storage of local foods for sale in the off-season.
- **Brokering-** Helping to facilitate transactions between farmers and market outlets. Some food hubs just play a coordinating role, but allow farmers and market outlets to coordinate their own physical distribution.
- **Branding and Market Promotion-** Food hubs can create product differentiation by coming up with region-specific brands and promoting the consumption of locally grown foods to grow market demand.
- **Packaging and Repackaging-** Food hubs can package foods under a common label while reducing the time and expense for farmers to package foods for market.
- **Food Processing-** Some food hubs offer more intensive food processing (such as canning or thermal processing). Others support more limited processing such as trimming, cutting, or freezing foods, which meets the needs of some institutional buyers for limited processing of raw food products.

Producer Services:
Food hubs offer the following services to support local farmers or businesses.

Return to Table of Contents

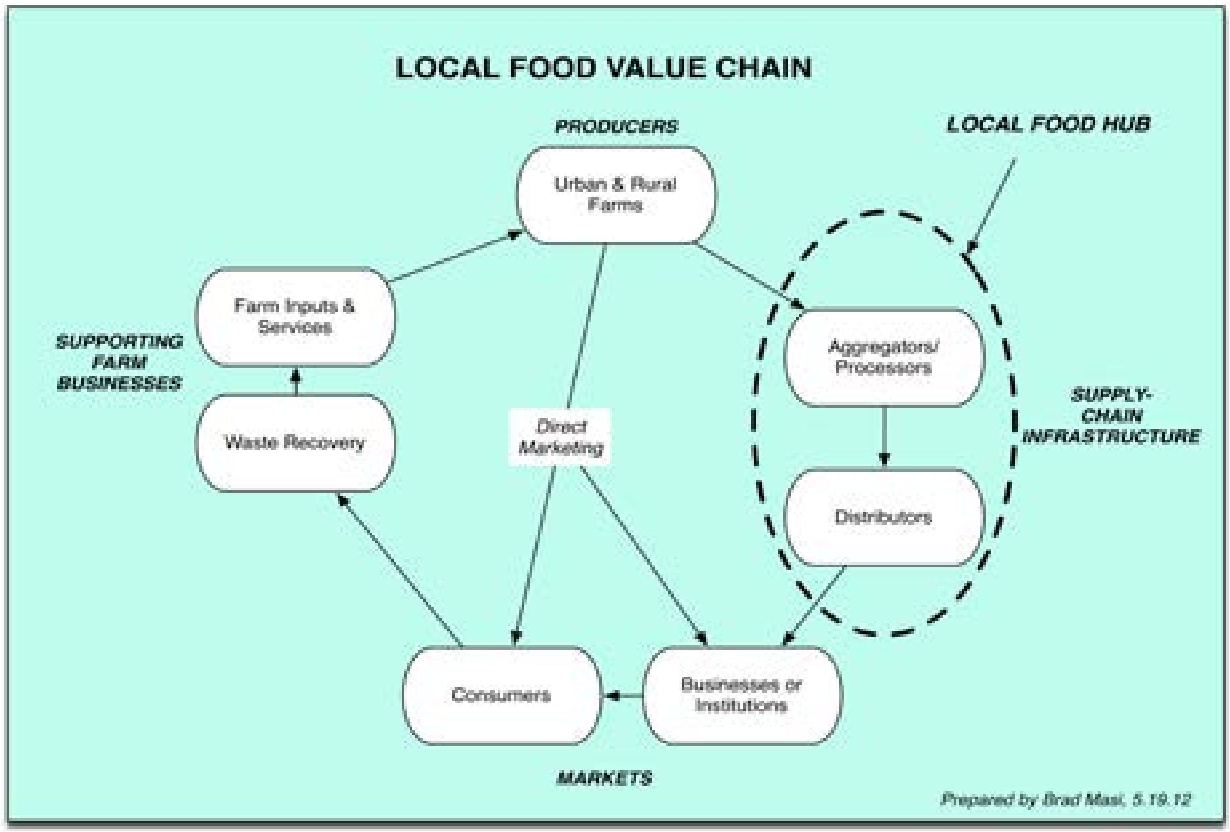
- **Linking Producers and Buyers-** Food hub workers have more time and resources to cultivate market outlets than farmers would have if they were doing it on their own.
- **On-farm Pick-up-** In some cases, food hubs provide trucks that can pick-up foods from farms, creating greater distribution efficiencies and permitting market access to farmers that might lack resources for transportation.
- **Post-Harvest handling -** Providing training for farmers in harvesting and washing techniques to better prepare food for market.
- **Business Management -** Providing business planning and financial management training or mentorship to improve farm business operations.
- **Value-added Product Development-** Working with farmers to identify opportunities to add more value to products through packaging or combining ingredients to make a processed product.
- **Food Safety and Good Agricultural Practices-** As food safety becomes a greater area of concern, food hubs can provide training for safe food handling and best practices for field production.
- **Liability insurance-** Offering liability coverage for food and providing facilities for safe handling reduces costs and barriers to entry for some farmers.

__Community/Environmental Services__:
Food hubs can offer the following services to local communities:

- **Community Awareness -** Supporting buy-local campaigns and consumer education about the benefits of local and healthy food consumption.
- **Food Deserts-** Intervening in the market place to foster distribution to under-served urban or rural markets.
- **Food Bank -** Increasing the supply of healthy local foods for food banks or purchasing seconds from area farmers for emergency food relief.
- **Youth and Community Employment-** Providing employment opportunities for youth, adults with developmental disabilities, or other groups that might otherwise struggle with employment.
- **SNAP Redemption-** Taking Food Stamps or Senior vouchers to improve the accessibility of local food for any retail components of a food hub or training participating market partners to accept food stamps.
- **Health and Cooking Education-** Strengthening market demand by raising awareness of health and teaching consumers how to prepare local foods in a healthy manner.
- **Transportation for Consumers-** Working with transportation planning to improve access to food for individuals relying on public transit or pedestrian movement.
- **Recycling or Composting -** Facilitating recovery and re-use of wastes, including packaging, or composting programs or biodigesters that return energy, organic matter, or nutrients back to food producers.

Investing in Local Food Value-Chains

Food localization has the greatest potential for economic impact when localization is applied to all aspects of the food value-chain. A food value-chain is a collaborative network that includes producers, enterprises specializing in distribution or aggregation, and markets. Food hubs provide a mechanism for facilitating collaboration and bringing together diverse networks across the entire food value-chain.



Return to Table of Contents

The common aspects of a food value-chain include:

- **Producers-** rural farmers, urban farmers, producers of raw food products;
- **Distributors-** enterprises that support logistics and delivery of food products;
- **Processors-** enterprises that add-vlaue to raw food products, including food preservation (freezing, baking, dehydration, canning) or mixing of ingredients to prepare a new product (salsa, sauces, etc.);
- **Restaurants, food service, retail-** commercial or institutional enterprises that prepare meals for consumption;
- **Consumers-** households or individuals who purchase food directly for self-preparation;
- **Waste disposal-** enterprises that convert wastes into revenue generating or cost-saving activities, including compost, recovered waste vegetable oil, recycling of packaging, etc; and
- **Input suppliers-** enterprises that provide inputs to local farming operations, including equipment dealers, fertilizer or input suppliers, farm services, or building contractors

Food localization, if it is to have a significant economic impact, must go beyond just connecting farmers and consumers. Focusing on localization of the entire food value-chain creates economic multipliers in which a dollar spent on local food generates more than a dollar of value for the local economy. For example, as farms realize greater revenue through local marketing, they will spend an increasing portion of their revenue purchasing goods or services from the local economy. Likewise, as markets for locally grown food increase, it provides new employment in such services as distribution or logistics. Food hubs serve as a “network node” where a variety of diverse food system players converge, producing collective benefits that work their way up and down the food value chain.

DEVELOPING A LOCAL FOOD HUB IN OBERLIN

Given Oberlin’s 20+ year history of support for local food systems development, a food hub can provide necessary infrastructure to:

- increase the percentage of local food purchased by institutions and businesses already committed to purchasing local food,
- reduce barriers of entry to other businesses and institutions in the community considering local food procurement, and
- increase the availability of local food to urban centers in cities in Lorain or Cuyahoga County.

Central goals for a local food hub in Oberlin include creation of a network of facilities and enterprises that facilitate year-round availability, reduction of transaction costs for local purchasing, and incubation of new or expanded farms or local food enterprises (including food, energy, and waste).

Local food hubs should include a mix of both operational support for physical storage, processing, and movement of local food in combination with efforts to raise the capacity of residents, businesses, and farms to contribute to the local food economy.

Local food hubs should include a mix of both operational support for the physical storage, processing, and movement of local food in combination with programming to raise the capacity of residents, businesses, and farms in and around Oberlin to contribute to the local food system. These functions can include:

Operational Aspects:

- **Aggregation/Distribution-** Aggregation and storage of local produce from seven county area and distribution to markets in Lorain/Cuyahoga counties
- **Limited Processing-** food preparation (slicing, dicing, etc.) and possible flash freezing or other forms of local food processing for institutional-scale usage.

Capacity Building Aspects:

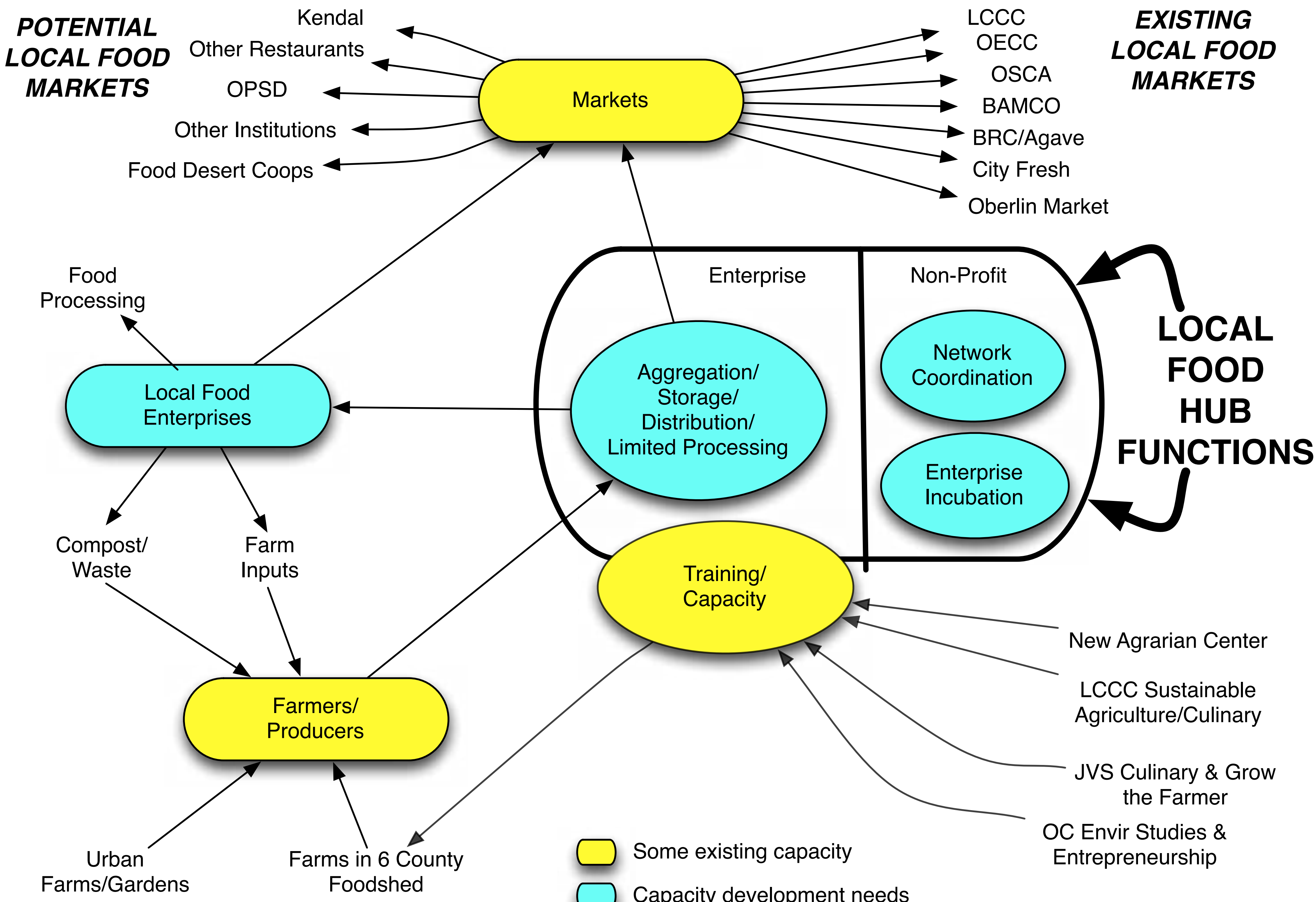
- **Network Cultivation-** facilitating connections between market partners and producers
- **Enterprise Incubation-** supporting incubation of new farm and food enterprises, both within Oberlin and in surrounding rural or urban areas
- **Training/Capacity Building-** work with consortium of formal and informal local food education efforts (Oberlin College, Lorain County Community College, Joint Vocational School, New Agrarian Center) to expand existing food/farm enterprises or to start new ones

Core Networks

More important than building a physical facility, the early cultivation of diverse collaborative networks of stakeholders, all of whom will have a stake in the success of the project, should drive programming and development for the facility. Stakeholders can be drawn from the following six areas:

- **Existing Market Partners**: Early adopters in the community that already have a demonstrated commitment to and practice of local food purchasing.
- **Potential Market Partners**: Businesses or institutions that have a stated interest in directing spending to support the local food economy, but are not presently purchasing locally at a high volume.
- **Local Food Entrepreneurs**: Businesses that add value to locally grown

Return to Table of Contents



Prepared by Brad Masi, 5.19.12

Return to Table of Contents

foods, including food processing or manufacturing, catering, distribution, or home-based businesses.
- **Farmers/Producers**: Producers who currently market foods locally or are interested in marketing foods locally. Should include both rural and urban food producers.
- **Food System Capacity**: Organizations or institutions with curricula or training programs that could be helpful to providing skills, training, and aptitudes to prepare youth or adults for entry to the local food economy.
- **Supporting Businesses**: Businesses that provide services or inputs to support local farm or food enterprises, including composting, energy, farm inputs, equipment sales and maintenance, or construction.

As shown in the accompanying chart, Oberlin's local food system has strong existing capacity in at least three of the above mentioned areas: existing market partners, local farmers, and capacity.

The following list of ***existing market partners*** can comprise the core stakeholders for the formation of a local food hub. Each already has a demonstrated commitment to local purchasing and can be the first to benefit from and inform the structure of a food hub:

- **Oberlin Student Cooperative Association-** The first official organization in Oberlin to form a local food procurement policy in 1990, this student-run association with eight dining cooperatives has the buying power and flexibility in decision-making to play a leadership role in the formation of a local food hub.
- **Bon Appetit Management Company-** A national food service provider, BAMCO has significantly increased the amount of locally purchased foods in college dining halls. They also have a Farm to Fork initiative as a core aspect of their corporate mission, with all accounts having to achieve 20% local purchasing within the first 3-5 years of operation. Bon Appetit has significant buying power, a national network of knowledgeable staff, a proactive approach to increasing local food supply, and some precedent of investing in local food enterprises.
- **Black River Café/Agave-** Founded by Oberlin College graduate Joe Waltzer, both Black River Café and Agave have made farm-to-table purchasing a core part of business operations to increase their capacity to supply BAMCO accounts.
- **Lorain County Community College-** Based in Elyria, the community college has a commitment to local food procurement. Their dining services are managed by an executive chef with farm-to-table experience from prior work with restaurants in Cleveland.
- **Oberlin Early Childhood Center-** With a meal program operated by Dave Sokoll, a recent Oberlin College graduate, the OECC blends local food procurement with healthy food preparation. They also include urban gardens on school property as a teaching tool
- **City Fresh-** A regional local food distribution and urban food access program, City Fresh is an initiative of the Oberlin-based New Agrarian Center and has access to a large network of mostly Amish farmers.
- **Oberlin Market-** The Oberlin Market is a small whole food store originally founded by an Oberlin graduate. They favor local purchasing whenever possible and also operate a small cafe that features specials that often include local ingredients.

Oberlin has several assets on which to build, including strong market support, strong supply networks, and a handful of small enterprises created by Oberlin graduates or local entrepreneurs. The local food hub can play a critical role in incubating new businesses that can add value to the local food economy.

In addition to these businesses and institutions already committed, the following list includes a number of ***potential market partners*** who have a stated interest in exploring local food purchasing:

- Kendal Retirement Community
- Downtown Oberlin restaurants including Cowhaus Creamery, Lorenzo's Pizzeria, Magpie Pizza, Oberlin Market, the Feve, Slow Train Café, and Sprouts
- Oberlin Public School District
- Retail/Coop Development in downtown Elyria and Lorain

As noted in the Food Assessment chapter of this report, a ***supply network*** of more than 80 local farmers and local food businesses representing 16 counties in Northeast Ohio currently supply Oberlin markets with more than a $1 million of food. The first step in the formation of a local food hub should focus on organizing input from this network of suppliers to determine their capacity for growth. Also, it would be helpful to develop a peer-support network from these suppliers- farmers or businesses that might be willing to mentor, organize informal workshops, or otherwise work with other farmers or businesses interested in marketing foods locally.

Oberlin already has a strong base of ***educational institutions and organizations*** that already have programs that can support local food systems development, including:

- **Lorain County Community College (LCCC)-** The community college, in collaboration with the Agricultural Technical Institute at Ohio State University, offers a sustainable agriculture certification program aimed at providing skills and training for individuals interested in small-scale food production to supply local markets. They also have a culinary arts program that can provide support for individuals interested in restaurants, catering,

Return to Table of Contents

or food service management that utilize local foods.
- **Joint Vocational School (JVS)-** The Lorain County JVS school has a culinary training program that includes some emphasis on preparation of local foods. The JVS is also exploring a program to provide training in sustainable agricultural production.
- **Oberlin College-** The Environmental Studies Program has a long history of providing both courses and practical learning opportunities in local food systems. A number of local entrepreneurs have graduated from the Environmental Studies Program. The Bonner Center for Service and Learning also provides students with a number of volunteer and internship opportunities in local food systems. The Center for Creativity and Leadership provides support for Oberlin graduates looking to pursue entrepreneurial opportunities.
- **New Agrarian Center (NAC)-** Formed in 2000 through a mix of community and college members, the NAC leases a 70 acre farm from Oberlin College. The NAC provides a number of workshops, volunteer opportunities, and employment for youth and adults in the local community. NAC programs cover both sustainable farm management and community food distribution.

The local food hub can work with these educational institutions and organizations to develop complementary programming and offer training for both entrepreneurs or workers that might utilize the local food hub or businesses or farms that supply it.

Oberlin has several assets on which to build, including strong market support, strong supply networks, and a handful of small enterprises initiated by Oberlin graduates. The food hub can play a critical role in incubating new businesses that can add value to the local food economy, with emphasis on the following four areas:
- **Food Processing/Manufacturing-** The food hub can procure and prepare local foods for processing into value-added products, such as salsa, sauces, or food-service ready meals. Food processing can be considered at the community-scale, helping to incubate small catering, home-based businesses, or collaboratives of students or backyard gardeners. Food processing can also be directed toward larger-scale food manufacturing which can produce prepared or preserved products for grocers, farmers markets, or institutional food service.
- **Composting/Waste-** Oberlin, like any community, generates a sizable amount of organic waste, upwards of 30% of the overall local solid waste stream. Food waste, yard or landscape waste, and manure can all be captured to produce energy, nutrients, or organic matter that can be valuable inputs to local food businesses or farms.
- **Energy-** As Oberlin moves toward a post-fossil-fuel future, bio-mass energy presents a significant source of energy for heating or electrical generation. Also, recycling waste vegetable oil or vegetable-based fuels can provide fuel to run distribution trucks or operate farm equipment.
- **Inputs and Services-** The growth of the local food system will create corresponding opportunities for supporting businesses, including lumber and wood, greenhouse construction, facilities construction, energy system installation, equipment sales and maintenance, and farm inputs.

Oberlin Food Hub Typology

What type of food-hub typology should Oberlin pursue from the list of food hub types identified earlier in this chapter? Given its status as a small-town in a largely rural area with close proximity to a number of urban centers, two typologies stand-out in defining a food-hub development appropriate to Oberlin:

- **Rural Town as a Food Hub**: Given Oberlin's history and impacts on local food systems and the high-level of interest among residents, businesses, and institutions, Oberlin is positioned to look at food hub development as a city-wide initiative. Rather than confining the food hub development to one centralized facility, it would make sense for Oberlin to look at the entire town as a food-hub that includes a mix of interdependent, but autonomous initiatives aimed at increasing the production and consumption of locally grown foods within the community. Particular emphasis should be placed on increasing healthy food access for limited-income residents in the community. Oberlin has a high percentage of students on free-and-reduced lunch and a high rate of poverty. Building equity into local food systems development can be accomplished through improved access (retail component of food hub that accepts Ohio direction, WIC coupons, or Senior Vouchers) or sourcing of food to City Fresh, churches, or the Oberlin Community Service Center. Equity can also be improved by providing opportunities for limited-resource residents to form small businesses based around local food systems (food processing, catering, restaurant, etc.)

- **Regional Aggregation Hub**: The idea of a regional aggregation hub should be considered in Oberlin. The aggregation hub can serve both the purpose of increasing access to locally grown foods to the myriad of institutions and businesses in Oberlin that have a stated interest in supporting local food producers. The aggregation hub can also leverage Oberlin's historic experience as a center for local food activity, its already existing networks of suppliers and businesses, its close proximity to inter-state highways, and its geographic location as a hinge-point between rural and urban communities to service markets beyond Oberlin, including Elyria, Lorain, or Cleveland.

This presents a two-tiered strategy for local food systems development in Oberlin. First, to achieve a 70% localization will require significant investment in infrastructure to support local food production, processing, distribution, storage, and use that will enable higher rates of participation among households, institutions, and businesses. Second, as Oberlin expands its own investments in local food systems, how can it also serve as a regional center that can expedite access to local foods in outlying urban centers, particularly neighborhoods in Lorain and Elyria that lack access to locally grown foods? Oberlin can serve as a model for increasing local food self-reliance through network cultivation, infrastructure for processing and distribution, and increasing the production of local food within the boundaries of the city. Oberlin can also grow to become a network node on a broader regional scale, including a diverse range of farmers and rural-based enterprises servicing the local food economy. Even though it's a small town, Oberlin size and experience could be transferable to a standard urban neighborhood, which, like Oberlin, typically has around 10,000 residents.

Location Options

Approaching Oberlin as a "rural town food hub" changes the orientation of food hub development from a single central facility to an inter-connected network of facilities, each serving different purposes and audiences.

Oberlin has a number of under-utilized assets, each of which could be appropriate to filling out different aspects of the local food system, including:

1) **The Missler's Grocery Store-** Located on the south-end of town, the Missler's Grocer is a 29,298 square foot facility located on a 4.3 acre parcel. As a commercial retail property, it features an ample parking lot, frontage on two streets, and rear loading docks. The building currently has 8,450 square feet leased to the CVS pharmacy, leaving about 21,000 square feet for further development. The Missler's grocery store can serve a variety of potential functions in Oberlin's local food economy, as described in the list that follows.
    a. **Retail-** providing a retail grocer that can improve access to local food throughout the week for Oberlin residents.
    b. **Farmers Market-** As a local food destination in the community, consideration could be given to permanently locating a weekly farmers' market in the parking lot by Missler's, providing the current farmers' market with more room for expansion as well as a more defined identity as a farmers' market space.
    c. **Healthy Food Access-** The neighborhood immediately surrounding the Missler's grocery store includes a large proportion of low-income households. It also faces greater economic instability, given a mix of higher unemployment rates and home foreclosures. Can the Missler's building serve to both increase healthy food access in the immediate neighborhood as well as employment or enterprise opportunities for residents?
    d. **Urban Agriculture-** The 4.3 acre site includes a fair amount of

2009 OBERLIN FOOD HUB STUDY:

The New Agrarian Center (NAC) partnered with the Appalachian Center for Economic Networks (ACENet) in 2009 to conduct a feasibility study for a community kitchen incubator to be located at the former Missler's grocery store.

The study considered development of a space that could support a wide-range of local food entrepreneurs, including:

- Oberlin-area farmers looking for fresh pack and cut or value-added foods (thermally processed, vacuum packed, dehydrated, frozen);
- new specialty food entrepreneurs utilizing local ingredients;
- established retailers or restaurants developing signature recipes as shelf-stable product lines;
- farmers' market vendors growing new crops for direct market sales; and
- home-based caterers or bakers.

Leslie Schaller, Program Manager and consultant with ACENet, recommended a three-phase development process, including:

- **Phase One- Fresh Cut Food Service and Value-Added Agricultural Products-** Acquisition of processing equipment and kitchen components to support value-adding of local agricultural products that could be sold to grocers or institutional markets. This would mostly include equipment for dicing, slicing, and vacuum-sealing. This phase would also emphasize development of warehouse and storage space (refrigerated and frozen) that could service a wide-range of local markets. Estimated cost: $165,000

- **Phase Two- Bakery and Prepared Foods-** This phase would create facilities to support a bakery operation and stations to support catering businesses. These facilities would provide support for making prepared foods. Estimated cost: $131,000

- **Phase Three- Thermal Processing-** This phase would include introduction of a thermal processing room which would create pressure-sealed jars. This would help to create shelf-stable foods for local restaurants, chefs, households, or new start-up food businesses. Estimated cost: $163,000.

Total cost for developing these three phases is estimated to be about $460,000.

Return to Table of Contents

green space which could be utilized for urban agriculture. The flat rooftop also offers space for potential production. Some urban agriculture landscape planning could also be developed in conjunction with the Underground Railroad Center, particularly emphasizing foods expressive of African-American ethnic traditions.

   e. **Storage/Processing/Aggregation-** With rear loading docks and a building structure set-up for refrigerated or frozen food storage, the Missler's store could feature space devoted to food storage and aggregation and limited processing. A flash freezing facility could be located there that could provide processing and storage of frozen products for the college or other institutional markets in Oberlin or the surrounding region.
   f. **Enterprise Incubation-** areas could be set-aside within the building to help to incubate local food or other green businesses.

2) **The Oberlin Industrial Park-** The Industrial Park of Oberlin, located on Artino Street, includes three vacant warehouse buildings that include 14,000 to 46,000 square feet of storage space as well as a vacant office building that features 12,000 square feet. These buildings would be ideally suited for Regional Food Hub development. Given its proximity to an urban neighborhood, the higher truck traffic of a food hub might make the Missler's space less desirable.

3) **Oberlin Public Schools-** Plans to consolidate the Oberlin Public School District into one common facility will leave at least three vacant school buildings which include the Eastwood Elementary School, Prospect Elementary School, and Langston Middle School. These three buildings include certified kitchens. The Boys and Girls Club at Oberlin, a property owned by the school district, also includes a large and un-used kitchen facility. The equipment and kitchen spaces of these buildings should be reviewed and considered for supporting a wide-range of local food enterprises within the local Oberlin community. Certified kitchens can be adapted to provide facilities for baking, thermal processing, dehydration, fermentation, or freezing. The spaces could be developed as "shared-use" kitchens, available for lease by groups ranging from home canners to caterers or small commercial businesses. The grounds surrounding these buildings should also be considered as spaces to support intensive urban agricultural production, some of which could also feed into the processing kitchens. The three acres of land surrounding the Boys and Girls Club, which presently includes the Oberlin High School Garden, would be ideal for intensive agriculture, combining both learning with market production.

Next Steps for Food Hub Development in Oberlin

The following next steps are recommended for further development of a food hub in Oberlin

NETWORK BUILDING ACTIVITIES:

1) **Convene Stakeholders-** Identify and convene critical stakeholders, including market partners, existing distribution businesses, current or potential entrepreneurs, investors, and farmers (urban & rural). Organize leadership council among key stakeholders to drive decision-making and review of food hub development options.

2) **Survey-** Distribute a survey to begin to identify potential users of a local food hub, including potential farmers, entrepreneurs, or market partners. The survey can begin to identify the needs of each group and can drive design of a facility and related programming that meets community needs.

3) **Regional Learning Network-** Determine potential linkages and synergies with other local food hubs or incubators in the region (Youngstown, Ohio City) to avoid overlap or unnecessary regional competition. Consider formation of regional learning network for food hubs or community kitchens to maximize peer-to-peer learning.

4) **Involve Regional Partners-** Work with community or economic development offices in Elyria, Lorain, and Lorain County to identify potential supply routes that might include new retail or commercial food developments, especially in food-desert neighborhoods in these cities.

LOCAL INVESTMENT ACTIVITIES

5) **Pre-Development-** Work with local entity such as the Zion Community Development Corporation to seek pre-development funding from the Ohio Department of Development Finance Fund to determine:
   a. **Legal Structure** (For-profit, non-profit, coop)
   b. **Markets** (current market base and market development potential)
   c. **Facilities Review** (identification of rough estimates of square footage, equipment needs, facility renovations, and pros/cons of available facilities in Oberlin)
   d. **Preliminary budget** with appropriate phasing of activities

6) **Product Mix-** work with market partners to determine an appropriate mix of products that best meet local demand, including meats, grains, produce, dairy, and value-added or processed foods.

7) **Business Plan-** identify appropriate legal structure (either working with an existing entity or forming a new one) and develop a five year viability plan for facility or facilities

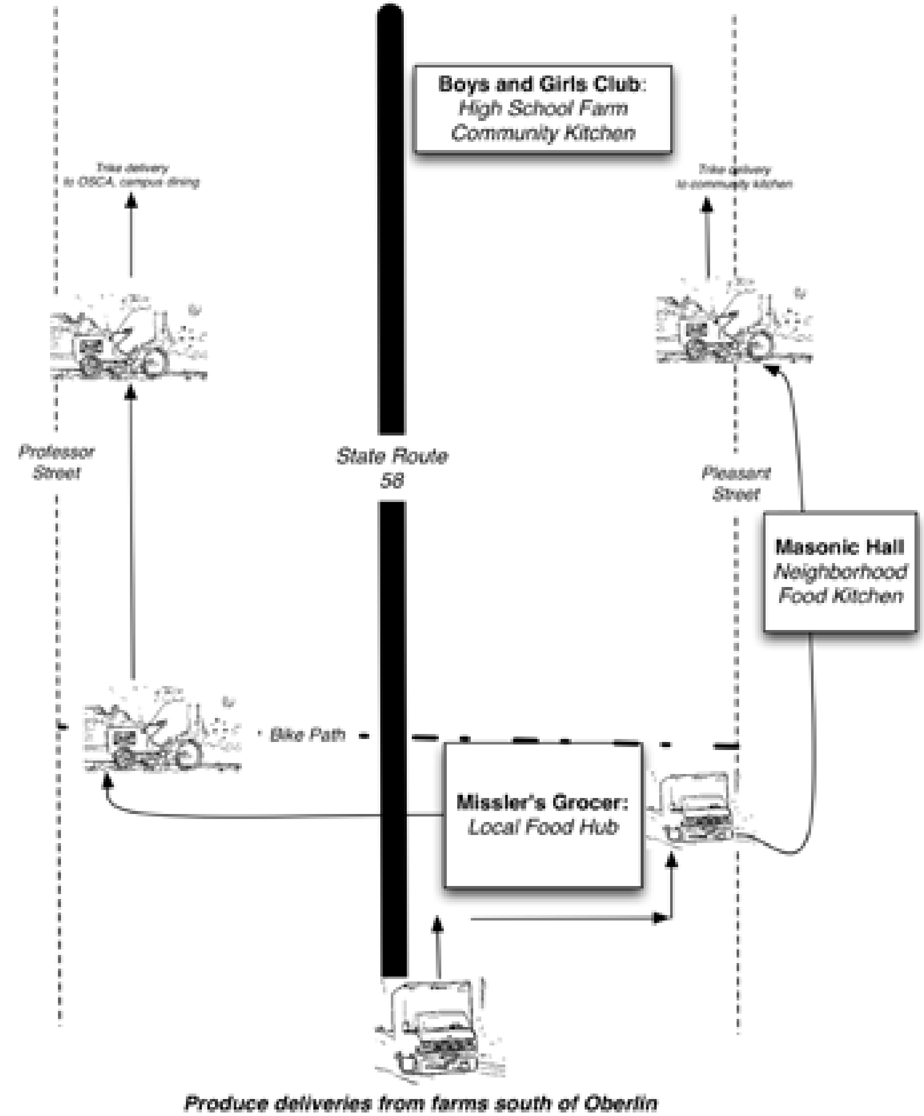
8) **Development-** Seek funding and investment for facility renovation and development. Grants will likely be needed for start-up and all activities related to training, network cultivation, and enterprise incubation. Private investments would be appropriate for expansion once basic legal structure, supply networks, and initial operations commenced. Cooperatives should also be considered as an effective way to both root ownership in the community and raise capital among committed stakeholders.

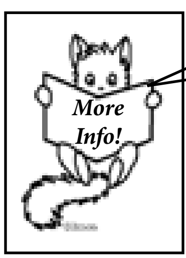
URBAN DESIGN:

1) Distribution Scales- Connect food hub development to a sustainable transportation plan in which trucks arrive at the former Missler's Grocery Store to make deliveries of local food from farms south of Oberlin. A micro-distribution system utilizes trikes to deliver local food to the community kitchen for processing along Pleasant Street to the Masonic Hall or Boys and Girls Club or for delivery to the Oberlin Student Cooperative Association and campus dining halls along the bike path and Professor Street.

2) Urban Agriculture- The grounds and rooftop surrounding the Boys and Girls Club and the former Missler's grocery stores are utilized for intensive urban agricultural production. Foods produced on these urban farms can be processed or utilized directly for consumption.

3) Equitable Access- Identify avenues to connect the food hub with the surrounding southeast neighborhood of Oberlin, including efforts to improve healthy food access through distribution, retail, and incubation of small businesses owned by neighborhood residents.





Click me to access more detailed documents on food hubs, including important information for funding!

EXAMPLES OF FOOD HUBS RELEVANT TO OBERLIN

The following list includes local food hubs in other communities in the United States that might present potential models for Oberlin:

Common Market, Philadelphia Pennsylvania- Common Market works with 15 producers in a 90 mile radius around Philadelphia who supply fresh produce, meat, poultry, and eggs. Common Market follows a farm-to-institution model, supplying food to 60-75 customers that include colleges, universities, hospitals, food cooperatives, and restaurants. With $580,000 in sales in 2010, they focus on market partners that serve low-income residents. www.commonmarketphila.org

Eastern Carolina Organics, North Carolina- Founded and run by Oberlin graduate Sandi Kronick, Eastern Carolina Organics has more than 40 producers selling to 150 customers in the southeast, including restaurants, grocers, food service, and cooperatives. They offer producer services, including planning, safe food handling, and liability coverage. www.easterncarolinaorganics.com

Eastern Market, Detroit- One of the nation's oldest public markets, Eastern market includes both retail (customers) and wholesale (grocers, restaurants, distributors). The market supports 250 vendors and they coordinate aggregation, distribution, and processing for many small to mid-sized farmers. www.detroiteasternmarket.com

Intervale Food Hub, Burlington Vermont- A non-profit organization that includes an Oberlin graduate, Intervale works with 22 farmers to aggregate, distribute, and market a wide-range of products. They operate a year-round CSA and supply products to restaurants, schools, and hospitals. The site includes an incubator farm that leases land, equipment, greenhouses, storage, and irrigation to small farmers. www.intervalefoodhub.com/home

Local Food Hub, Charlottesville Virginia- This non-profit food hub distributes produce, frozen meat, and value added products from a network of 70 small producers to over 120 businesses and institutions. Growers receive technical and business planning support as well as liability coverage. The hub includes a 3,500 square foot warehouse and a 60 acre educational farm that provides training and internships for beginning farmers. www.localfoodhub.org

Town of Hardwick, Vermont- This town of 3,200 residents includes a diverse base of "agrepreneurs" that offer several complementary businesses that support a local food economy, including a community-owned food coop, a local food restaurant, an organic seed company, a compost producer, mobile butchers, a distillery, and a number of organic farms. This working-class town emerged from the collapse of the granite industry to embrace local foods as an economic renewal strategy, supporting a vibrant downtown businesses and shipping products to markets across the Northeast. http://www.hardwickagriculture.org/index.html

CORE ACTIVITY AREA TWO- WASTE TO FOOD AND ENERGY

For the past 20 years, Oberlin has developed a number of small-scale projects to focus on composting and organic waste utilization. However, a comprehensive and community-wide effort is needed to optimize the utilization of organic wastes in the community as productive inputs to local agriculture. Organic waste, when properly processed, produce a number of inputs useful to local agriculture, including nutrients, organic matter, and energy. A distributed approach to organic waste utilization matches waste streams to a number of local food applications, including heat for greenhouses, natural gas for commercial kitchens or food preparation, bio-char as a soil amendment, and recuperation of nutrients to improve soil fertility. Utilizing these local waste streams can reduce the dependency of local agriculture on imported nutrients and energy.

The development of a local food hub addresses the front-end of the local food economy- connecting consumers, businesses, and institutions more directly with local farmers and food businesses. The second critical area of investment addresses the back-end of the local food economy- productive utilization of organic waste streams as inputs to local agriculture.

This report recommends orienting community investment toward the development of a community-wide organic waste re-utilization effort. Organic wastes include yard or landscape waste (leaves, wood mulch), agricultural wastes (manure, straw, crop residue), institutional or commercial waste (food scarps, plate scrapings, napkins, bio-degradable plates). Traditionally, these wastes are viewed as a liability and communities devote significant energy and expense to their disposal in landfills or through wastewater treatment. The first step to bolster a local food economy is a more effective utilization of one of the most valuable assets in any urban community- organic waste.

Rather than focus on a single, centralized composting facility, common to many communities, this section focuses on the development of multiple waste streams re-purposed as productive inputs to local agriculture. These streams include:

- use of household waste for **home composting** and home or neighborhood-based food production;
- reduction of campus dorm waste through **on-campus compost** tumblers producing compost for campus gardens or landscaping;
- development of a **composting commons** as a permitted **Class II waste handling facility** that can collect, aggregate, store, and process organic waste for different uses in the community;
- use of **grinder-pulper** to create a nitrogen-rich slurry as an input to bio-digestion which **turns organic waste into methane** gas and nutrients;
- utilization of **captured methane energy** to support a community processing kitchen or to heat greenhouses;
- use of **waste-heat from a landfill** energy project to heat greenhouses that can produce fish, vegetables, seedlings, and algae (for fuel) through a re-circulating system; and
- development of **bio-mass energy generation** that produces **bio-char** as a by-product, a powerful soil amendment to support local agriculture.

To engage community stakeholders, an organic waste utilization summit was organized through a collaboration between the Oberlin Project and student recyclers from Oberlin College. The summit included three primary goals:

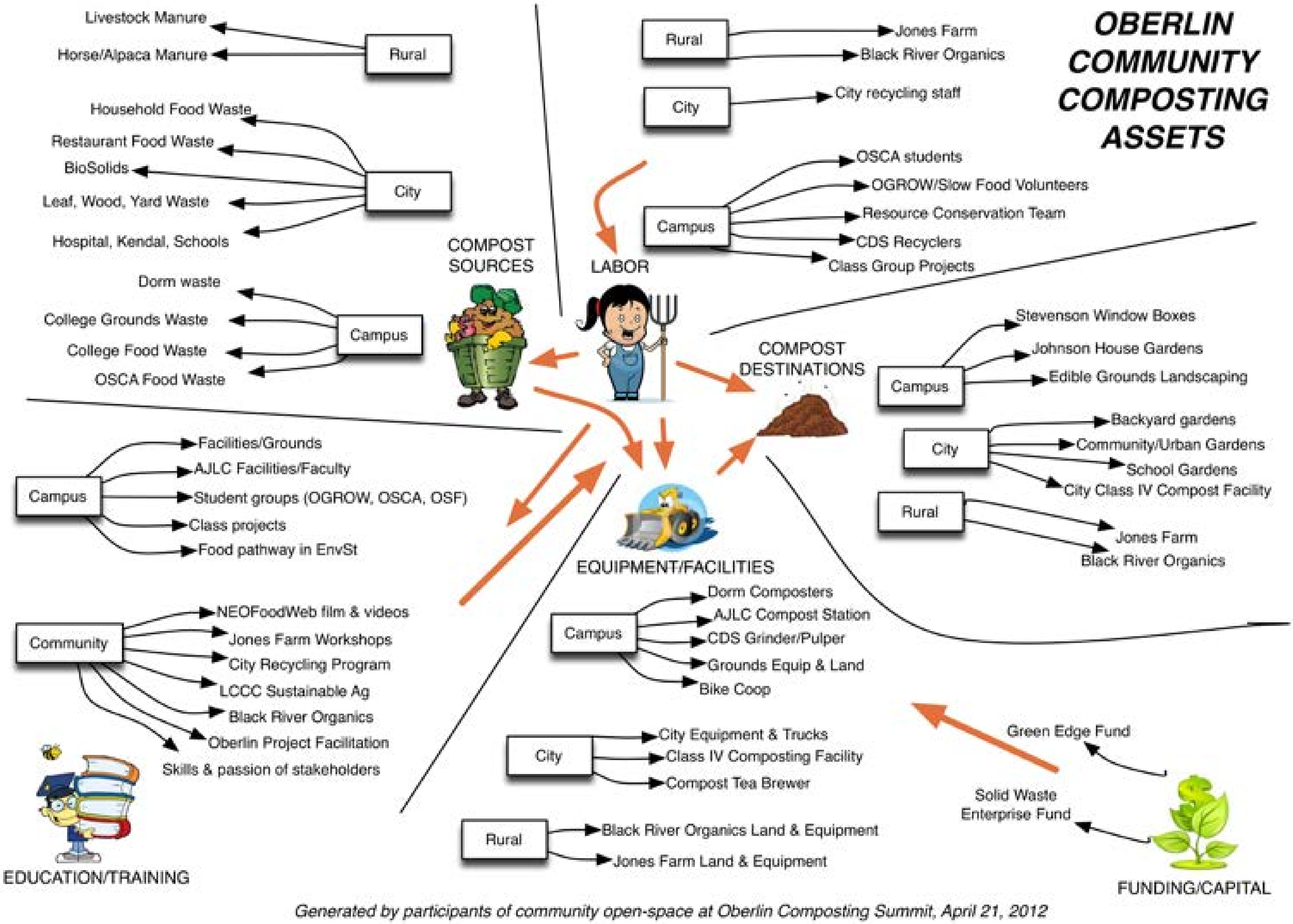
- build more diverse collaborative networks within and between Oberlin College and the broader Oberlin community;
- provide a learning opportunity to raise local awareness about on-going composting efforts already active within the community and other Ohio communities through tours and presentation of a documentary film detailing different approaches to composting across Ohio; and
- engage stakeholders in identification of local assets, opportunities, and projects to support composting.

Community Assets and Opportunities

Summit participants took two tours to learn about current composting activities in the local community. The first tour featured a review of two **community assets**, the George Jones Farm's vermicomposting operations and the City of Oberlin's municipal Class IV leaf and wood mulch composting facility. The second tour included a demonstration of the grinder/pulper unit in operation at Stevenson hall followed by a tour of small-scale composting containers that process food waste from campus dorms. These examples were looked at as starting points for considering a broader, community-wide initiative.

The participants of the compost summit then identified a number of assets already existing in the local community that could be leveraged to expand a community-wide composting initiative. An asset map was organized from community input, shown in the accompanying flowchart. The assets were divided between three primary geographic areas:

- **Campus-** assets existing on the Oberlin College campus or resulting from college activities,


OBERLIN COMMUNITY COMPOSTING ASSETS
COMPOST SOURCES
Rural
Livestock Manure
Horse/Alpaca Manure
City
Household Food Waste
Restaurant Food Waste
BioSolids
Leaf, Wood, Yard Waste
Hospital, Kendal, Schools
Campus
Dorm waste
College Grounds Waste
College Food Waste
OSCA Food Waste
LABOR
Rural
Jones Farm
Black River Organics
City
City recycling staff
Campus
OSCA students
OGROW/Slow Food Volunteers
Resource Conservation Team
CDS Recyclers
Class Group Projects
COMPOST DESTINATIONS
Campus
Stevenson Window Boxes
Johnson House Gardens
Edible Grounds Landscaping
City
Backyard gardens
Community/Urban Gardens
School Gardens
City Class IV Compost Facility
Rural
Jones Farm
Black River Organics
EDUCATION/TRAINING
Campus
Facilities/Grounds
AJLC Facilities/Faculty
Student groups (OGROW, OSCA, OSF)
Class projects
Food pathway in EnvSt
Community
NEOFoodWeb film & videos
Jones Farm Workshops
City Recycling Program
LCCC Sustainable Ag
Black River Organics
Oberlin Project Facilitation
Skills & passion of stakeholders
EQUIPMENT/FACILITIES
Campus
Dorm Composters
AJLC Compost Station
CDS Grinder/Pulper
Grounds Equip & Land
Bike Coop
City
City Equipment & Trucks
Class IV Composting Facility
Compost Tea Brewer
Rural
Black River Organics Land & Equipment
Jones Farm Land & Equipment
FUNDING/CAPITAL
Green Edge Fund
Solid Waste Enterprise Fund
Generated by participants of community open-space at Oberlin Composting Summit, April 21, 2012

- **City-** assets residing in the City of Oberlin among residents, city government, or businesses, and
- **Rural-** assets located in areas outside of the city and college in adjoining rural areas

The assets were further developed into the following classes, with examples listed below. For a more complete list of assets, see the accompanying flowchart.

- **COMPOST SOURCES-** Sources of organic material that can be composted, including agricultural manure; food waste from households, businesses, and institutions; and yard or landscaping waste from the college, local businesses, or householders.
- **LABOR-** Labor includes existing volunteer or paid staff positions that can be directed toward composting efforts, including local farmers, city recycling staff, and college student volunteers and paid work-study workers or interns.
- **EDUCATION AND TRAINING-** Includes assets within the community that can support education, training, and capacity building to increase knowledge and skills around composting. Participants identified a number of campus resources, including classes, expert knowledge, and research capacity. In the community, assets included local organizations such as the NAC for workshops or informal learning and educational institutions for formal curriculum and study.
- **EQUIPMENT/FACILITIES-** Includes any equipment, land, or buildings that can be utilized to support composting. Assets include: on-campus composting stations, CDS grinder/pulper, and grounds equipment and land; city municipal Class IV composting facility, and area farms with equipment of space to support composting.
- **FUNDING/CAPITAL-** Funding and capital to support composting efforts include the Green Edge Fund at the college, the Lorain County Solid Waste District, the Lorain County land-fill, and the city's Solid Waste Enterprise Fund
- **DESTINATIONS-** Locations where finished compost can be applied to enhance the local food system include edible landscaping on-campus, window boxes; backyard gardens, community/market/school gardens; and urban-edge, farms such as the George Jones Farm or Black River organics near Wellington.

Building on these assets, the summit participants also identified a wide-range of **opportunities, included in the accompanying chart,** that could result from a community-wide composting process, including:

- **Creating Employment-** creating jobs or small enterprises around composting for students or community members;
- **Volunteerism-** providing volunteer opportunities for members of the Oberlin Student Cooperative Association or other students to participate in the movement, processing, and application of compost;
- **Community Education-** working with the city and organizations like the New Agrarian Center to educate the broader community on back-yard composting, restaurant composting options, and uses of compost to improve local food production;
- **Urban Gardens-** utilizing compost to encourage backyard, community, school, or market gardening within the city;
- **Local Farms-** Supply compost materials to farms that supply local food to the college or other local markets;
- **Compost Hub-** coordinating and consolidating waste materials in a common community facility that can process compost materials for application in the community; and
- **By-Product-** using compost to generate biogas, heat, and nutrients.

Community Composting Clusters

Following an identification of assets and opportunities, stakeholders split into four primary clusters to tease out further details and next steps for community-wide composting. Clusters are a term for community networking that involve a diverse collection of stakeholders drawn to a particular topic, initiative, or enterprise. Clusters can include mixtures of ages (youth, adults, elders), education (students, non-students), enterprises (non-profit, coop, for-profit), or community decision-makers or advocates (policy makers, grassroots).

The clusters were identified as the four areas that would lead to the highest level of participation for composting within the Oberlin community, acknowledging that composting can occur at a variety of scales. The **Urban-Home Composting** cluster focused more on individual households or residents engaged in small-scale composting appropriate to backyard or community garden spaces. The **Municipal/Commercial** cluster looked at larger-scale composting that could accommodate commercial or institutional food waste streams. The **Logistics** cluster considered optimizing use of the college's grinder/pulper and discussions about collection and transportation. Finally, the **Waste-to-Energy** cluster identified opportunities to generate methane gas through anaerobic digestion that could be deployed as an input for local agriculture in the form of heat, cooking gas, or electricity.

The following summarizes the discussion and recommendation for each of the following four clusters:

Urban-Home Composting: Home and community gardening play an important role in the local food economy. This cluster focused on how to connect more home or community-garden scale composting to improved local food availability at the neighborhood-scale. Discussion focused on two streams of activity. The first focused on home-based composting, encourages residents to utilize kitchen scraps, leaves, or other yard waste to reduce household waste. The second stream focused

Return to Table of Contents

COMMUNITY COMPOSTING OPPORTUNITIES

LABOR

- Leveraging OSCA student labor for compost trike
- Creating jobs/enterprises around composting

EDUCATION/ OUTREACH

- School garden compost education stations
- Engage community membs not composting
- Communication & networking sites
- Educating restaurants/businesses
- Use compost video
- Permaculture classes for compost making
- Linking people with food waste to those needing compost

LOCAL FARMS

- Compost to farms supplying local food
- Specialty crop farms
- On-farm Earth Tub composters
- Balanced pasture development

URBAN GARDENS

- Green roof gardens
- Herb gardens at dining halls
- Backyard garden inputs
- Community compost exchange
- Community garden development
- Pollinator gardens
- AJLC gardens
- Kendal gardens
- OECC gardens
- Ark f Taste/Biodiversrity gardens on campus
- Oberlin High School gardens
- Dorm gardens

USE OF BY-PRODUCTS

- Pulper waste to generate energy
- Capture heat for showers

DISTRIBUTION

- Organized distribution to network of food production sites
- Collection site to consolidate material

on the need to bring in larger amounts of materials to accelerate the development of garden beds and growing spaces for urban food production.

Composting systems appropriate to this scale include compost tumblers, mobile composting to regenerate patches of soil, vermicomposting, compost burritos (food waste wrapped in newspapers), and lasagna-style raised bed composting.

Some next steps to promote home or urban-scale composting identified by the cluster include:

- identifying businesses or outlets in the community that might generate food waste appropriate to urban-scale composting;
- organizing more intentional networks of backyard gardeners or urban farmers that can share effective composting techniques or coordinate food waste pick-up and transport;
- creating a community learning network in which innovative approaches to home or urban garden composting can be shared with the broader community;
- working with city to find ways that bulking materials (leaves or wood mulch) might be made available to urban gardens; and
- developing a virtual commons to facilitate pick-up and deliveries of materials.

Municipal/Commercial Composting: The City of Oberlin currently has an active composting program in which about 500 tons of leaves and wood mulch per year are collected at the residential curb-sides and composted on a Class IV composting site. Discussion focused around the possibility of upgrading the City's current Class IV site to a Class II facility that would be set-up to accept food waste. Such a transition would require additional upgrades in the physical site and equipment as well as a full-time staff person to manage the operation. Given operating expenses, the cluster discussed developing a business case for a commercial composting facility

HISTORY OF COMPOSTING AT OBERLIN

Interest and activities to support composting in Oberlin go back at least 20 years. As early as 1990, the Oberlin Student Cooperative Association (OSCA) created a composting initiative for their student-operated dining cooperatives. In 1996, the coops brought food waste to the Oberlin Sustainable Agriculture Project (OSAP) farm and managed a small pile there. In turn, they purchased about $20,000 of produce from OSAP each year. The farm operation moved to the George Jones Farm in 2001 and OSCA continued its composting efforts until the spring of 2012.

In 2003, after having served as a farm intern at the George Jones Farm and a compost coordinator for OSCA, Oberlin student Lucian Eisenhauer devoted his Senior Honors Thesis in Environmental Studies to a feasibility study for developing an in-vessel composting system. He determined that the college produced an average of 154 tons of food waste each year. The college was receptive to the plan, but the high capital cost prevented it from being implemented.

In 2006, the New Agrarian Center (NAC), which operated the Jones Farm, received an Ohio EPA grant to study the development of a more "distributed", low-capital system for composting. The concept of "distributed composting" involves dispersal of food waste and other organic wastes to a variety of smaller-scale applications. Compost becomes more effectively captured as a "food source" for a number of different sources on a farm, from pigs to worms. Capital and operating costs are assumed by users who directly benefit from the use of composted materials. As a part of the project, the NAC worked with Will Allen, CEO of Growing Power in Milwaukee, to organize a compost training that involved installation of a vermicomposting system at the Jones Farm and an asphalt garden installation at the Full-Circle alternative fuel station in downtown Oberlin. This project laid the groundwork for a number of small vermicomposting sites at the Jones Farm which continued for the next several years.

In 2011, Oberlin College installed a grinder/pulper in one of its dining halls, a unit that grinds food waste (including meat and bones), napkins, and kitchen waste. Unfortunately, the mix was too rich for the Jones Farm vermi-composting systems. Additionally, the student coops could no longer afford insurance for their coop trucks. These set-backs provide an opportunity to re-think a community-wide composting effort for Oberlin.

that could be managed by a third party operator. Consideration would need to be given to the scope of work for the operator. Would they just focus on operating the compost facility or would they also facilitate transportation of materials to and from the site?

It is not clear, given the small-scale of the Oberlin community, if there would be enough material to support a full-time employee or a viable business. What configuration of facilities and equipment would be needed to manage the smaller-scale waste streams that Oberlin generates?

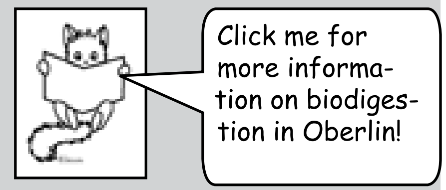
Some recommendations for next steps from the cluster included:

- better determination of cost and volume of food waste generated by Oberlin College and approximately how much food waste currently ends up in the landfill;
- developing a business case for a commercial composting facility;
- identifying the waste volume and cost for other outlets in Oberlin, starting with the Kendal Retirement Community; and
- contacting potential partnerships with other commercial composting operations in the area (Barnes, Rosby, Kurtz Brothers) to get a sense of the feasibility of a third party operator for Oberlin.

Waste-to-Energy and BioDigestion: Biodigestion is an anaerobic process in which decomposition occurs in the absence of oxygen. This contrasts with composting, which requires oxygen to activate bacteria and micro-organisms involved

BIODIGESTION OF ORGANIC WASTES

Pennsylvania State University defines an anaerobic digester as "an air-tight, oxygen-free container that is fed an organic material, such as animal manure or food scraps. A biological process occurs to this mixture to produce methane gas, commonly known as bio-gas, along with an odor-reduced effluent. Microbes break down manure into bio-gas and a nutrient-rich effluent."



There are two primary by-products that result from the anaerobic digestion process, including:

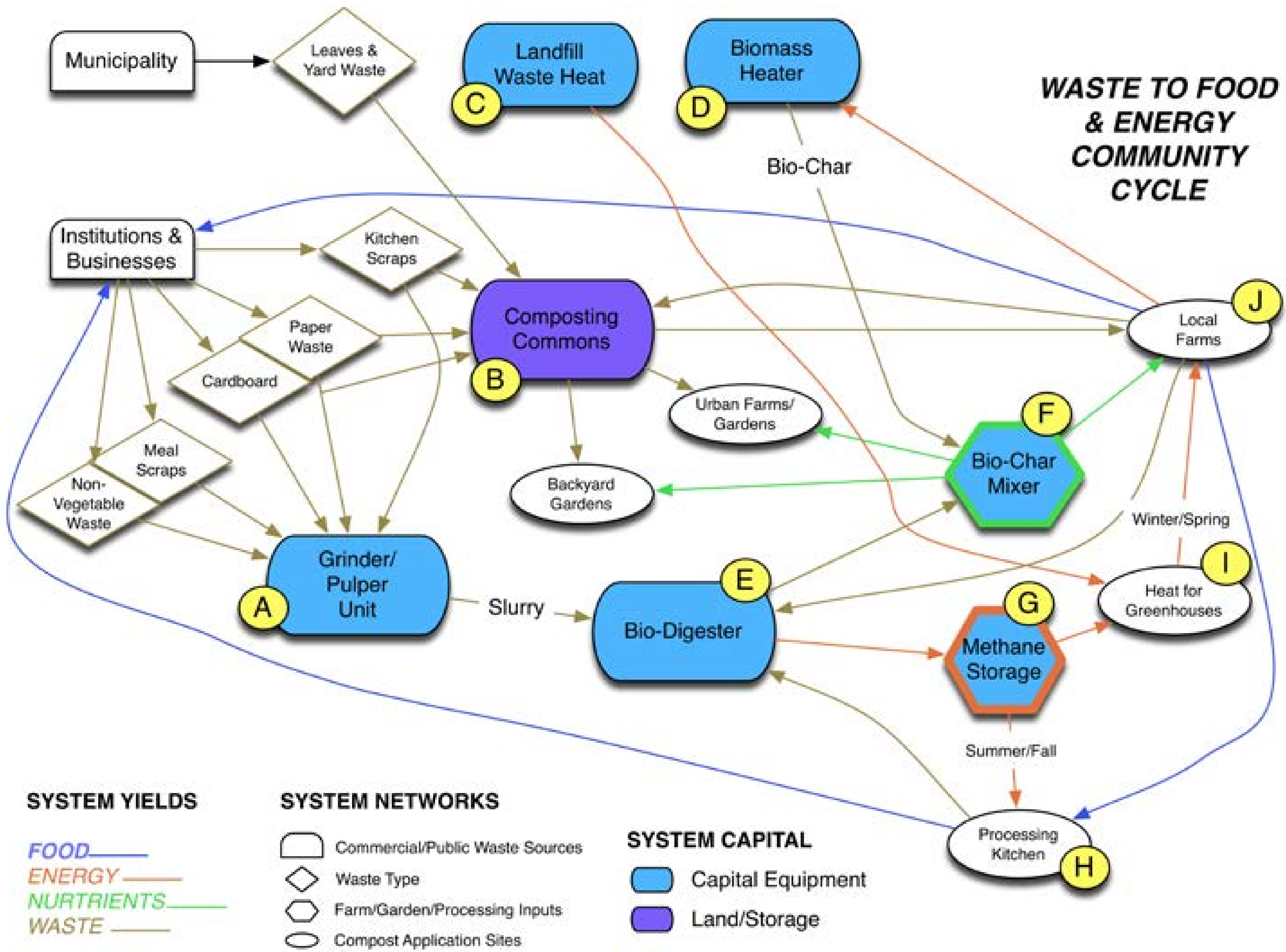
α) **Bio-gas-** natural gas and other components that can be used to produce electricity, heat, or power engines.
β) **Digestate-** nutrient rich by-product that provides an amendment for agricultural production

Bio-gas can be utilized for just about any process that presently utilizes natural gas. The primary uses of bio-gas products include:

a) **Bio-Gas Generation-** AD facilities will typically utilize some of the energy generated by the bio-gas to operate the facility itself, capturing both heat and electricity to operate different components of the system.
b) **Heating-** bio-gas can be used to generate low-grade heat, ideally utilized in water-based boilers. Bio-gas cannot generate steam heat directly and typically maximizes at about 180 degrees.
c) **Electricity-** Bio-gas can be run through a Combined Heat and Power (CHP) generator to produce electrical energy. Waste heat results as a by-product of CHP generators and can be used to heat AD facilities or can be captured for uses in adjacent buildings.
d) **Fertilizer-** The by-product remaining from the biodigestion process, called digestate, is a nutrient rich slurry that can be direct land-applied for agriculture or can be mixed with compost to raise fertility and nutrient content.

In September of 2012, the Oberlin Project spent a month reviewing different scenarios for applying bio-digestion technology to a variety of potential agricultural applications in Oberlin. The third section focuses on a review of anaerobic digestion options for the Oberlin Community. This section reviews community assets, evaluates bio-gas production potential from food waste samples collected at the Stevenson Dining Hall, and reviews waste collection options. This section then identifies five development scenarios for anerobic digestion in Oberlin. Some scenarios rely on existing infrastructure in the community and others require more investment and capacity building:

1. Quasar Energy Facility: deliver food waste to anaerobic digester that powers a Waste-Water Treatment Plant in Shefield Village, about 16 miles from Oberlin.
2. Oberlin Waste Water Treatment Plant: utilize existing anaerobic digester at WWTP to provide heat and electricity for the treatment plant and bio-solids for local agricultural production. This option would utilize existing infrastructure for sewage water and would reduce utilization of outside energy to power the facility.
3. Local Food Hub: modeled after the Plant in Chicago, develop an anaerobic digester to support development of a local food hub in Oberlin that could provide energy for heating, cooling, or food processing or preparation.
4. On-Farm Biodigester: develop small-scale, farm-based biodigesters that can provide heat that can be used to extend seasonal production in greenhouses.
5. Lewis Environmental Studies Center: utilize anaerobic digester that is a part of the Living Machine to capture bio-gas for use in heating a high performance greenhouse in the Lewis Center landscape



Return to Table of Contents

Compost Summit Highlights April 21, 2012

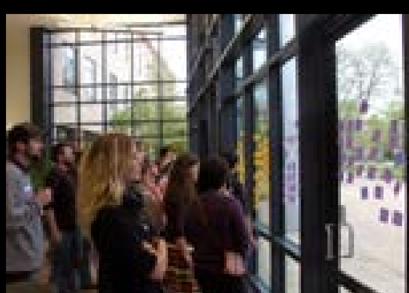
Steel drum band entertains at lunch

Students learn about grinder-pulper.

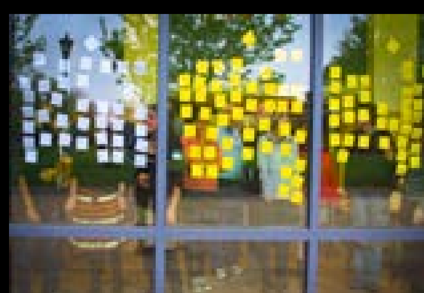
Tour of Jones Farm compost system.

Demonstrating the grinder-pulper unit.

Grinder-pulper waste from dining hall food.



Community stakeholders generate ideas.



Maps of assets and opportunities.

with decomposition. The primary outputs of biodigestion include methane gas and inorganic nutrients. Methane gas can be combusted for heat, for cooking, or, if compressed, can be used to generate electricity or compressed gas for transport. Inorganic nutrients can be land applied as a form of agricultural fertilizer or mixed with bio-char. Biodigestion affords some advantages over composting, including reduced release of carbon dioxide in the decomposition process, generation of energy, and production of nutrients. Carbon dioxide released from methane combustion can also be captured to enhance greenhouse production. However, organic matter yields in bio-digestion are much lower than composting. If mixed with bio-char (a by-product of biomass energy generation), nutrients can be mixed with organic matter for improved soil quality.

Several cluster members have experience with biodigestion, including Sean Hayes who has built a bio-digester and can provide resources and expertise in the development of a bio-digestion system. Two students have done research or worked with companies that specialize in bio-digestion.

The cluster identified the following next steps to take in developing a bio-digestion project in Oberlin:

- Identification of a site to locate a bio-digestor, with several suggesting the George Jones Farm or close proximity to the grinder/pulper to reduce waste hauling;
- determination of a scale appropriate for Oberlin's waste stream which will help to determine the cost of installing a bio-digester;
- better quantification of waste streams to get a sense of the throughput and seasonality of waste;
- identifying options for a truck to move waste;
- determining options for supplemental heat for a bio-digester to function optimally during the cold months, including having the bio-digester heat itself;
- a thorough analysis of the waste output from the grinder/pulper would be needed to determine ratios (waste, gas, sludge);
- identification of end-users of bio-digester digestate and nutrient outputs;
- determination of whether or not energy could be used directly from the bio-digester or if some form of compression and storage would be required (which raises costs as well as safety concerns); and
- looking into the EPA P3 grant program once a project is defined with funding amounts for developing a proposal at $10,000 and a prize of $75,000 for project implementation.

Collection and Logistics: This cluster identified some other zero-waste initiatives in the state of Ohio, mostly composting at Ohio State University. At Buckeye Stadium, 75% of the waste goes to a compost facility. A campus-owned inn and the student union utilize a pulper that feeds a Quasar bio-digester, operated independently of the university. On the Oberlin campus, a residential compost-

Return to Table of Contents

ing system generates waste that is processed in dorm tumblers or utilized at the Johnson House gardens. Pre-consumer dining waste from OSCA and CDS has been going to the George Jones Farm since 2006. A grinder-pulper unit at the college generates 2 tons of food waste per week from Stevenson dining hall, exceeding what the Jones Farm can handle. Presently, pre-consumer food waste still goes to the Jones Farm for vermicomposting. Food waste is picked-up by Jones Farm staff and a tipping fee covers the cost of hauling the waste to the farm. Kitchen scraps go through the grinder/pulper and are hauled to a composting facility in Cleveland, operated by Rosby's. The college has a number of student labor resources devoted to composting, including OSCA coop members and CDS recyclers and members of the Resource Conservation Team.

The cluster made a distinction between residential food waste collection and dining hall or cooperative food waste collection. Their goal was to see all dorms and senior housing on campus to have access to compost tumblers which can produce compost that can be used for campus landscaping or the Johnson House garden. Dorms presently have students who serve as "compost captains" and do training and orientation for other students to encourage composting. There was some suggestion that a similar process might work in the community as well.

Concerning dining waste, the purchase of a grinder/pulper was intended to expedite composting. The grinder/pulper generates about 2 tons of food waste per week from the Stevenson Dining Hall, with about 1,000 students being fed. Due to meat, bones, and food waste, the nitrogen content was too high for the vermicomposting system at the Jones Farm. However, this mix could be optimal for a bio-digester unit.

Overall, the cluster concluded that the grinder/pulper was working well, but more planning is needed to effectively utilize pulped waste. The cluster members agreed that the ideal scenario would be for the waste to get utilized by local farms from which the college would purchase local food, completing the waste to food cycle.

The logistics cluster recommended the following next steps for advancing composting efforts, mostly focused on campus initiatives:

- organize a network of farms to participate in the receipt of compost;
- organize a master composter workshop to raise campus and community literacy about composting (more oriented for residential/dorm composting);
- identify ways to expedite composting for the smaller dining halls on campus; and
- research licensing requirements for compost systems and the transport of food waste to composting sites or farms.**A Comprehensive Organic Waste Initiative for Oberlin**

Given Oberlin's past history with composting and input from the community composting summit, there is an opportunity to begin to develop a much more comprehensive, community-wide composting effort that converts food waste streams to productive inputs for local agriculture.

The accompanying diagram lays out a schematic design for a how a community-wide organic waste utilization effort might function. There are six critical assumptions underlying this design as listed below.

1) The goal of the system is to maximize the conversion of organic waste streams in the Oberlin community into productive inputs to support local agriculture.
2) The system includes multiple pathways for food waste to be utilized by local agriculture, including as a source of organic matter, a source of nutrients, and a source of energy.
3) A broader consideration should be given to include not just food waste but other forms of organic waste, such as bio-char as a by-product of biomass energy production.
4) Composting should be considered at multiple scales within the community, including urban or backyard production and broader commercial or farm applications.
5) Scale-matching can also be considered, such as smaller sources of food waste going to more urban sites and institutional-scale food waste going to larger-scale composting systems.
6) Dispersal of organic waste streams rather than centralization will insure a more diverse food web that can utilize organic waste assets within the community.

The accompanying flow chart begins with four primary sources of organic waste in the community that include:

- **Households-** kitchen scraps and yard waste generated by households to support gardens or natural spaces around homes or in surrounding neighborhoods
- **Municipal Waste-** organic wastes collected by the City of Oberlin, including leaves and woody materials
- **Institutions/Businesses-** food waste from institutional dining services or commercial businesses (grocers, food banks, restaurants) include mostly food scraps or biodegradable waste (plates, napkins, cardboard, paper towels, etc.)
- **Biomass Energy-** biomass-based heating system that generates bio-char as a by-product.

To optimize the waste conversion process, five capital equipment investments are recommended:

- **Grinder/Pulper Unit (A)-** A unit that can grind multiple sources of organic waste, removing moisture and producing a slurry that can be directly fed into a bio-digester. Consideration should be given to moving the

Return to Table of Contents

unit from Stevenson dining hall to a location that could process multiple streams of waste.

- **Composting Commons (B)-** A common facility in which organic waste generated by commercial or institutional sources is stored and processed. This area would require adequate land, leachate collection, and a Class II operating license. The site could also make available two streams of organic waste: grinder/pulper waste for bio-digestion and composted food waste and bulking materials for urban or backyard applications.
- **Waste-to-Heat (C)-** Developing infrastructure to transfer waste heat from a landfill gas generator to heat greenhouses that include an aquaculture (fish farming) system that delivers nutrients to the production of algae (for fuel and fish feed) and for vegetable and greens production.
- **BioMass Heater (D)-** A Combined Heat and Power system being considered as a potential component of a new hotel/Green Arts District development could utilize pyrolysis to generate heat and power from locally produced biomass, yielding bio-char as a by-product.
- **Bio-Digester (E)-** A small to medium-scale bio-digester that can be used to convert organic waste from the grinder/pulper into methane gas and nutrients.

A secondary set of capital equipment will be needed to process the products resulting from the first stage of organic waste processing, including:

- **Methane Storage (F)-** A unit that would enable methane gas from the bio-digester for storage or potential transport.
- **Bio-Char Mixer (G)-** A unit that can pulverize bio-char and mix-in inorganic nutrients produced by the bio-digetser.

Three primary end-users have been identified that can utilize the final products to enhance local agriculture or local food production, including:

- **Processing Kitchen (H)-** Use of natural gas to provide supplemental fuel to a processing kitchen that can be utilized by local farmers or entrepreneurs to process locally grown foods at peak harvest into canned or frozen products. The processing kitchen could be utilized during the summer and fall, the times that correspond to peak harvest when there will be the largest demand for processing food.
- **Greenhouses (I)-** Methane can be utilized as a source of heat for greenhouses as well as a source of heat to keep the biodigester itself optimized during colder months. It is recommended that the bio-digester be physically located inside of a greenhouse, enabling heat to both keep the bio-digetser operating while extending the seasonal production window for local produce or aquaculture. Methane could be utilized by greenhouses in the Winter and Spring when there is less demand for cooling and more need for affordable sources of heat. Greenhouses can also utilize waste heat from the landfill gas project.
- **Local Farms (J)-** Local farms can utilize methane energy to heat greenhouses or dairy parlors and can land-apply nutrient-activated bio-char to improve the productivity of the soil. Local farms can also produce food that gets sold to markets in Oberlin that then cycle the food waste back into inputs for the farm. Local farms can also generate biomass crops that can be utilized by the bio-mass heater.

Viability of Organic Waste System

Critical to the success of a community-wide organic waste utilization effort will be financial viability. How will the labor and capital costs of such a system be covered?

Connected to this question will be a related question of ownership. Who will ultimately "own" the community composting system and be responsible for its successful development and operation?

There are five different potential ownership options for the composting process:

1) **Private, For-Profit Business-** A private business leverages capital and operates the composting system as a for-profit business, charging tipping fees to commercial or institutional generators of waste and sale of the finished product to local farms or other users.
2) **Non-profit Social Enterprise-** A non-profit organization operates the compost facility, leveraging grants for system development and emphasizing education and community engagement in the composting process. A non-profit organization needs to operate a viable system that covers operating expenses over the long-term.
3) **Community Cooperative-** Businesses, institutions, and end-users form a cooperative and leverage collective capital and possible community investments to create a community-owned facility.
4) **Municipal Facility-** The City of Oberlin operates the composting system as a municipal facility, drawing from fees charged to residents or businesses in the community to maintain operations.
5) **Local Farm Enterprise-**A local farm develops the composting facility as a farm-based enterprise, utilizing waste generated by the facility as direct inputs to the farm or through sales to the general public.

Given these options, the most viable approaches for the Oberlin community would be development of a Community-Cooperative or a Local Farm Enterprise. Given the experience of other composting facilities, the organic waste stream generated by the Oberlin community alone is unlikely to be at the volume needed to sustain a commercial enterprise. Also, the more likely markets for compost generated from a commercial facility will be landscapers or urban homeowners, will be less likely to be able to afford the costs of compost compared to other available inputs. A non-profit organization could be a useful partner in the development of education, training, and promotion of composting in the community, but might lack the capacity to manage and operate such a facility. The city, confronted as any municipality with significant financial challenges, is unlikely to have the resources to support operation of a compost facility.

A cooperative system holds a couple of advantages. First, it would help to leverage the collective assets of critical food system stakeholders and could provide a more effective structure for involving student volunteers or workers. It could also leverage potential financial capital from members who would all have a stake in the success of the operation. Businesses and institutions might have avoided costs of disposal (although a tipping fee would still need to be administered) and would be directly investing their waste streams into a supply chain that would provide them with locally grown food. End-users would benefit from the increased availability of compost or energy that could then benefit the productivity of their operations. End-users could include farms, urban gardens, or households.

Alternately, a farmer-owned model could provide another approach. Pork-Q-Pine farms in Delaware, Ohio operates a commercial-scale compost facility that accepts food waste from around the greater-Columbus area. The compost operation is an enterprise embedded in their hog farm operation and some of the solid waste stream (shredded office paper and newspaper) provides bedding for their hogs. A local farm could assume responsibilities for operating the compost facility as a part of a larger farm operation. As with Pork-Q-Pine farm, a portion of compost could be provided as a tax-deductible donation to support urban farms, particularly those with a social-service or food access orientation.

Next Steps and Recommendations

NETWORK BUILDING ACTIVITIES:

A group of stakeholders who participated in the composting summit met to review the results of the summit and came up with the following five next steps for developing a community effort in Oberlin.

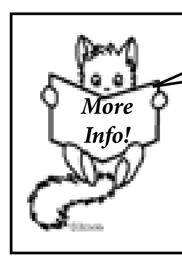
1) **Waste to local food model-** Establish the central organizing goal for the project as an effort to link food waste collection and processing to the enhancement of local farms.
2) **Zero Waste Ordinance for the City of Oberlin-** Work with the City of Oberlin to develop a zero-waste ordinance, modeled on other cities such as San Francisco, as a long term goal of diverting all forms of solid waste to another use (recycling, re-purposing, composting, etc.)
3) **Feasibility Study-** Jeff Baumann, Oberlin's Public Works director, organized an outline for a potential feasibility study that could more accurately assess the feasibility of a composting operation in Oberlin. The feasibility study would cover:
   - **a.** **Feedstocks-** Review of public, institutional, private-sector, and residential waste, estimated carbon-nitrogen ratios of waste streams, and costs of current disposal methods.
   - **b.** **Collection System Scenarios-** Development of collection schedules, storage and containment, loading and transfer equipment, and capital and operating costs of collection system.
   - **c.** **Class II Compost Site-** Identification of potential site locations, capital requirements, permit administration, and operation/maintenance costs
   - **d.** **Business Plan Development-** development of viability plan that covers markets, local value of compost, estimated quantities, probable demand, sales, comparison with conventional disposal costs, projected revenues to meet expenses, and annual and five-year budgets.
   - **e.** **Options for Organizational Structure-** Consideration of potential ownership and operations/management options, including public, private, non-profit, public/private, public/non-profit, or cooperative
   - **f.** **Final Report-** Final report of business plan, organizational recommendations, and next steps.

LOCAL INVESTMENT ACTIVITIES

4) **Third party structure options-** Further consideration of potential stakeholders that might be owners or potential operators of a compost facility and review of organizational structures developed in other communities.
5) **Funding/Capital-** Review of potential sources of funding, including government, private sector investment, or philanthropic.

URBAN DESIGN

6) **Waste to Food Hub-** Pursue development assessment for waste-to-food-hub to combine composting, bio-digestion, and waste-heat capture for greenhouse production.
7) **Connect with Future Developments-** Include organic waste utilization as a part of future developments in the Oberlin community, such as the hotel and Green Arts District or a local food hub, each of which will increase the available supply of organic materials that could be used for compost or energy.



Click me to access more documents that detail Oberlin's rich history of composting along with some other useful information!

Return to Table of Contents

CORE ACTIVITY AREA #3- URBAN AGRICULTURE

In the past decade, urban agriculture has become an increasingly wide-spread practice in cities both large and small. For cities like Cleveland or Youngstown, urban agriculture has emerged as a productive utilization of large inventories of vacant land resulting from a 50% or greater loss of population since the 1950's. Even large cities like Toronto or Chicago, which lack large vacant land inventories, still have an active urban agriculture scene. As a small-town with about 380 acres of vacant land, Oberlin can look to urban agriculture as the first and most important step toward achieving a 70% localization. Through a more active promotion of food cultivation within city boundaries, Oberlin can increase its supply of healthy, locally grown foods while improving quality of life on campus and in neighborhoods.

The first and most critical step in developing a 70% localization of Oberlin's food supply centers on maximizing the capacity for local food production within the city limits of Oberlin. While building relationships with farmers throughout the six-county area that defines the Oberlin foodshed will be critical, Oberlin has an opportunity to develop pathways for becoming more self-reliant in its own food production. Urban agriculture can foster both informal and formal economic opportunities for residents, businesses, and institutions in Oberlin. The informal economy includes food that people can grow for their own consumption or for sharing with family, friends, or neighbors. This includes backyard gardening, urban homesteading, or community gardens. There are also opportunities for more formal economic activities, including urban market gardens or learning gardens that sell food to local markets. Urban agriculture represents the lowest hanging fruit for food localization and the first point of entry for many residents to become active producers for the local food system. Initiatives that encourage backyard gardening, for example, allow residents to utilize assets already within their control to increase their own food supply. Active backyard gardening can expand the skill base of experienced growers, providing opportunities for backyard gardeners to transition to market gardening or initiate small businesses around local food processing.

Definitions for urban agriculture vary widely. For the purposes of this report, urban agriculture can be described as cultivation of food within city limits for consumption within the city. Forms of urban food production include:

• **Home Gardening/Urban Homesteading** involves individuals or families raising food for themselves, to share, or to sell on front yards, backyards, side yards, rooftops, window boxes, or inside.

• **Community Gardens** provide common spaces where individuals, families, or groups operate an allotment of land to grow food for themselves to increase fresh food access, reduce monthly food budgets, spend time outdoors, engage in physical activity, or connect with neighbors.

• **Market Gardens** produce food on urban land for sale to local markets, including farmers' markets, Community Supported Agriculture shares, restaurants and cafés, or other urban markets. Land for market gardening can be done on privately-owned property, leased parcels owned by others, institutional land (often as a part of a social or educational program), common land designated for agricultural purposes, or cultivation of vacant lots or land-bank properties.

• **School or Learning Gardens** can include school gardens connected to a formal curriculum, institutional gardens incorporated into a training or wellness program, or more informal learning spaces dedicated to demonstration and neighborhood education. Food grown at learning gardens can provide earned income to support the garden and its educational mission or it can be donated to community banks or to support a social program.

• **Aquaculture** represents one of the most efficient systems for producing protein in a limited amount of space. Aqua-ponic systems combine fish and hydroponic vegetable production, utilizing nutrient-rich fish emulsion as a fertilizer for plants.

• **Rooftop Agriculture** supports intensive agricultural production on flat-roof spaces, often utilizing container gardens, hydroponic systems, greenhouse enclosures, or "stacked" or vertical systems of growing.

MODULE	MAINTENANCE INTENSITY	LAND INTENSITY	LAND-USE TYPES
Annual Organic Vegetable Gardens	High	Low to Medium	Home gardens, city land, institutional land
Organic Fruit Production	Low	Medium	Home gardens, city land, institutional land
Mixed Urban Livestock/Vegetable and Fruit	High	High	Home gardens (1/4 acre or more)
Permaculture/ Food Forests	Low	High	Home gardens (1/4 acre or more), institutional land, city land
Native Habitat	Low	Low to High	Homes, institutional, city
Greenhouses	High	High	Home, institutional
Compost/Energy Production	Medium	Low to High	Home, institutional, city
Rooftop Production	High	High	Private businesses or land owners
Hydroponic	High	High	Home, institutional, private business
AquaPonic	High	High	Home, institutional, private business

Return to Table of Contents

• **Urban Farm Districts** include clusters of multiple parcels of land to support more extensive farming, including livestock or commercial composting. Urban farm districts can include zoning more favorable to agricultural production and are often ideal in areas with extensive residential or commercial vacancy.

Urban agriculture has emerged in the last decade as a productive utilization of urban land, particularly in cities like Detroit or Cleveland that have large inventories of vacant land. However, urban agriculture can also be common to more densely populated cities like Toronto, Ontario. Urban agriculture provides a number of amenities to city dwellers, including:

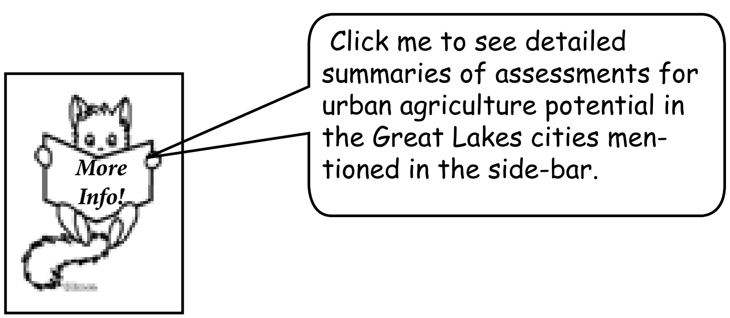
• **Bio-Diversity**- Unlike their rural counter-parts, urban farms frequently feature a diverse range of crops, often including a blend of annual and perennial fruits and vegetables and small livestock. This mix of plants supports greater diversity in diets and also provides additional habitat for a variety of birds, amphibians, reptiles, insects, and mammals.

• **Stormwater Mitigation**- Because of a large amount of impervious surfaces (such as asphalt or turf-lawn), most cities face challenges with stormwater run-off which contributes to flooding, erosion, and water pollution. A well-managed urban farm will have a higher percentage of organic matter in the soil which can absorb and store storm water, releasing it slowly into the environment and, if stored and captured, easing irrigation demands.

• **Public Health/Food Access**- Urban food production provides immediate access to healthy fruits and vegetables, especially in urban neighborhoods considered “food deserts” where residents lack convenient access to fruits and vegetables or other whole foods that comprise a healthy diet.

• **Re-Use of Organic Waste**- With higher population densities, cities generate a high volume of organic wastes. Urban farm sites can turn organic waste streams into productive inputs to increase the urban food supply. A number of common organic wastes to boost fertility and soil organic matter content include: leaves, wood mulch, grass clippings, newspapers, cardboard, recycled paper, food waste, coffee grounds, or micro-brewery or distillery waste. These materials can be composted on urban farms or even layered into raised beds to quickly boost fertility in otherwise compacted and infertile urban land.

• **Social Fabric**- Urban agriculture often creates stronger networks between neighbors. Community gardens increase security, reduce litter, promote mixing between diverse age groups and ethnicities, and increase social activity within neighborhoods.



CAN CITIES FEED THEMSELVES?

To understand the potential for vacant land to be utilized for urban agricultural production, Oberlin can look to neighboring cities like Detroit, Cleveland, Toronto, and Chicago to see some of the innovative approaches that these cities are taking to convert vacant lands into assets for urban food production. A number of studies and projects have looked at the capacity for these cities to feed themselves through urban food production. Here are examples from these Great Lakes cities:

CLEVELAND- Ohio State University researcher Parwinder Grewal conducted a study to determine if Cleveland could achieve self-reliance in the provision of several key foods. In this city of 430,000, there are 18,345 vacant lots which adds up to 3,414 acres of vacant land. The study focused on vegetables, fruits, chickens, and honey- all suited to urban production. His study concludes that if 78% of available vacant land, 7.2% of every occupied residential parcel, and industrial or commercial rooftops were utilized, Cleveland could provide 46-100% of produce, 94% of poultry and eggs, and 100% of honey. This assumes preservation of produce for winter months and 6 chickens per city parcel as stipulated by the city’s chicken legislation.

DETROIT- A study by Kathryn Colasanti and Michael Hamm looks at the capacity for self-reliance in fruits and vegetables in Detroit, a city of 835,000 residents and 44,000 vacant properties. Their study compared actual consumption levels to the recommended daily intake of fruits and vegetables. It also considered scenarios for storage and season extension and intensity of production methods (conventional row crops versus bio-intensive). They conclude that about 76% of vegetables and 42% of fruits could be supplied year-round on 2,014 acres of land using bio-intensive methods. By contrast, the same level of production using standard commercial methods would require 12,067 acres of land.

TORONTO- Unlike Cleveland or Detroit, Toronto is a much more densely populated city of 2.5 million residents that does not have a high inventory of vacant land. A study looked at whether or not 10% of fresh vegetable requirements for Toronto residents could be met within the city, considering organic production without season extension or bio-intensive methods. Their study concludes that the 5,725 acres needed to meet this demand could be met through utilization of about 2,652 acres from land currently zoned for food production (Toronto has urban agriculture zoning) and 25% utilization of roof-tops suitable for production.

Applying this to Oberlin, about 76% of its vegetable needs and 42% of its fruit needs could be produced on 121 acres utilizing storage and season extension techniques and standard commercial row crop production. However, under the most advanced bio-intensive scenario, the needed land area would shrink to about 20 acres. Either production scenario fits within the available vacant land area that exists in Oberlin now. High bio-intensive agriculture methods follow Jon Jeavons Square Foot gardening techniques which maximize production through cold frames or greenhouses, succession planting, inter-cropping, and vertical or stacked production.

Return to Table of Contents

• **Local Economy**- Urban farm sites benefit the local economy by enabling individuals to grow their own food to stretch their income for other priorities, supplement income, create low-wage employment opportunities, introduce skills of entrepreneurship, and reduce municipal expenditures on the maintenance of vacant properties.
• **Rural Communities**- Urban agriculture also benefits rural farmers. As urban agriculture activity increases, it improves markets for locally grown foods. City farmers have greater familiarity with neighborhoods and businesses and can collaborate with rural farmers to improve their ability to access markets. In Cleveland, a number of farmers markets that serve rural growers have been initiated by urban farmers who have the time and social connections to get them going. Urban and rural farmers can also work together to create a larger mix of local food, with rural farmers able to produce certain products (like grazing livestock or squash) that require greater land area. Meanwhile, urban farms can specialize in greens, herbs, or small livestock more suitable to smaller and more intensive growing spaces.

Despite all of these benefits, urban agriculture still faces a number of barriers, including:
• **Temporary Land-Use**- Many city planners or economic development offices look at agriculture as the lowest value land-use when compared to residential, commercial, or industrial uses. Urban farm sites fall victim to the "highest and best-use" mentality that simply evaluates properties on the basis of their potential tax base or employment impacts. This fails to account for the number of social and environmental amenities that urban farms can provide. Urban agriculture should be considered a permanent land-use in appropriate areas that adds to the quality of life, health, and attractiveness of urban communities. In cities like Cleveland or Detroit, with a supply of commercial and residential land that exceeds demand, urban agriculture can be an effective response that meets a number of local needs.
• **Public Attitude**s- There is still a cultural perception that considers agriculture or farming as interfering with an orderly and efficient urban environment. For some urban residents, going back to farming seems almost uncivilized or impoverished. Fortunately, many of these perceptions are not founded and can be changed over time as urban agriculture adds to urban life in a number of positive ways.
• **Labor Intensity**- As a culture, we have relied on an increasingly large-scale, fossil-fuel intensive, mechanized system of agriculture. Urban agriculture requires continuous maintenance, physical labor, and time spent outdoors. Finding people willing to engage in physical labor and spend time outdoors can be a challenge, especially given that most urban activity takes place indoors.
• **Mis-Placed Expectations**- In a lot of cases, the idea of farming seems more appealing than actual act of farming. Farming requires a great deal of commitment and concentrated work. A number of urban farm sites have fallen into dis-repair or neglect as people have realized that they cannot commit to the amount of time required. Providing people with opportunities to learn more about urban farming or to have small spaces to gain practice can help to insure greater success. Cooperatives or collectives that include a larger number of individuals working together can also help to distribute labor and tasks, creating a mutual support system that works more efficiently than an individual working on their own.

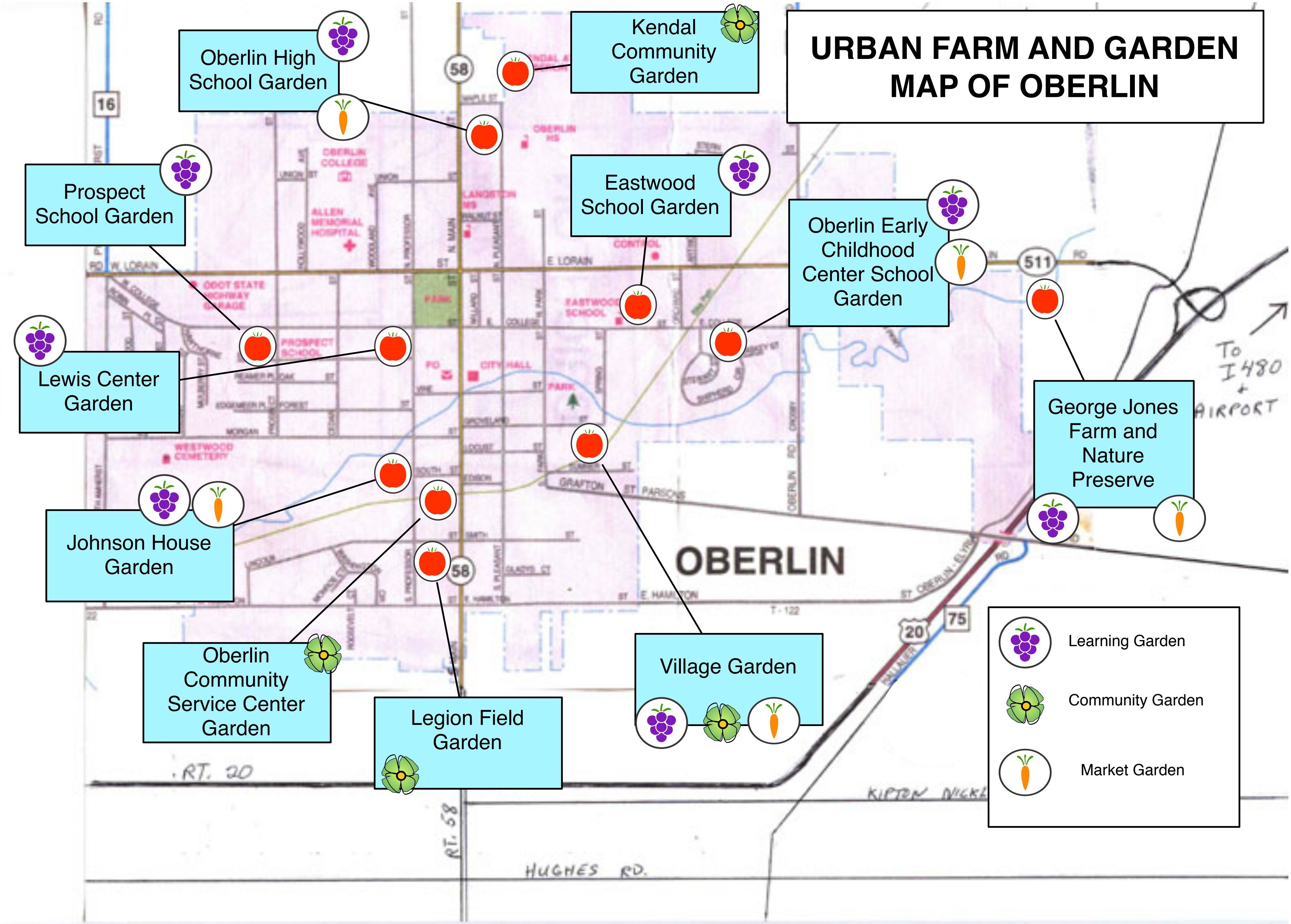
Overall, urban agriculture should be considered an essential component of sustainable urban design. A sustainable city will be walkable, safe, healthy, energy and resource efficient, and supportive of entrepreneurship, whether for individuals or groups. Incorporating urban agriculture into the long-term fabric of an urban center can provide a number of important amenities for the quality of life of a space. Neighborhoods with a vibrant urban agricultural system tend to be more visually pleasing, safer, and more socially connected. A vibrant local food scene can also make cities more enticing destinations for tourists, job-seekers, or for people looking for a place to settle.

OBERLIN URBAN GARDEN ACREAGE:

NAME OF GARDEN	TOTAL CULTIVATABLE ACRES	ACRES UTILIZED	OWNERSHIP
George Jones Farm	25	3	College
Johnson House Gardens	1	0.25	College
Environmental Studies Center	1.5	0.5	College
Legion Field Gardens	3	0.5	Municipal
Village Garden	0.75	0.75	Municipal
Community Service Center	0.25	0.25	Non-profit
Oberlin High School Garden	1	0.25	School
Prospect School	0.125	0.125	School
Eastwood Elementary School	0.125	0.125	School
Early Childhood Center	0.25	0.25	School
TOTAL	**32.5**	**6.75**	

Percentage of Gardens by Type	
College	30.00%
Municipal	20.00%
Non-profit	10.00%
School	40.00%
Percentage of Gardens by Acreage	
College	62.50%
Municipal	20.83%
Non-profit	4.17%
School	12.50%
Percentage Gardens by Total Acreage Available	
College	83.33%
Municipal	11.36%
Non-profit	0.76%
School	4.55%

Return to Table of Contents


URBAN FARM AND GARDEN MAP OF OBERLIN
Oberlin High School Garden
Kendal Community Garden
Prospect School Garden
Eastwood School Garden
Oberlin Early Childhood Center School Garden
Lewis Center Garden
George Jones Farm and Nature Preserve
Johnson House Garden
Oberlin Community Service Center Garden
Legion Field Garden
Village Garden
Learning Garden
Community Garden
Market Garden
OBERLIN
To I 480 + AIRPORT
RT. 20
RT. 58
HUGHES RD.

A Blueprint for Urban Agriculture for a Small Town

As Oberlin contemplates a growth of support for local food systems, it is useful to consider what percent of food Oberlin could actually grow for itself within city limits. To this extent, many of the same approaches can be taken to assess available vacant land, review production techniques, and estimate how much land would be needed to make the city more self-reliant in the provision of its own food.

With comparatively larger lot sizes than larger cities and a high interest among residents in local food systems, Oberlin has significant potential for home-based food production. Kitchen gardens provide a common use of backyard space, including small plots that contain a mix of perennial fruits and annual vegetables and herbs for use in home kitchens. Residents also maintain livestock in the city, including chickens, goats, or sheep. Livestock are allowable in Oberlin, but there is provision for nuisance complaints. Many homes also incorporate native landscaping, including rain gardens, backyard ponds or wetlands, native trees, and wildflowers. Residents also engage in food preservation, mostly canning, freezing, or dehydrating food for use in the off-season. Some older homes contain large basement pantries that were commonly used for storing preserved foods in the past.

Outside of urban homesteading, Oberlin has a diverse mix of urban agriculture projects, most of which utilize institutional land such as school properties, college land, or public housing. The majority of urban gardens in Oberlin have been established within the last 5 years. The accompanying graphic shows a map of locations of current urban agriculture projects in Oberlin. The map distinguishes three types of urban farming orientations:

- **Learning Gardens** have an education or learning focus;
- **Community Gardens** are utilized by people to grow food for themselves; and
- **Market Gardens** produce food for sale to local markets in Oberlin

Many gardens in the city combine more than one of the above features. For example, the Village Garden operated by the Oberlin Underground Railroad Society involves elementary school students who grow seedlings in classes, space for public housing residents to grow their own food, and food that is sold by high school youth to local markets. The George Jones Farm and Nature Preserve is also included on this list. The farm sits mostly within the City of Oberlin and, even though it differs from other urban gardens in scale and intensity, should be considered part of the urban land-base for Oberlin to feed itself.

Assessment of Current State of Urban Agriculture in Oberlin

The combined acreage of active urban gardening or farming space in the City of Oberlin is about 6.75 acres which represents 0.25% of the total land acreage in the City of Oberlin. Most of the urban garden projects utilize only a portion of the land area available to them, with a total of about 31.5 acres of land available for future cultivation. This represents only a 21% utilization of available space. It is important to note that much of the available space is located at the George Jones Farm. The acreage devoted to nature preserve at the Jones Farm is excluded, leaving about 25 total cultivatable acres. If the Jones Farm is excluded, there is presently about 6.5 acres of land presently utilized for urban gardening in Oberlin, with about only 3.75 acres in actual use, representing about 43% more area for future expansion of urban gardening.

The majority of urban farms in Oberlin are located on institutional land, including the college and the Oberlin Public School District. The college owns about 67% of the acres presently utilized for urban agricultural production and 86% of the total acreage currently available for urban agricultural production. Almost 20% of the land used for urban agriculture is owned by municipal entities, including the City of Oberlin and the Lorain Metropolitan Housing Authority. Schools occupy about 11% of the acreage used for urban agriculture and about 5% of the total available acreage. A small percentage of acreage is operated by a non-profit agency, the Oberlin Community Service Center.

In terms of the total number of urban garden projects, 70% are based at educational institutions with 30% of the projects operated through partnerships with Oberlin College and 40% operated through partnerships with the school district. Municipal gardens

Project	Ownership	Seasonality	Usage
George Jones Farm	Institutional land leasing to outside non-profit organization	Season extension through heated and unheated greenhouses	Direct and wholesale market sales
Oberlin High School Farm Collaborative	Institutional land devoted to institutional program	No season extension	Sales to high school cafeteria
Johnson House Gardens	Institutional land used by student group	No season extension	Donations and limited sales
Prospect Elementary School	Institutional land used by outside group	No season extension	Perennial Flowers, Limited Food Production
Eastwood Elementary School	Institutional land used by outside group	No season extension	Perennial Flowers, Limited Food Production
Zion CDC Legion Field Community Garden	Municipal land utilized by outside group and residents	No season extension	Self-consumption
Oberlin Early Childhood Center	Institutional land used for institutional program	No season extension, but seedling greenhouse	Use by school cafeteria with limited sales
Village Garden	Institutional land used by outside group	No season extension, but seedling greenhouse	Mix of self-consumption, market sales, donations
Oberlin Community Service Center	Institutional land used for institutional program	No season extension	Donation of food to clients served by agency
Lewis Center for Environmental Studies	Institutional land used for institutional program	No season extension	Self-consumption, donations

comprise 20% of the total garden projects and 10% from non-profit agencies. Excluding the Jones Farm from the land area, the college still includes about 40% of the acreage presently being utilized for urban agriculture with municipalities owning about 33% and the schools 20%. In terms of total available acreage, municipalities own about 42% of the total available acreage, much of it at the Legion Fields.

Some observations can be drawn about urban agriculture in Oberlin today and its future growth in the city. Solidifying partnerships with public schools and Oberlin College will be important to the growth of urban agriculture. As highlighted in this section, almost all urban agriculture in the city takes place on institutional or municipal land. Both the schools and the college have significant grounds that can be utilized for urban food production. This also reduces long-term maintenance costs and carbon emissions and pollution from lawn mowers. The Jones Farm, the Johnson House gardens, and the Oberlin High School gardens all sell food to their respective host institutions, increasing the possibility for these operations to become viable.

Given tight budgets, creating financially self-sufficient urban farms should not present a significant budget impact for supporting institutions. If done correctly, they will actually save institutions money while contributing to the local food supply and providing applied educational opportunities for students. In addition to their marketing function, these institutional gardens can become community learning centers, providing education and training to encourage greater home food production. For much of the 20th century, the Cleveland Public School system utilized school gardens as a part of a curriculum for youth as well as training and education for adults. The overall result led to significant urban beautification with both private and public spaces supporting extensive urban agricultural production. It is estimated that the school gardens in Cleveland produced $3 million worth of food annually.

Schools can also partner with urban farming projects away from the school grounds. For example, the Village garden on Spring Street provides a market garden space for high school apprentices who sell what they grow there to local markets. Eastwood Elementary school children also grow seedlings in classrooms for transplanting into the Village garden. They also participate in school field trips to the garden as well.

Discussion

Oberlin has a diverse number of urban agriculture initiatives with a wide-range of activities that integrate education, nutrition, family self-sufficiency, and market production. Each of the gardens has its own network of operators and volunteers, with limited overlap of volunteers between different gardens. The presence of the Jones Farm in the mix of urban farming spaces provides some lateral mobility with examples of individuals migrating from smaller garden projects to the more commercial-scale opportunities of the Jones Farm. Likewise, individuals have moved from experiences at the Jones Farm to initiate or work-on garden projects within the city. The Jones Farm offers an important asset in the community, both as a site to teach sustainable food production and as a location for individuals to transition from urban garden production to more commercial-scale farming.

When considering the growth of urban agriculture and the ability for the City of Oberlin to feed itself, the following factors should be taken into consideration:

- **Maximize Use of Current Available Acreage**- with the inclusion of the Jones Farm, only about 20% of the available acreage for urban farming is utilized. With the exclusion of the Jones Farm, there is still only about half of the total available space being utilized.
- **Intensify Use of Available Acreage**- Most of the production on urban farm sites focuses on annual vegetable crop production with minimal season extension. There are few perennial trees or shrub crops and, with the exception of the Jones Farm and Lewis Center, no livestock. Current acreage of urban agricultural production could be optimized through more diversified and intensified operations that blend annual and perennial production with small livestock.
- **Labor**- Labor remains the dominant limiting factor for all urban agricultural projects. Most projects are already working at their maximum with limited staff or volunteer resources. Many projects struggle with maintaining an adequate base of volunteers or participants to keep the gardens maintained and growing adequately. Any further expansion of current urban farming projects will require a much higher degree of participation among students and community residents.
- **Capital and Equipment**- The productivity of labor can be further enhanced through soil building, small-scale mechanization, and the use of advanced season extension techniques. However, the expansion of equipment or facilities to support more productive urban farming will require an initial investment of capital and a greater degree of collaboration between projects that might share equipment between sites.
- **Inventory Available Vacant Land**- An inventory of vacant land in the City of Oberlin can lead to a better assessment of the upper potential of food production within the City of Oberlin, but again, this potential for growing needs to be coupled with an expansion of participation among college and community members and a higher literacy for bio-intensive urban farming techniques.

VACANT LAND INVENTORIES IN OBERLIN

Agriculture	125
Commercial	60
Industrial	20
Residential	170
Tax-Exempt	5
TOTAL	380

VACANT LAND UTILIZATION IN OBERLIN

According to research done by Paul Boehnlein with the Western Reserve Land Conservancy, there are about 380 acres of vacant land in Oberlin, based on a review of land records available from the county auditor's office. Vacant land is considered land without a structure. Within Oberlin, the vacancy rates for land are 125 acres in agriculture, 60 acres commercial, 20 acres industrial, 170 acres residential, and 5 acres tax-exempt.

Return to Table of Contents

For residential land, there are about 170 total acres of vacant land within the City of Oberlin. If just 10% of this land area was utilized for urban agricultural production, it could make available 17 additional acres of combined production area within the city. Individual parcels would need to be evaluated in terms of access to water, sunlight, drainage, and other criteria. An assumption that 10% of available vacant land as optimal for urban agricultural production is a fairly conservative estimate.

According to Ohio State University, the 56 combined acres of land in Cleveland under cultivation through community gardens or market gardens generate between $2.6 to 3 million per year worth of produce. That represents a utilization of about 2% of the total vacant land available within Cuyahoga County. Average per acre yields at this scale would range from $46,250 to $53,570 per acre. It needs to be noted that these gardens are highly labor intensive and most community gardens range from about 1/8 to ¼ of an acre of land. However, this points to an enormous potential for growing the availability of local food through utilization of urban land.

Assuming that SPIN (Small-Plot Intensive) methods are utilized, there is an upward potential of generating between $50,000-120,000 per acre, depending upon crop selection, full versus part-time work, and season extension infrastructure. A 10% utilization of vacant land within the City of Oberlin, if managed at maximum potential, could capture between $800,000 to $1.9 million of local markets.

As the previous studies reveal, the feasibility of urban food production will be driven by the intensity of food production. Focusing on standard commercial row crop production or rectangular bed production for annual vegetables will require much greater land area to feed an urban population. Systems that involve more season extension and intensive production methods (producing more calories on a smaller footprint of land-area) hold greater potential for feeding Oberlin. However, these more intensive systems will require significant upfront investment in season extension, crop storage, soil building, and small-farm equipment. They will also require reliable labor for a greater portion of the year. Realizing the potential for Oberlin to feed itself will require the introduction of more advanced farming techniques, including mixing perennial crops into growing areas, incorporating urban livestock, encouraging permaculture or low-maintenance food forests in public parks, restoring native habitat, encouraging water gardening, installing more greenhouses or high tunnels, increasing composting, utilizing flat-roof space for intensive production, and introducing aquaculture.

Next Steps for Expansion of Urban Agriculture in Oberlin:

Reviewing the potential for urban agriculture in Oberlin, the available land resources exist to support a significant amount of agricultural production within the city. There is also significant market potential for households, institutions, and businesses looking to source food locally. The most significant challenges include: finding leadership, willing labor, and raising the skill-level to encourage high-yielding, bio-intensive farm systems. The following next steps can be considered to begin to expand urban agriculture activities within Oberlin:

NETWORK BUILDING ACTIVITIES

1) Develop Learning Infrastructure to Advance Urban agricultural techniques. Work with formal and informal educational partners to develop workshops, mentoring, and formal classes that raise the ability of urban growers to increase production on the same given land area. Courses should focus on such techniques as bio-intensive, square-foot gardening, SPIN (Small Plot Intensive or SPIN) farming, permaculture, greenhouse management, cold frames, urban livestock, and bio-intensive shelter design. Use the following techniques to raise the collective literacy of advanced urban farming techniques:

a. Neighbor-to-Neighbor or Peer-to-Peer networking and mentoring to encourage more collaboration and information sharing at the neighborhood or peer-group scale.

b. Utilize digital media to highlight particularly successful or innovative urban farming techniques and broadcast them through a variety of social media channels. A “garden-of-the-month” contest city-wide could highlight some of Oberlin’s most green thumbs and spread ideas for successful gardening. These could be produced by high school and college students through the Apollo project or Cinema Studies Program.

c. Organize intensive learning workshops drawing on the expertise of regional, national, or international practitioners. Offer workshops either for credit as a part of the LCCC sustainable agriculture certification or other accredited programs.

d. Develop applied courses in intensive urban agriculture at LCCC’s sustainable agriculture certification program, the Joint Vocational Schools, or Oberlin College’s Environmental Studies Program.

2) Establish a position for an urban agriculture trainer that can be housed in Oberlin and shared between a number of gardening efforts. This person would be available to assist with urban agriculture projects in Oberlin, focusing efforts on training, technical assistance, and education.

3) Organize a community network of individuals engaged with urban agriculture that can provide input into educational priorities and needs. This group can also help to organize labor for urban agriculture, including mutual aid support groups (urban gardeners helping other urban gardeners) or community volunteers (students or others volunteering time to help with urban agriculture projects).

4) Create a community map as a part of the bio-regional dashboard that identifies urban farming sites throughout the city.

LOCAL INVESTMENT ACTIVITIES:

1) Work with community composting initiative to facilitate transfer or municipal leaf

mulch or other materials that can be utilized to condition soils and build the productivity of urban farm sites.

2) Develop a local investment fund that includes growth and expansion of urban agriculture, mostly focused on infrastructure development such as water collection systems, food storage, greenhouses, soil development, equipment purchases, and other investments that could raise the productive capacity of land in the city.

URBAN DESIGN

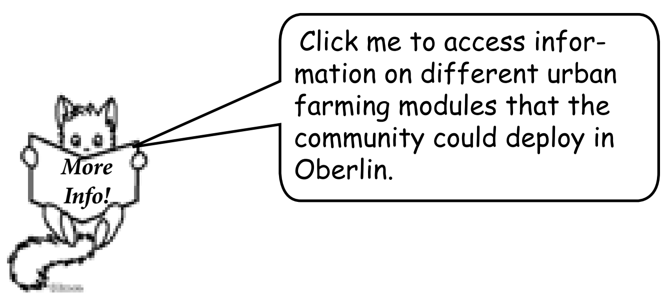
1) Work with city government to assess the usefulness of the following changes in zoning code to better support urban farming within the city:

a. County Land Bank for Vacant Parcels- Work with Lorain County land-bank system (in the process of development) to provide a land-bank for vacant parcels in Oberlin. Develop urban agriculture and market gardening as acceptable temporary or permanent uses of vacant land.

b. Urban Farm Zoning- Develop new zoning category for urban agriculture that can enable individual parcels to be zoned for agricultural use. This enables properties to be permanently designated for agricultural use, protecting them from future development.

c. Urban Farm District- An urban farm district will involve a greater acreage of urban land, often including multiple vacant parcels clustered in a common area. Urban farm districts can involve larger livestock or compost operations that might be more difficult to do in more densely populated neighborhoods. Urban homesteads that include agricultural land can also be enticing for people that want to farm.

d. Urban Edge Commons- Acquire and hold land on the urban edge (within 1 mile of Oberlin city limits) that can be designated as permanent agricultural land or green space. Land can be developed with infrastructure for agriculture and then leased to individuals, businesses, or groups that utilize the land to support the local food economy. Ownership stays with a land conservancy or other appropriate land-holding entity.



CORE ACTIVITY AREA #4- Returning Balance to the Carbon Cycle

Food localization efforts in Oberlin need to consider both reductions in greenhouse gases resulting from the production, processing, transport, and consumption of food in combination with maximizing the carbon storage and sequestration capacity of local soils and plant biomass. This involves approaches to food and farm production that promote efficiency of energy-use in all on-farm, transportation, and storage systems; utilize renewable energy and fuels to support food and agriculture enterprises; develop waste to energy applications, such as bio-digestion of food or animal waste or utilization of waste vegetable oil as an alternative fuel; and deploy "carbon farming" methods, which include a package of farm management techniques that maximize carbon storage and sequestration.

A 2009 report issued by the World Watch Institute in collaboration with Eco-Agriculture Partners identifies a range of options for mitigating climate change through changes in food systems and land-use policy. The report, titled *Mitigating Climate Change through Food and Land-Use,* emphasizes the important role that the food and farm sector can play in both reducing carbon emissions and sequestering atmospheric carbon. Many climate mitigation projects focus mostly on greenhouse emission reduction with a focus primarily on energy-use, buildings, and transportation. The Clinton Climate Initiative, does not list food systems among its list of strategies for addressing climate change challenges. The exclusion of food or land-use is also common to many international climate change negotiations where, according to the WorldWatch report, "there is considerable resistance to expanding the scope of land-use related climate mitigation activities beyond certain types of forest conservation."

The Oberlin Project is uniquely situated to leverage terrestrial carbon sequestration as fundamental to advancing local food systems in addition to off-setting greenhouse gases by the city of Oberlin. "Terrestrial carbon" refers to the carbon that is stored or moved through soil and biomass. While policy and strategy discussions about climate change focus on the energy and transportation sectors, the role that terrestrial carbon plays as both a problem and potential solution to climate change needs to be considered.

Terrestrial Carbon and Climate Change

Popular perceptions of climate change often focus on addressing coal-fired power plants, car-choked highways, or inefficient, fuel-hungry vehicles. While these are significant contributors to climate change, more attention needs to be given to the relationship between land-use and climate change. Globally, land-use and land-use changes account for about 31% of the total human-induced greenhouse gases in the atmosphere. Land-use changes lead to the release into the atmosphere of all three forms of greenhouse gases: carbon dioxide (77%), methane (14%), and nitrous oxide (8%). Common sources of greenhouse gas emissions resulting from land-use changes include:

- massive clearing of forests and peat lands for agriculture, often by burning;
- the decay of plant matter resulting from clearing;
- utilization of tillage which disturbs the soil profile, leading to the oxidation of carbon stored in soil organic matter (oxidation refers to the process by which soil carbon is exposed to atmospheric oxygen to be released into the atmosphere as carbon dioxide);
- the release of nitrous oxides from the application of nitrogenous fertilizers, common to most agriculture;
- methane release from water-logged rice patties; and
- methane release from rumens (cattle, goats, sheep) from both digestion and manure decomposition.

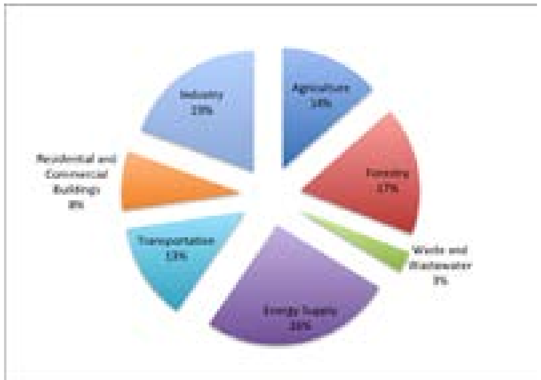
The chart below lists the annual emissions of the three primary greenhouse gases from some of the land-use impacts mentioned above:

LAND-USE	ANNUAL EMISSIONS (million tons CO2 equivilant)	Greenhouse gas emitted
Soil fertilization (inorganic fertilizers and applied manure)	2,100	Nitrous oxide
Gases from food digestion in cattle (enteric fermentation in rumens)	1,800	Methane
Biomass burning	700	Methane, nitrous oxide
Paddy (flooded) rice production	600	Methane
Livestock manure	400	Methane, nitrous oxide
Other (e.g. delivery of irrigation water)	900	Carbon dioxide, nitrous oxide
AGRICULTURE TOTAL	**6,500**	
Deforestation for agriculture and livestock	8,500	Carbon dioxide
TOTAL RELEASES	**15,000**	

Land-use and the combustion of fossil fuels (including oil and coal) comprise the two major contributors to the accumulation of carbon in the atmosphere. The graph below lists direct impacts from agriculture, the dominant form of land-use in the world. Agriculture is listed here as contributing 14% of global carbon emissions, which captures only releases from direct agricultural production. Climate change impacts from farming comprise only a portion of the overall climate impacts of our food system.

The increasing globalization of the food system over the past fifty years has been made

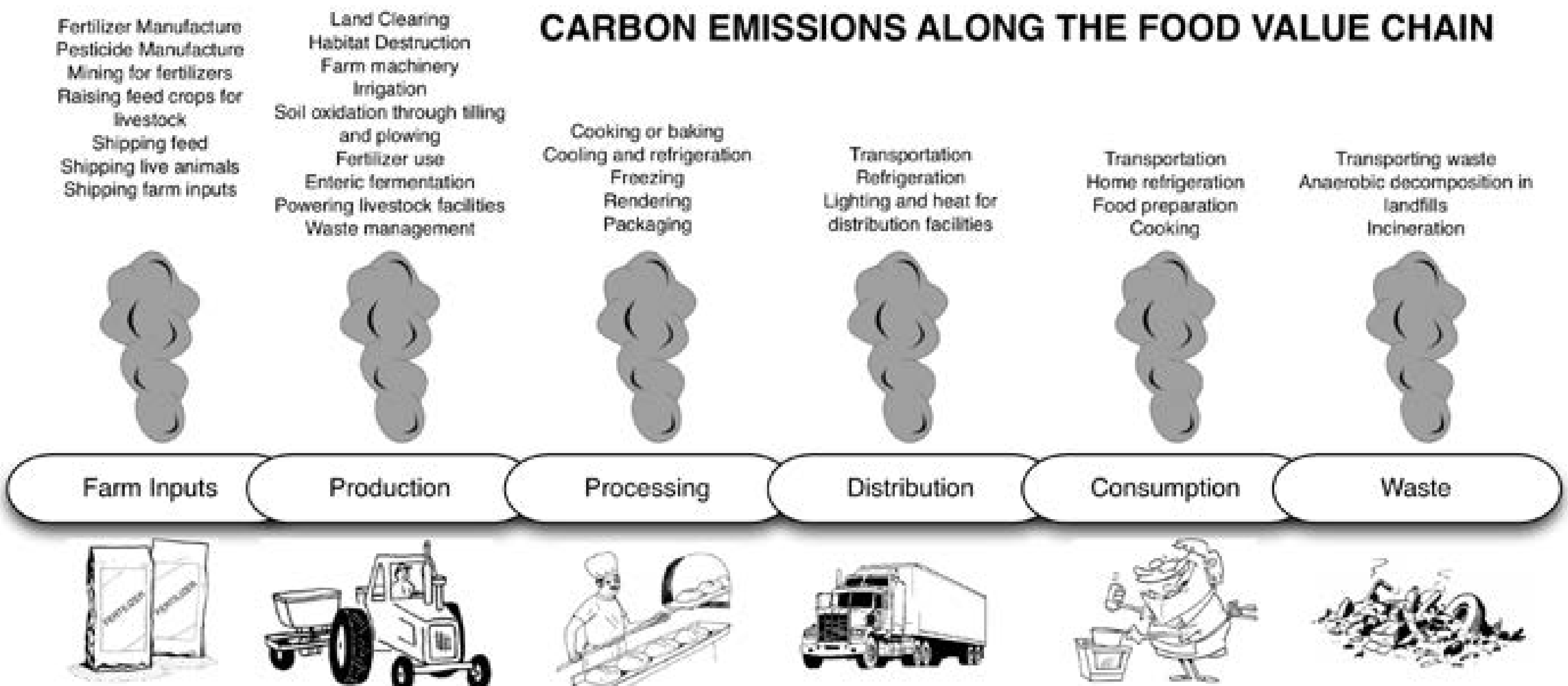
Share of Global Carbon Emissions by Sector



possible through the expansion of energy, manufacturing, and transportation sectors. The below illustration is based on information from the International Panel on Climate Change, which breaks down the emissions of carbon dioxide by sectors

As the graph indicates, about 31% of global carbon emissions can be traced back to agriculture or forestry, the two sectors tied to land-use. Anna Lappe, in her book *Diet for a Hot Planet*, notes that the climate impacts of food do not end with land-use. She writes, “Hiding in the IPCC breakdown, though, are the ways in which the food system is connected to climate change within nearly every sector of our economy.”

Lappe points out that direct agricultural production is just the first in six steps along the food value-chain that gets food from the farm gate to the dinner plate. Climate impacts result from the extensive transportation of food over long distances (an average of 1,500 to 2,500 miles), food processing and manufacturing to prepare it for long-distance shipment, refrigeration, packaging, transportation, cold storage at food outlets, home cooking, and finally, disposal of food waste. Additional consideration needs to be given to the large amount of energy embodied in manufacturing and distribution of farm



*Sources: *Diet for a Hot Planet* by Anna Lappe © 2010 and the Food Climate Research Network inputs, including chemical fertilizers, pesticides, and equipment.

In her book, Lappe presents a chart, adapted from the Food Climate Research Network, that contains the climate impacts occurring in every stage of the food chain. The chart below depicts the sources of emissions along the food value chain: production, land-use, food processing, storage and transportation, food preparation, and waste disposal.

The Carbon Cycle

The Worldwatch report on "Mitigating Climate Change through Food and Land-Use" discusses the importance of understanding the carbon cycle, a natural cycle of re-circulation of carbon through the atmosphere, soil, and plant biomass.

Terrestrial carbon refers to the carbon stored in soils and plant biomass. Since land makes up a quarter of the earth's surface, soil and plants hold three times as much carbon as the atmosphere. About 1,600 billion tons of this carbon is stored as soil organic matter and 540-610 billion tons is stored in living vegetation contained in forests and grasslands. Overall, the volume of carbon on the earth's surface and atmosphere is only a tiny fraction of the trillion tons of carbon stored beneath the surface of the earth in the form of sediments, sedimentary rocks, and fossil energy.

Carbon is a highly mobile compound and the earth naturally re-distributes carbon through the natural processes of growth and decay. Plants absorb energy from the sun to photosynthesize atmospheric carbon dioxide and water to produce complex sugars necessary to life. Plants remove carbon from the atmosphere and store it in soils, vegetation, and bodies of animals that feed on the vegetation. Plants, animals, and organic matter release carbon dioxide back into the atmosphere through digestion, respiration, and decay.

Our present economy operates largely through the mass extraction of underground carbon, utilization of the stored energy, and release of carbon into the atmosphere as a by-product of this process. The past two centuries of industrialization have involved a mass transfer of carbon from the ground to the atmosphere, fundamentally changing the bio-chemistry of the atmosphere. Economic growth also tends to accelerate massive land clearing and agricultural tillage, further moving terrestrial carbon from soil and plant matter into the atmosphere.

There is a dynamic equilibrium between the release of carbon through natural processes of decay and respiration and the re-absorption of carbon through photosynthesis or storage in soil organic matter. The disruption of this natural carbon cycle and the rapid alteration of the bio-chemistry of the atmosphere drives climate change.

Climate Change Impacts on Agriculture and Food Systems

The emergence of agriculture over the past 10,000 years has corresponded with relative climate stability common to the Heliocene era. The rapid accumulation of carbon in the atmosphere resulting from human activity has created a climate "forcing", which refers to an event or activity that fundamentally alters the climate regime. As noted in Bill McKibben's book *Eaarth*, we are at a transition point into what is referred to as the "Anhtropocene" era, influenced by the alteration of the climate by human activity, and the resulting changes on the world's biotic systems.

We already see many of the effects of climate change which will only continue to intensify over time as concentrations of greenhouse gases rise. Climate change will have a significant effect on the conditions necessary to support the stability of agricultural systems, including changes in severe weather events (drought, floods), destructive storm events, disease and pest outbreaks, and the productivity of land.

To be effective, any climate change mitigation strategy needs to develop solutions that address terrestrial carbon, including reducing greenhouse gas emissions from land-use practices and facilitating greater carbon sequestration, and storage. Carbon sequestration, in addition to reducing carbon accumulation in the atmosphere, also generates a number of positive benefits to agriculture. Increased soil organic matter (soil carbon) improves soil tilth, nutrient storage and exchange capacity, water infiltration and storage, micro-organism activity, and overall plant productivity. Rather than a sacrifice, methods that increase soil carbon comprise an investment in local agricultural productivity.

To be resilient, a local food system needs to address the following:

EXTREME WEATHER IMPACTS U.S. AGRICULTURE IN 2012

As the USDA declared 1,000 counties as a part of a disaster area due to prolonged and intense drought, the following headlines in just one week indicate the dramatic effect that a changing climate can have on the stability of agriculture:

No Relief in Sight- Corn in Northwest Ohio is Suffering in fields- moderate to severe drought reported across state

Farmers concerned with lack of rain for crops- growers forced to irrigate fields to save harvest

Symptoms and effects of water stress on soybeans- plant in fields showing indications of lack of precipitation

USDA: Corn in 18 states hurt by drought- prices surge as crops continue to be scorched by weather

Drought watch… soil moisture levels lowest in century- supplies already very tight, could see prices soar

Extracted from Ag Clips, Buckeye Edition, July 11, 2012.

Return to Table of Contents

- **reduction in greenhouse emissions** connected to the production, distribution, processing, consumption, and disposal of food;
- maximization of **terrestrial carbon sequestration** and storage; and
- development of **resiliency in agricultural production systems** to increased variability and climate extremes.

The WorldWatch report identifies the following five areas of focus for the development of food systems that mitigate climate impacts:

- **Enriching Soil Carbon**- Agricultural systems can reduce their carbon emissions by minimizing invasive tillage, reducing or eliminating the use of nitrogen-based fertilizers, and preventing soil erosion. These techniques not only reduce the emission of greenhouse gases, but they also increase the carbon storage capacity by building soil organic matter or plant biomass. Bio-char is a by-product of biomass combustion in pressurized, low-oxygen environments- a process called pyrolysis. Pyrolysis extracts energy from biomass material, but stores carbon in condensed form, like charcoal. The production of bio-char eliminates greenhouse gas emissions resulting from biomass energy production. Bio char also provides a promising soil amendment, storing carbon in soil and improving its overall productivity.
- **Perennial Agriculture**- Perennial crops produce a number of benefits for both reducing carbon emissions and improving sequestration possibilities. A perennial cropping system does not require regular tillage. Perennial plants store significant carbon in wood biomass and roots while providing more permanent ground-cover to limit soil erosion or oxidation of organic matter. Perennial crops can be useful for animal feeds, energy crops, or oils. They can also be included in annual cropping systems by providing wind breaks or field boundaries.
- **Climate-friendly Livestock Production**- A rise in world-wide demand for livestock products has greatly increased the number of animals, the concentration of livestock operations, the generation of waste, and the clearing of natural habitat for grazing. A number of innovations can reduce these impacts, including rotational grazing (which involves brief concentrations and continuous movement of livestock across a series of pastures), better manure management, bio-gas production from waste manure (instead of direct land-applying manure), and improved feeds that contribute to more efficient digestion.
- **Protecting Natural Habitat**- The 4 billion hectares of forests and 5 billion hectares of grasslands in the world provide an extensive reserve of carbon both in vegetation and below-ground root systems. Growth of ecological reserves removes carbon from the atmosphere. Land clearing and both natural or human-induced fires release significant carbon into the atmosphere. Incentives and best-management practices can lead to the incorporation of natural vegetation and habitat areas in farms. This will also benefit biological diversity as well.
- **Restoring Degraded Watersheds and Rangeland**- Poor land management practices have degraded the productivity of lands throughout the world. This has a long-term impact on communities that could benefit from the responsible stewardship of land and water resources. Restoration of vegetative cover, improvement of soils, and restoration of habitat reserves can help to restore degraded lands while providing a more sustainable base for rural communities dependent upon land and water resources for their livelihoods.

As the Oberlin Project looks to identify a 20,000 acre network of productive land to feed a local food system for the greater Oberlin area, a number of the above-mentioned strategies could be deployed to mitigate the carbon footprint of the local food system. Additionally, these strategies can be incorporated into a larger effort to off-set the greenhouse emissions of the college and city.

Local Food Systems and Climate Neutrality for Cities

A central focus of the Oberlin Project is the development of a city-wide effort to achieve climate neutrality or, even further, creation of a climate positive community that sequesters more carbon than it releases into the atmosphere. The incorporation of local foods and land-use in the overall strategy for Oberlin opens a variety of opportunities for the city to collectively impact its own contributions to climate change. In the process, it can also serve as a demonstration that can be replicated in other communities in Northeast Ohio or the broader Great Lakes region.

A local food systems development strategy should couple local food systems growth with reductions in carbon emissions and sequestration in soils. A 70% shift should include partnerships with agricultural producers and local food businesses committed to best practices that minimize emissions and maximize sequestration. Households, institutions, and businesses in Oberlin can invest in and support food production systems that mitigate climate change impacts. This would result in a carbon off-set strategy that actually stimulates the local food economy.

Oberlin can employ some of the below strategies to leverage local food systems development in a broader effort to minimize its climate impacts.

- **Maximize Urban Agriculture**- Maximize the potential for growing food within the City of Oberlin itself, increasing community participation and implementing advanced models of bio-intensive, urban food production.
- **Organize a Producers Network**- Leverage the buying power of businesses and institutions to support growth of existing and new food and farm entrepreneurs selling directly to the college. Work with these producers to encourage tillage tech-

Return to Table of Contents

niques, vegetative cover, perennialization, rotational grazing, and habitat restoration to increase the carbon storage capacity of area farms.

- **Education and Training**- Develop the educational resources through both informal and formal educational channels to identify and implement best practices for climate-friendly farming;

- **Household Engagement**- Work with residents to encourage backyard and urban food production while increasing market demand for area farmers;

- **Local Food System Infrastructure**- Maximize the energy efficiency and use of renewable energy in all activities related to food processing, storage and distribution, including alternative fuels, bio-gas generators running off of urban organic waste, highly insulated storage facilities, and energy efficient appliances and vehicles.

- **Carbon Fund**- Develop a local investment fund that can enable local producers to invest in the equipment and facilities needed to support carbon farming methods.

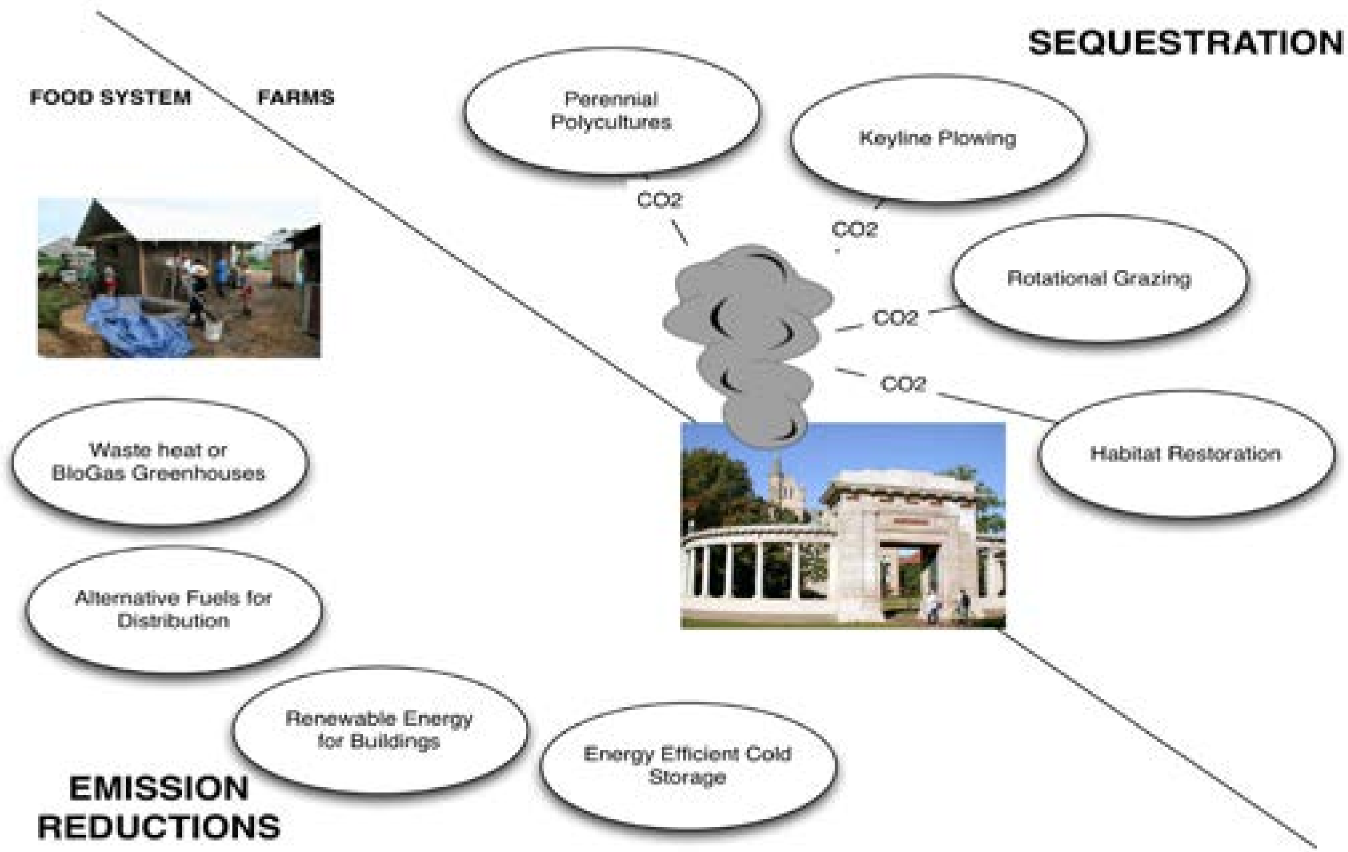
Assessment of Current Efforts to Link Food and Climate Change in Oberlin's Local Food System

Although a formal or coordinated effort to link climate change and local food systems development has not formed, there are a number of smaller initiatives in Oberlin that point to some of the creative solutions that can be expanded upon, as listed below.

- **Carbon Farming Courses**- The New Agrarian Center has hosted two permaculture design certification trainings and one workshop on carbon farming in the past 5 years. These workshops have reached about 60 people from Oberlin and Northeast Ohio, introducing a number of techniques that can be deployed to create a much more regenerative food production system that can also mitigate climate change effects. The courses covered such topics as: soil carbon formation, rotational grazing, perennial polyculture systems, keyline plowing (see below), and intensive food production.

- **Alternative Fuels**- City Fresh is a regional distribution network operated out by the New Agrarian Center that distributes locally grown food to over 20 urban neighborhoods in Sandusky, Cleveland, Lorain, Elyria, Oberlin, Avon, and Vermilion. The distribution truck utilized by City Fresh features an on-board straight vegetable oil system installed by Full Circle Fuels in Oberlin. The truck utilizes mostly waste-vegetable oil from Oberlin College and other restaurants around Cleveland. The on-board system features a filtration system that processes used vegetable oil and runs it directly to the engine as an alternative to the diesel line. About 70% of the distribution is supported by recycled vegetable oil.

- **Soil Carbon Sequestration**- The George Jones Farm is a 70 acre farmstead on the east side of Oberlin. Owned by Oberlin College, the farm is leased to and operated by the New Agrarian Center. The farm employs a variety of land management systems that lead to the storage and sequestration of terrestrial carbon, including a restored 10 acre prairie meadow and a 22 acre wooded preserve. The site also includes 8 acres of restored wetlands. While the wetlands accumulate organic matter, they also release methane as a result of anaerobic decomposition and cannot necessarily be considered a carbon off-set. The three acres designated for crop production have



moved from a soil organic matter content of about 1.7% in 2000 to about 5-8% content in 2010, indicating overall sequestration of carbon. Cover crops are utilized to reduce oxidation of soil carbon and contribute additional organic matter. Areas not utilized for production have reverted to wildflower meadows, which also accumulate and store carbon.

- **Keyline Plowing and Rotational Grazing**- Lorain County farmer Eric Grimm operates a grass-fed dairy operation that utilizes intensive rotational grazing methods. While cows release methane as a result of digestion, a well-managed grassfed system will more than off-set these releases through sequestration. Cows graze grasses, but leave root systems intact. Their manure adds fertility and organic matter to rangelands, increasing the quality of biomass over time. Grimm also employs a keyline plowing system. This involves a non-invasive form of plowing. Conventional plowing turns over soil, exposing much of the soil carbon to oxygen which leads to the release of carbon dioxide and reductions in soil carbon. Keyline plows, by contrast, features a series of 22-24" sub-soil shanks set on a vibrating plow that "fractures" the soil while creating drainage channels that more effectively distribute and store water in the landscape. Keyline plowing accelerates the accumulation of organic matter in the soil while increasing the water storage capacity of soil. This creates greater resilience on the farm to handle both large precipitation events and longer drought periods. Soil productivity and function improves over time.

- **Perennial Cropping**- Oberlin alumni Phil Rutter operates a farm in southeastern Minnesota that produces hazelnuts and chestnuts, perennial crops that can match or exceed the equivalent per-acre yields of soybeans. Once the crops are planted, they remain in place. Unlike annual crops, the soil does not have to be disturbed each year to prepare the beds for planting. The perennial trees store carbon in biomass and in root systems, while keeping soil carbon intact and protected. Phil worked with the Environmental Studies Program to establish a demonstration plot of hazelnut trees on the landscape of the Lewis Environmental Studies Center. Efforts to introduce these perennial crops to a larger-scale production system have been considered.

- **Energy Efficient Agricultural Buildings**- The George Jones Farm has utilized strawbale construction techniques to build a walk-in cooler for produce storage. The 8' x 12' structure utilizes strawbales for its wall and ceiling enclosures. The strawbales are coated with a thick layer of earth plaster (a mix of sand, clay, and chopped straw) and waterproofed with a lime plaster layer. The strawbales add significant insulation and the earth plasters have a high thermal mass. As the air cools, the earth plasters also cool, maintaining cooler temperatures with reduced overall energy expenditures. The strawbales provide insulation with a R-Value (Resistance Value) of about 45. This keeps interior temperatures cold by putting a large thermal barrier between hotter outside air and colder inside air. The unit is cooled with a standard window air conditioner, replacing the energy-intensive 3 phrase compressor units common to most walk-in coolers. In addition to improving energy efficiency, the system utilizes an waste straw, an abundant agricultural waste product that is also non-toxic and completely bio-degradable.

Recommendations for Leveraging Local Food System Growth to Reduce Emissions and Mitigate Impacts of Climate Change

Following the framework developed by the WorldWatch Institute, the following steps can be taken to couple local food systems growth with greenhouse gas reductions and expansion of terrestrial carbon storage and sequestration:

NETWORK BUILDING ACTIVITIES:
1) Expand the literacy among local farmers supplying food to Oberlin markets on best-practices and techniques that simultaneously sequester carbon while improving the productivity of local farms. Develop the following specific approaches for education and training:

a. incorporate carbon farming and regenerative farming techniques in curricula being developed at the Lorain County Community College and Oberlin College;

b. organize a peer-to-peer learning network that highlights the innovative efforts of local farmers like Eric Grimm and facilitates replication of techniques on other farms.

c. utilize digital media to highlight innovative local examples; and

d. develop an incubator farm, focusing on the 200 acre farm north of campus, that can place advanced carbon farming techniques into the context of a working farm. Integrate rotational grazing, perennial agriculture systems, keyline plowing, renewable energy generation, and habitat restoration. Include area farmers in the project to transfer or replicate successful strategies to other farms.

2) Work with the college and other local businesses to develop a local procurement policy that favors purchasing from farmers that utilize techniques to maximize terrestrial carbon storage and greenhouse gas emission reductions.

3) Work with Oberlin College and Ohio State University/Ohio Agriculture Research and Development Center to more accurately monitor and quantify real impacts of carbon storage or emissions reductions.

LOCAL INVESTMENT ACTIVITIES
1) Organize financial resources to encourage carbon-friendly agricultural techniques, focusing on equipment purchasing or cost-shares for the establishment of rotational grazing or perennial agricultural systems. Financial resources can include:

a. Utilization of funding through the USDA-NRCS, such as the EQIP fund that can enable farmers to retire old equipment and replace it with less invasive plowing equipment

b. Organization of a community loan fund that can enable businesses and individuals to pool their resources to invest in the development and replication of carbon farming systems. This can also provide a way that the residents and businesses in Oberlin can invest in systems that off-set carbon emissions by the city while supporting growth of opportunities in the local food sector.

2) Encourage utilization of bio-digestion technology to reduce the carbon impacts of manure or food waste while creating productive energy and fertility inputs for local agriculture.

3) Organize college land-use policy that requires that any college farmland utilized for agriculture follow adherence to carbon-friendly farming and land-management approaches.

URBAN DESIGN

1) Encourage urban agricultural production that utilizes organic or bio-intensive farming systems to further sequester carbon within the city while reducing fuel use in food distribution.

2) Establish a farm incubator at the George Jones Farm or other college farm property that can provide a working farm that supports farm enterprise development, research, development, and training around carbon farming techniques.

CORE ACTIVITY AREA #5- LEARNING NETWORKS

A 70% localization of Oberlin's food supply will only be possible if there is broad community awareness, participation, investment, and support for local food systems. The first and most important step to growing the local food economy around Oberlin is a concerted educational effort that increases the capacity for local participation in all aspects of the local food system, including consumption, production, and enterprises that support distribution, processing, waste handling, and supporting services for local farms or food businesses. The learning network includes both formal (schools, colleges) and informal learning processes (mentoring, skill-shares, workshops, etc.).

Over the past century, non-profit and for-profit entities are commonly utilized to accomplish a task, address a social issue, or produce a product or service. These entities typically have a narrow mission and a hierarchical line of accountability. A board holds fiduciary responsibility and hires a CEO or director who then hires and manages employees. While a successful structure for providing goods or services, most organizations are too limited to have a large-scale or systemic impact.

In recent years, facing increasing economic pressure, organizations have formed mergers, coalitions, alliances, or partnerships, combining their resources to have a larger impact on a particular market, issue, or policy. Like organizations, coalitions typically organize around a narrow topic or focus based on the consensus of their supporting stakeholders. Coalitions tend to be short-lived, focused on narrow agendas, and often disperse once a particular policy has changed, a campaign concluded, or funding runs its course.

How do traditional organizations and coalitions address a topic as complex as transformation of a local food system? To be sure, traditional organizations can address specific aspects of a local food system, such as promoting a farmer training program or creating a messaging campaign to promote local healthy eating. However, true change in the local food system requires a whole-scale transformation of local economic systems. More than just linking farmers and buyers, developing a local food system requires coordinated activity that includes producers, distribution systems, warehousing and processing facilities, culinary skills, entrepreneurship, supporting businesses, and waste management.

A 70% localization of Oberlin's food supply will require new forms of collaboration and economic development that overcome some of the limitations of traditional organizational forms.

In *The Network Weaver Handbook*, network expert June Holley discusses the importance of facilitating dynamic and diverse networks as critical to broad-scale social and economic transformations that challenges like growing sustainable local food systems or addressing climate change will require. Holley notes,

> *Systems change when new networks supplant the old. Underneath every system is a set of networks. First, there is a network holding the old ways in place that needs to be exposed to the world and opened up for change. In addition, there is a network (often much larger than we realize) of unconnected or loosely connected individuals who want a healthier system. One of the most effective ways to change a complex system is by connecting these individuals and helping them take action to change the system.*

Core to the network approach is for more people to see themselves as leaders and innovators, seeding change through their own small acts in concert with others that can complement or support their individual efforts. Holley discusses how a network approach aligns much more effectively with major shifts taking place at the start of the 21st Century. A combination of emerging technologies, declining effectiveness and faith in traditional institutions, and contemporary challenges have motivated some of the following shifts:

20th Century	**21st Century**
Broadcast----------------------------	Engagement
Few leaders---------------------------	Everyone a leader
Cause and effect----------------------	Complex causes
Told what to do-----------------------	Many people initiate
One right way-------------------------	Many different perspectives
Assembly line-------------------------	Experimentation
Predictable----------------------------	Unexpected
Control--------------------------------	Support
Television-----------------------------	Social web

** Source- June Holley, Network Weavers Handbook, 2012*

Holley goes on to note that

> *one thing we know about transforming systems is that the process requires tremendous amounts of innovation and experimentation. This will be most useful when the results of hundreds or thousands of experiments are shared widely.*

Core to the transformation of a local food system is the creation of what Holley refers to as "an innovation periphery" which provides a continuous stream of new information and ideas, organizes learning clusters with diverse partners around key topics, and accelerates the spread of successful projects to other communities.

The formation of a learning network around local food systems will be a core support needed to transform Oberlin's local food economy and the broader regional food system of Northeast Ohio. A learning network consists of an inter-connected web of formal and informal learning opportunities that enable individuals and groups within a community to gain the awareness, skills, and practices that can lead to the development of a local food system. A learning network should foster entrepreneurship, workforce training, and general public education that addresses all aspects of local food: production, storage, distribution, processing, preparation, and waste utilization. Ideally, a learning network is open-source, available to people regardless of socio-economic standing, and includes a mix of opportunities for individuals to both teach (share knowledge) and learn (gain knowledge). Many of the components of a healthy local food system already exist within the community. Innovation occurs when these assets are connected in new and creative ways. A learning network can also be organized around crucial gaps in the local food system where additional capacity can lead to growth. For example, a learning network could be formed among restaurants and institutions that buy food. Those with active local food purchasing efforts can become teachers for those who are interested in doing more local purchasing. As a result of this learning, new collaborations can form between businesses and institutions to increase the overall spending on local food in the community.

Holley suggestions the following seven key innovation processes that learning network participants will need to learn to innovate more effectively:

a) **Exploration**- identifying and learning about new ideas or opportunities.

b) **Engaging Diversity**- bringing together people with different perspectives, values, and experiences, especially people that might not typically connect with each other due to differences in political opinion, socio-economic status, religious beliefs, or ethnic background.

c) **Recombination**- the repurposing or recombination of different elements to add something new to a situation.

d) **Joint Design**- Organizing a process that harvests valuable input from a lot of people, but doesn't require them to make decisions together. People use input to inform their own designs rather than trying to coalesce a whole group around a consensus set of actions.

e) **Rapid Prototyping**- Organizing projects for quick implementation with the flexibility to accept and incorporate feedback to re-design or improve the project.

f) **Learning Processes**- Encouraging people from different disciplines or backgrounds to provide perspectives on a project's progress or challenges to provide new insights or solutions that might not have been considered.

g) **Reflection**- Allows for the identification of small breakthroughs and consideration of what works or does not work in a process.

A Dynamic Learning Network

An effective learning network integrates the learning assets already in place in a community, deepening connections, supporting complementary niches between programs, and filling gaps in skills and knowledge as needed. A learning network to support growth of Oberlin's local food system will work with the pieces already there. They just need to be more effectively connected and calibrated to the skill, knowledge, and practice needs a sustainable local food system will require.

The learning network proposed for Oberlin will focus specifically on the capacity for individuals or groups of individuals to take the next step in expanding the local food supply, whether increasing home production through backyard gardening, starting a local food restaurant, organizing local food procurement for an institutional cafeteria, or developing a value-added local food product.

A learning network will be effective to the extent that it increases pathways for participation in the growth of a local food system. It will help to cultivate new leaders, innovators, and entrepreneurs who can add new skills, replicate effective models, or experiment with new enterprises. However, it is unreasonable to expect everybody to be an entrepreneur. A learning network can also emphasize workforce development or even more informal engagement in local food systems, such as growing food at home or in a community garden. In fact, home gardening and community gardening can provide skills and empower individuals that might go on engage in more commercial production of local food.

A learning network operates in the space between institutions, providing educational opportunities through both formal and informal learning experiences. Formal educational experiences include public schools, colleges and universities, community colleges, or vocational training programs. These experiences are more immersive, usually involve a curriculum of multiple classes, and can provide degrees or certifications. Informal educational experiences provide equally valuable learning opportunities, especially for individuals that are just getting started. Informal education includes workshops organized by non-profit organizations, peer-to-peer networking between groups (farmers, cooks, business owners, etc.), learning farms, food incubators, or digital or on-line media.

An effective learning network combines elements of both formal and informal learning. The more connected networks will provide multiple pathways between the two. For example, students can enroll in a sustainable agriculture program at a community college and then work on an incubator farm or get placed with an older farmer as a mentor. Digital media resources can be utilized both by formal classes as a part of a learning curriculum or informally accessed by a homeowner that wants to increase their own food supply. Or an individual might start farming an individual plot in a community garden and then decide to enroll in a vocational training to become a market farmer. A student might become a meal cook in their college dining cooperative and then decide to enroll in a culinary training program, or apprentice in a local restaurant.

Return to Table of Contents

A learning network approaches learning as a lifetime pursuit and not something that concludes at the end of a class, receipt of a degree, or completion of a training. A learning network will also provide support for experimentation, innovation, and an ability to quickly replicate successful models, creating a knowledge commons that both formal and informal educational systems can contribute to and draw from. To this extent, a learning network, as much as possible, should be open-source and accessible to a wide-range of individuals, businesses, institutions, or groups who can utilize it for both teaching and learning.

Learning networks can work at a variety of scales. They can exist within a neighborhood, within an institution, between a neighborhood and institution, within a municipality, between municipalities, or within a multi-county area. The networks will vary, dependent upon the scope of projects and the base of available assets. The more dynamic networks will encourage greater fluidity and mixing between traditionally siloed groups.

Review of Current Learning Assets in the Greater Oberlin Area

As a college-community with a long history of innovation in local food systems development, Oberlin has a number of recent examples that exemplify how learning networks can function. For example, David Benzing retired from a distinguished career as a Biology Professor and internationally renown botanist to start a winery just outside of Oberlin. Benzing experimented with the growth of different grape varieties at his homestead and began making his own wine as a hobby. Upon retiring, Benzing applied his extensive knowledge of plants and botany with his years of experimentation with wine-making and grape production to establish the winery as a successful local business.

Dave Sokoll, a recent graduate of Oberlin College, represents another way that learning networks can function. As a college student, Sokoll took courses about local food and sustainability and became involved with a number of local food efforts in the community, from helping to start a high school garden to gaining cooking skills at student cooperatives. Upon graduating, Sokoll became the truck driver and logistics coordinator for Lorain County City Fresh, an initiative of the Oberlin-based New Agrarian Center (NAC), which distributed food from area farmers to urban neighborhoods in four northeast Ohio counties. Sokoll then became the head chef of the Oberlin Early Childhood Center, building on the network of suppliers that he got to know through City Fresh to convert the pre-school meal program to feature healthier, locally grown foods.

A third example of learning networks at work involves City Fresh and their efforts to establish an urban market garden training program in Cleveland. This initiative trained community gardeners, recent college graduates, retirees, social service agency, and local businesses in how to convert vacant lots in the city to market farms that improve local food access in urban neighborhoods. This initiative provided a training program organized by horticultural experts from Ohio State University with hands-on learning workshops at the George Jones Farm in Oberlin. The participants in the market garden workshops were encouraged to collaborate and, through their efforts, were able to establish new urban farmers markets or Community-Supported Agriculture programs to increase market outlets for local food. An urban agriculture investment fund was established as part of the training as well, which provided grants ranging from $500-3,000 to a about 15 urban farms with promising business plan. Many of these farms are still operating today, five years after the program.

Development of educational resources should mirror the needs of all aspects of a sustainable local food system, including:

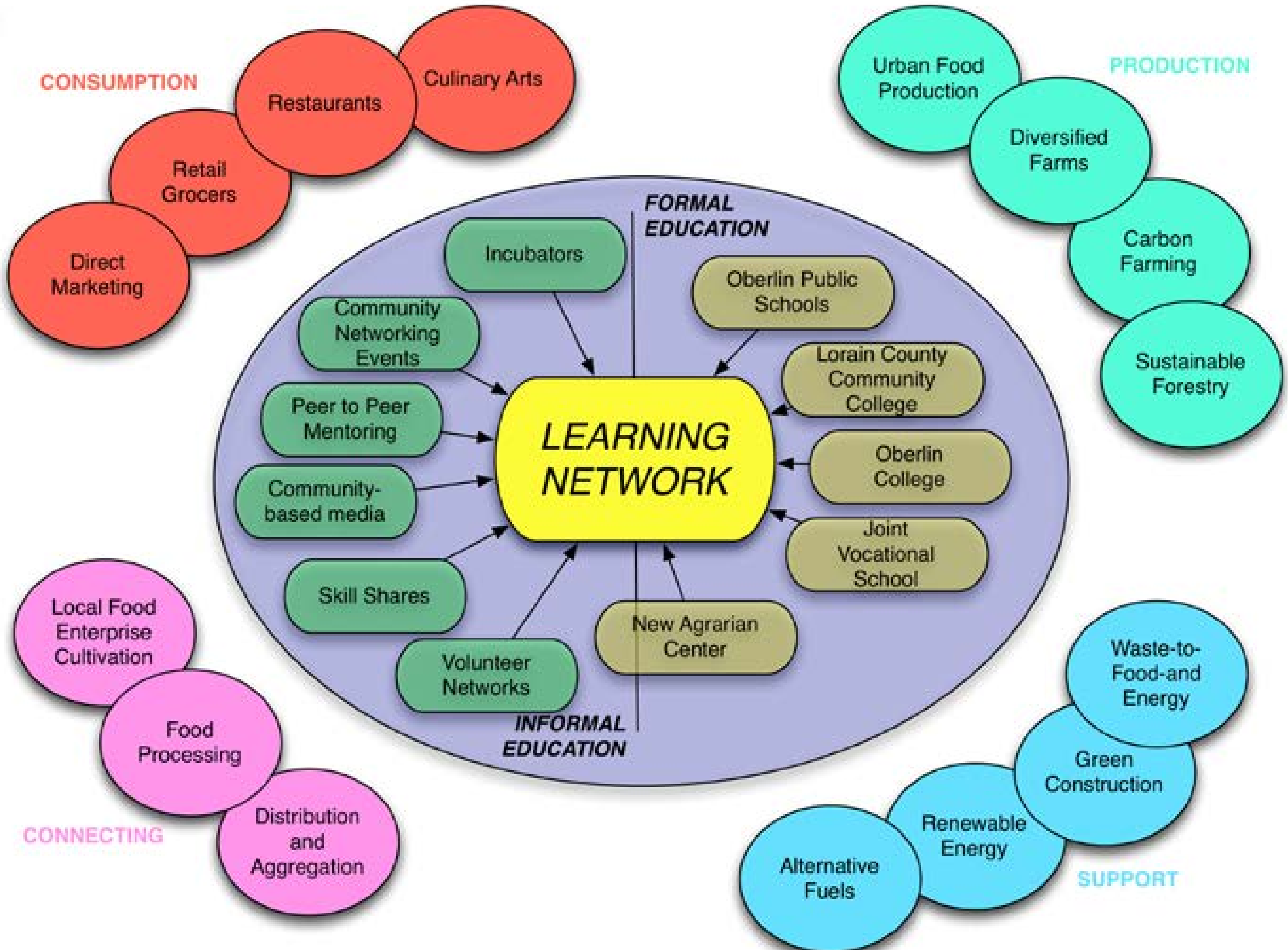
- **PRODUCTION**: Urban agriculture (formal and informal), diversified, small-scale farm management, carbon farming, and sustainable forestry;
- **CONNECTING INFRASTRUCTURE**: local food distribution and aggregation, food processing and manufacturing, and business management/enterprise development;
- **CONSUMPTION**: direct marketing, retail marketing/grocers, wholesale marketing, restaurants, and culinary arts; and
- **SUPPORTING SERVICES:** alternative fuels, renewable energy, green construction, and waste-to-food-and-energy.

These are just three among many examples of how learning networks already function in Oberlin to drive innovation and growth in the local food system. The following section summarizes some of the formal educational assets in and around Oberlin.

Oberlin College has been a long-time pioneer in local food systems development nationally and has contributed to the local food economy in a number of significant ways, including

- a local procurement initiative that began through a class-study and student organizing;
- food pathway in the Environmental Studies Program that enables students to assemble courses with themes related to agriculture and agrarian traditions;
- a student-run cooperative system that provides students with applied learning experiences in healthy food preparation, food safety, composting, and local food purchasing;
- an institutional dining system that regularly supports engagement with the local food system through local food festivals, informational brochures, and signage;
- the Bonner Center for Service and Learning supports a variety of engaged learning opportunities, community scholarships, and volunteer opportunities in urban gardening, local food systems, local schools, food pantries, and engagement with local farms;
- a number of student organizations support local food efforts, including campus or community gardening (OGROW), rain garden installations (OSWAMP), campus composting, Slow Food, and the Johnson House campus garden;
- a number of paid internships regularly provide students with opportunities to remain in Oberlin in the summer, working with the George Jones Farm, doing wetlands research, or maintaining the landscape and gardens around the Environ-

Return to Table of Contents



Return to Table of Contents

mental Studies Center; and
- an active network of alumnae also remain invested in the community, remaining in Oberlin to start businesses, non-profit organizations, or programs, many of which stem from their experiences as students.

Lorain County Community College (LCCC) is in the early stages of organizing a sustainable agriculture certification program. This will provide students with both classroom and hands-on learning experiences at area farms. Current courses being offered include:

- Principles of Sustainable Agriculture
- Spring, Summer, and Fall Crop Production
- Soil Management and Conservation
- World Views to Support Sustainable Agriculture
- Food Systems, Society, and Global Health
- Plant Propagation
- Wild Edibles
- Service Learning/Work-based Learning
- Permaculture Certification

Course work also includes distant learning modules developed by the Ohio Agricultural Technical Institute (ATI) in Wooster and a number of applied learning modules, service learning opportunities at the George Jones Farm in Oberlin, and field trips and guest presentations from a wide-range of area farmers, wineries, or other food businesses.

Courses can be taken individually for continuing learning opportunities for young and older adults or can be taken as a part of a certification program for those wanting a more immersive experience.

In addition to its sustainable agriculture program, LCCC also offers a number of classes in the culinary arts, with increasing attention devoted to the use and preparation of locally grown foods.

The Joint Vocational School (JVS) is located south of downtown Oberlin, offering a culinary training program that increasingly provides education around utilization of healthy local foods. JVS students operate an on-campus cafeteria and frequently cater for fundraising or other events to gain hands-on experiences working with the public. The JVS is also exploring development of an agricultural program as well that can provide training opportunities for high school students and continuing education for adults. Their program is considering formation of an incubator farm that can provide access to land, equipment, and skilled management to provide students or area adults with opportunities to operate their own farm enterprises.

The **Oberlin Public School System** provides a number of opportunities to support education around urban agriculture and local food systems. Oberlin High School students organized a Food Awareness Club that combines education on nutrition with operation of a high school farm. The school owns the Boys and Girls Club facility where the school farm is located. The club also includes a commercial kitchen. Promotion of school gardens at each of Oberlin's four schools can provide space for growing food as well as curriculum learning opportunities. According to a review of Ohio Achievement standards by the New Agrarian Center in 2003, more than half of state learning standards could be taught in school gardens. School gardens can also provide an important teaching tool for parents with children in the school system, helping to support increased backyard gardening or urban farming in the wider community.

The **New Agrarian Center (NAC)** is a non-profit organization established in 2000. The NAC is based at the George Jones Farm and offers a number of informal educational opportunities, including workshops, opportunities for school field trips, internships, a farm camp for young children, learning programs for public schools, and volunteer opportunities through its City Fresh urban food access program.

The NAC can also serve as a bridge between formal and informal learning opportunities, helping to facilitate pathways between the two. Informal learning activities, many of which the NAC has utilized over the past decade, can include:

- **INCUBATORS**: providing spaces that combine training and enterprise development, including farmsteads like the Jones Farm where beginning farmers can be provided with land to farm and educational opportunities or community kitchens that can help to incubate small local food businesses.

- **COMMUNITY NETWORKING EVENTS**: Identifying community spaces that can support gatherings of diverse members of a community for learning, education, or new collaborations. The NAC organized a series of networking events at the Great Lakes Brewery that involved its network of City Fresh shareholders with opportunities to learn about local food systems and meet others with the same interests.

- **PEER-TO-PEER MENTORING**: This involves tapping more experienced farmers or businesses to teach beginning farmers or new entrepreneurs. The NAC has organized learning opportunities between young farmers at the Jones Farm and Amish farmers that supply their City Fresh program.

- **COMMUNITY-BASED MEDIA**: Utilization of documentary films, on-line videos, and written guides that can be utilized to highlight best-practices or raise awareness in communities about local food systems. The NAC has produced three feature-length documentary films about local food efforts in Northeast Ohio and sponsors the NEOFoodWeb.org which offers a library of innovative approaches to local food systems drawn from communities across Northeast Ohio.

- **SKILL SHARES**: Skill shares involve informal learning events where individu-

Return to Table of Contents

als or groups teach skills to others in the community. Skill shares are often connected to a practical project. The NAC has organized several skill shares around natural building construction, including installation of a strawbale greenhouse at an urban farm in Cleveland that taught participants the basic techniques of strawbale construction.

- **VOLUNTEER NETWORKS**: Volunteer networks can be organized to gather large groups of people for half-day or full-day events. These volunteer events also offer a good introductory educational experience for people that want to gain experience with farming or local food systems work. The NAC organizes regular volunteer events at the Jones Farm for college students and community members. The NAC's City Fresh network also works with a network of over 100 volunteers who operate neighborhood Fresh Stops for local food distribution.

Recommendations and Next Steps

The following recommendations and next steps are suggested to cultivate stronger and more diverse earning networks to drive local food systems development:

NETWORK BUILDING ACTIVITIES:
1) Organize a collaborative educational network that includes representation from educational institutions and non-profit organizations engaged with learning about local food systems. Informal network gatherings can provide opportunities for networking between efforts, discussion about gaps or needs in the local food system that can be addressed through education, identification of collaborative funding opportunities, and niche development that allows programs to be organized in complementary rather than competitive ways.

2) Oberlin College has a rich and diverse base of alumnae engaged in a variety of local food efforts across the United States. The college has an opportunity to tap this alumni knowledge network to advise the development of local food efforts. Additionally, Oberlin can serve as a convener to bring alumni groups together and broaden national networks around the development of sustainable local food systems.

3) Develop learning clusters that can combine real-time gatherings with on-line communities, organized around a variety of topics related to local food systems. Learning clusters can be locally-based or they can include people from multiple communities. Learning clusters involve groups of people sharing knowledge, skills, and even labor on any number of topics, from backyard wetlands to culinary innovations.

4) Establish a local food knowledge commons which includes a web-site that aggregates publications, testimonials, blogs, and video or audio content that can provide new ideas or approaches in the local food system.

5) Organize an effort to regularly highlight and celebrate creative local food projects in the wider community, including a garden of the month contest, local food business of the year, or winning recipe for utilization of kale.

LOCAL INVESTMENT ACTIVITIES
1) Establish an innovation fund that can provide seed funding to individuals, enterprises, or organizations looking to experiment or attempt new approaches to the local food system. Similar to the market garden training in Cleveland, an innovation fund will ideally be attached to a formal or informal learning program, enabling individuals to access capital after getting some basic training and preparation.

URBAN DESIGN:
1) Support learning and network spaces that allow for people to share dreams, skills, and assets and to find new collaborations with others. Successful network events will combine opportunities to highlight local examples or innovations and provide people with fun and non-contrived ways to meet each other and find new opportunities for collaboration. Network spaces can be anywhere, from a hosting farm to a coffee shop micro-brewrey, or church.

2) Organize an incubator farm that includes space for prototyping experimental local agricultural systems (such as perennial polyculture systems) as well as land-area that beginning farmers can operate as a cooperative to gain skills and knowledge before graduating to their own farm operations.

TOOLS AND PROCESSES TO ACHIEVE A 70% SHIFT

CRITICAL TOOLS FOR THE DEVELOPMENT OF REGENERATIVE LOCAL FOOD SYSTEMS

Consideration of a 70% localization of Oberlin's food supply requires an entire systemic transformation in the way in which food is grown, stored, distributed, and disposed. It requires new ways of organizing local economies around regenerative ecological systems, community health and vitality, the flow of capital, and the retention of wealth. Even if the community were to achieve half of this goal, it would have a transformative effect on urban and rural landscapes, availability of local jobs, emergence of new small businesses or cooperative enterprises, engaged models of learning and education, and capacity for regional collaboration.

A transformation of this scale, even for a small town like Oberlin, will require the cultivation and development of a number of new tools and approaches that differ from earlier forms of organization or enterprise.

In this section, we identify four critical tools that will be essential to achieving the systemic changes that a 70% shift would require. These four tools include:

- **Cultivation of Robust Networks**- leveraging the power of diverse and open networks in the community to drive innovation, experimentation, and, ultimately, growth in the local food economy.

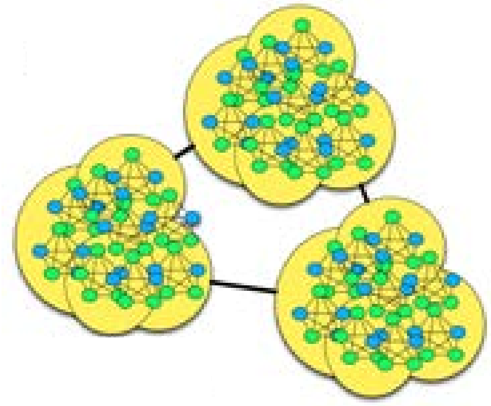
- **Development of Local Investment Mechanisms**- identifying avenues that enable greater access to financial, social capital, and physical capital in the Oberlin community

- **Place-Based Urban Design**- incorporating local food systems more intentionally in urban forms throughout the city (neighborhoods, businesses, parks, urban-edge land, etc.)

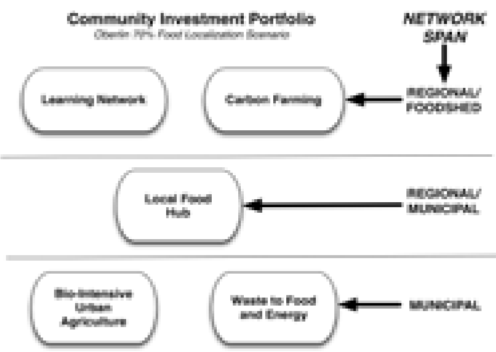
- **Organization Around Key Points of Leverage**- facilitating mechanisms for systems transformation by identifying key strategic leverage points in the community.

Ultimately, these tools reflect new ways of organizing change to focus on systems transformation. As such, these tools are all predicated on the assumption that systems change comes about through a broadening and deepening of leaders and innovators at all levels of the community.

Cultivation of Robust Networks

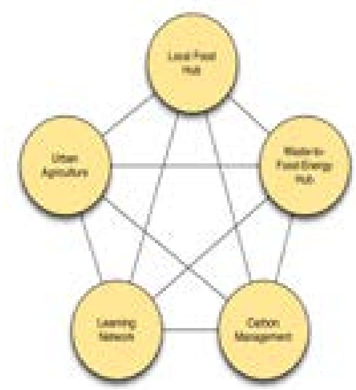


Community Investing



Urban Design

Key Points of Leverage



Return to Table of Contents

TOOL 1- CULTIVATING ROBUST NETWORKS

The first step toward cultivating a more vibrant local food system involves organizing more diverse, inter-connected, and robust community networks. Oberlin has great diversity between the college and the community, but not always strong connections between communities. A robust network has multiple points of entry for residents, students, businesses, institutions, or others interested in contributing to the local food economy. Multiple "network hubs" can serve different local food system functions (from local food distribution to urban agriculture education) and can increase overall connectivity between communities in and around Oberlin.

Local Foods As Alternative Economic Development Paradigm

Traditional economic development has been likened by Economist Ned Hill from Cleveland State University as "the great buffalo hunt". In this model, an economic development specialist goes out into the great global savanna and seeks the prized buffalo that can feed the whole village. Often, they are confronted with hundreds of other economic development specialists doing the same thing, so they have to be crafty in how they lure the beast in the midst of so much competition. The overall promise of this approach to economic development is to bag the big game and hopefully feed the village for a period of time. And when the food runs out, it comes time to sack another buffalo.

This is an allegory for the typical "retention and recruitment" approach to developing a community's economy. It is a model that is based on attracting outside investment, often leveraging tax abatements to make a community more competitive while sacrificing education or other community amenities. Communities across Northeast Ohio contain the bones of many companies that have been recruited, nurtured, and ultimately re-located to more favorable climates elsewhere in the world that might have cheaper labor or more lax regulations.

Local food systems differ from traditional approaches to economic development through a heavy emphasis on decentralization, distributed ownership, cultivation of local assets, and social entrepreneurship. Rather than seeking to draw capital and assets into the community, local food systems look inward to find and connect assets already there. Assets might include small amounts of capital, people with certain skill-sets, under-utilized buildings or equipment, or fallow land. Investments in the context of a local food system might include a school contributing idle land for urban farming, a restaurant offering commercial kitchen space to a local food entrepreneur during off-hours, or a small group of friends pooling their resources to launch a local food cooperative.

Local food systems depend upon healthy networks to function and grow. A network consists of an interconnected web of individuals, groups, businesses, organizations, or agencies leveraging their collective assets (skills, people, financial capital, equipment, facilities) to increase and strengthen social and economic connections. As a largely place-based endeavor, local food systems tend to value the local environment more, seeing healthy soil, bio-diversity, and access to clean water as the natural capital that underpins the success and long-term sustainability of the economy.

Project Ecosystems to Support Local Food Systems

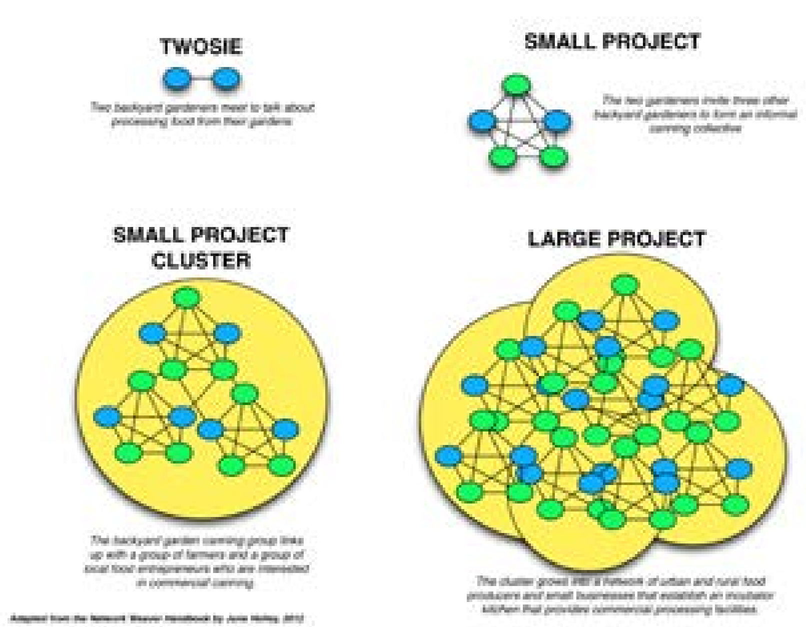
Based on their success in connecting local food systems with job growth, wealth retention, and tourism in the Athens area of Southeastern Ohio, the Oberlin Project and New Agrarian Center collaborated to bring June Holley to Oberlin to train local food stakeholders in and around Oberlin. Through a day-long workshop and facilitation of a local food summit at Lorain County Community College, Holley shared some of her 20 years of experience with local food systems to help inform broader efforts here.

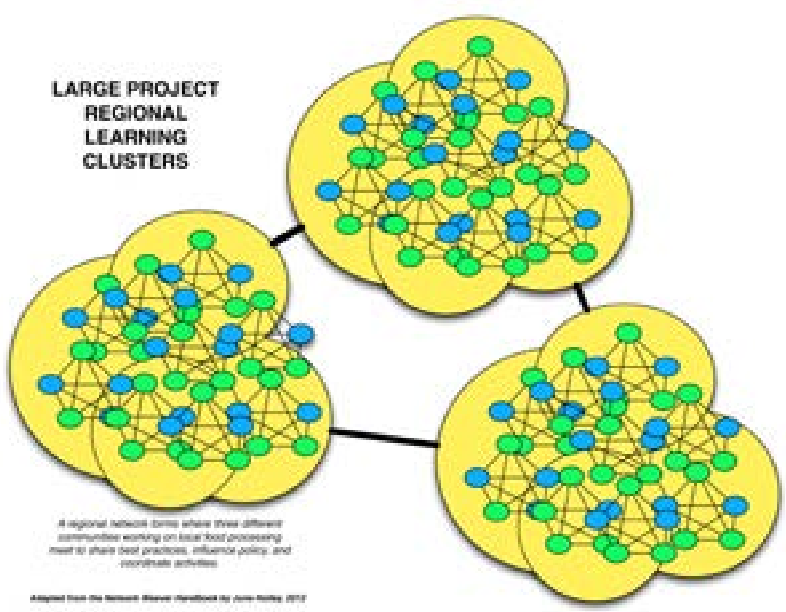
Holley made a distinction between traditional organizational approaches (which rely on hierarchical management and the formation of teams and standing committees) with more network approaches like the Appalachian Center for Economic Networks (ACENet), which favor more self-organizing projects. She distinguishes between the two, noting the traditional organizational designs can be effective at some things, such as issue campaigns, but they lack the designs that can lead to much more wide-spread change or systems transformation.

Holley describes a bottom-up, network approach to projects which can begin with simple conversations between two people and grow into larger-scale or region-wide initiatives such as ACENet. The types of formats that induce more self-organizing projects include:

- **Twosies**- A "twosie" offers a low-risk, flexible way to meet, build trust, and start small collaborations. A twosie does not require a skilled facilitator or coordination. *For example, two people meet to brainstorm ways that there can be more processing of local foods in the Oberlin community to extend the seasonal availability of local food.*

- **Small Projects**- This involves groups of 3-7 participants meeting for defined block of time that ends when the project is done. Smaller groups can be more manageable and can create an ideal environment for learning and collaboration. Small projects can come out of a Twosie when two people invite others in their network to initiate a project. Small projects can also devolve into twosies within the group that meet to work out different aspects of the project. *For example, a small project forms around an effort to organize 4 or 5 backyard gardeners who collaborate to manufacture pesto utilizing ingredients that they grow in their backyards.*





• **Small Project Clusters**- This involves sets of small projects exploring different approaches to the same goals. These can be supported by an innovation fund that provides seed capital to support a diverse range of small enterprises producing different local food products. *For example, a number of local processing clusters form, one including backyard gardeners, a second including a group of caterers utilizing a common kitchen, and a third including college students who want to preserve local food for their coops. Together they form a cluster that collaborates on local food preservation projects in the community.*

• **Large Projects**- These projects involve larger numbers of people and require more trust, resources, and coordination. These can be built out of Small Project Clusters where people bring in their own experiences working with each other. *For example, the groups involved with the processing cluster decide that they can no longer get by on a handful of church or school kitchens. They need their own dedicated facility. They work together with a Community Development Corporation to invest in a community kitchen facility in the unused commercial kitchen at the Boys and Girls Club.*

• **Large Project Learning Clusters**- These are sets of large projects where participants are brought together regularly to share strategies, build skills, and replicate successful models. This can be done virtually or through in-person events. *For example, the community kitchen in Oberlin meets with community kitchen groups in Athens, Youngstown, and Cleveland and they share strategies, best management practices, and also coordinate their development to create some regional specialization of their each projects.*

This approach begins with dozens of small acts that enable a large number of community members to become leaders and innovators. The approach ends with a broader regional transformation which comes about when large numbers of smaller projects impact their own communities and then become networked to allow for an acceleration of innovations and best practices that more effectively link efforts in the region.

Holley uses the term "self-organizing networks" to describe how effective networks function. A self-organizing network is not driven by a central plan, person, organization, or business. Rather it consists of an inter-connected web of partners (including both individuals or organizations) that form smaller collaborations and efforts to link assets for systems transformation. Organizations or individuals can serve the role of "network weavers", helping to facilitate connections within a network or forming spaces where collaboration can take place. Holley notes that there are four steps necessary to growing self-organizing networks:

1) Awareness of Interests and Opportunities- Open-space processes (consisting of small or large groups of people that form collaborations or learning exchanges around shared interests or affinities) in which individuals can begin to explore collaboration by identifying their interests. Twosies can also be formed around areas of shared interest in often can lead to larger projects.

Return to Table of Contents

2) Clustering for Collaboration- People cluster around areas of shared interest or common opportunity areas to begin to define small projects.

3) Coordination- Before a system can become self-organizing, it will often require a Project Coordinator. This person is like a network weaver who might spend more time at the front-end organizing meetings and keeping people connected. Ideally, the project coordinator will spread skills out to the other members of the team so that their role is more catalytic and less about continuous management.

4) Sharing and Reflection- This is an important part of the process and enables learning to occur throughout the broader network. A process for sharing lessons with others can also help to spread innovative or effective approaches to maximize the catalytic impacts for a broader network.

June Holley notes that networks differ from traditional organizations by supporting people in a broader network rather than controlling people through management from above. Holley notes that "a critical function of networks is to create an enabling environment, allowing communication to flow and collaborative action to self-organize." She pinpoints five crucial steps to create such an enabling environment:

1) Understanding the system to be transformed- A singular issue focus defines traditional organizational or political approaches in which all activity focuses on one issue, such as health care, the environment, or drug treatment. A network approach considers the broader system and enables participants to see how elements in a broader system affect each other. System transformation requires the integration of multiple issues, such as a local food system that addresses environmental impacts, promotes public health, and creates jobs in the local community. Systems transformation can be developed through: **researching the issue space** (research all elements of a problem or issue, identify key players, assess the overall health of the system in place, identify efforts shown to be effective), **analyzing the system** (conducting network or system maps, identification of strategic, high-potential leverage points, and understanding dynamics of effective responses), **engaging the network** (locate current and past activities in a system, modify actions to match high-leverage points, identify critical collaborators around each leverage point), and **experimenting around high leverage points** (develop collaborative experiments around each leverage point, involve diverse partners for broader innovation in approaches, and encourage mixing between multiple groups to encourage greater cross-fertilization).

2) Communication and networking systems to support interaction and engagement- Communication strategies focus on increasing opportunities for individuals or groups to share information and find new opportunities for collaboration. Communication can be facilitated through **networking hubs** (physical locations that encourage social mixing, information sharing, and collaborative activities), **informal gatherings** (more like social events that encourage people to get to know

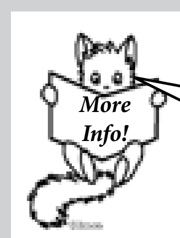
LEVERAGING THE POWER OF NETWORKS IN ATHENS, OHIO

One of the best examples of leveraging the power of networks to cultivate stronger local food economies is right here in Ohio. Located in Athens, the Appalachian Center for Economic Networks (ACENet) has been cultivating the development of a sustainable local food system since its formation in the mid-1980's. Based in Southeastern Ohio, ACENet works with the 18 Ohio counties that are part of an extended Appalachian region that spans 11 states. While rich in natural resources, Appalachia has struggled with high rates of economic poverty, mostly related to the decline of the coal, timber, and other extractive industries that brought a large number of short-term jobs to the region, but not long-term economic stability. This largely rural region of Ohio has among the highest poverty rates in the country, with about 35% of its residents at or below the poverty level.

The impacts of 20 years of relationship building and network cultivation have had a noticeable impact on this chronically impoverished regions. Today, the work of ACENet and the hundreds of farmers and entrepreneurs have woven together a local economic tapestry that includes:

- over $3 million in annual sales at the Athen's Farmers Market;
- the start-up of seven additional farmers markets in Trimble, Nelsonville, McConnelsville, Chesterhill, Shawnee, Somerset, and New Lexington;
- over 200 unique farm and local food businesses utilizing the ACENet shared-use kitchen facility each year;
- tenants and clients of the ACENet kitchen had an aggregate of over $28 million in annual sales in 2011, supporting over 220 self-employment, full-time, and part-time jobs; and
- their 30 Mile Meal brand has over 130 collaborating partners working to leverage their local food work to make Athens a destination for tourists and improve quality of life for residents.

Leslie Shaller, worker-owner and financial manager for Casa Nueva restaurant and Food Ventures director for ACENet also notes the importance of collaborative network culture, "having folks who get that culture of deep reciprocity who understand the relationship based step. It's not like we all love each other and aren't sometimes competitors, but there's a real interesting collaborative, cooperative spirit that has come out of the work over the past 20 years, whether it's the Athens Farmers Market or the Food Ventures Center, people have learned the win-win of strong relationships."



Click me to access a more detailed description of the exciting and innovative local food efforts in and around Athens, Ohio!

Return to Table of Contents

each other and include short talks, film clips, or organized activities such as speed networking), **formal meetings** (including speed networking or other relationship building activities at a meeting, engaging report outs, and time for smaller group discussions), and **social media** (utilizing web platforms to share information, post events, discuss topics, or work on collaborative documents).

3) Access to resources- A successful network requires a pool of resources (money, skills, facilities, equipment) that everyone in the network has access to. Resources that can help networks grow in their reach and effectiveness include **community assets** (meeting spaces, shared equipment, people with expertise or skills, volunteers, and shared web-platforms), **money** (network trainers, mapping or social network software, funds for travel to other communities), **innovation fund** (a pool of money used to support collaborative projects, seed innovative ideas, provide start-up funding, and mechanisms to share learning across networks for replication), and **network support** (social media platforms for on-line networking and learning, digital media and film, organization of networking events, and establishing communities of practice for network leaders).

4) Opportunities for collective sense-making- A typical planning approach identifies outcomes and then organizes a set of actions to achieve those outcomes. A more networked approach fosters smaller experiments and amplification and expansion of those that are most successful at shifting key leverage points and introducing broader systems change. Collective sense-making can be fostered through **system mapping** (locating networks on a systems map around key points of leverage, identification of key system gaps and how they can be filled), **collaborative projects** (mapping key collaborations around leverage points, inviting new players in to diversify perspectives, create forums for presenting collaborative projects around each leverage point and documenting what has been learned), **patterns of success** (identifying approaches that work or do not work, documenting processes for successful system transformations, utilizing digital media or live events to share these stories).

5) Support for network leadership- Unlike traditional approaches which rely on a select group of defined leaders, successful networks are based on the idea that every participant in the network becomes a leader. Some effective network leadership approaches include **formal training** (bringing in an outside trainer to develop a "train the trainer" workshop that works with existing leaders to become trainers of other network leaders), **network coaching** (someone who checks in with network leaders to observe what is happening, identify challenges and strategies to address them, and garner insights), and **organizing communities of practice** (forming a core group of network leaders to develop skills, share experiences, encourage peer-to-peer learning, and facilitate "peer assists" where an individual or group in the network seek the thinking and advice of others to address a challenge).

2012 Lorain County Local Food Summit

In March of 2012, the New Agrarian Center worked with the Oberlin Project and Marcy Kaptur's Congressional Office to host a Local Food Summit at Lorain County Community College. The summit was facilitated by June Holley from ACENet and Jack Ricchiuto, a collaboration designer based out of Cleveland. The summit included about 80 partici-

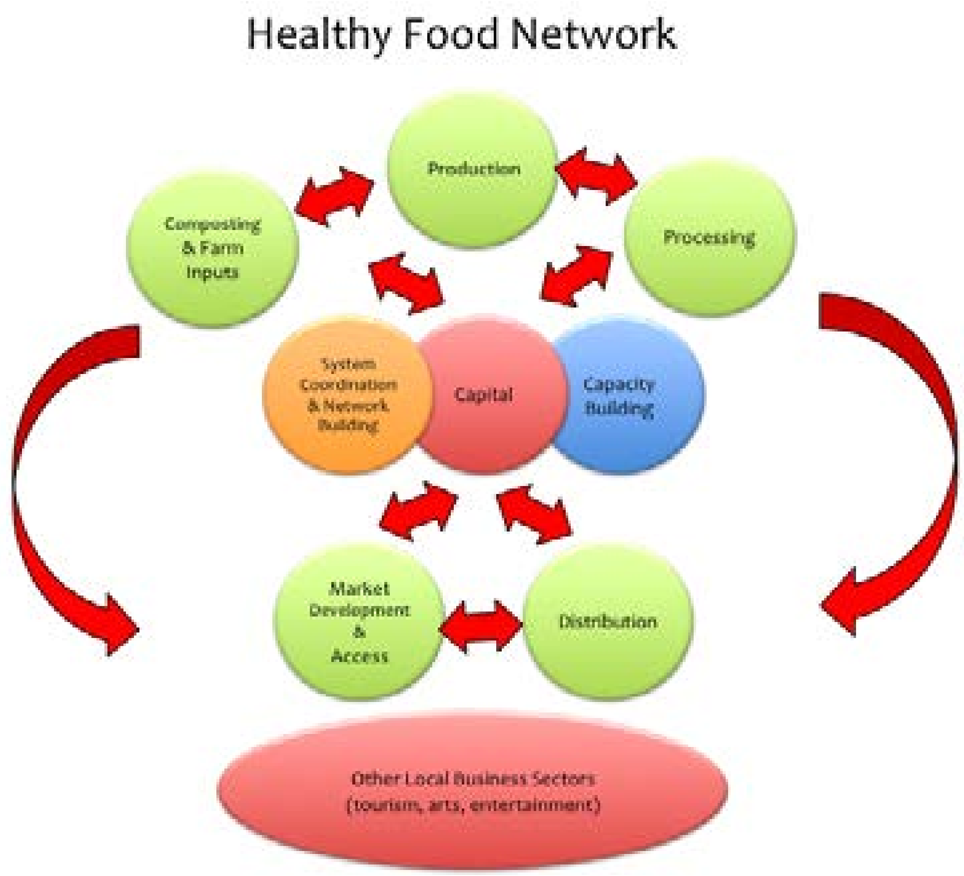


Diagram prepared by June Holley for Lorain County Food Summit March of 2012

pants representing 6 counties in Northeast Ohio. Summit participants came from as far away as Youngstown, Wooster, and Sandusky and as close in as Cleveland, Elyria, and Oberlin.

The summit was designed to maximize new network connections and to foster collaborative networks around each of the major components of a local food value chain that comprise a healthy food system. The summit helped to move beyond a more simple view of local food systems in which farmers connect individually with consumers and move toward a wider view of localization that encompasses all of the key elements necessary to support a healthy local food system.

The goal of the summit was to move people from a more simple view of local food system efforts that just connects farmers and consumers to one that involves the many inter-acting components that can make local foods more viable and cost-competitive with imported food. In other words, localization should focus not just on the production of food, but all aspects of the value chain, including:

- **Production**- urban and rural food producers;

- **Processing**- packaging, butchering, cutting, freezing, baking, dehydrating, fermenting, canning;

- **Distribution**- moving products from farms, to processing or distribution hubs, or to markets;

- **Market Development and Access**- access points where consumers locate local food, including retail or direct venues (CSA's, farmers markets, farm to table) or wholesale or indirect venues (food hubs, distributors);

- **Consumption**- where food is prepared, cooked, and enjoyed; and

- **Composting & Farm Inputs**- where food is composted or run through a bio-digester to create nutrients, organic matter, or energy to support a farm. Also includes businesses providing goods or services to farmers, including equipment sales and repair, construction, seeds and materials, etc.

- **Other Business Sectors**- include tourism, arts, entertainment

This chain also functions in a circular, rather than linear model with waste generated through the process re-captured to produce energy, nutrients, and organic matter back on the farms or other points along the value chain.

In the center of the chain, driving its development, are:

- **System Coordination**- Coordinating and connecting farmers, businesses, and buyers;

- **Network Building**- Cultivating and connecting the diverse stakeholders needed to support a thriving local food system; and

- **Capital**- Nurturing social, financial, and natural capital as the productive base for a local food system.
- **Capacity**- Building capacity through education, skill-training, entrepreneurship development, incubation, experimentation, research

The Four Conversations

The Local Food summit included a four step process where participants identified which local food cluster most aligned with their interests and met with others from around the region to share common dreams, assets, networks, and actions. The process was facilitated by collaboration designer Jack Ricchiuto out of Cleveland. Ricchiuto works internationally on strategic planning and organizational design. The process was based on a book that he authored titled *Instructions from the Cook: Recipes for New Conversations*. The process included four conversations which help to foster conversations that build community. These conversations inspire dreams, initiate small acts, engage gifts, and create invitations. Each of the conversations help to organize and strengthen local networks, including:

- **Dream Conversations**- What is true about the Local Food System in 2020?

- **Gift Conversations**- What assets does each person at the table bring to contribute to growth of the local food system

- **Invitation Conversations**- Who else should be invited to participate that is not presently a part of the group?

- **Small Act Conversations**- What smaller actions can be taken in the next 2 months to move a few steps closer to larger dreams?

What is True about The Local Food System in Northeast Ohio in 2020

We asked people in entrance surveys for the summit to identify what they would see as critical indicators of a successful local food system in the year 2020. We sorted through about 100 responses and came up with the following key indicators that would be indicative of a healthy local food system:

<u>Accessible</u>- Is local food widely accessible? Is it price competitive with imported foods? Is there equitable access to quality foods for diverse socio-economic groups? Have food deserts been reduced?

<u>Urban Sustainability</u>- Are local food systems a fundamental part of urban design? Do

Return to Table of Contents

cities encourage and support urban agricultural production? Are rooftops and vacant lots maximized for food production potential? Are there healthy and robust networks connecting urban and rural populations?

Farmers- Has the average age of the farmer dropped over time? Are farmers able to pursue diversification strategies to insure multiple sources of income? Is year-round production potential realized? Can farmers support their families adequately on income from farming? Is there reliable skilled labor available?

Capital- Do farmers or small businesses have access to capital? Are municipal governments or regions investing in local food infrastructure to support distribution, processing, and storage? Are micro-loans available to support small projects with low capital needs and high potential impact?

Environment- Does water quality improve over time through adoption of soil conservation and minimization of chemical inputs? Is energy-use efficient? Do energy inputs for farm or food businesses come from renewable sources? Are greenhouse gases minimized? Are carbon sequestration opportunities maximized?

Economy- Is there a growing base of smaller, locally owned businesses forming around local food and farm production? Has there been an increase in jobs or income earning enterprises? Do local food enterprises spur other sectors like energy or building?

Health- Are populations becoming healthier with lower incidences of obesity or diabetes? Are school lunches more healthy and supplied with local foods?

Democratic- Do people have diverse food choices? Do people have access to capital, land, and resources necessary to build more self-reliant communities?

Ethics- Are animals raised humanely? Are farming practices regenerating soil and water and not creating burdens for future generations? Are farm workers or farmers receiving a living wage and adequate working conditions?

Examples of Small Acts

After each cluster discussed longer-term dreams, inventoried their assets and identified individuals that might be invited to the process, they identified smaller steps that could be actionable in the next 2 to 6 months. These small acts represent small interventions in the system that, over time, can grow into much wider, systemic change. Out of over 150 small acts that came out of the event, some examples are listed below.

a. Production- Set-up an equipment sharing network for backyard or urban gardeners that can increase productivity of urban spaces without individuals having to spend a lot of money on individual equipment.

b. Processing- Investment in a community grain mill facility that can increase support of staple grains, beans, and other products.

c. Network Building- Establish virtual volunteer network to raise awareness of different projects in community and announce volunteer needs or opportunities.

d. Distribution- Organization of local food hubs throughout Northeast Ohio to facilitate more cost-effective distribution and specialization and exchange of products around the region.

e. Production- Develop vacant land policies to encourage vacant lots to be used for small livestock or urban farming while reducing maintenance expenses for municipalities.

f. Education- Distribution of film and other media to educate public officials and citizens about local food efforts and how to participate.

g. Capital- Organize bundle of infrastructure projects for community-level storage, processing, and utilization of local foods with networks of supporting capital from community banks, credit unions, or networks of individual investors.

Network Review of Oberlin's Local Food Systems

As indicated by the case study of southeastern Ohio's local food efforts and the role of the Appalachian Center for Economic Networks (ACENet), it should be clear that cultivating and supporting robust networks is a pre-cursor to the emergence of a healthy, vibrant local food system.

It would be helpful to utilize a social network mapping software, such as Valdis Kreb's In-Flow application to assess the diversity and connectivity of Oberlin's local food networks and determine areas where there might be weak links or no connections at all.

Overall, June Holley writes about four general patterns that are characteristics of all effective networks:

1) People tend to form networks around shared interests or common values. These networks can also be limiting if they are closed-off to outside influence, such as an Old Boy's Network.

2) Diversity is essential to driving innovation and maintaining openness in the larger network to diverse communities.

3) A robust network will have multiple pathways between any nodes of activity. If one connecting link breaks down, people can find other pathways to reach what they are looking for.

Return to Table of Contents

> 4) Network nodes or hubs where a variety of smaller networks support a larger project or collaborative space are critical to network health.

Holley describes “knitting the net” as a method for weaving more robust networks. Holley notes that this network weaving requires active leaders “who take responsibility for building a network” and do not wait for “spontaneous connections between groups to emerge very slowly, if at all”. She describes four network typologies that characterize the states of evolution in network structure:

1) Scattered Emergence: This pattern is common to networks in an early state of formation. A variety of smaller networks are active, but remain relatively disconnected and isolated. If these clusters do not organize further, the network remains weak and under-performing.

2) Hub-and-Spoke Network: The hub-and-spoke network features a common or central “network hub” that connects the more scattered, smaller networks. This network resembles a bike wheel with a hub in the center and connecting spokes reaching out to each of the more scattered networks. The hub-and-spoke model can provide an effective method for catalyzing a network, but should not be utilized for long as it concentrates power in one node. This is also a weak network structure because the health of the network depends upon one central node.

3) Multi-Hub Small World Network: An effective network weaver might begin with a hub-and spoke model, initially serving as a central connector between multiple networks. As the network weaver brings together different groups, they move from being a coordinator to a facilitator, cultivating the emergence of new network weavers who can foster their own connections between groups. Over time, a multi-hub network emerges which features a lack of a central node and multiple pathways between nodes. This demonstrates greater network strength, as there are minimal path-lengths that people have to travel to access or move through the network.

4) Core/Periphery Network: This is the most advanced form of network and features a large cluster of connections at the center of the network, indicating a density of connections between groups. The networks at the periphery, with less density of connection, represent those new to the community working toward the core or bridges to other network hubs. This typology can also describe a healthy local food system which will have a dense core of connections and activities in urban centers (where markets, populations, and businesses are concentrated) with a variety of connections to smaller networks of producers along the periphery of the city or in between cities in a larger region.

In terms of assessing the strength of Oberlin’s current local food networks, it generally shows the patterns of Scattered Emergence with some limited examples of multi-hub networks forming.

Scattered emergence in Oberlin is indicated through some of the following examples:

> **a) Local Food Purchasing**: There are four major local food purchasing efforts in Oberlin: Oberlin College/Bon Appetit institutional food purchasing, Oberlin Student Cooperative Association group purchasing, Black River Café and Agave Café restaurant purchasing, and City Fresh. Each maintain their own individual supply networks at a great individual expense of time. If these scattered networks could be connected through a collaborative food ordering system or a local food hub, each could likely access more local food with less expenditure of time. This structure would also reduce barriers to entry for other businesses or institutions in the community that might be interested in doing more local purchasing.
>
> **b) Urban Agriculture:** In the past five years, Oberlin has seen the emergence of a variety of urban agriculture initiatives, including the Oberlin High School Gardens, Legion Field Gardens, the Village Garden, and a variety of new community gardens on the Oberlin campus or in the community. Each of these gardens typically have their own network of gardeners and supporters and there is little overlap between them. Part of this is okay, as gardens tend to be more proximity-based, with supporting networks coming from their surrounding neighborhood or campus community. However, there could be benefits to urban garden projects forming a larger network that can support more advanced training, shared equipment or facilities, distribution of compost, or even volunteer coordinators that can help organize rotating work days on different sites. These networks could also support connections with backyard gardeners who could collaborate around learning, equipment use, or even working together to supply local markets in the community.

Some examples of multi-hub networks in Oberlin’s local food system include:

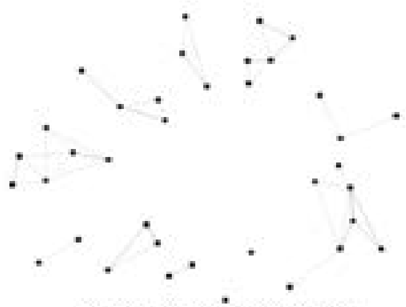


Figure 1 – Scattered Emergence

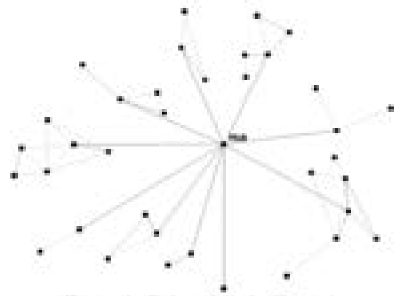


Figure 2 – Hub-and-Spoke Network

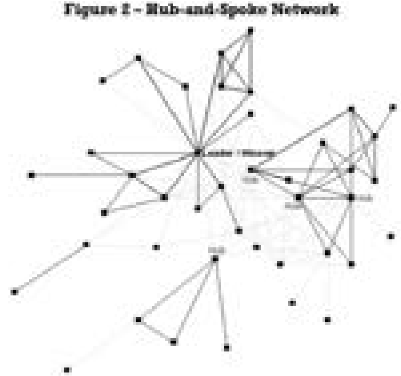
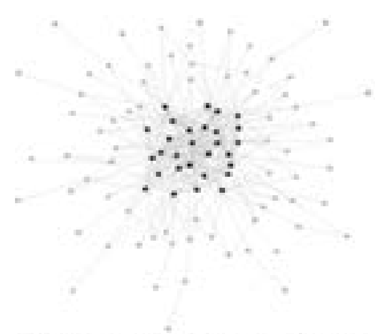
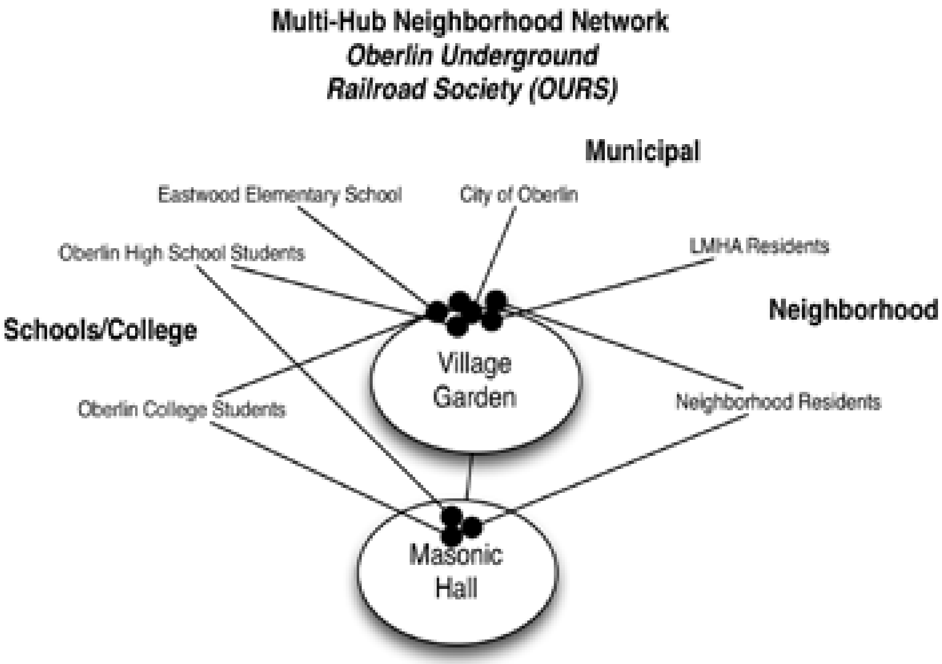


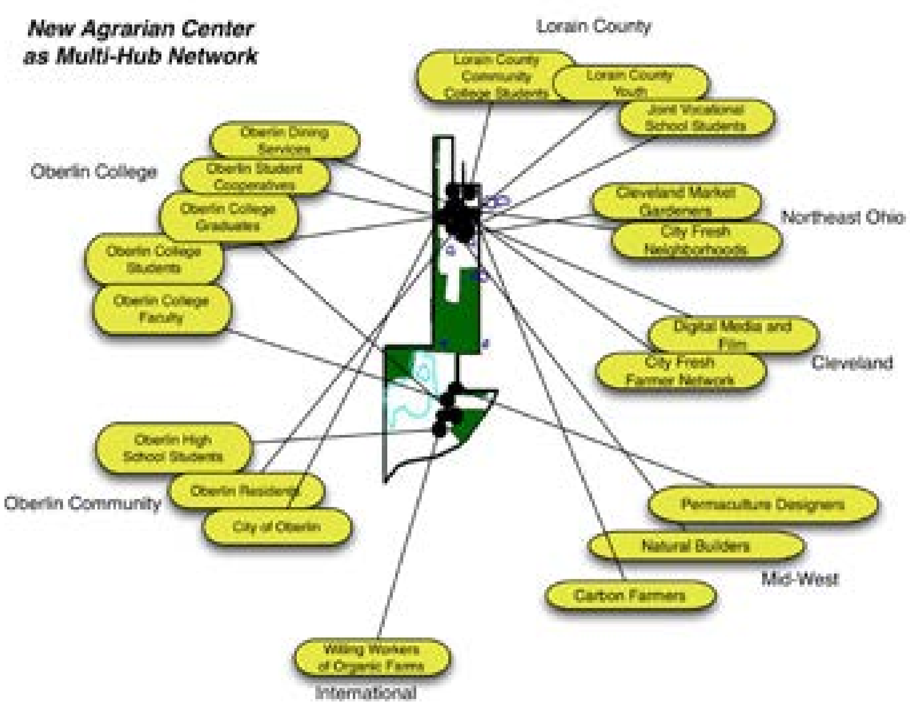
Figure 3 – Multi-Hub Small World Network



Figures from Network Weavers Handbook by June Holley, copy-write 2012

Return to Table of Contents





a) New Agrarian Center: Critical to local food systems will be improved knowledge and skills for local agricultural techniques. The New Agrarian Center represents one example of a multi-hub network that involves networks from the broader northeast Ohio region. The George Jones Farm is a 70 acre farmstead that provides hands-on learning activities in sustainable agriculture for young children, high school students, college students from Lorain County Community College and Oberlin, and adults through informal learning workshops. The NAC's City Fresh program connects a network of 25 mostly Amish farmers south of Oberlin with 20 community partners in six Northeast Ohio cities (including churches, hospitals, schools, libraries, and other civic organizations) with access to healthy local foods.

b) Oberlin Underground Railroad Society: Another example of a multi-hub network is the Oberlin Underground Railroad Society (OURS). OURS operates the Village Garden near the bike path on Spring Street as a space that provides a market garden for high school students, a learning center for Eastwood Elementary School children, and a connecting point between public housing residents, the broader neighborhood, and college students. OURS also operates the old Masonic Hall building on Pleasant Street as a mixed use center that combines art, community events, and local food. High school students at the Village garden, for example, sell produce at a road side stand at the Masonic Hall. Overall, both locations provide neighborhood-based network hubs that support positive social mixing and collaborations between neighborhood residents, youth, and college students.

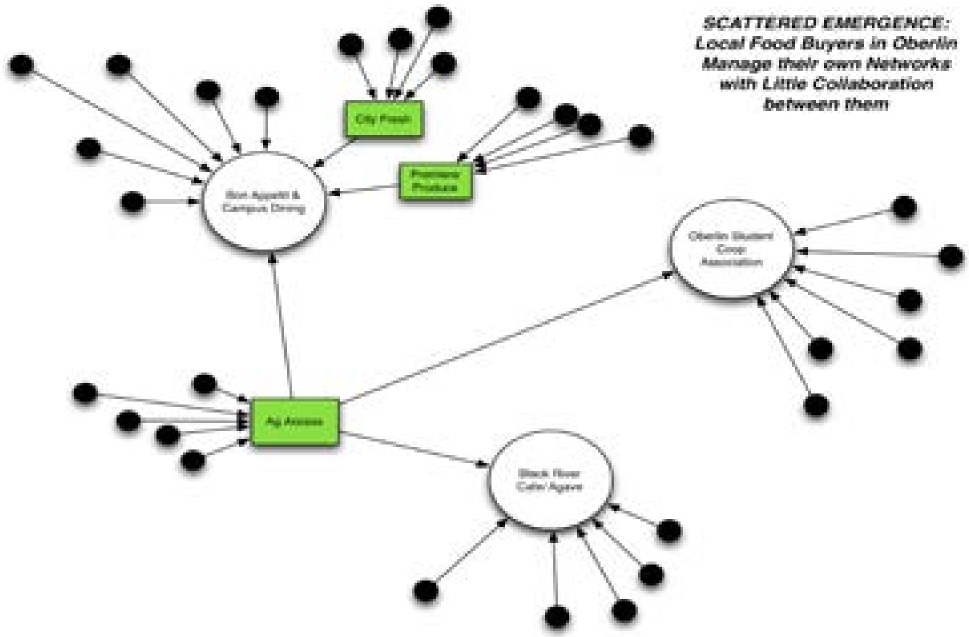
c) College Volunteers: Oberlin students represent another area that patterns multi-hub activities. Students have a wide range of interests, reflected in a number of courses, independent studies, student groups, and community service initiatives that support a wide-range of local food initiatives in the community. The Center for Service and Learning and the Environmental Studies Program at the College provide an important role as a network hubs, connecting a diverse number of students to a mix of different organizations or initiatives in the community.

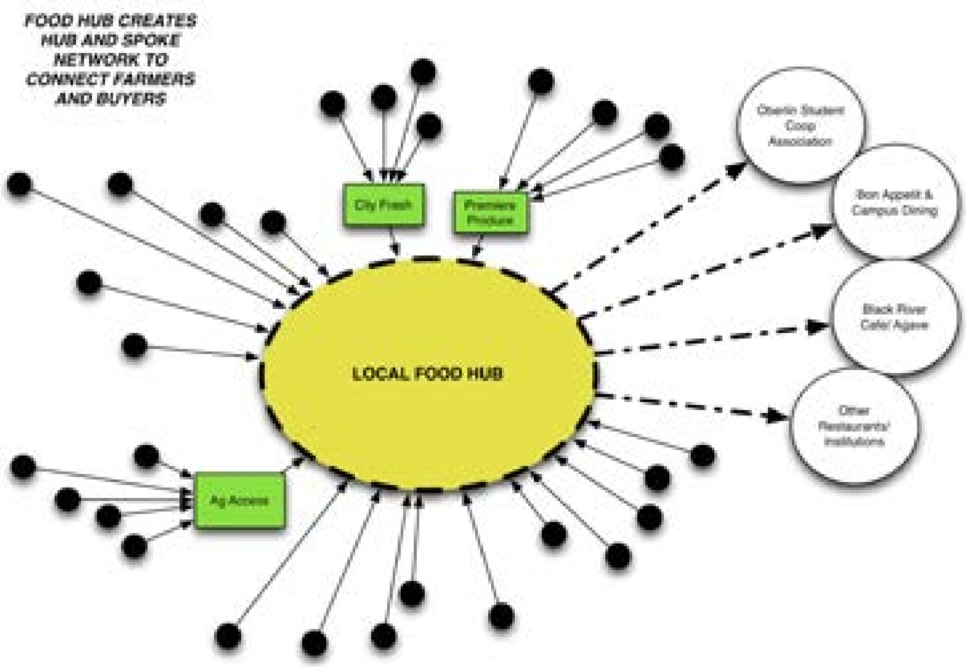
Catalyzing Network Activity in Oberlin

The first step for the further development of Oberlin's local food system is to concentrate on forging stronger connections between smaller networks and the organization of "network hubs" that can bring together a variety of smaller networks toward the common purpose of growing the local food economy.

For example, as the diagrams on the following page demonstrate, the network pattern of local purchasing efforts in the Oberlin community presently match more of a scattered emergence model. As the diagram shows, the three main local food buyers, the Oberlin Student Cooperative Association, Bon Appetit Management Company, and the Black River Cafe/Agave Cafe all maintain and manage their own separate networks of growers and suppliers. There is little overlap between suppliers, with the exception of AgAccess, a locally owned local food distribution business that supplies food to all three buyers.

Return to Table of Contents





The development of a local food hub, as shown in the next diagram, enables the supplier networks of all three buyers to be shared. Through a hub-and-spoke network formation, the food hub provides a connecting node between farmers, local distribution businesses, and market partners (businesses or institutions committed to local purchasing). This kind of network collaboration would reduce the transaction costs for each buyer who presently has to maintain their own separate supply network. The food hub would also facilitate ordering, delivery, and growth of the farmers network. Not only would this format increase the efficiency with which OSCA, Bon Appetit, and the Black River Cafe/ Agave could access locally grown foods, it also makes it easier for other institutions or businesses in Oberlin or elsewhere to purchase locally. Instead of each business or institution having to take the time to form their own supply networks, the food hub facilitates this function. Over time, this increases the level of local spending and the retention of wealth in the local community.

Some activities that might help build network connectivity in Oberlin's local food efforts include:
a) social network mapping effort to identify core networks, network leaders, and overall connectivity of networks;

b) utilizing screenings of the *For the Love of Food* film in community settings accessible to multiple groups to cultivate new participants, leaders, or innovators in Oberlin's local food effort;

c) pilot clusters of small groups collaborating on new enterprises, such as backyard gardeners sharing equipment and skills to introduce a line of pesto or other value-added product to the community;

d) organizing regular informal network gatherings for groups that rotate between urban farm spaces to share knowledge, ideas, food, and possible shared activities (sharing equipment or rotating flash work mobs);

e) bringing together institutions and businesses purchasing local foods to discuss implementation of methods that encourage coordination of distribution, logistics, or shared supplier networks;

f) organizing "pop-up" events that draw diverse networks of people to events that simulate possible new enterprises or activities in the community. For example, the abandoned Missler's Grocery Store might provide an ideal site for a "pop-up" distribution hub that simulates how an actual distribution hub might function in that space. The Oberlin Farmers Market and City Fresh could move for one week to the space and all farmers and distributors could drop their food off there for it to be sorted and re-distributed to local markets to simulate what might eventually happen in the space. This helps to build a "community of practice"- a useful precursor to more involved long-term projects.

Return to Table of Contents

TOOL 2- COMMUNITY INVESTMENT

A Community Investment Portfolio (CIP) offers an accounting for the multiple forms of "capital" that a community can leverage to grow their local food system. Social, human, natural, and built capital present assets that can bring value to a community and increase the effectiveness and impact of financial investments. Communities also have a number of financial assets that can be leveraged to support growth of local food systems, including cooperatives, investment clubs, time banks, or self-directed IRA's. These tools can enable community members to invest in their own communities, thereby improving services and quality of life.

A Community Investment Portfolio (CIP) is a mechanism that leverages multiple forms of capital within a community to support the development of greater self-reliance, local or community ownership, retention of wealth, and the creation of new enterprise clusters. CIP's differ from traditional financing in two significant ways:

1) CIP's leverage multiple forms of capital, including financial capital, deployment of existing stranded or under-utilized equipment or facilities, and time and volunteerism;

2) CIP's help to direct investment capital (time, money, or physical assets) to support clusters of inter-related enterprises rather than focusing on one individual business.

The purpose of a CIP is to more effectively utilize the assets that already exist within a community. Often times, people stall action on a good idea because of the lack of immediate financing to support the project. However, a number of local food businesses began through time investments among a group of individuals. For example, in Kent, Ohio, Abbe Turner, a local farmer and cheese producer, began the Lucky Penny Creamery with very few financial resources. She matched her own volunteer time with contributions of time from family, friends, or farmers to get things up and running. The Local Roots Cooperative in Wooster, Ohio transformed two empty storefronts in downtown Wooster into a 600 member producer/consumer cooperative that features all local foods. With few financial resources other than what founding members pooled together, they initially relied on a lot of volunteer labor. Farmers pooled their equipment, skills, and time to renovate the space and get it operating. Volunteerism of this nature is not entirely an altruistic act. For the individuals contributing time to the start-up of Lucky Penny, the return on their time investment was access to high-quality, artisan goat cheese that they wanted to have available to them. In the case of Local Roots, farmers invested their own time helping to renovate the coop storefront, knowing that it would create new market sales that would pay off down the road. Especially in the start-up phase of new enterprises, the value of time investments should not be under-estimated.

In addition to leveraging latent time resources, many communities contain under-utilized physical assets. These can come in a number of forms, including empty or under-utilized store fronts, old manufacturing buildings, idle equipment owned by a business or individual, commercial kitchen space that might not be utilized for portions of a day, or the equipment and facilities left behind by a school closure. A new local food enterprise can look to these stranded assets within a community as a more cost-effective way to start-up a new business. In many cases, these facilities can be donated or offered for a short-term lease.

Overall, the Ford Foundation, in its publication *Wealth Creation in Rural Communities*, develops a broad-based approach to capital formation in communities that goes beyond just financial capital. Their report identifies seven forms of capital that a community can leverage to support local food systems development:

- **Individual**- the stock of skills and physical, and mental health among people in a community;
- **Social**- the stock of trust, relationships, and social networks supporting civil society and the openness of these networks to community participation;
- **Intellectual**- the stock of knowledge, innovation, creativity, and research capacity within a community;
- **Natural**- the stock of natural resources that underpin a local economy, including soils, bio-diversity, clean water, stable climate, watersheds, and forests;
- **Built**- the stock of available land, buildings or facilities that might be deployed or re-purposed for local food systems activity;
- **Financial**- the stock of unencumbered financial resources in a community that might be available to invest in the growth and development of local farms or local food enterprises; and
- **Political**- the stock of available power held by individuals, groups, or organizations that can be leveraged for broader change in a community.

Financial resources can be more productively leveraged if a community has pooled together its time and identified existing assets that can be deployed. Both of these activities actually strengthen social networks which can be an important per-requisite to financial investment. In the area of food incubators, June Holley notes that many kitchen incubators struggle because of a singular focus on brick-and-mortar development and inade-

WEALTH MATRIX- LOCAL FOOD SYSTEMS DEVELOPMENT IN OBERLIN

Type of Capital	Indicator	Measure
Individual	Are individuals in the Oberlin community gaining the skills to improve diet and health through local food consumption?	Changes in diet, number of people gardening in the community, accessibility of local food within ¼ mile of every home
Social	Does Oberlin have a diverse network of individuals, groups, businesses, and organizations collaborating on local food systems development?	Number of network hubs with concentrations of local food activity in community, number of pathways connecting groups, accessibility of local food networks to diverse socio-economic, ethnic, or age groups
Intellectual	Does Oberlin possess a vibrant learning community which fosters open knowledge, innovation, experimentation, and applied research?	Diversity of learning opportunities in formal institutions, coverage of all aspects of the local food value chain, mix of informal learning opportunities available to residents, businesses, or institutions.
Natural	Does the local food system enhance and restore healthy ecological systems, insuring its longevity?	Soil quality indicators, organic matter/carbon storage, utilization of organic wastes for energy or nutrients, water quality impacts, biodiversity of cropped and non-cropped areas, overall greenhouse gas emissions
Built	Are under-utilized buildings or facilities accessible to support growth of the local food system?	Square footage of available commercial kitchen space, square footage of re-purposed buildings in the community, accessibility of physical infrastructure to entrepreneurs or businesses
Financial	Is there accessible financial capital in the community that can be invested in local farms or local food infrastructure?	Percentage of financial capital originating from within the community, value of capital funds in community, interest rate levels, financial capital leveraged from outside of the community.
Political	Do local systems of government or institutions develop policies supportive of local food systems?	Local procurement policies, land-use and zoning, economic development, encouragement of urban agriculture, preservation of agricultural land.

quate social network development. As a result, there is a high rate of failure among many kitchen incubators nationally.

There is not a singular template for a CIP and the concept is fairly new. The Ohio Agriculture Research and Development Center (OARDC) has developed a template for a CIP that can be adapted to the growth of the local food economy in and around Oberlin. However, CIP's can also include other sectors as well, such as energy or other local materials or goods.

The CIP provides a matrix of assets that can be leveraged within a community to develop a local food system. It also provides a tool that can encourage individuals, businesses, or institutions to determine what forms of capital they may be able to contribute to the growth of the local food system. For example, Oberlin College has been the source of multiple forms of capital supporting local food systems in Oberlin. Examples of capital contributed by the college include:

- **Volunteerism**- The Bonner Center for Service Learning at the college engages hundreds of students annually in local food efforts, including Day of Service events, volunteer placements with local organizations working on food issues, or community projects;

- **Applied Research**- The Environmental Studies Program, an academic department on campus, enables students to pursue internships, honors research, or class projects that support local food systems;

- **Alumni**- A number of college alumnae have remained in Oberlin after graduating to initiate local food businesses or social enterprises;

- **Purchasing**- local purchasing policies implemented by the Oberlin Student Cooperative Association and Bon Appetit Management Company have a combined impact of over $800,000 in local spending;

- **Land**- the college contributes 70 acres of a college-owned farmstead to support the George Jones Farm and the New Agrarian Center;

- **Investment**- the Oberlin Student Cooperative Association has provided several low-interest loans to support local farm projects; Bon Appetit Management Company has invested in greenhouses and produce delivery capacity; and the Green Edge Fund, a student-administered fund, has provided numerous grants to support the George Jones Farm or community gardening initiatives in the community;

- **Waste**- Food waste generated by coops and dining halls has been composted and utilized as an input for the Jones Farm and community gardens on campus.

In a CIP matrix, Oberlin College contributes multiple forms of capital to support the local food system, including investments in individuals, volunteer networks, knowledge and research, natural capital, land, and financial investments. A CIP more broadly applied to the community would capture other forms of capital that can be contributed by the network of residents, businesses, and organizations that make up the Oberlin community. A CIP provides an effective method for mapping assets within the community and assessing areas where gaps might exist.

Moving forward, the CIP can be further developed to promote the development of what the OARDC refers to as "business ecosystems". The OARDC defines a business ecosystem as "a collaborative network of producers, suppliers, distributors, processors, business supporters (financial institutions, NGO's, educators that prepare the workforce, R&D, etc.) and customers that share a common set of values or supply chains. Collaboration can reduce risk and cost, and increase efficiency."

The five core activity areas identified as critical to the growth of Oberlin's local food system each comprise an example of a "business ecosystem". For example, a local food hub can include an ecosystem that includes three facilities that support the aggregation, distribution, and processing of locally grown foods (the old Missler's Grocery Store, the Boys and Girls Club kitchen, and the Masonic Hall). These three facilities will be supplied by a network that includes both urban market farms in Oberlin and rural producers from the six-county Oberlin foodshed. Market partners, including college accounts and local businesses, can access locally grown food through these facilities. The facilities can also include capacity for urban food production that takes place on surrounding grounds, roof-tops, or nearby properties. This network can also connect with the Food-to-Waste-and-Energy hub to coordinate the collection and processing of food waste that can be utilized for energy (bio-digestion) or organic matter and nutrients (compost) that can be re-invested as inputs to farms or urban gardens that are a part of the network.

Rather than matching capital to individual businesses, a CIP helps to leverage multiple forms of capital to support entire "business ecosystems". This produces a greater catalytic effect in which capital circulates more freely to support more inter-linked businesses. This provides a more effective investment of capital, the benefits of which spread out and benefit a number of participating businesses. For example, a local food hub could include a flash freezing facility that enables fruits or vegetables to be taken at peak harvest and frozen for use during the off-season. The capital investment in the equipment and storage space for flash freezing could benefit a number of local farms or local food businesses who could utilize the facility to process their own products or to access frozen products that could become ingredients for meals or manufactured foods. Instead of each farmer or business individually having to raise the capital to support flash freezing, the facility is shared, enabling the capital to benefit overall growth in the local food network.

Local Investing

The CIP provides a mechanism for leveraging multiple forms of capital within a community. This does not diminish the importance, however, of financial capital as a critical driver for local food systems development. This section identifies specific tools that can be utilized to increase the availability of local financing that can be invested in local food systems.

Creating an environment for local financing requires a shift in how economic development is typically framed. Political and economic development leaders are often fixated on equating economic growth with the ability to participate in the global economy. To this extent, globalization has created an economic environment where export-earnings and competitiveness in the global market place has taken precedence over investments in local businesses and economies. In April of 2012, Michael Schuman, economist and author of the book *Local Dollars, Local Sense* came to Oberlin to explore some of the mechanisms by which a community could invest in its own businesses and economic well-being.

For Shuman, a global economic orientation is becoming a less attractive economic option for communities for three primary reasons. First, the emergence and growth of the service economy tends to largely favor local businesses whereas global trade tends to focus on goods. Second, the rising cost of fossil-based energy will continue to increase the costs of global manufacturing and distribution. Third, in part with the rise of the internet, there has been a recent rise in home-based businesses. All three of these areas will continue to favor the competitiveness of local enterprises over global companies.

Shuman listed six areas of focus for nurturing local businesses:

- **Planning**- plugging leaks in a local economy;
- **People**- supporting local entrepreneurs;
- **Partners**- increasing competitiveness through local collaboration;
- **Purse**- harnessing local capital investments;
- **Purchasing**- spearheading "local first" buying campaigns; and
- **Policymaking**- removing an anti-local bias in public policy.

Based on the workshop with Michael Shuman, the following investment tools emerged as possible mechanisms that can be used to support community investment in local food systems.

LOCAL BANKS AND CREDIT UNIONS

In this section of his book *Local Dollars, Local Sense,* Shuman includes local investment options that can be supported by community banks or credit unions. These institutions have the capacity to manage these programs which can be initiated by individuals or groups of account-holders.

Purchase Targeted CD's-

Specialty CD's offer one tool that community banks can utilize to generate capital for local investing. A specialty CD can be targeted for investment into local businesses with banks providing administrative resources to manage the resources. This enables unaccredited investors an opportunity to invest savings in long-term CD's. The banks utilize capital raised through the CD's to collateralize loans to local businesses. Investors gain the same rates of interest that they would with a normal CD, although they (instead of the bank) do assume risk if the investment fails. This tool enables individuals to do double duty with investments, earning a comparable interest rate while investing in businesses that match their social criteria. As one example, Equal Exchange, a worker-owned company that specializes in fair trade products that meet strict environmental

Return to Table of Contents

and social criteria, leveraged a specialized CD program that raised $1 million in credit from individuals supportive of their mission. Working with a community bank or credit union in downtown Oberlin, a group of residents could set-up specialty CD's that could raise collateral capital that could support development of local food or energy enterprises within the community.

Micro-Loan Fund-

The Self-Help Association for a Regional Economy (SHARE) provides another example of working with community banks to provide capital to collateralize loans to local small businesses. Initiated by the New Economics Institute (formerly the E.F. Schumacher Society) in Great Barrington, Massachusettes, the program targeted mostly rural, home-based businesses that could utilize small amounts of capital to expand small rural enterprises and local food initiatives. Many of these enterprises needed small loans of $2,500 to $3,000 to introduce or expand small enterprises, such as cheese-making. Micro-loans of this scale are difficult for banks to administer and often carry interest rates that make them prohibitive to small, rural enterprises. SHARE organized as a non-profit organization that partnered with the Berkshire Bank to organize the micro-lending program. A Berkshire resident could open up a savings account at the bank as a joint account with SHARE. The account remained in the ownership of the depositor, but could be pooled with others to form collateral for small loans that were facilitated by the SHARE non-profit. In its early formation, the program had 70 depositors and made 14 loans that included some investments in a small milking parlor and cheese room for a small farm, a loan to a home knitter to purchase a new knitting machine, or an appliance repair man that was able to expand his inventory of spare parts. In all, the program reportedly created forty new jobs without any loss of loans. The depositors received a quarterly newsletter to update them on which businesses received loans through SHARE. Many of the depositors included small, relatively low-income residents who saw the benefits to the loan pool to support businesses in the local community like theirs. The introduction of new Community Reinvestment Act regulations, lower interest rates, and changes in community banking reduced the need for the program which ceased operations in the 1990's. Susan Witt, the co-founder of the SHARE program, observed in retrospect that they were able to nurture more capital, but needed a program that provided more business planning support for residents interested in loans. The legal documents for SHARE can be downloaded at www.neweconomicsinstitute.org for replication.

COOPERATIVES

Cooperatives provide one option for accessing local capital without the need for accredited investors. Members of a cooperative can purchase shares in the cooperative, providing capital as well as a voice in the decision-making of the enterprise. Cooperatives have seen a recent growth in the past 5 years, particularly as capital from traditional sources has become less available. Cooperatives, such as Local Roots in Wooster, Ohio leveraged both the financial and time resources of their farmer and consumer member-owners to establish a local foods retail store in an empty downtown building. The Evergreen Cooperative in Cleveland is a cooperative fund that is investing in a number of worker-owned cooperative enterprises, including a green launder, a solar installation company, and a hydroponic greenhouse operation. The Evergreen Project in Cleveland was initially capitalized by the Cleveland Foundation, the largest community foundation in the United States. It demonstrates a novel way for foundations to invest their financial assets in the start-up of social enterprises that provide employment, build local wealth, retain capital, and provide services that have a social benefit (improved local food supply, green laundry, solar energy, etc.)

According to Shuman, economically, cooperatives provide a number of benefits as described in the list below.

- **Investing in Fields that Others Won't Touch**- The Rural Electric Cooperatives provide one example of investing in rural infrastructure in an area that traditional financiers would not touch.

- **Consumers Drive Down Price**- When consumers have a share in the business, it helps to keep prices low and reduces the flight of profits from outside of the community.

- **Higher Worker Productivity**- A number of studies indicate that worker-owners of cooperatives tend to have higher rates of productivity, due to their co-ownership of the company and place in the decision-making affairs of the enterprise.

- **Bulk Purchasing**- Bulk purchasing provides another advantage where local businesses can team up to do bulk purchasing of supplies or inputs.

Perhaps one of the greatest benefits of cooperatives is local ownership. The owners of a cooperative enterprise usually include members of the same community that the coop serves. In terms of developing local food systems or sustainable energy initiatives, coops invest in local infrastructure with a long-term interest in the well-being of the community. Traditional investment routes often seek capital from investors that are often not members of the targeted community whose sole interest is return on investment. In a globalized economy, this facilitates a downward spiral where highly mobile capital travels the globe in search of the most favorable investment returns, often to the detriment of local communities.

Some of the models of cooperative investment identified by Shuman are summarized in the list below.

- **Member Capital**- Coops raise initial capital through their membership. Becoming a member of a cooperative requires an equity investment or share. Share rates can be prorated or extended over longer time-periods to accommodate a more mixed socio-economic base of supporters. Capital raised by membership can be used to invest in facilities, equipment, inventory, or other needs for the cooperative. Membership often yields dividends, in which a share of profits are distributed

Return to Table of Contents

to members, keeping profits anchored in a local community.

• **Member Lending**- Coops can also leverage their membership base to pool together loans to support expansions, upgrades or moves within a community. The Willy Street Coop in Madison Wisconsin, for example, raised $600,000 in 34 days from its 21,000 membership base. Members were allowed to select an interest-return rate, with many favoring lower interest rates to support the cooperative.

• **Coop Loan Funds**- One of the Rochdale Principles guiding cooperative enterprises includes "Coops Helping Other Coops". Coops will often leverage their own capital resources to support the growth of coops, whether in their own community or in other communities. The Oberlin Student Cooperative Association (OSCA) has a history of making loans to other cooperatives across the United States, from starting local CSA's in Oberlin to investing in university-based coops or small coops in low-wealth communities as far abroad as Nicaragua. Coops can often charge a more favorable rate of interest than traditional financiers.

• **Investing Coops**- Some coops can be organized to invest in community assets to foster broader local economic impact. For example, Coop Power, with 390 members and 7,000 supporters in New England, leverages its membership capital to invest in the community assets necessary to transition away from fossil-fuel-based energy systems. The coop invested in businesses to support energy efficiency services, bio-fuel plants, and renewable energy. Individuals joining the cooperative included thought-leaders and energy experts from throughout the region. In addition to leveraging about $300,000 in membership capital, the knowledge resources of its members are tapped to advise the development of new energy businesses. With $300,000 in member equity and another $200,000 in member loans, the coop has assembled three energy-efficiency crews, launched a solar hot water installation program, and supported other energy businesses that collectively employ 100 people.

• **Cooperative Loan Funds**- Cooperatives can also create special loan funds that can direct resources toward supplying businesses. For example, the La Montanita Food Coop, based in New Mexico operates five stores, has 17,000 members, and about $30 million in annual sales. The coop has a large network of small to mid-size farms that utilize sustainable production methods. The coop developed resources to invest in distribution, storage, and wholesale market development to support the 700 regional farmers in its network. The coop introduced a program to pre-pay farmers or food processors in exchange for later reductions in invoices, generating another small pool of capital to support capital investments in these enterprises.

• **Worker-Owned Coops**- Workers in a worker-owned cooperative can also be a source of capital. While less common in the United States, perhaps the best-known example of worker-ownership is the Mondragon Cooperative Corporation in Spain, a network of 256 cooperative and non-cooperative businesses which fold a portion of their profits back into the cooperative association to support new businesses or business expansions. The Evergreen Cooperative in Cleveland is replicating the Mondragon model to invest in a number of green cooperative businesses focused on leveraging the spending power of University Circle institutions, such as Case Western Reserve University, University Hospitals, and the Cleveland Clinic. The development of these cooperatives is supported by the Evergreen Cooperative fund. All cooperative businesses are owned by the workers. A typical worker-owner is projected to build up a $65,000 equity stake from profit distributions in 8 to 9 years. The Evergreen Cooperative Development Fund provides the capital for the worker cooperatives. Over time, the work cooperatives pay back into the fund through a share of profits, supporting the expansion of coops in the fund or the development of new cooperative enterprises.

With a rich history in cooperative enterprise, Oberlin can begin to look at the development of new cooperative enterprises that can raise capital from member-owners while supporting investments in community assets that can support the development of new local food or energy businesses. Some possible tools that Oberlin could consider might include:

• **Local Food Hub**- Organizing a local food hub by leveraging equity capital from local businesses and institutions that can become founding members;

• **Cooperative Fund**- Organizing a cooperative development fund that, like Evergreen, can provide capital to starting-up cooperatively-owned businesses that can become engaged in local food processing or distribution, compost or waste management, biomass energy generation, or a loan fund for farmers supporting Oberlin markets; or

• **Micro-Loans**- leveraging small amounts of capital can also be distributed to support urban agriculture efforts, including backyard gardening cooperatives or urban market gardens or home-based businesses for local food processing;

ACCREDITED INVESTORS

Accredited investors include wealthy organizations, or individuals (banks, insurance companies, large charities, endowments, etc.) that are permitted to invest in higher risk projects. Types of investments might include provision of seed money or venture capital, limited partnerships, hedge funds, or angel investor networks.

• **Community Development Finance Institutions** - State and local government can provide a source of capital investment through the formation of revolving loan funds. These loans have to be self-financing, meaning that the interest from early loans have to cover the expenses of the fund, although they can be initiated or periodically infused with public money from local, state, or federal entities. The State of Vermont, for example, created state a Vermont Sustainable Jobs Fund to support development of a green economy. The fund receives about $250,000 from the state which covers a portion of operating expenses and enables them to further leverage $1 million of capital each year from a mix of federal agencies, foundations, or individual donors to provide grants and technical support. The Vermont Economic Development Authority has a bond market to under-write low-interest loans to family farms. Growing out of these initiatives, the state has created a new designation for a low-profit limited liability company (L3C). This new business structure enables a mission-oriented business to form with the objective of not maximizing profit. The Flexible Capital Fund is an example of a L3C created. With about $2 million in capital, the Flex Fund draws accredited investors who are interested in investing in mission-oriented businesses in the state. Its investments target value-added agriculture, green technology, waste management, and renewable energy project. The fund invests strategically to fill gaps in local food supply chains, investing in businesses that have a product or service that another business needs. The State of Vermont has experienced job growth in the local food economy when many sectors were mostly losing jobs. As one example, the town of Hardwick Vermont, with a population of 3,000 residents, organized a group of private investors and local food businesses to create about 100 new jobs in the local food economy through targeted investing in a collection of businesses providing goods and services to each other.

• **Program Related Investments**- Another source of capital for mission-oriented business investment comes from private foundations. Many foundations are set-up to make program-related investments, low-interest loans that often favor higher-risk businesses with a social mission that have difficulty attracting funding from traditional financing sources.

• **New Market Tax Credits**- New Market Tax Credits provide equity investments, loans, and technical assistance to low-wealth communities. These funds are available to accredited investors who put money into the fund for seven years and receive a 39% credit on federal taxes. About $30 billion has been authorized for this program which can be used to particularly target initiatives in low-income communities.

NON SECURITIES

The greatest barrier to local food businesses is access to capital. Since most local food businesses are small, including home-based businesses, sole proprietorships, or small co-operatives, it is difficult for them to attract investment capital, even if they are approaching accredited investors. However, there are a number of investment tools available to small businesses which should be leveraged in Oberlin. They include:

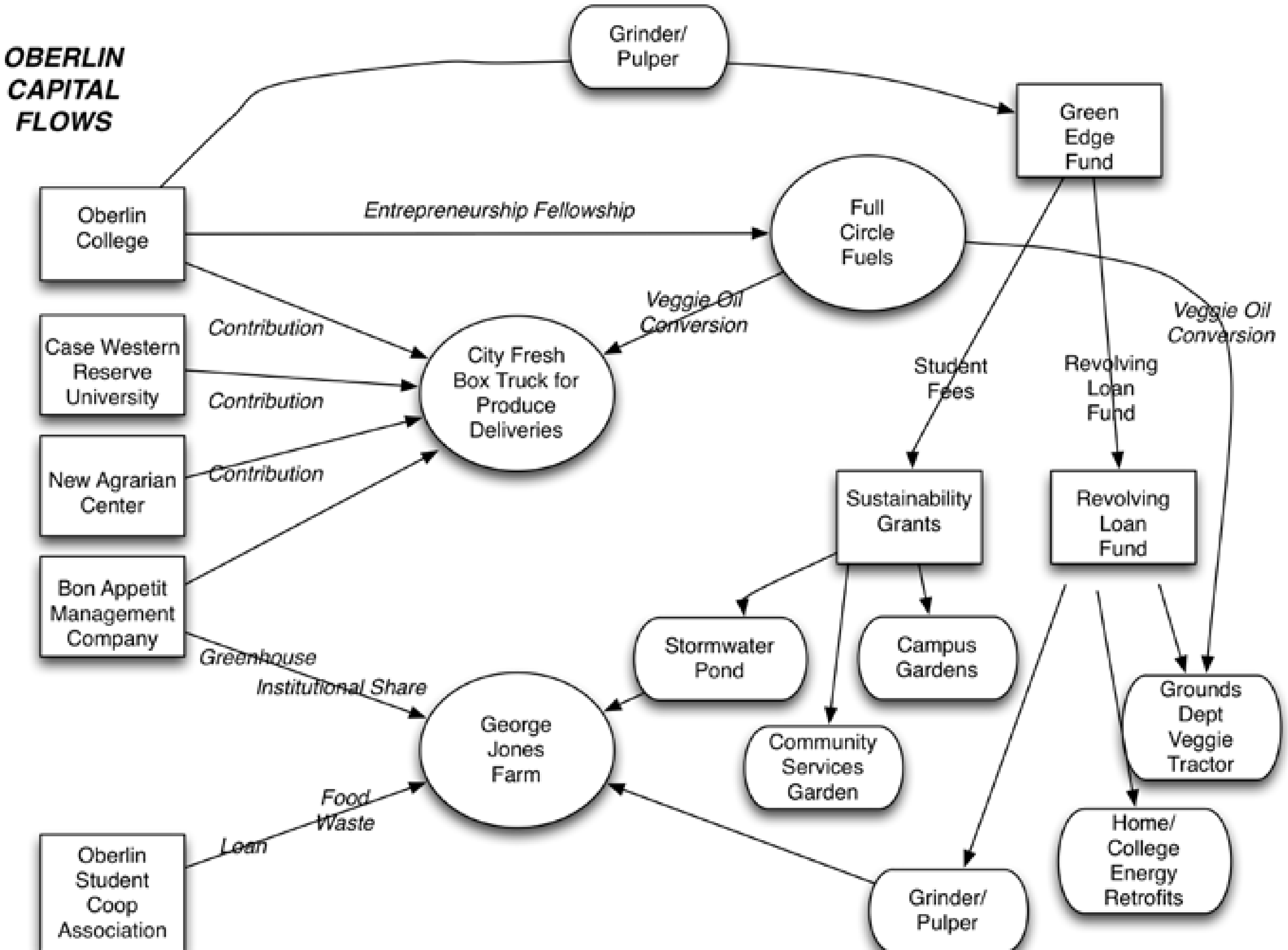
• **Crowdfunding**- Crowdfunding has been bolstered through the internet and the development of some on-line crowd-sourcing tools like KickStarter or RocketHub. These on-line tools provide new support for artists, artisan producers, and others that have trouble accessing credit through traditional channels. A project is placed on a crowdsourcing web-site, with a target amount of capital being sought. Individuals can sponsor the project by pledging funds on-line. The target amount must be achieved within a certain window of time, typically 60 days. This income is not treated as an investment, as the money will not be returned to the sponsor, nor will it earn them interest. These projects are most successful for projects that have strong support among a network of people likely to be affected by the project. For example, a number of micro-breweries have utilized crowd-sourcing to generate capital. The people that provide funding support are also likely to be the same people that might patronize the micro-brewery. To the extent that a project has wide visibility and support within a community, crowdsourcing can be an effective source of start-up capital or capital for expansions.

• **Microloans**- Another common source of capital comes from micro-loans intended to assist mostly small entrepreneurs that require low amounts of capital to get started. Kiva provides a common platform for micro-loans and has been successful in third world countries where residents might have a difficult time finding access to capital. A micro-loan is a form of interest-free lending. Capital is provided and then paid back, but at 0% interest, which enables it to avoid security laws. While Kiva mostly transfers capital from networks of supporters from wealthier nations, a community-based variation of this could be developed for Oberlin's local food system.

• **Pre-selling Goods and Services**- Pre-selling goods and services can offer another avenue for a small business to generate capital. This works particularly well for already existing businesses that have a loyal clientele. Café Gratitude in San Francisco issued discount gift cards to their clientele to open-up another restaurant location. The gift cards could be purchased for $1,000 and provided $1,200 to spend at either of their restaurants. Café Awakening, a new café being developed in Oakland, California as a gathering space for area artists and social entrepreneurs, the café is financing its development by pre-selling goods and services from the café.

• **Time Bank**- A time bank allows people in a community to more effectively leverage their time resources. Within a time bank, one hour of work holds the same value, regardless of the type of work that it is. For example, a plumber might install an irrigation line for an urban market garden and the market garden will provide produce back to the plumber. A time bank allows for a more reciprocal form of volunteerism where people can receive credit for time contributed and exchange that credit for other services from within the community.

• **Local Currency**- Local currencies are a variation on time banks. In a local currency, an actual local scrip is issued that can be exchanged for goods and services



Return to Table of Contents

within a community. In the example above, a plumber might purchase food from a local market garden using a local currency. The urban gardener might then pay for massage therapy services to take care of a sore back with the local currency. In the late 1990's, the Oberlin Sustainable Agriculture Project (OSAP), a Community Supported Agriculture farm, issued its CSA shares in the form of "Oberlin Dollars". Shareholders then exchanged these dollars (in any amount) at the farmers market to re-deem their produce. A discount was built in, so that a $100 share would yield $120 Oberlin dollars. These Oberlin dollars could be shared with friends or also used to purchase meals at the Black River Café or food at the Oberlin Market whole food store who in turn used the local currency to purchase food from the CSA. The program lasted for about three years, but never reached the community scale achieved by Ithica Hours or other successful local currencies.

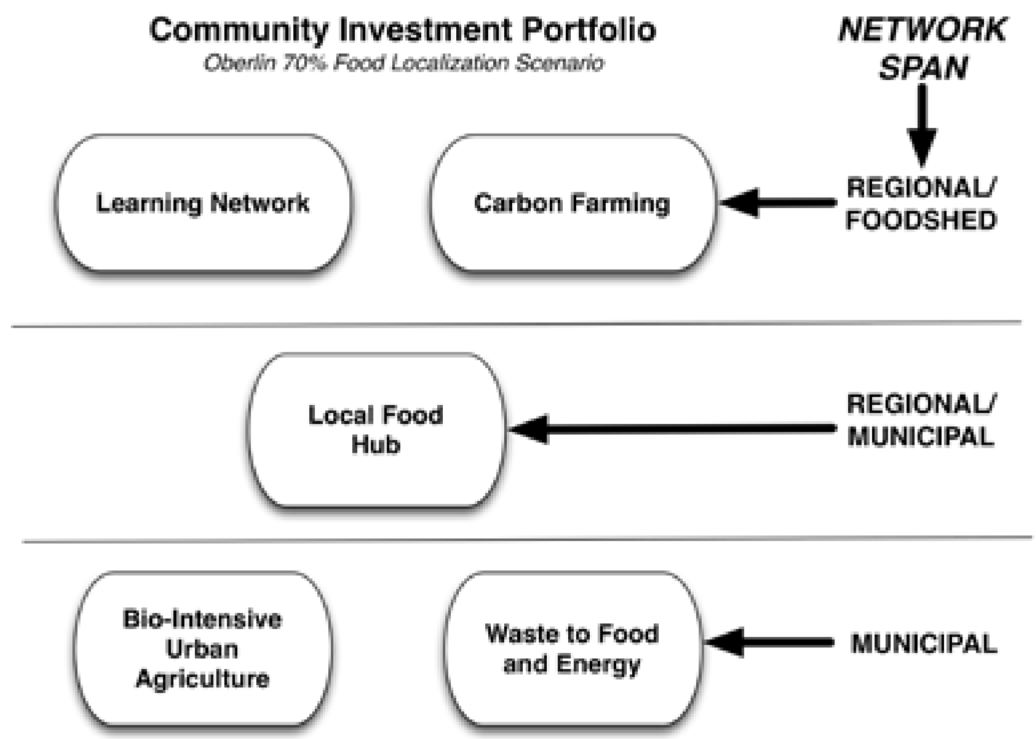
• **Slow Munis**- Another tool that can be developed would the issuance of "slow municipal bonds". This plays off of the Slow Food movement which seeks to encourage a return to more healthy and sustainable local food systems that honor regional culinary traditions. Slow municipal bonds provide a mechanism for investing in local soils, land, and infrastructure for local food systems. A bonding agency (could be a port authority, a municipal government, or other recognized authority) would issue municipal bonds that could be purchased by the residents or businesses within their geographic area. The bonds could generate capital to invest in local food systems. In the *25% Shift* regional food assessment of Northeast Ohio, the formation of a Local Food Authority was recommended as a body that could issue Slow Muni bonds and then mobilize local enterprises and infrastructure investments that would have the greatest catalytic potential for localizing the food system. An initiative such as this has yet to be established in Northeast Ohio, but could enable greater public investment in local food systems which in turn could create increased jobs, enterprises, tax earnings, and retained wealth.

LOCAL INVESTMENT POOLS

Shuman identifies local investment pools as mechanisms that enable larger groups of investors to pool their resources in larger investment funds that can be administered by the investors themselves, a partnering non-profit organization, or more formal investment structures like mutual funds or pension funds.

• **Non-profit Revolving Loan Fund**- Non-profit revolving loan funds can be formed to support investment in mission-oriented for-profit businesses. In these, cases, a non-profit organization administers the loan fund and directs investments into companies that meet criteria for social or ecological responsibility. For example, the Rudolf Steiner Foundation (RSF) supports a network of private schools organized around Rudolf Steiner's philosophy of learning and living. RSF loans to businesses that fall within its core missions of food and agriculture, education, the arts, and ecological stewardship. They also assess a business's supply chain as well, to insure that high standards of social and environmental responsibility are practiced across the entire value-chain. The RSF's Social Investment Fund has about 1,000 investors, 80% of whom are unaccredited, although the majority of the Fund is supported by the 20% of investors that are accredited. Loan rates are not determined by market rates, but rather through a negotiation between the borrower and representative investors. While the network is national, many projects focus on connecting investors and businesses within the same region.

• **Investment Club**- An investment club can be organized by a group of individuals interested in pooling small amounts of capital to invest in local food businesses in their region. According to SEC rules, every member must participate in the decision-making process for every loan and one person cannot contribute more than 25% of the total pot. Investment clubs work well in communities with strong social networks where groups of investors know and perhaps even patronize the farms or small food businesses that they want to support. One example of an investment club is No Small Potatoes in Maine. The investment club has about 14 members, each of whom chip in at least $5,000. The club issues micro-loans that support small local food businesses, including a loan for a produce delivery van for a growing farm and loans to a goat cheese maker, a butcher, a farmer developing a



Return to Table of Contents

composting business, and a farmer interested in improving his software for on-line marketing. In all cases, the small loans went a long-distance in growing the bottom line of the farms and businesses being supported. The loans are issued at 5% interest. About 2-3% is distributed back to club members and the remaining is accrued to cover administrative fees and a loan loss reserve. Investment Clubs provide a powerful tool for voluntary associations of small, unaccredited investors to form within a community and support investments in its local food system.

• **Local Mutual or Pension Funds-** According to the *25% Shift* Report, there is an estimated $56 billion in mutual funds and $172 billion in pension funds invested among individuals and non-profit organizations in Northeast Ohio alone. All of these long-term savings are tied up in large funds in Wall Street, with no capital available for direct local investing. There is increased interest in developing mutual or pension funds that can enable funds to be directed to the development of small local businesses. While there is significant potential, the development of mutual or pension funds that can be invested in local businesses in the region would take a significant amount of infrastructure. A community would have to have a critical mass of local securities. Then the securities would need to be traded through a local exchange to maintain liquidity. When local stocks are tradable, a community can look at creating a local mutual fund. While these steps are not insurmountable, they would require a much wider regional infrastructure necessary to spread out risk across a large pool of food or farm related businesses.

SELF-GENERATED

Shuman identifies a final option for local investing which involves individuals setting up their own retirement funds which they can either direct themselves or through special administered funds.

• **Self-Directed IRA's**- Self-directed IRA's include a largely overlooked opportunity for directing retirement savings toward local investing. A self-directed IRA requires a custodian, but can otherwise be directed at the investor's discretion. Self-directed IRA's can help to raise local capital that can be invested in new business innovation or the growth of local food businesses. A group of neighbors could even set-up a self-directed IRA in which they could invest in each other's houses, avoiding higher interest charges from banks. Self-directed IRA's also enable greater diversification in an individual's portfolio, compared to traditional IRA's which usually have one main asset class- stocks or mutual funds. While appealing, self-directed IRA's require a good deal of financial acumen, requiring that people be more involved with determining projects that might make for good investments. They can be a good option for individuals with investment experience and enough savings to invest a portion into local businesses.

LOCAL INVESTMENT SUMMARY

Fourteen of the 25 attendees of a workshop on local investing led by Michael Shuman shared their perspectives through a follow-up survey on what investment tools might be developed to support local food and energy efforts in and around Oberlin. Overall, the attendees saw a need to expand education in the community around the benefits of local investment and to begin to develop some reliable mechanisms to enable individuals, businesses, or organizations in the community to invest a portion of their resources to capitalize local efforts.

Some of the recommendations that participants favored among the 40 local investing tools presented included:

- formation of a Local Stock Exchange at the county or regional level;
- consideration for how churches and individual congregants might invest financial resources in the local food economy;
- encourage residents to utilize community banks or credit unions;
- developing a GoLocal debit card;
- incubation of cooperative enterprises;
- self-directed IRA's;
- standardized CD's to collateralize local investment; and
- work with the college to determine possible avenues for local investing through workplace contributions.

The projects that attendees identified as potential candidates for local investing initiatives included:

- a cooperative enterprise that operates a local food hub for distribution and limited processing;
- capitalization for home-energy conversions to promote conservation;
- web-site clearing-house that lists local businesses that individuals can invest in with mechanisms for doing so;
- community-wide composting system;
- fund to enable local farms to transition to more sustainable and local production;
- pilot a specialized CD program to raise capital with Lorain National Bank; and
- developing and documenting local investing applications in Oberlin to enable other communities to learn and replicate.

OVERVIEW OF LOCAL INVESTING IN OBERLIN

A number of tools can provide sources of capital to support the development of a local food and energy system in Oberlin. These tools can help to augment an already active set of innovative financial tools that have supported sustainable enterprise development in Oberlin over the past decade.

The accompanying chart lists some of the capital flows that have supported a variety of initiatives in the Oberlin community, leveraging the capital already existing in the community to impact the community in a number of possible ways. The following lists some of the tools, many similar to the ones listed above, that have already been utilized

Return to Table of Contents

in Oberlin:

• **Pre-Selling Goods & Services**- The George Jones Farm and Nature Preserve (and its previous incarnation as the Oberlin Sustainable Agriculture Project) have utilized a variation on the Community Supported-Agriculture model to generate start-up capital to get through the early months of the growing season. In addition to membership shares sold to individual households, in the late 1990's, the farm received loans of $5,000 and $6,000 respectively from the college and the student coops. The loans were paid back through credits on invoices during the fall harvest to each market, with the interest provided as a discount on the produce sold.

• **Internship Support**- Oberlin College has provided internship support to graduating students who have leveraged these experiences to initiate a variety of social enterprises in the community. For example, Sarah Kotok, OC '98, received a summer fellowship to initiate the Oberlin Farmers' Market in 1996. She utilized her experiences as the market manager to start the Oberlin Market, a whole foods retail store, after graduating. The business is still operating under different ownership 15 years later. Aaron Englander and Sara Waterman both participated in summer internships at the George Jones Farm through internship support from the Environmental Studies Program. Both went on to become farm managers of the George Jones Farm after graduating. Aaron Englander served as head grower for three consecutive years, growing the farm to about $80,000 in gross sales.

• **Fellowship Support**- Oberlin College has also offered a number of post-graduation fellowships, such as the Compton Fellowship, which provides fellowship grants to graduating students with innovative ideas. Sam Merrett graduated in 2004 and took his interest in bio-diesel and alternative fuels as a student to found Full Circle Fuels, a renovated gas station that specializes in converting diesel engines to run on vegetable oil as well as offering a wide-range of vegetable-based fuels. The business is still in operation eight years later.

• **Non-Profit Loans**- The Oberlin Student Cooperative Association has a long history of providing low-interest loans to a number of local food initiatives in the Oberlin community. They provided a $10,000 loan to start the Oberlin Sustainable Agriculture Project, enabling them to invest in a greenhouse and equipment. They provided also provided a $15,000 loan to the New Agrarian Center to establish a working farm at the George Jones Farm and Nature Preserve. OSCA charged about 3% interest on loans, a favorable rate for initiatives that had no hope for attracting traditional financing. The loans provided important support for acquiring equipment and supplies needed to make the farm enterprises viable.

• **Institutional Support**- The Bon Appetit Management Company collaborated with the New Agrarian Center (NAC) to support a grant to acquire a diesel box truck to support the City Fresh social enterprise. City Fresh works to supply neighborhoods and businesses with locally grown foods, particularly marketing to low-income neighborhoods that lack access to healthy, local foods. The box truck came about through equal investments between Bon Appetit's national office and Oberlin College and Case Western Reserve University. The grant for the truck included a vegetable oil conversion by Full Circle Fuels. Used vegetable oil comprises about 70% of the fuel for the distribution. The truck has also included distribution to Case Western and Oberlin College accounts to increase the availability of local food while generating revenues to subsidize food shares for low-income neighborhoods. More recently, the college and Bon Appetit invested in a grinder/pulper system which can pulverize a number of organic waste streams (food waste, napkins, plate scrapings, etc.) from the college's largest dining hall. This investment is intended to increase the amount of organic waste that can be utilized for compost and as an input to local agriculture.

• **Green Edge Fund**- Oberlin College levies a voluntary student fee from all Oberlin College students that goes directly to the Green Edge Fund, a foundation that is administered by a board of students committed to facilitating sustainable development on-campus and in the community. The Green Edge Fund includes sustainability grants which provide support for efforts in the community, with about $100,000 contributed annually. Recent examples include a stormwater and irrigation pond at the George Jones Farm, a community garden at the Oberlin Community Service Center, and the development of campus gardens. The Green Edge Fund also includes a revolving loan fund, supported by the college administration, that enables investments in energy or resource efficiency that have a payback through cost savings. Recent loan investments include the conversion of a Grounds Department tractor to run off of vegetable oil, home and college building energy retrofits, and the grinder/pulper for Stevenson dining hall to facilitate composting.

In the 25% Shift report, it was estimated that a 25% food localization scenario for the 16 counties of Northeast Ohio would require about $1 billion in investment. That investment would return an estimated 27,000 jobs while generating $4.2 billion in the regional economy. That translates to about $2.5 million of investment for each community of 10,000 individuals to generate an average of 62 local jobs in those communities.

All of these examples demonstrate the ways that Oberlin already has several working models for local investing in sustainable food and energy systems.

Under a 70% localization scenario, these impacts will be greatly magnified. On the basis of these numbers, it is estimated that a 70% localization of Oberlin's food supply would require about $7 million in investment with the potential of creating 174 jobs. Not all jobs created would necessarily be located in Oberlin, as much of the induced spending resulting from localization will benefit distributors, farmers, farm services businesses, builders and contractors, and others not residing in Oberlin. Jobs in Oberlin could include aggregation, storage, micro-distribution, urban food production, value-added processing, waste management, and educational services.

Shuman's recommendations for local investing offer a number of useful tools that Oberlin can consider leveraging to further deepen its support of local food system efforts.

Based on some of the local investing models discussed previously, there are two types of investment strategies that Oberlin can consider. The first set provides more immediate tools that focus on increasing available capital within the Oberlin community to support local food initiatives. The second set features more long-term projects that will require a greater local investing infrastructure at the regional or state level with a broader collaboration with groups from outside of Oberlin.

Short-Term Investment Strategies (Strategies only limited by the lack of engaged individuals in the community implementing them):

- Specialized CD's with local banks or credit unions
- Micro-loan program
- Pre-payment of goods
- Crowdsourcing or micro-financing initiatives
- Investment Clubs
- Time banks and local currencies
- Revolving loan funds
- Program-related investments
- Grants or loans from private foundations, state or federal government

Longer-Term Investment Strategies (Strategies that require more sophisticated infrastructure and regional partnerships):

- Self-Directed IRA's
- Slow Munis
- Local Mutual or Pension Funds
- Local Stock Exchanges

Longer-term investment strategies will require broader regional partnerships that will have a catalytic effect on local food systems development outside of Oberlin. The first step in growing Oberlin's local food efforts will be to leverage already existing capital within the community by cultivating local financing networks and raising community awareness of local investment opportunities. The second step will involve a broader coalition of regional partnerships that could be facilitated through a Local Food Authority- an agency that can issue public bonds and investment financing in multi-county initiatives, such a food hubs.

The below break-down offers a possible allocation of resources to support growth of the five core activity areas necessary for a substantial food localization effort:

- **Local Food Hub**- $2.5 million in facilities development, equipment acquisition. Investment. ***Investment Tools***- federal grants, loans, program related investments, specialized CD's, investment club, slow munis, local pension funds, local stock

- **Waste-to-Food-Hub**- $2.5 million in facilities development, equipment acquisition, Class II permit establishment, steam-heat line and greenhouse development. ***Investment Tools***- federal or local grants and loans, program related-investments, slow munis, local pension funds, local stock

- **Carbon Fund**- $500,000 to support equipment pool, perennial crop development, habitat restoration for participating farms. ***Investment Tools***: micro-loans, investment clubs, pre-payment of goods, federal farmer grant programs (NRCS), program-related investments.

- **Urban Agriculture Fund**- $500,000 for funds to support advanced bio-intensive production methods, season extension technology, soil development, micro-loans for urban food production opportunities. ***Investment Tools***: crowdsourcing, investment clubs, time banks/local currencies, grants, pre-payment of goods

- **Learning Network Development**- $1 million for capacity development and training. ***Investment Tools***: grants or loans, crowdsourcing

These figures are preliminary and provide a rough guide for what it would cost to more fully implement the core activity areas listed in this report. Ultimately, planning and development grants would be ideal to support more detailed budget development and project phasing.

Return to Table of Contents

Critical Tools #3: Pattern Language for Local Foods and Urban Design

Local food systems will thrive to the extent that there are supporting patterns in urban centers that encourage more direct connections between people, food, land, and community. From urban agriculture to efficient food distribution, embedding a local food system into the fabric of a city can improve quality of life, community connectivity, and a healthy relationship to nature and natural patterns.

Christopher Alexander's *Pattern Language* offers an alternative approach to urban development that reinforces patterns that:
• improve connectivity between neighbors and community members;
• mix and disperse the basic functions of living, working, shopping, and civic spaces to make them accessible by foot;
• blur the sharp edges between municipal boundaries and the surrounding rural countryside;
• encourage opportunities for people to commune with others from their community through more intentionally designed buildings, landscapes, neighborhoods, businesses, and common or civic areas; and
• introduce the elements of a functioning democracy and civic engagement more intentionally throughout urban space.

As we consider a 70% localization of Oberlin's food supply, a number of applications of *Pattern Language* concepts can inform how food localization itself can create more sustainable patterns of urban design and development. Likewise, sustainable patterns of urban design can also encourage or facilitate the process of food localization.

A common approach to food localization draws on the concept of "import substitution", an economic development theory that suggests that local economies can be strengthened by replacing items that are imported into a community with the same or similar items produced locally. This enables local economies to more effectively leverage the "multiplier effects" that localization of production and consumption can bring. In other words, if Oberlin organizes a local composting program, we begin to substitute fertilizer inputs that we presently import into the local economy. The manufacture of synthetic fertilizer creates a number of jobs from the extraction of materials, the manufacturing of synthetic fertilizers, and the distribution of those materials to various markets across the globe. Composting provides an alternative method of retaining the abundant nutrients contained in organic waste streams or sewage. Local composting operations can create local jobs in processing and transport of materials. A local composting operation is also more likely to purchase goods or services from other local businesses in the community, such a local equipment repair shop or a local contractor to install facilities.

Import substitution is often identified as a proactive response to peak oil and resource challenges. As the price of energy continues to rise, local communities will be at a competitive advantage if they have production and distribution systems that minimize energy inputs compared to food shipped in from long distances. Import substitution does not make sense for everything, especially for specialized high-tech applications (which have a much lower cost for transport per unit of weight) or manufactured items like cars. But for food, it makes considerable sense. For example, lettuce contains about 90% water. The energy used to transport lettuce is, in effect, being used to transport water from one end of the country to the other. Because food generally weighs more per unit of value than micro-chips, for example, it will be increasingly costly to maintain distribution for heavy items like food.

A detailed reading of the *Pattern Language* reveals that an import substitution strategy is the first step. But actually creating a local food system that can compete with the current system of long-distance shipment AND reliably supply food year-round to a supporting community will require a transformation in the spatial organization of cities and the surrounding countryside. Over the past 50 years, the industrialization of the food system has moved direct participation in agriculture further and further outside of cities. Even though Oberlin is surrounded by farms, most of the land area is devoted to commodity grain production (corn, wheat, soybeans) that cannot be directly consumed by urban residents. Food localization means bringing agriculture into a more direct relationship with city-dwellers, including the utilization of urban space to support agricultural production. Food localization cannot be considered without reviewing the basic assumptions of urban design and development that pervade most communities.

Pattern Language provides a counter-balance to a lot of the dominant trends in urban design which favor:
• automotive transport over pedestrian or alternative modes of transportation;
• single-use zoning and disaggregation of the basic functions of living, working, shopping, and learning;
• architectural and neighborhood development patterns that isolate rather than connect residents; and
• move toward increasing privatization of space and social functions with decreasing emphasis on "commons" or civic areas.

Interestingly, engagement with local food systems actually reverses many of the above trends. The appearance of CSA distributions, farmers' markets, or food carts increasingly create neighborhood access to local foods that minimize driving. Many urban farm sites integrate learning, commerce, recreation, and improve living conditions for surrounding neighbors. Community gardens or farmers markets provide common spaces within communities that increase interaction between neighbors.

An acceleration and expansion of local food systems can actually become a positive driver for more sustainable patterns of urban development. And the good news is that Oberlin already reflects many of the positive patterns listed in *Pattern Language*, including an active urban farming scene, relatively undeveloped areas around the periphery of the city, strong pedestrian orientation, a college and town that share a common square, a variety of independently owned businesses, and a population size conducive to democratic participation.

In considering the five major areas of development for a 70% localization of Oberlin's food supply, attention can be placed on some of the following combinations of patterns:

Carbon Farming:
Carbon farming focuses primarily on coupling local food purchasing with a robust network of small to mid-sized farms that utilize production methods that sequester carbon in soil or plant biomass. Most of the regional patterns apply here:

1- Independent Regions
2- City-Country Fingers
7- The Countryside
29- Density Rings

Learning Network:
A learning network includes a variety of pathways where individuals, businesses, or groups can access the knowledge they need to enact the various components of a healthy local food system (farming, urban gardening, culinary arts, business development, etc.). Education should include opportunities for both formal (learning for credit) and informal learning (apprenticeships, workshops, peer-to-peer learning, etc.) and spaces where the two can combine (such as a learning farm that also provides a field lab for a community college curriculum). A number of patterns support a vibrant learning network:

18- Network of Learning
26- Lifecycle
30- Activity Nodes
40- Old People Everywhere
43- University as Marketplace
45- Necklace of Projects
57- Children in the City
60- Accessible Green
80- Self-governing Shops and Offices
124- Activity Pockets
147- Communal Eating

Local Food Hub:
A local food hub provides a central gathering area that can support a variety of functions for a healthy local food economy, including aggregation of food coming from a network of small farms, training and workforce development, new entrepreneurship, connections to businesses or households, and overall coordination of local food activities. Consideration should be given to a food hub that includes nearby access to affordable housing (allowing people to walk to work), improves food access in the city for diverse socio-economic groups, provides a space for gathering needed to foster new collaborations, and supporting existing or new small businesses that utilize locally grown foods. Given that the goal of the food hub is to seed and support a base of small and mostly independently-owned businesses in the community, the food hub should be spatially laid out to encourage smaller work groups focused on a variety of functions in the local food system (baking, slicing and dicing, freezing, co-packing, aggregation and warehousing, logistics, etc.). The food hub can be a common space that facilitates these inter-connected small enterprises that together form a larger economic network. The following patterns would reinforce a vibrant local food hub:

9. Scattered Work
19. Web of Shopping
30 Activity Nodes
46. Market of Many Shops
80. Self governing workshops and offices
87. Individually owned shops
88. Street Café
89. Corner Grocer
90. Beer Hall
93. Food Stands
124. Activity Pockets
148. Small Work Groups
182. Eating Atmosphere
184. Cooking Layout

Urban Agriculture:
Clearly, the one activity that can have the largest impact on urban spaces is the cultivation of food within the city itself. As local foods brings people in closer contact with the roots of their food system, urban agriculture opens up a wide arena for direct participation. Backyards can become productive spaces for home gardening or market gardening. Community gardens or urban market gardens can provide connecting nodes in neighborhoods or on school or college grounds. Urban farming spaces help to cultivate a variety of positive social connections too, creating bridges between youth and elders,

Return to Table of Contents

students and residents, diverse socio-economic groups, or even neighbors that have little contact with each other. The following patterns will reinforce a healthy urban agricultural scene within Oberlin, with some looking at more community-wide development patterns and others considering more design elements of individual urban garden or farm spaces:

- 8. Mosaic of Sub-Cultures
- 9. Scattered Work
- 14. Identifiable Neighborhoods
- 22. Nine-Percent Parking
- 26. Life Cycle
- 29. Density Rings
- 37. House Clusters
- 40. Old People Everywhere
- 45. Necklace of Projects
- 51. Green Streets
- 57. Children in the City
- 60. Accessible Green
- 74. Animals
- 80. Self-governing workshops and offices
- 106. Positive Outdoor Space
- 111. Half-Hidden Garden
- 114. Hierarchy of Open Spaces
- 118. Roof Garden
- 139. Farmhouse Kitchen
- 147. Communal Eating
- 148. Small Work Groups
- 169. Terraced Slope
- 170. Fruit Trees
- 171. Tree Places
- 172. Garden Growing Wild
- 173. Garden Wall
- 174 Trellised Walk
- 175. Greenhouse
- 176. Garden Seat
- 177. Vegetable Garden
- 178. Compost

<u>Waste to Food/Energy Hub</u>:

A Waste to Food/Energy Hub can be looked at as similar in composition and purpose to the local food hub. However, unlike the food hub, it represents the back-end of the local food system, focusing on the productive re-use of organic food and yard waste and other local waste streams. These waste streams each contain potential enterprise opportunities, including the generation of energy, waste composting, or utilization of waste-heat to support greenhouse production. The same networks supplying food to the local food hub can also be the recipients of some of the products coming out of the Waste to Food/Energy Hub, including farmers utilizing nutrients or bio-char or commercial kitchens utilizing bio-gas. Patterns that reinforce smaller enterprises or work groups can be helpful to a Waste to Food/Energy Hub, including:

- 3. City to Country Fingers
- 67. Common Land
- 74. Animals
- 80. Self-Governing Workshops and Offices
- 148. Small Work Groups
- 175. Greenhouse
- 178. Compost

<u>General Patterns</u>:

In addition to patterns reinforcing each of the five above areas of activity for local food systems, cities can consider land-use policies and local codes that also reinforce a healthy local food system. Most of these patterns relate to areas where there might be zoning or building code restrictions on activities that are conducive to local food development patterns, including keeping of livestock in the city, conservation or open-space zoning, limits to land-area devoted to parking, common access open space areas, architectural features such as roof gardens or greenhouses, wildflower or more mixed front yard garden spaces, and encouragement of distributed commerce or commercial activity in traditionally residential areas. Some of the reinforcing patterns that cities can pursue include:

- 3. City Country Fingers
- 9. Scattered Work
- 12. Community of 7,000
- 14. Identifiable Neighborhoods
- 22. Nine Percent Parking
- 29. Density Rings
- 37. House Cluster
- 60. Accessible Green
- 67. Common Land
- 74. Animals
- 93. Food Stands
- 118. Roof Garden
- 172. Garden Growing Wild
- 175. Greenhouse

The following pages provide more detailed explanations of the patterns identified in the lists above as they apply to local food systems development in Oberlin. Pattern descriptions are connected to visual examples of local food systems applied to a variety of urban settings, including Oberlin and Cleveland as well as more other locations such as Pittsburgh, Chicago, Vancouver, and San Francisco. These patterns are useful as both an educational tool and as a method of visualizing how urban centers can create intentional spaces that foster and support local food systems activity. These patterns can define broader regional or city-wide efforts or they can be used to shape specific spaces such as urban gardens or green streets.

REGIONAL PATTERNS

Pattern 1- Independent Regions: ***Metropolitan regions will not come to balance until each one is small and autonomous enough to be an independent sphere of culture.*** Localization of the food system in Oberlin begins with consideration of how Oberlin is situated within the larger patterns of the Northeast Ohio region. The growth of the local food economy in Northeast Ohio means that there is an increasing amount of food that is grown, distributed, and consumed within the same geographic region. How does Oberlin embed itself in this larger regional movement for food localization? The ability to localize the food supply will also require a greater density of transactions between households, businesses and institutions in Oberlin and farms and businesses in the outlying region. How does Oberlin see itself as one piece of a regional area that includes a population of 4.2 million residents? How does Oberlin contribute to the larger patterns of movement toward a more self-reliant regional food system? And how does the localization of the food system in Northeast Ohio accelerate localization within Oberlin as a smaller community embedded in the larger region?

The six acre Ohio City Farm creates an agrarian corridor at the edge of the Ohio City neighborhood, along an eastern bluff of the Cuyahoga River and within view of downtown Cleveland.

The 70 acre George Jones Farm in Oberlin creates a mixed-agricultural and habitat reserve along the eastern edge of Oberlin. The site integrates farming, wetlands, woodlands, and wild meadows.

Pattern 3- City-Country Fingers: ***Continuous sprawling urbanization destroys life, and makes cities unbearable. But the sheer size of cities is also valuable and potent.***
The idea of city-country fingers is to blur the distinction between town and country, encouraging urban development patterns that maintain an active network of small farms in close proximity to the city. This creates greater continuity and interaction between urban and rural communities. It also maintains productive greenspace within and around the city. The notion of a "green-belt" can be thought of as a series of fingers extending into the urban space rather than a continuous ring surrounding the city. This balances the density of urban interaction with the preservation of greenspace that supports the rural economy and provides local food, habitat, stormwater retention, carbon sequestration, and clean water.

Pattern 7- The Countryside. ***Create stewardships among groups of people, families, and cooperatives, with each stewardship responsible for a part of the countryside.***
Aldo Leopold defines the "land ethic" as a greater symbiosis between people and the land, soils, and ecological systems upon which all life depends. Creating greater permeability between city populations and the countryside creates a potential for more responsible stewardship of land resources. City populations invest in the integrity of local farms and the stewardship of the land and water which feeds them. In turn, farmers provide a sustainable local food supply. Greater exchanges can take place too between in converting urban wastes streams into inputs useful to local agriculture, including organic matter, nutrients, or energy from bio-digestion.

The Berkley Street community garden in the South-End neighborhood of Boston features 150 garden plots each expressing different growing traditions. The garden is a connecting point between east-Asian immigrants and the surrounding neighborhood.

Pattern 8- Mosaic of Sub-Cultures. ***The homogeneous and undifferentiated character of modern cities kills all variety of lifestyles and arrests the growth of individual character.***

A mosaic of sub-cultures implies greater distinctiveness of the variety of cultural perspectives that make up the Oberlin community. To some extent, sub-cultures can be a derivative of neighborhoods and more distinct neighborhood identities. Another sub-culture includes diverse communities, such as students, faculty, residents, or socio-economic groups. It is important that the city develop environments that accommodate the particular needs and backgrounds of different cultures while maintaining a high degree of access and social mixing between groups. Local food systems already exemplify this with spaces created by the farmers' market, City Fresh Fresh Stop, and community gardens. Each has a distinctive identity, but also creates space for positive social mixing and collaboration. Expansion of local food activities can improve the connectivity and variety of Oberlin's smaller communities.

Pattern 9- Scatter Work- ***Use zoning laws, neighborhood planning, tax incentives, and other means available to scatter workplaces throughout the city.***

The idea of scattering work helps to achieve a more mixed distribution between commercial and residential activity. Reducing the concentrations of areas that are singularly residential or commercial creates more access to services and goods and more positive mixing. Proximity between work and home also enables greater continuity with family connections. Development of a local food economy provides a number of opportunities to scatter work throughout the city, including a mix of more concentrated local food activities (such as a local food hub) and decentralized activities, such as home-based businesses, neighborhood-based community kitchens for food processing, Fresh Stops, small road stands, or urban market gardens.

The Revolution Brewery pub in Paonia, Colorado offers a gathering space that mixes the surrounding neighborhood with tourists and residents from the surrounding area. The brewery that supplies the beer is located in a converted gas station across the street from the pub at the edge downtown Paonia.

SELF-GOVERNING COMMUNITIES

Pattern 12- Community of 7,000- ***Individuals have no effective voice in any community of more than 5,000 to 10,000 persons.***
Oberlin's size and compactness as a small town affords greater opportunities for citizen involvement in the development of the city. At this scale, government can be more direct and more accessible to citizens. There is greater freedom for people to initiate new enterprises or initiatives and mistakes become more manageable on a smaller scale- a key tenant of Jeffersonian democracy. The larger population can be further devolved into smaller, self-governing and self-budgeting communities that can partner directly with municipal leadership. As local food networks expand, the accessibility of small-town government can play an important role in aligning policies and resources to support grassroots-initiated projects throughout the community.

The atrium of the Science Center at Oberlin College provided a day-long gathering space for students, local residents, farmers, and businesses discussing options for converting food waste generated by Oberlin institutions and businesses to an input for local agriculture.

In a neighborhood in Oberlin, a road-side stand sits in front of the old Masonic Hall, a historical gathering space for the African-American residents of the surrounding neighborhood. The stand provides a space for High School students to sell produce that they grew at the Village Garden, a combined community and market garden located just two blocks away.

Pattern 14- Identifiable Neighborhood- ***People need an identifiable spatial unit to belong to.***
Neighborhoods comprise smaller populations and themselves contribute to the life of the city. Identifiable neighborhoods have their own unique geography, centers of activity for commerce or social mixing, and common spaces. A functional neighborhood extends a wider sense of "home" across a whole block or neighborhood. Local food activity can contribute to healthier and stronger neighborhoods in a number of ways. Food can provide a gathering point for diverse neighbors to come together, whether it is being grown, prepared, or shared. Neighbors can combine yard spaces to create small commons for growing and sharing food. Urban gardens provide spaces that enable neighbors to mix and garden. Individual households, churches, or social agencies can host local food distribution through shares or neighborhood markets. A healthy neighborhood can be measured by the number of healthy local food options that exist within its boundaries.

Community Network Interdependency

Pattern 18- Network of Learning- Creative, active individuals can only grow up in a society which emphasizes learning instead of teaching.

Cities contain a number of learning resources and a well-designed city serves as an embedded curriculum that supports life-long learning for all residents. A learning network decentralizes education, expanding the notion that learning does not just occur within the walls of school buildings or universities. A healthy community offers a number of opportunities for learning, particularly relying on the rich diversity of its residents and their collective experiences. Developing intentional learning spaces interspersed throughout the community helps to keep people engaged. Robust local food systems rely on a largely decentralized form of education. Learning activities include workshops offered by experienced gardeners or farmers, peer-to-peer learning, sharing information through community workshops, informal exchanges of information, or offering apprenticeships to young people. Learning spaces that encourage mixing and exchange of information can include kitchens, gardens, home workshops, formal schooling, free universities (such as the Experimental College at Oberlin), or learning farms (such as the George Jones Farm). Learning spaces can also be virtual and include opportunities for farm-to-business connections (such as LocalFoodSystems.org) or a platform for sharing innovative local food stories (such as NEOFoodWeb.org). A healthy local food system will have a number of access points for learning for anybody that would like to get involved.

In the Ohio City neighborhood, a branch of the Cleveland public library enables residents to check out books about gardening and healthy eating remotely. The book table is integrated into a City Fresh share distribution site (called a Fresh Stop) which distributes share-bags of locally grown produce to neighborhood residents.

Pattern 19- Web of Shopping- Shops rarely place themselves in those positions which best serve the people's needs, and also guarantee their own stability.

Like a vibrant learning network, the Web of Shopping concept seeks to decentralize and disperse shopping opportunities throughout a community. Each shop has a "catch basin" of customers. Can shops be located in ways that are accessible to the needs of given communities? Can shops be reached on foot or by bike to encourage more pedestrian access? Most city zoning encourages single-use zoning that discourages the incorporation of commercial activity in residential zones. Communities that sponsor more mixed-use zoning efforts encourage greater connections between where people live and where they go to meet their basic daily needs. This also solidifies the social fabric of a healthy community. Local food systems can support similar webs of shopping, dispersing food access through community gardens that might consolidate urban produce or include a road-side stand, food share pick-up locations (such as City Fresh), or locating farmers' markets in close proximity to residential areas. A map of current local food access points in Oberlin indicates decent accessibility for most residents. With about .25 to .5 miles of distance being ideal to encourage walkability, areas where there are gaps in access can be targeted for local food developments, including gardens, CSA drop-off points, or small buying clubs.

In the Slavic Village neighborhood of Cleveland, Mural-Garden Park mixes a mural, a Fresh Stop for the neighborhood, and a garden that mixes edible and native species. The Fresh Stop and garden attract both residents and people that work in the neighborhood with a historic business district along Broadway Street.

Pattern 22- Nine Percent Parking- ***Very simply, when the area devoted to parking is too great, it destroys the land.***

The 9% parking rule defines the area of parking that an urban center can tolerate before it becomes disruptive to ecological function and quality of life. Communities that have large areas devoted to parking, roads, and servicing of automobiles become less livable, more dangerous, less inviting to people, and tend to keep people indoors. Automobile dependency can also erode neighborhood spaces for social communion. A community that limits parking and automobile dependency will increase area that can be utilized for urban agriculture, urban habitat, or common spaces. This increases civic life and community participation. Distributing food access points throughout a community can also relieve dependency on the automobile. Fresh food outlets that remain open for much of the week can also encourage smaller refrigerators that use less energy if people walk to a food outlet and carry smaller bags with them.

Volunteers form a Wonder City Farm plot on an asphalt parking lot on the east-side of Cleveland in 2006. Wonder City Farm was established by two sisters that started an urban market farming initiative. The organic matter on the parking lot will absorb stormwater. The site reverted to the Cuyahoga County Board of Developmental Disabilities in 2011 as a part of Cleveland Crops, a market gardening initiative for adults with developmental disabilities.

In Oberlin, a garden plot provides locally grown produce for the Oberlin Community Service Center, which operates a monthly community food bank. The garden is integrated into a larger open-space that includes a children's play area and benches where residents or elders can sit and converse or enjoy the scenery.

Pattern 26- Life Cycle- ***Make certain that the full cycle of life is represented and balanced in each community.***

Much of urban design in America has focused on dis-aggregation, separation of use, and urban monocultures. Young people are concentrated in schools, families in single-use residential zones, and elders in retirement homes. With little common space to encourage healthy mixing, quality of life suffers. A healthy community has spaces that support people at all stages of their life cycle (infants, young children, adolescents, young adults, adults, and elders). A healthy distribution of common spaces that encourage mixing or activity between groups can further improve the social health of a neighborhood. Each person, whatever their place in the life-cycle, has unique needs and unique contributions that they can make. Local food systems can create a number of spaces that contribute to the full-life cycle of a community, including community gardens or markets that encourage a mixing of ages or community food preservation activities that match elders and youth. Local food spaces throughout the city should be designed deliberately to encourage participation of mixed-age groups. For example, elders might need accessible garden beds or places to sit in the shade.

Neighborhood Boundaries

Pattern 30- Activity Nodes- ***Create nodes of activity throughout the community. Activity nodes occur where a number of paths or roads in a community converge.*** Activity nodes are better dispersed throughout a community, with each neighborhood or work area having walkable access. Cooperative clustering can take place too around complementary activities. Examples of activity nodes that can be organized around local food systems include a local food hub for distributing local food to businesses or households, a community food processing kitchen, a composting and waste hub, learning farms around schools, or community gardens in neighborhoods. Each of these spaces draw multiple people together for shared activity, exchange (whether food, recipes, or growing techniques), and learning.

The Village Garden in Oberlin provides a space not just for residents and high school students to raise food, but it sponsors community events. Here students and residents celebrate an Indigenous People's Festival, dancing to jazz music played by jazz majors from Oberlin's Conservatory of Music.

The Farm Stand at the Ohio City Farm occupies a converted shipping container. The road stand provides a market outlet for the five urban farming enterprises located at the 6 acre Ohio City farm. The farm preserves a more mixed urban land-use, combining greenspace and social mixing between immigrants, adults with developmental disabilities, community gardeners, recent college graduates operating a market farm, and a diverse mix of nearby restaurants that support the farm.

Pattern 29- ***Density Rings- Once the nucleus of a community is clearly placed, define rings of decreasing local housing density around his nucleus.*** Urban sprawl encourages a flattening of housing density, with a monoculture of single-use homes dispersed equally across the landscape. This destroys any notion of center or nucleus that defines a more healthy pattern of urban design. People generally want to have close proximity to shops or services for excitement, convenience, or social connecting while also wanting more private spaces for quiet reflection, family life, or green-space. People tend to prefer one direction of the other. Density gradients from a central city can help to preserve a more functional urban form. In terms of local food systems, having gradients of density helps to concentrate residential populations around city centers. This creates more robust markets and can mostly be accessed by foot. Reducing densities in the outer rings of a central city helps to preserve workable farmland and maintains the rural character around a city. However, homes are still ideally clustered in ways that maintain viable farmland or open space. Local food can also thrive in high-density settings, where intensive gardening provides green-space, social mixing, and food supply and markets provide opportunities for outlying farms and rural communities.

Return to Pattern Language Lists

Return to Table of Contents

Housing Clusters


The Maple Community Garden in Vancouver, British Columbia provides gardening space for over a 100 residents in the adjoining apartment complexes. The garden spans an old railway right-of-way that provides a walking and biking path. The garden efficiently utilizes vacant space between residential complexes that adds to the character of the area.

Pattern 37- House Cluster- ***Arrange houses to form rough, but identifiable clusters around common land and paths.***
Looking at shared common greenspace or open space between houses creates more opportunity for neighborhood interaction, more efficient maintenance (not everybody has to own their own lawnmower), creates more open traffic patterns, and provides residents with access to a larger open space than if they each had their own lawn. The open space forms a core to the cluster, with houses built along its edge. This kind of pattern, especially in future planned developments or subdivisions, can encourage smaller lots, more pedestrian-friendly design, and sizable land areas that can be devoted to urban gardens or small-scale farms. The notion of common land between houses can also come about through individual household agreements where two neighbors might form a common space for farming by combining their properties. Through the leadership of the Open Space Commission in 2004, Oberlin developed a conservation district zoning for planned unit developments which clusters houses on small lots and allows for up to 40% greenspace which can be utilized for agriculture or other uses.

The Slavic Village Fresh Stop draws together neighborhood residents. A neighborhood elder found a shady spot to sit, enjoy the gardens, and watch residents coming to the Fresh Stop.

Pattern 40- ***Old People Everywhere- Old people need old people, but they also need the young, and young people need contact with the old.***
One of the casualties of the single-use zoning is reducing points of healthy integration or mixing within a community. The sequestration of aging communities into their own separate homes or spaces can have the effect of cutting them off from interaction with the rest of the community. Designing communities where elders share some of the same streets and spaces as the young create opportunities for healthy interaction. In many traditional cultures, the linkages between youth and elders provides opportunities to connect young people with perspectives from the past. Local food can provide a useful draw for integrating elders into the life of community. Designing spaces within urban gardens or farms that accommodate elders (even ground, shaded places for sitting, raised beds that can be more easily accessed without bending) fosters healthy mixing. Finding shared garden activities between youth and elders can also informally connect people. Organizing community meals at churches or other accessible community spaces that draw diverse ages can also create opportunities for mixing.

Return to Pattern Language Lists
Return to Table of Contents

Work Communities

Pattern 43- University as Market Place- ***Establish the university as a market-place for higher education, more dispersed and mixed with the surrounding town.*** Universities and colleges cloistered and closed-off from meaningful interaction with their surrounding communities reduce opportunities for learning and positive exchange between students and other members of a larger community. Looking at classes and learning opportunities as a traditional marketplace enables individuals to self-select and freely follow the pathways of most interest to them. Looking at concepts like the "free university" can create positive learning spaces where anyone can take a course or teach a course. In terms of local foods, this kind of notion of a "free" or "open" university can offer some new ways to get more people involved in local foods. Oberlin already has the "Experimental College", an example of an open-university where students or towns-people alike can teach courses of interest. The semesterly EXCO fair is an open market where people can circulate between tables for the different courses and sign-up for topics that interest them. Defining campus and urban gardens as spaces that encourage open sharing of information and knowledge can also help to increase interactions and learning spaces to enhance or accelerate local food systems development.

With over 100 vendors, the Athens Farmers Market is the largest year-round farmers' market in Ohio. The market brings together small farmers and local food businesses from around southeastern Ohio. Its proximity to the Ohio University campus also draws students and staff of the college, an important economic stabilizer. The market also facilitates access to low-income residents in this largely impoverished region, being the first farmers market in Ohio to accept food stamps and donating market surplus to area food banks.

Pattern 45- Necklace of Community Projects- ***The local town hall will not be an honest part of the community which lives around it, unless it is itself surrounded by all kinds of small community activities and projects, generated by people for themselves.*** Having a robust grassroots sector enlivens the democracy of a small community. Grassroots movements, often unpopular at their inception, provide an important place in challenging established ideas or providing services to community members otherwise overlooked. Grassroots initiatives can be supported through the provision of low-cost or free storefronts, offices, or meeting spaces (often buildings that might otherwise be empty). Organizing open forums for ideas to get into the public for consideration can also help to change the life of a community and its openness to new ideas or perspectives. Many, if not most, healthy local food efforts are largely driven by grassroots communities, including farmers markets, community gardens, or collaborative marketing among a number of small farmers. Local food systems will grow to the extent that grassroots participation and innovation is encouraged. Creating a "necklace" of local food projects throughout the community can encourage an acceleration of local food consumption and innovation that will drive growth in the local food economy. Creating physical spaces for meeting or temporary offices on community gardens or neighborhood-based initiatives in the city can help to increase participation. Organizing an open knowledge commons can enable people to contribute and share ideas that others can learn from, refine, or critique.

Pattern 46- Market of Many Shops- ***Establish frequent marketplaces, each one made-up of many smaller shops which are autonomous and specialized (cheese, meat, grain, fruit, etc.).*** The market of many shops concept reinforces the "web-of-shopping" idea where communities have access to a number of goods or services that they might need with minimal transportation distance to each of them. Markets of many shops get basic human contact back, where shop-keepers are specialized in knowing about what they are growing or producing and how to use it. Such personalized attention cannot be found in larger, more impersonal supermarkets which are mostly designed as warehouses for moving large amounts of product with minimal transaction costs. In terms of local food systems, this market of many shops can be found most obviously at the Oberlin Farmers' Market where about 12 vendors offer a variety of specialized goods: produce, meats, cheeses, spices, baked goods, etc. A local food hub can similarly be approached as a market of many shops in which a number of small growers or enterprises, each producing different foods essential for a healthy diet, converge into a common space to facilitate marketing and distribution.

Pattern 57- Children in the City- ***If children are not able to explore the whole of the adult world around them, they cannot become adults. But modern cities are so dangerous that children cannot be allowed to explore them freely.***

In a vibrant community, children have a number of ways to learn and pattern healthy adult behaviors through interaction with the neighborhood and larger community. Learning should not be confined only to schools, where children mostly interact with a mono-culture of other kids their exact same age. From fast moving vehicles, to dangerous machinery, or the threat of kidnap or assault, the perceived or actual threats of cities limit healthy interaction for children. Children need places to freely roam, explore, or have chance interactions with other children, adults, or elders. Dispersed and well-designed urban gardens can provide healthy spaces for adults and children to interact or share activities. In addition to children's gardens, incorporating habitat areas, water features, or natural play areas in garden design can encourage these spaces to become destinations for neighborhoods. Schools grounds can also provide a space to encourage more interaction between schools and parents and residents in a community. Insuring that accessible urban gardens are distributed throughout the city can further increase both neighborhood identity, healthy interaction, and access to healthy foods.

At the Village Garden in Oberlin, children living in adjacent public housing gather water and maintain plants in the garden. The children were taught basic gardening and helped to monitor the plants to see if they needed water. The space provides a safe area for children to interact with nature and participate in the growth of their own food.

This green street in the Mole Hill neighborhood of Vancouver converted 50% of a paved ally to native landscaping and gardens, greatly reducing stormwater loading. A car-share program pools a handful of cars between residents, reducing demand for paved parking and increasing the appeal of the neighborhood through bio-diversity and food production.

Pattern 51- Green Streets- ***There is too much hard asphalt in the world. A local road, which only gives access to buildings, needs a few stones for the wheels of cars; nothing more.***

This reinforces the 9% for parking rule stated earlier and looks at reforming minor streets, driveways, or access roads into mostly grass and permeable surface. This helps to more effectively absorb stormwater while making streets less automobile dominated and more accessible to children. It also helps to reduce the speed of traffic, making the urban environment safer. Related to local food systems, green streets can be lined with orchard trees or brambles to create natural fencing between streets and buildings. Stormwater can be collected from streets and filtered through gravel or sand to provide water collection that can be utilized for irrigation of fruit trees. Consideration should be given as well to designing streets to accommodate more pedestrian, bike, trike, rick-shaw, or animal drawn transport.

Public Open Land

Pattern 60- Accessible Green- ***People need green open places to go; when they are close they use them. But if the greens are more than three minutes away, distance can overwhelm need.***

By a standard measure, at least 1 acre of green space located within a three minute walk of every business or household can create much more accessible green space that invites connection with nature, a break from work life, or common space to organize small gatherings. Proximity tends to favor use, but thoughtful design also encourages more use. Scattering green throughout the city also distributes ecological services, such as critical habitat, stormwater retention, or carbon sequestration. Accessible green spaces can provide places for community gardens or small market gardens distributing foods to neighboring households or neighbors. Connected to community processing kitchens, these spaces can provide foods that can be preserved for winter months. In less frequently trafficked spots, food forests can be established, which include a diverse mix of mostly perennial, food-bearing shrubs, trees, vines, and groundcovers that require little maintenance.

Pattern 67- Common Land- ***Without common land, no social system can survive.***

Accessible common land helps to knit together the social fabric of a community, providing space in between buildings or around cities that foster a mix of activity, from playing, to socializing, to growth of food. In a culture that favors privatization of most space, there is little encouragement of common spaces. Roads comprise the bulk of common space in cities today, certainly not places that invite healthy social mixing. As a design guide, it is recommended that 25% of privately held land should be held in common, providing everything from walking and hiking to organic food production. Buildings without close access to common land become isolated and reduce positive interaction with the outdoors. For local food systems, common land can provide important access to the production of local food or raising of grazing livestock. Conservation development districts also encourage tighter clustering of housing to make for up to 40% land area that can be utilized as common green space or agricultural land. Common land can also be leased by a community to individual farmers or a farming cooperative. This helps to reduce the cost barriers that many farmers face in attempting to access land for production. The Cuyahoga Valley's Countryside Initiative provides one example for public land that gets leased to individuals or farm families. The national park maintains the land as agriculture and aspiring small farmers can access the land and facilities needed to support their agrarian-based enterprises.

Pattern 74- Animals- ***Animals are as important a part of nature as trees and grass and flowers. There is some evidence, in addition, which suggests that contact with animals may play a vital role in a child's emotional development.***

Outside of zoos, common pets, or vermin, animals are absent from most urban environments. Incorporating animals in the life of cities can provide important interactions, particularly for young children. Animals can also provide a range of functions or services in a city, including transportation (donkeys, horses), recycling of garbage (pigs), provision of eggs or meat (ducks, chickens), milk or meat (goats, sheep, cows), pollination services (butterflies, bees, certain birds), or insect control (birds). Animals need appropriate space to encourage health and to prevent nuisance or disease problems. Provision for animals to be more widely incorporated into cities provides a number of benefits to healthy local food systems. Animals can be utilized to maintain or "mow" empty lots or public parks, as his been done in the City of Cleveland to more cost-effectively maintain vacant lots. Animals can enliven a backyard garden or urban homestead by providing food and producing manure which increases garden fertility. Animals can provide a variety of protein-heavy foods, from meat to dairy to eggs and animal fibers can be made into clothing. Manure management remains an important aspect of productively incorporating animals, but, if managed well, this adds to the fertility of and productivity of local farms or urban gardens.

Like much of Cleveland, this west-side neighborhood has a large inventory of vacant properties, many of which are in the city's land-bank. A "Mow Goat" pilot opened up these properties for a group of urban goat-hearders. The goats graze overgrown weeds, reducing the maintenance costs to the city. The goats also provide an economic opportunity and serve as a fun draw for kids and families in the surrounding neighborhood.

Work Groups

The Appalachian Center for Economic Networks (ACENet) in Athens, Ohio offers a food incubator that provides facilities to support over 150 small farmers and local food entrepreneurs. The surrounding region has a 35% poverty rate, owing to the rise and fall of coal and timber extraction. ACENet formed its facility to leverage local food systems activity to create jobs and revitalize the local economy.

ACENet utilizes human-scale technology that improves productivity without creating a dehumanizing work environment. Facilities include support for thermal processing (canning and bottling), flash freezing, baking, pasta-making, flour milling, post-harvest handling of vegetables and grains, storage, and packaging.

Pattern 80- ***Self-governing Workshops and Offices- No one enjoys work if he or she is a cog in a machine.***
Mechanization, from a Buddhist point of view, can either enhance the skill and power of workers or it can have a de-humanizing effect as they become supplanted by machines. The majority of technological development since industrialization has created workers as inter-changeable cogs as opposed to individuals that are masters of a craft. The idea of self-governing workshops or offices is to create work environments where workers have more control and ownership over decision-making and economic rewards. Self-governing workshops acknowledge a place for appropriate technology that creates human-scale work environments. For local food systems, self-governing patterns of farms, locally-owned businesses, or cooperatives tend to favor smaller and more involved groups of people. Cooperatives have seen a recent surge in the past decade as a mechanism to maximize the productivity of small groups working together while utilizing technology that is scaled appropriately to a safe work environment. Larger-scale local food projects, such as food hubs, can include federations of smaller work groups that each specialize in a different aspect of the local food system (i.e. cheese-making, baking, drying herbs, etc.)

Return to Pattern Language Lists

Return to Table of Contents

Local Shops and Gathering Spaces

Revolution Brewing in Paonia, Colorado incorporates a micro-brewery in a converted gas station across from a pub that provides a family-frendly community gathering space that mixes conversation, music, and art. Hops produced at a farm on the edge of town are utilized by the brewery.

Pattern 87- ***Individually Owned Shops***- Small, individually owned, non-franchise businesses add to the unique character of a community and work with local supply networks to the extent that it is feasible.

Pattern 88- ***Street Café***- Spaces that mix food and refreshment with informal gathering encourage conversation, dialogue, or learning that also add to the life and vitality of neighborhoods or downtown centers.

Pattern 89- ***Corner Grocer***- Small grocers that are accessible by foot encourage pedestrian access and more frequent purchases of smaller items, encouraging use of fresh foods and limiting energy intensive refrigeration at home.

Pattern 90- ***Beer Hall***- Public drinking houses can encourage conversation and mixing within larger community. Designed with open alcoves and mixes of different activities.

The Great Lakes Brewery in downtown Cleveland hosts a number of lectures and sustainability networking event, including this workshop on carbon farming offered by an international permaculture expert.

Pattern 93- ***Food Stands***- Food stands provide low-capital, individually-owned businesses that can add to life and smells on the streets. Many food trucks can feature ethnic or locally grown foods and can be transported to accompany events or large community gatherings.

Food trucks have become a popular feature of many neighborhoods in Cleveland. Food trucks are locally-owned and can provide quick access to food for large public gatherings, including commencement weekend at Oberlin College.

Built Environment

Pattern 106- ***Positive Outdoor Space***- Positive outdoor spaces are partly enclosed and partly open, creating a mix of micro-climates and providing shelter from rain or shade from the sun. Positive open spaces are like outdoor rooms, utilizing buildings, trellises, garden walls, shrubs, or other features to create partial enclosure while increasing the land area that produces food or supports quality habitat.

Pattern 111- ***Half-Hidden Garden***- Half-hidden gardens include in-between or transitional spaces that balance a sense of privacy or quiet with views or adjacencies to streets or clusters of buildings. These spaces can utilize a variety of vines, shrubs, or other perennial plants to create a partial sense of enclosure and a local food supply.

Pattern 114- ***Hierarchy of Open Spaces***- Position spaces for sitting or quiet reflection that are partially exposed, creating space that protects the back while offering a view into larger spaces. This can be an effective way to incorporate elders into spaces who have comfortable seating in shaded area that offer views into gardens or other activity areas.

The City Farm in Vancouver combines urban gardening with home compost education for city residents. An earthen building includes a covered oven for baking bread or pizzas. A green roof and perforated walkways also absorb stormwater. The building itself creates sheltered gathering spaces in the garden.

The Farmhouse Restaurant in downtown Chicago features a wide-range of locally grown dishes. They also utilize the rooftop above the restaurant to grow fresh herbs, vegetables, and herbs which they harvest daily during the growing season.

Pattern 118- ***Roof Garden***- Utilization of roof space for gardens or food production helps to add to the square footage of growing area within a city while also absorbing stormwater or creating micro-climates that reduce the heat load of buildings.

Return to Pattern Language Lists

Return to Table of Contents

Building Design

Pattern 147- ***Communal Eating***- In a metro-area, spaces for communal eating create overlapping spaces between groups and encourage more socializing or mixing over food and drink. This can increase opportunities for accidental conversations or chance encounters that can lead to new social or economic connections.

Pattern 139- ***Farmhouse Kitchen***- The farmhouse kitchen design merges dining and cooking spaces, reducing the separation that tended to become popular for houses with servants. This encourages more community around food and communal sharing. It also enables the hearth to double as heat source for a larger building and cooking space.

Pattern 148- ***Small Work Groups***- People generally don't resonate well with large groups or masses of people nor do they like to work in isolation. Creating businesses or work areas that support work groups of between 3-8 people can create more engagement, productivity, and creativity in work environments. People also tend to have more productive interaction in smaller groups, adding to the economic life of a business or cooperative. Small work groups can also be encouraged through garden design as well.

In the Tremont neighborhood of Cleveland, dishes at Lucky's Cafe often feature locally grown foods, including herbs and vegetables harvested from a garden in a side-lot next to the cafe. The garden includes areas for seating. Weekly City Fresh meetings took place at the cafe. It also provides a space for mixing between neighborhood residents. Youth from the neighborhood are hired to maintain the garden.

Spaces Between Buildings

Pattern 124- ***Activity Pockets***- For open areas, define pockets of more intensive activity around the edges. People tend to gravitate to edges and not wide open centers and circulation paths can connect activity pockets through a common center. Activity pockets also encourage lingering and gradual entrance into a space and can be ideal places to locate food carts, farm market stands, or intensive gardens with a accessible open space.

The snaking pathways around the Learning Garden at the George Jones Farm in Oberlin slow the approach to the farm's learning center and office. The raised beds in the garden also double as benches for school field trips.

Gardens in the Urban Landscape

Pattern 169- ***Terraced Slopes***- Even though Oberlin features a mostly flat environment, terraces or earthworks can be shaped, especially in parks or around buildings, that provide unique environments for the growth of fruit trees or other food crops that require good drainage. Terraces or earthworks can be formed with surplus earth from excavations to make for more interesting landscapes.

Pattern 170- ***Fruit Trees***- Populating yards, urban gardens, or common areas within a city with fruit trees to create shaded paths, line green streets, or occupy the understory of areas with taller trees. Fruit trees can also be managed communally, as is done in Cleveland with a fruit share program that focuses on renovating and harvesting fruit from historic fruit trees around the city.

A terraced slop at the Lewis Center for Environmental Studies at Oberlin College features a mix of apple and pear trees and blueberry bushes. The terraced berm was constructed with fill dirt from excavation and provides a shaded gathering area for students.

A 3 acre urban farm in Youngstown, Ohio provides a local food source and an educational site for neighborhood youth. Here, farm educator Maurice Small sits in the shade and shares gardening books with high school students responsible for maintaining the garden.

Pattern 171- ***Tree Places***- Rather than ornamental plants plucked into concrete planters, trees can actually create outdoor spaces, providing shade, places for gathering, and habitat. Planting trees in groves or in avenues can also create appearances of "outdoor rooms". Native fruit or nut trees can be favored as well to create additional sources of food.

Pattern 172- ***Gardens Growing Wild***- Gardens growing wild refer to garden spaces that mimic the patterns and structure of native ecosystems. For Oberlin, this would include forested or wetland environments. Food forests feature a mix of perennial trees, shrubs, vines, groundcover, and root crops that both maximize production on limited space while having a more natural or wild appearance. Designed well, these spaces require little maintenance, with most of the work concentrated on the first 1-3 years of establishment.

Gardens in the Urban Landscape

Pattern 173- ***Garden Wall***- In cities, public parks don't often provide adequate opportunity for people to connect with nature, shielded from the sound of traffic or city noises. Garden walls can create more enclosed spaces that provide solitude, meditation, and connection with nature and natural cycles. Garden walls can support vining plants or, if left exposed, can provide a surface for murals, mosaics, or other art forms. Garden walls can also contain seating or other features to encourage people to reflect or enjoy quiet time away from outside stimulus.

Pattern 174- ***Trellised Walk***- Trellised walks create enclosed spaces that shape pathways through outdoor spaces. Trellises can be seeded with grapes, kiwis, or other vining plants that filter sunlight, creating a more pleasant walking environment during the day. Trellises can also take the place of garden walls, creating more permeable borders and shaping outdoor spaces that surround them.

Pattern 176- ***Garden Seat***- While gardens provide spaces for hands-on labor and work, they also provide important spaces for quiet reflection and connecting with nature. Wordsworth described tranquility in nature as a basic human right. Garden seats provide places to be in touch with nature, to mediate, to have conversations with one or two other people, or to unwind from the busy life. Garden seats can be incorporated into trellis spaces, garden walls, or along boundaries created by buildings, providing coverage from the back, but open views in the front.

Vining grape vines shade a trellised walk-way at the Cottonwood Community Garden in Vancouver. Benches interspersed along the walk-way provide space for quiet reflection or conversation.

A strawbale greenhouse provides a space for seedling starts and vegetable production at Vel's Purple Oasis in Cleveland. The strawbales provide insulation to improve heat retention during cold months. The greenhouse was built over a weekend by 80 volunteers, including students from the nearby John Hayes high school.

Pattern 175- ***Greenhouse***- Greenhouses are an important feature in supporting growth of a more localized food system. Greenhouses can be scaled for household use, built on the sides of buildings, or can support larger, more commercial growing spaces on local farms. Greenhouses extend the growing season, retain heat, and can also be used as a workshop- an area to store tools or work on garden projects without tracking dirt and mud into a house or main building. A proliferation of greenhouses in Oberlin would be one indicator of growth in the local food system and attention should be paid to creative and artfully considered designs that utilize local materials, like strawbales or salvaged wood.

Gardens in the Urban Landscape

Pattern 177- *Vegetable Garden*- Vegetables are an essential part of a healthy diet and most Americans consume below the recommended 4-5 daily servings of fruits and vegetables. Vegetable gardens, if well maintained and connected to home food preservation, can provide a year-round supply of fruits and vegetables to a small family. It is estimated that about 1/10 of an acre is ideal for a typical family. The ability for every resident to have walkable access to gardening space in their yards, in common areas between buildings, or in urban gardens is one measure of a healthy local food system.

This community garden in San Francisco provides space that combines environmental education and local food production. The garden sits along a terraced slope in a busy neighborhood.

Garden waste from the community garden at the Oberlin Community Service Center decomposes in a palletized compost system that adjoins a public bike path. A scarecrow with a planter demonstrates the incorporation of art into the garden landscape.

Pattern 178- *Compost*- Compost piles represent some of the most essential infrastructure for a healthy local food system. Compost represents a process by which a community retains and re-utilizes nutrients which all-too-often end up polluting water ways or filling up landfills. Compost systems can be scaled for backyards or neighborhood gardens or larger commercial-scale systems can be located on the edge of urban boundaries to provide nutrient distribution to surrounding farms. Alternative sewage systems, including eco-machines or living machines and composting toilets should also be considered as a way to retain valuable nutrients to support and healthy food system.

Internal Gathering Spaces

The Zenith art gallery and antique store in Pittsburgh offers brunches during weekends that feature vegetarian dishes sourced with local food. The space is a popular social gathering space surrounded by unique antiques. Zenith offers a creative mixed-use space that combines a retail store and a social gathering space.

Pattern 182- ***Eating Atmosphere***- Creating common areas of eating, whether in households, restaurants, or public eating spaces, help to bring people together and foster social interaction. Rooms should be arranged to encourage people to eat leisurely and comfortably while feeling part of a larger group. Round tables with lighting concentrating on the middle of the table creates an ideal format for people to relax, and enjoy food mixed with company.

Pattern 184- ***Cooking Layout***- Organizing a kitchen space that is efficient, but not too small, is ideal for preparing meals with locally grown foods. There should be adequate storage for raw foods (whole grains, vegetables, fruits, root crops), frozen foods (meats and vegetables especially for winter consumption), and dried foods (flours, dried beans). A kitchen space should have smaller cooking centers organized around food preparation, food processing, mixing, cooking, cleaning, and serving. An ideal kitchen has no two spaces at more than 3-4 steps or 10 feet apart. A counter quickly accessible to a stove and a cleaning space can further reduce time spent cooking meals.

Legume restaurant in Pittsburgh specializes in locally grown foods. The kitchen features a variety of spaces that enable local food processing, including the small-scale grain mill pictured here. The restaurant utilizes fermentation to process local food for use during the off-season and also has an area for butchering whole animals.

TOOL 4- STRATEGIC POINTS OF LEVERAGE

Local food systems can be complex, including a number of diverse actors across the food value chain (farmers, restaurants, distributors, etc.). A final step in growing local food systems involves identification of and action around strategic leverage points. These are strategic actions that produce the greatest catalytic effect with the least investment of time, resources, and energy.

Growing a sustainable local food system requires an understanding of complex systems and the identification of key leverage points in systems where small actions can lead to significant change. In the *Network Weaver Manual*, Holley lists several key steps to transforming systems on a broad scale:

- system development needs to be connected to and coordinated with advocacy and policy change;
- strategy needs to operate at a number of levels- individual beliefs and behaviors, changes in organizational or inter-organizational relations, changes in structures and processes, and policy changes;
- focus should be placed on organizing multi-scalar networks- connect local action to regional or international networks to facilitate learning and innovation; and
- transformative strategies include people with different perspectives on an issue, particularly those who have had little power in previous processes.

Holley also offers five steps for effective strategy development:

1) Researching the issue space- Understand the system that the network will be transforming. Instead of looking at network nodes, look at the elements of the system, including aspects of the problem, institutional services, projects or programs that have been tried, new institutions, political positions, etc.

2) Analyzing the system- Organize a system map that identifies key system elements and the connections between elements, whether negative or positive. This enables people to understand how systems are connected and identify "high-potential leverage points" where something positive can be amplified or where a focused advocacy campaign might be concentrated.

3) Engaging the network- Network participants can locate themselves on the systems map, identifying where they can concentrate their actions collaboratively around high leverage points.

4) Experimenting around high leverage points- Collaborative experiments can begin to be formed around high leverage points to begin to gain experience with effective approaches.

5) Collective sense-making- This involves a process where people involved with different projects can come together and see areas where the system is beginning to be transformed. Current projects and approaches can be reviewed as well to determine "patterns of success" or key factors that have significant impact on systems change.

In her seminal essay, *Leverage Points- Places to Intervene in a System*, the late systems theorist Donella Meadows identifies critical strategies for transforming systems. Developing a stronger local food system in and around Oberlin will require an overall transformation of the system that provides daily sustenance to the members of the Oberlin community. Transformation of a food system requires broad changes at all levels of the community. It includes changes in land-use patterns, local economies, urban development, neighborhood design, and the daily behavior of the businesses, institutions, and residents that make up the Oberlin community. Meadow's essay identifies 12 points of leverage where strategic interventions in a system can have the greatest catalytic affect. In 2011, Oberlin Project Director David Orr released a short paper called "Sustainability by Default" which identified seven key leverage points from Meadow's essay: rules, incentives, information, feedback, integration, forecasting, and mindset.

Applied to the a 70% food localization scenario in Oberlin, here are some of the key leverage points that can lead to broader systems change. These interventions touch all realms of community life, from individual behavior to broader policies.

Rules

What rules, policies, or infrastructure could be developed/enacted to increase participation? One of the key leverage points for local food systems lies with encouraging the development of procurement policies for institutions, businesses, or public bodies (like schools) that favor locally grown food. Bon Appetit Management Company, which operates Oberlin's college dining systems, has a national corporate policy that states that all accounts achieve a minimum goal of 20% local purchasing. Implementation of this policy becomes a part of the management of the dining systems, where chefs and food buyers collaborate to identify sources of locally grown food to incorporate into meals.

The Oberlin Student Cooperative Association (OSCA), which operates eight dining cooperatives that serve 25% of the student body, has a local food buying policy which includes the election of "Local Food Coordinators" for each cooperative and for the organization at large. These coordinators collaborate to identify farmers and make arrangements for the purchase of locally grown foods.

Procurement policies can also require that locally produced foods adhere to best practices for sustainability that might include organic production methods, soil conservation, soil carbon sequestration, humane treatment of livestock, or protection of riparian corridors or critical habitat.

Development of **a local food hub** in the Oberlin community can further facilitate local procurement throughout the community, working with a network of growers that implement best practices for sustainability and a network of market partners that would like to increase their spending to support local food or farm enterprises. A **waste-to-food-energy hub** can be connected to "zero-waste" policies that can be enacted by Oberlin College or the City of Oberlin. These policies can support the investment in collection and processing infrastructure to make it easier for food waste or other organic wastes to be utilized as soil or energy inputs for local agriculture.

Incentives

What incentives or rewards could be developed to encourage people to make the right decisions?
A number of incentives can be developed to make it easier and even provide rewards for individuals, farmers, businesses, or institutions who participate in the local food economy.

A list of businesses in the Oberlin community that purchase 25% or more locally grown food can be identified in a guide. Residents or students can be encouraged to patronize businesses that show a high commitment to local, sustainably-raised foods. Tourism guides can be published as a draw to visitors who might be drawn to Oberlin's commitment to local agriculture. In Athens and Youngstown, the "30 mile meal" concept is utilized to encourage both tourism and local food systems development by creating hyper-local supply chains and cultivating a local food culture that more tightly connects regional producers, restaurants, and markets.

Annual or quarterly contests in the community could encourage greater participation in urban homesteading, urban farming, or creative culinary uses of locally grown foods in the community. In the past, the student cooperatives have organized "Iron Chef" events in which each of the dining cooperatives has to come up with a creative dish that utilizes a featured local food, such as winter squash. Judges drawn from restaurant owners or chefs in the community rank each of the meals and declare a winner. Featuring a "garden of the month" contest can identify an exemplary garden in the community and include information about some of their techniques. These contests highlight innovative things that people, groups, businesses, or institutions are doing to advance local food systems. The contests provide recognition and help to spread innovative approaches to the broader community.

Incentives can also be organized for farmers to encourage their participation in local food efforts. A local food hub can help to reduce barriers to entry for local farmers, helping to make markets more accessible. A capital investment fund can be utilized to encourage farmers to employ practices that conserve soil, increase bio-diversity, or sequester atmospheric carbon.

Information

How do people get information to make decisions?
Information is perhaps one of the most important forms of currency in the growth of local food systems. How do residents or businesses access information if they want to participate more broadly in local food systems? How can that information provide a form of feedback and encourage change?

A collaborative of educational institutions and local non-profits, as a part of a local food learning network, can provide a number of avenues for residents, students, or businesses to access information useful to local food systems. This include courses, workshops, or educational events that increase skills in intensive urban food production, sustainable agriculture, local food processing, culinary arts, or other topics.

A "knowledge commons" can also provide an open-source, virtual space that encourages individuals, groups, businesses, or institutions engaged in local food work to share knowledge, form collaborations, learn from each other, or identify innovative approaches or best-practices to local food systems. The knowledge commons can include forums for communication or group collaboration, video or published case-studies or reports, and a list of topical or geographic groups focused on targeted aspects of local food systems development. A virtual commons is most effective if it is combined with live events that bring people together for networking, volunteer work (i.e. building a greenhouse or installing a garden), learning, or community problem-solving.

Feedback

What feedback loops exist, or could be put in place, that tells us how we are doing?
The Oberlin dashboard project provides real-time data on energy and water use in a number of buildings on-campus and in the community. The display of this information helps to educate community members about their environmental impacts in ways that encourage conservation or efficiency. While focused on energy and water-use, the dashboard can also be utilized to share information about local food systems, including annual local food purchasing impacts, soil carbon sequestration levels at monitored sites, video or photo libraries of local initiatives, or profiles of local food businesses or farmers.

An annual accounting of local food purchasing by participating businesses or institutions can provide a percentage of total community purchases that originate from local sources. The accounting can further show the flow of actual dollars to different communities or counties to make regional economic impacts more visible. This accounting can

Return to Table of Contents

also be used to track progress over time.

A social network mapping assessment can be conducted every two years to look at the formation of local food networks over time and an analysis of network strength and resilience. This can also be used to identify areas where there gaps or weak links in the network that can strengthened through collaboration, education, or incentives. The social network maps can be organized around what community stakeholders identify as key issues, challenges, gaps, or leverage points. For example, if it is determined that a large percentage of Oberlin's resident population lacks access to healthy foods, how can the community leverage its collective assets and networks to develop creative and collaborative solutions to the challenge? What new network connections would be helpful to create greater collaboration between groups?

Integration

How well are decisions integrated across organizational divisions within and between organizations?

Integration will be critical to successful development of a local food system. How effectively can initiatives or efforts within the local food system be connected in ways that maximize synergies?

There is a clear point of integration between a local food hub and a local waste hub. Each can work with the same network of institutions and businesses to increase local food purchasing while organizing collection of waste. Waste can be processed and delivered as an input to some of the same farmers that supply local food. The George Jones Farm provides an example of this. Food is grown on the farm and sold to college dining halls and cooperatives. Food waste is then collected from these same locations and run through a vermicomposting system where worms process waste into a nutrient-rich soil input.

A local food hub can also encourage integration and coordination between businesses who are committed to purchasing local foods. At the right scale, this can lead to increased efficiencies that can lead to cost-savings for buyers. In Cleveland, a number of independent restaurants collaborate around the purchasing of artisan foods originating from Europe. By working together, they create a larger overall volume of demand, encourage efficiency in distribution, and end up saving more money than if they each individually purchased these same items. A similar model can be developed for local food.

Another critical point of integration involves coupling the college and cities efforts to reduce greenhouse gas emissions with the development of local farms that employ "carbon farming" methods that lead to increased sequestration of carbon into agricultural soils. Greenhouse gas reduction policies then become a form of investment in the productivity of local soils.

Forecasting

What are our visions and goals? What do we want to see in the future?

Nobody can predict the future with complete certainty, but we can forecast and anticipate certain trends, such as the rise in awareness of local food systems or issues like climate change and the peaking of fossil-fuel energy supplies. These forecasts can help to guide future actions.

With climate change, we can forecast a more variable and unpredictable climate which will have a number of effects on agriculture in the Great Lakes. For example, we can anticipate longer and more intense droughts, shorter and more concentrated rain events, and more frequent episodes of extreme weather. How do these conditions shape the resilience of our local food systems? A strategy of increased localization can create a certain vulnerability if a climate event significantly strains the local food system for a given season. How do we balance an emphasis on localization with connections with other regions? What best practices can help to safeguard the food supply in the event that the energy-grid goes down and freezer or refrigerator storage is compromised? How can increased soil carbon improve the ability of soil to adapt to increased drought or flooding by increasing the capacity to absorb and store water?

In an era where fossil-based energy is becoming more scarce and increasingly costly to extract, how do we invest in alternative energy systems to insure that systems of food production, distribution, and storage can function without fossil-based energy inputs? City Fresh, for example, has developed a distribution system that draws about 70% of its fuel from recycled waste-vegetable oil, an abundant waste-product in the communities that it serves.

Mindset

How do goals of sustainability permeate routine operations and long-term decisions? How do we transcend paradigms?

Although the most difficult to achieve, the most effective involves a paradigm shift. Over the past several decades, with the expansion of the industrial food system, people have become accustomed to convenience foods and sedentary lifestyles. Can local foods play a role in responding to the nation's spiraling health care costs through improved dietary habits and exercise? Urban gardening activity encourages exercise. Utilization of less-refined, whole foods creates the market demand that will enable farmers to shift crops and production practices.

In addition to personal health, the health of planetary systems can also be addressed through a community-wide effort to build sustainable local food systems. How do we de-couple our diets from agricultural practices that reduce bio-diversity, increase atmospheric carbon, or cause significant water pollution problems? Well-managed farms will increase biodiversity, provide cleaner water, and store atmospheric carbon, reversing many of the environmental problems associated with the current system.

Return to Table of Contents

CORE ACTIVITY AREA	Network Building	Local Investing	Urban Design	Systems Leverage Points
Local Food Hub	• Convene critical stakeholders • Survey potential food hub users (farmers, market partners, entrepreneurs • Identify outlying regional market partners (Lorain, Elyria, Cleveland) • Organize regional food hub learning network	• Pre-development and planning for food hub development • Determine product mix • Organize business plan • Capital and facilities financing	• Connect food hub with micro-distribution in Oberlin • Integrate urban agriculture on rooftop and site grounds • Integrate with surrounding neighborhood for food access and business development	• Increased coordination with those already committing to buying local • Outreach to farmers and market partners to expand networks • Development financing for local food hubs (regional, community kitchen, neighborhood)
Waste-to-Food-Energy	• Convene critical stakeholders • Conduct waste inventory of Oberlin businesses • Identify network of end-product users (energy, nutrients)	• Organize feasibility plan • Determine third party structure for waste hub • Secure capital and facilities financing	• Site design plan for food hub • Incorporate efficient organic waste recovery for future developments	• Organize on-farm bio-digestion pilot • Detailed waste audit for Oberlin community • Development financing for food waste hub
Urban Agriculture	• Solidify community learning network • Establish shared urban agriculture trainer • Organize mutual aid networks • Develop community map of urban farming sites	• Connect with waste hub for soil building resources • Develop local investment fund for shared equipment, season extension infratructure	• Work with city government to advance zoning for wide-spread urban agriculture activity (land bank, urban farm zoning, urban farm district, urban edge commons).	• Formal backyard garden training • Investment fund for development of year-round urban farms • Shared training and equipment between gardens
Carbon Management	• Organize network of farmers interested in carbon farming	• Organize buyers to invest in carbon farming fund • Encourage bio-digestion for on-farm energy using local waste	• Support bio-intensive urban farming approaches • Establish carbon farm incubator and learning center	• Establish model carbon farm • Organize farmer network • Create investment fund
Learning Network	• Education collaborative • Engage Oberlin alums • Develop learning clusters on critical topics • Virtual knowledge commons • Highlight innovative projects or practices in community	• Establish innovation fund that can seed new initiatives, enterprises, technologies, or organizations	• Identify potential community networking spaces for collaborative network events • Organize incubator farm at Jones Farm to prototype advanced sustainable farming methods	• Organize collaborative of educational partners • Establish Oberlin alumni connections • Develop a “knowledge commons” that speeds distribution of innovations

Another paradigm shift focuses on valuing local or regional self-reliance. From an energy perspective, self-reliance means minimizing outside energy inputs into food production and distribution systems. Can we define productivity as increases in system yield that rely on decreasing outside energy or nutrient inputs into the system? How do we identify degrees of self-reliance, beginning at the farm scale then working upward to the community or regional scale. How would a shift in regional self-reliance translate to other social indicators, such as health, economic opportunity, wealth, or community vitality?

STRATEGIC POINTS OF LEVERAGE

For greatest potential catalytic effect, three strategic recommendations are offered as next steps for each of the five core activity areas for local food systems development, as described in the section that follows. These activities are summarized on the table on the next page along with strategic recommendations for leveraging networks, local investing, and urban design to catalyze the greatest possible impact.

Local Food Hub

1) Local Food Buyer Coordination- The first step in the development of a local food hub involves creation of a forum for Oberlin's main local food buyers (Bon Appetit/ Oberlin College, OSCA, Black River Cafe/Agave, City Fresh) to begin to coordinate purchasing efforts. As coordination between committed buyers becomes more established, it creates an environment that will reduce barriers to entry for other businesses that might be interested in buying locally, but lack the time or connections to do so.

2) Expansion of Local Food Networks- Utilize networking events, targeted outreach, or professional associations (farmer associations, restaurant associations, etc.) to expand the number of market partners who might be seeking locally grown foods and area farmers interested in marketing food locally. Leverage these networks to grow the local food hub as an enterprise.

3) Development Financing- Establish and secure the financing necessary to develop the full potential of a local food hub and related initiatives in the community (a community kitchen, Oberlin Underground Railroad Society kitchen). Begin with pre-development and planning funding, a detailed market study, property acquisition, and equipment and facilities development. Seek funding through USDA grants or private philanthropy for local food infrastructure development.

Waste-to-Food-Energy Hub

1) Small-Scale Biodigestion- Create a small-scale bio-digestion pilot at the George Jones Farm to create a better understanding of small-scale biodigestion as an approach more scaled to the volume of food waste feedstocks generated by Oberlin. This will also help to create smaller and more distributed waste systems that adapt common global technology to the cold-climate conditions of Oberlin. Seek funding from the Green Edge Fund.

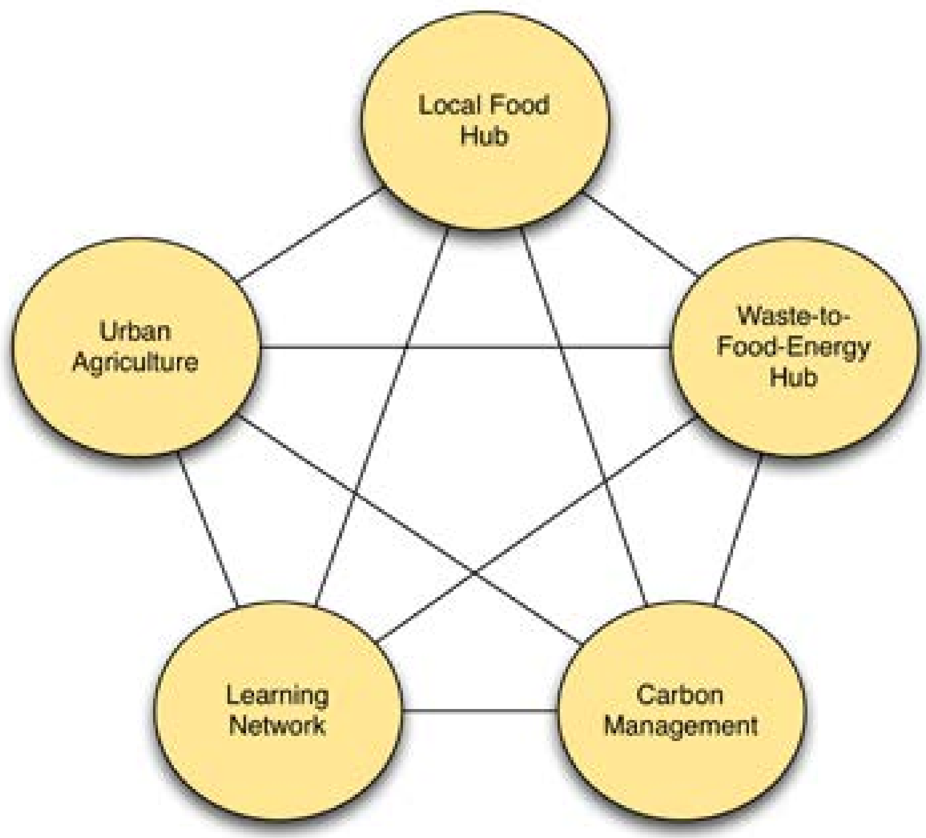
2) Waste Audit- Conduct a detailed food waste audit of the Oberlin community that includes other institutions and businesses throughout the community. This will provide useful information for the flows and volumes of potential feedstocks for bio-digestion or composting in the community. Seek funding from the Lorain County Solid Waste District or the Ohio EPA to complete this.

3) Development Financing- Conduct a detailed assessment for the development of a Class II waste handling facility that can provide a consolidation site for organic wastes in Oberlin. Develop this facility at the City of Oberlin property by the Wastewater Treatment Plant that already includes the city's leaf composting program. Also, determine financing options for development of a greenhouse complex that utilizes waste-heat from the county landfill.

Urban Agriculture

1) Home Garden Training- The most effective way to increase the local food supply and increase the skill-base among Oberlin residents involves a wide-scale encouragement of home gardening. This can include window boxes, backyards, side-yards, and front yards. This training can include identification of successful gardeners in the community who are willing to share techniques and ideas, creating increasing sophistication in home food production over time.

2) Bio-Intensive Training- Create a training program that brings expertise into the community to teach bio-intensive urban food production methods, including square foot gardening Small Plot INtensive (SPIN) farming, or permaculture. Invite all active urban homesteaders and community/market farmers in the community to participate in these workshops. Connect urban gardeners with the local food hubs as well to create potential for new urban market garden production. Look to the Lorain County Community College or the Joint Vocational School to formalize adult training programs in urban agriculture.



Return to Table of Contents

3) Urban Agriculture Investment Fund- Create an investment fund that can provide infrastructure for more productive urban food production with the goal of supporting year-round production. Investments might include greenhouses, water capture and storage, shared equipment, or perennial plant stock.

Carbon Management

1) Carbon Farm Incubator- Establish the George Jones Farm as a small-scale carbon farming incubator that combines techniques that maximize carbon storage in soils and plant bio-mass. Include development of techniques such as rotational grazing, keyline plow management, cover crop management, habitat restoration, and perennial crop production. Begin feasibility study of a broad-acre carbon farming system on the 200 acres north of the Oberlin campus by the solar field that can provide a working farm relevant to mid-size farms.

2) Organize Farmer Learning Network- Identify area farmers who already employ carbon-friendly farming practices and organize video and written content and organize workshops or tours of their operations. Organize these farmers as advisors for the Jones Farm or north campus farm-site. Invite other interested farmers to events that can enable them to learn more about these practices. Connect these farmers with the local food hub development. Work with the Lorain County Community College to introduce

	Local Food Hub	Waste-to-Food-Energy Hub	Urban Agriculture	Carbon Management	Learning Network
Local Food Hub		Bio-gas utilization for local food hub operations, including heat or cooking fuel.	Food hub facilitates seedlings, seed-stock, farm inputs or equipment pools for urban farms	Increase in sustainable farming practices that sequester carbon creates a supply network for the local food hub that has beneficial environmental impacts.	Curricula at area institutions provides training for employees to work at food hub or connected businesses (distributors, restaurants, farms, etc.)
Waste-to-Food-Energy Hub	Common network of businesses and farmers for food and waste exchanges		Surplus farm or garden waste can be processed at waste hub if there are limitations to composting on-site.	Local farms can produce energy crops for biomass pyrolysis (for heating) and can capture bio-char as by-product.	The waste-to-food-energy hub provides education to improve composting practices in the community.
Urban Agriculture	Opportunities for intensive urban agriculture incorporated in and around the food hub facility	Produces high quality compost for incorporation into urban farms or gardens		Carbon farming techniques can be adapted to urban agricultural systems to maximize their ability to absorb and store carbon.	Aspiring urban farmers can take courses or workshops in the community and urban farmers can partner with rural farms for improved product mix
Carbon Management	Food hub purchasing policy and carbon fund incentivizes carbon reductions or sequestration with participating farmers	Bio-digestion produces energy while reducing carbon impacts of composting or fossil-based energy sources	Urban agriculture reduces carbon footprint by reduced transportation miles and carbon sequestration.		Specialized courses and academic research and development of carbon farming techniques along Oberlin's local food supply chain.
Learning Network	Food hub partners with collaborative of education organizations to grow entrepreneurs and workforce	Encouragement of home or neighborhood-based composting	Urban gardens and farms can be the first point of entry for more wide-spread education and participation in local food systems.	Network of farmers can educate, mentor, or train other farmers in carbon farming through workshops, field trips, or on-line resources.	

a formal carbon farming curriculum.

3) Carbon Fund- Create a local investment fund, financed by residents, businesses, and institutions in Oberlin, that can make available financing for farmers to transition operations or start new enterprises that employ carbon farming methods. Include financing for equipment, perennial crop establishment, or alternative fuel infrastructure for farm machinery or produce distribution.

Learning Network

1) Education Collaborative- Formalize an educational collaborative that includes Oberlin College, the Oberlin Public Schools, the Joint Vocational School, Lorain County Community College, and the New Agrarian Center who can meet and identify educational pathways that can provide multiple points of access for individuals interested in getting involved in the local food economy. Programs should be scaled to include options for all levels of participation, from home gardening to broad-acre commercial agriculture.

2) Oberlin Alumni Network- Oberlin has an extensive network of alumnae engaged in innovative local food work across the country and world. Work with the alumni office at the college to bring alumnae back to Oberlin who can contribute ideas, knowledge, and innovations that can inform local food networks in the Oberlin community. This can include community lectures, consultations, or workshops.

3) Develop a Knowledge Commons- A knowledge commons provides an open-source virtual learning center that enables individuals to advance innovation and knowledge in the successful application of local food systems. The commons can feature an events calendar, a video library of best-practices, research publications, and information about access points in the community for people that want to get more involved with local agriculture. The NEOFoodWeb.org platform provides one example of a knowledge commons that also includes organization of live networking events that complement on-line content.

STRATEGIC PARTNERSHIPS

The implementation of a local food system will require a greater degree of collaboration between diverse and sometimes siloed community stakeholders. The following section elaborates on strategic stakeholders for each of the Core Activity Areas identified in this report. The stakeholders represent formal organizations, businesses, or agencies that each have their own networks of community members. However, this should not preclude individual or small-group initiatives outside of the list of partners indicated here that can bring new energy, new approaches, or fill in gaps not covered by current stakeholders. Ultimately, a healthy network will encourage a mix of formal institutions and organizations with more informal entrepreneurial networks or grassroots initiatives.

Local Food Hub:

The Local Food Hub will include the largest and most diverse group of stakeholders. Work on the Local Food Hub can help to solidify community networks that can benefit other core activity areas in the local food system.

Market Partners: Oberlin College, Oberlin Student Cooperative Association, Bon Appeitt Management Company, Lorain County Community College, Oberlin Early Childhood Center, City Fresh/New Agrarian Center, Joint Vocational School, Black River Cafe, Agave, Kendal Retirement Community, Oberlin Public School District, and restaurants in Oberlin and broader Lorain County

Educational/Training Partners: Zion Community Development Corporation, Joint Vocational School, Oberlin College, Oberlin Public School District, New Agrarian Center, Ohio Agriculture Research and Development Center

Facilities: Oberlin Underground Railroad Society, Station Square Development, Oberlin Public School District, Boys and Girls Club

Farmers/Producers: Ohio Agriculture Research and Development Center, Innovative Farmers of Ohio, Ohio Ecological Food and Farm Association, Ohio Farmers Union, Ohio Farm Bureau

Waste-to-Food-Energy Hub:

Core Partners: Oberlin College, Bon Appetit Management Company, City of Oberlin, Oberlin Wastewater Treatment Plant, New Agrarian Center, Republic Industries, EDI, Oberlin Student Cooperative Association, restaurants, food services, and area farmers

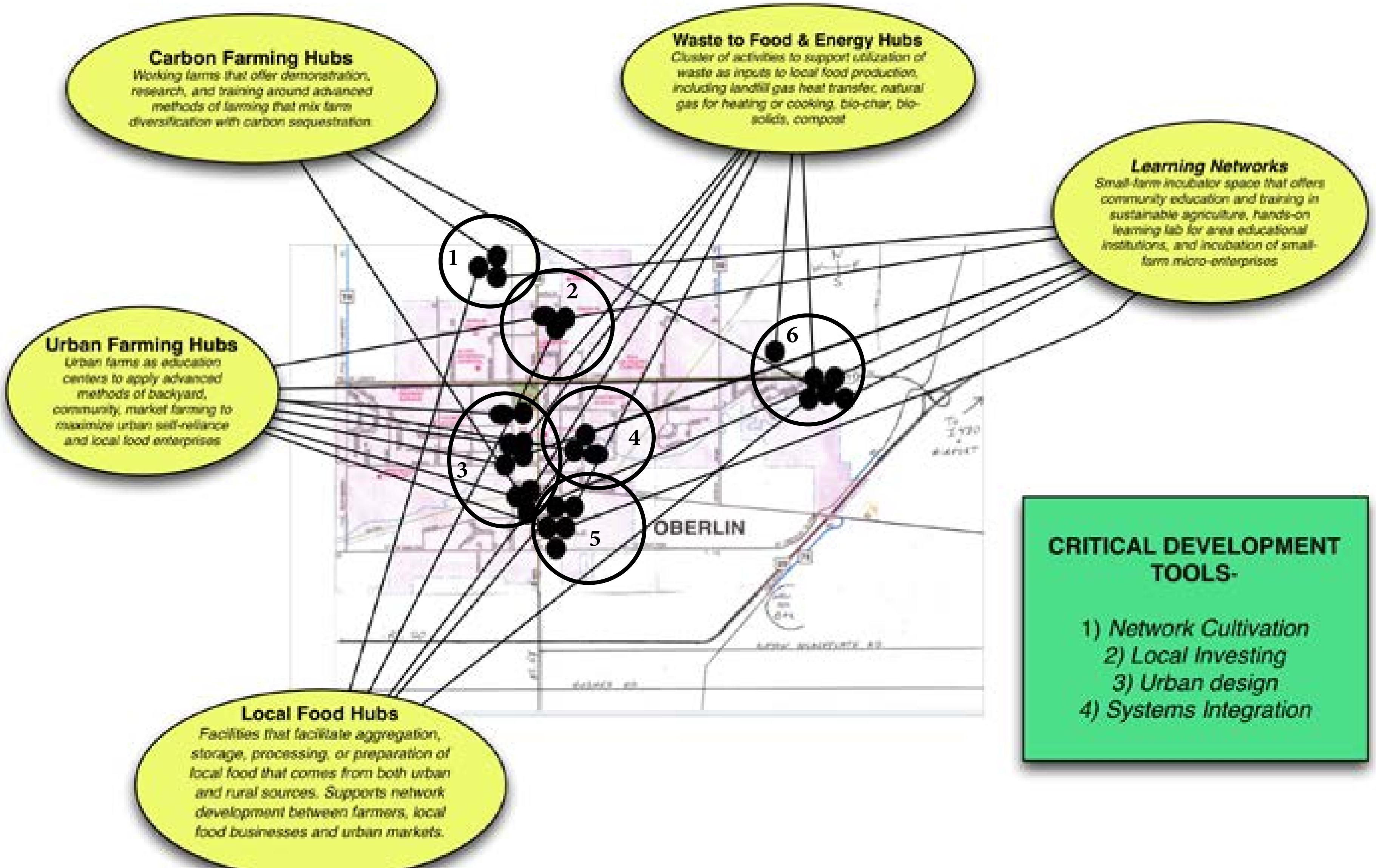
Urban Agriculture:

Garden Partners: Oberlin Community Service Center, Oberlin Public School District, Boys and Girls Club, Oberlin Underground Railroad Society, Zion Community Development Corporation, Oberlin College, Kendal Retirement Community, New Agrarian Center, Oberlin Early Childhood Center, Lorain County Community College, Joint Vocational School, City of Oberlin

Carbon Management

Core Partners: Ohio Ecological Food and Farm Association, Oberlin College Environmental Studies Program, City of Oberlin, Natural Resource Conservation Service, New Agrarian Center, Western Reserve Land Conservancy, Lorain County Community College, Ohio Farmers Union, Innovative Farmers of Ohio, Ohio Farm Bureau

Facilities: George Jones Farm, Oberlin College Properties



Network Integration for Food Localization

Return to Table of Contents

Learning Network

Core Partners: New Agrarian Center, Lorain County Community College, Joint Vocational School, Oberlin Public School District, Oberlin College

CONNECTING INITIATIVES

The five core activity areas should not be seen as separate projects, but as inter-related initiatives that mutually support each other. For example, the local food hub can leverage its network of market partners and farmers to support the waste-to-food-energy hub. The same market partners that purchase food will be the same ones to contribute food waste that can be utilized as an input to local farms. These local farms can then sell products back to these same market partners through the food hub. In the area of carbon management, programs can be developed to increase the sequestration of carbon in both urban and rural farm sites. The urban agriculture initiative can connect with the waste-to-energy-hub to access materials for improving the productivity of compacted urban soils. And the Learning Network can provide support for all of the other four activity areas through supporting educational curricula, workshops, and network building events. The chart below summarizes some of the ways that the existence and growth of one core activity area can contribute to the development of another activity area.

The map on the next page shows a spatial distribution of core activity areas throughout the Oberlin community. The map begins to resemble a "multi-hub network" in which multiple network nodes exist throughout the Oberlin community, some serving one of the core activity areas, others serving multiple activities. These nodes can be places where diverse networks converge, financial investments can be concentrated, and intentional design can integrate the activity with the life of the community and the broader Northeast Ohio region. The following list indicates these network nodes and the core of activities that can take place there at each location.

1) Fields North of Campus Node: Oberlin College owns about 200 acres north of the athletic fields. A recent solar photovoltaic system has been installed on 11 acres of the property. Currently much of the property is utilized for commodity grain production. It is recommended that the site be considered as a network node to support broad-acre carbon farming methods, oriented toward production options that owners of larger acreages of farmland might consider. The operation should be established as a working farm and social enterprise that combines education and training with a viable farming operation. The farm can be connected to the local food hub as an outlet for foods produced utilizing advanced methods of ecological farming that build and store carbon in the soil. This area can also provide a potential consolidation site for campus food waste that can be delivered by a system of student-operated trikes, processed, and moved to the Waste to Food and Energy hub at the Wastewater Treatment Plant.

2) Boys and Girls Club/Oberlin High School Node: This node includes the Oberlin High School and the Boys and Girls Club and can include a variety of activities that include an educational and learning program that can be accessible to the Oberlin High School and Langston Middle School. A community kitchen can be developed in an un-used commercial kitchen facility at the Boys and Girls Club which can be utilized for home canning, home-based businesses, or small community enterprises. The four acres of open land surrounding the Boys and Girls Club presently hosts the Oberlin High School Farm Collaborative. This initiative can be expanded into a broader urban market farming cooperative that combines a variety of bio-intensive techniques and greenhouses for season extension. This node will also be accessible to residents on the north side of town and can provide an urban agriculture training facility for the broader community.

3) Southwest Urban Agriculture Node: This area includes a hub of urban agriculture sites on-campus and in the community, including the Lewis Center for Environmental Studies, the Johnson House gardens, the Oberlin Community Service Center gardens, and the Legion Field gardens. It also includes facilities for the distribution of food and services to residents in need. These gardens can be accessible to students and residents around the immediate college campus. These can also be areas for hands-on learning or applied research in urban agriculture. The Oberlin Community Service Center can be included in an effort to provide more healthy, locally grown foods for emergency food relief.

4) Local Food Hub: This hub would be centered around the former Missler's Grocery Store. This can be the point of entry for local foods coming in off of State Route 58 from farms or local food businesses in the broader Oberlin Foodshed. Micro-distribution can connect Oberlin College and Oberlin Student Cooperative Association Markets, restaurants in downtown Oberlin, and local food for community kitchens at the Boys and Girls Club or the Masonic Hall. A portion of the 5 acres of land around the Missler's grocer and on its rooftop can be utilized for urban agricultural production. The food hub can also collect and deliver food waste from the site and nearby restaurants that can be delivered to the Waste to Food-Energy-Hub for processing. The farmers market can be moved to this location where a permanent space can be offered in and around the grocery store to maintain a year-round farmers' market.

5) Southeast Neighborhood Node: This area provides a neighborhood food hub that includes the Village Garden and Masonic Hall operated by the Oberlin Underground Railroad Society. The village garden provides a market garden for neighborhood food distribution and the Masonic Hall can offer a certified kitchen that can be utilized by neighboring residents or businesses. This can encourage the development of home-based businesses or neighborhood-based micro-enterprises that utilize locally grown foods. The Masonic Hall can also feature educational activities centered around food, art, youth entrepreneurship, and community building.

6) Northeast Urban-Edge Farm and Waste Node: This node includes the George Jones Farm, the Waste-to-Food Hub at the City's Wastewater Treatment Facility, and the Republic Industries landfill. This area can offer a cluster of larger-scale, urban-edge food-based enterprises that operate off of waste, including a Class II composting facility, an area for processing organic wastes to feed bio-digestion, and a greenhouse complex heated by waste-heat from the Landfill gas conversion project. As an urban edge farm, the George Jones Farm provides a connecting node for both the Oberlin community and the broader region. The farm can provide a farm incubator which supports a collection of inter-related agricultural enterprises, including bio-intensive fruit and vegetable production, perennial nut crop production, free-range livestock, small-scale milling, natural construction, and applied permaculture. The farm presently has programs that serve local children, high school apprentices, Oberlin College interns, Oberlin College graduates, Lorain County Community College students, and Joint Vocational School students. The farm can continue to provide a broad-range of working enterprises that provide hands-on learning experiences for diverse communities in the region.

APPENDICES

1- Oberlin Foodshed Details

2- Local Food Hub Details

3- History of Composting in Oberlin

4- Oberlin BioDigestion Pre-Assessment Report

5- Urban Agriculture Case Studies from Great Lakes Cities

6- Urban Farming Modules for Oberlin

7- Leveraging the Power of Networks- Case Study of Athens, Ohio

8- References

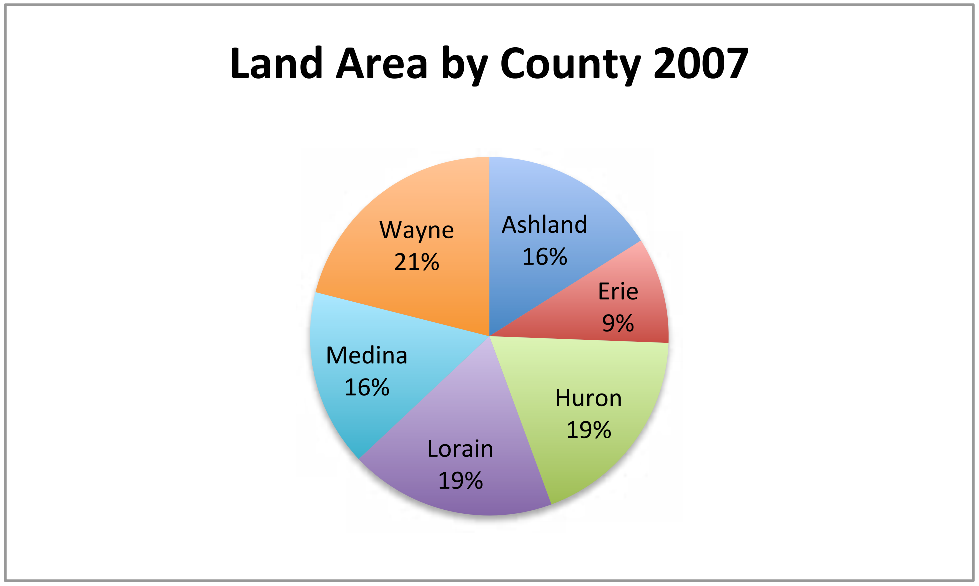
APPENDIX ONE- OBERLIN FOODSHED DETAILS

In conjunction with the Oberlin Project, we have developed a six county "foodshed" that includes Lorain County and contiguous counties, excluding Cuyahoga County. The counties included are:

- Ashland
- Erie
- Huron
- Lorain
- Medina
- Wayne

The Oberlin Foodshed contains a total of 2,637 square miles or 1.7 million acres of land. The chart below shows the % of total land area occupied by each of the six counties. Wayne County covers the largest land area, encompassing about 21% of the total land area with Lorain and Huron counties each at about 19%. Erie County covers the smallest land area with about 9.5% of the total.

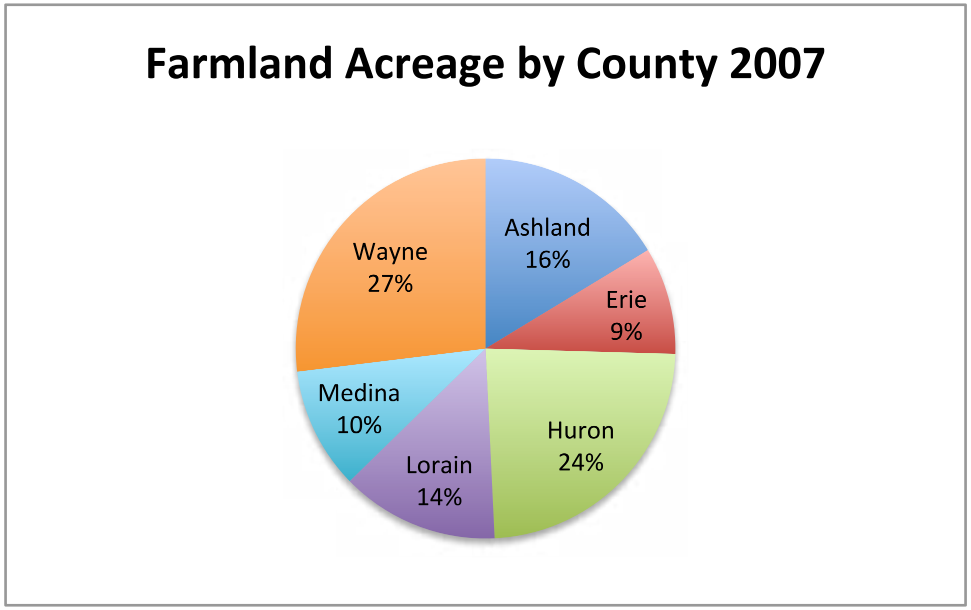
	Sq Miles	Acres	% Total Land
Ashland	423.00	270,720.00	16.04%
Erie	252.00	161,280.00	9.56%
Huron	495.00	316,800.00	18.77%
Lorain	491.00	314,240.00	18.62%
Medina	421.00	269,440.00	15.97%
Wayne	555.00	355,200.00	21.05%
TOTAL	**2,637.00**	**1,687,680.00**	

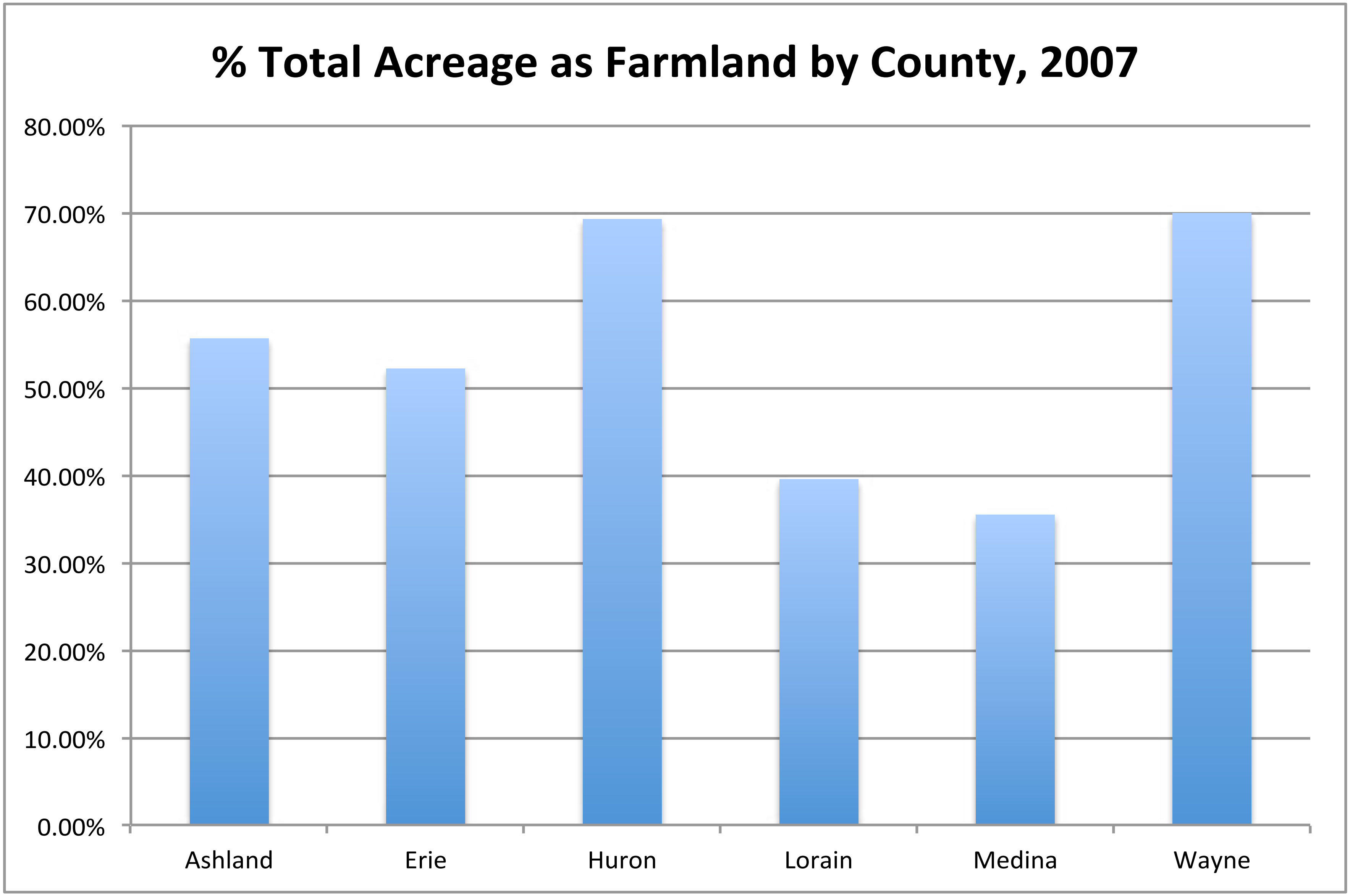


The total land area only tells part of the story when considering viable farmland, as urbanization will be more of a factor in Lorain and Medina counties than the outlying counties west (Erie and Huron) and south (Wayne and Ashland). The chart below summarizes the total Farm Acres by county and the % of each county's land area that is classified as farmland. About 55% of the total land area in the Oberlin foodshed contains farmland. The actual percentage of land by county varies more widely. For example, Wayne and Huron Counties each have about 70% of their total acreage devoted to farming. By comparison, Lorain and Medina counties have only about 1/3 of their land area devoted to farming given the greater pressures of urbanization in each county.

The graph below shows the distribution of farmland between the six counties, with Wayne and Huron Counties occupying more than 50% of the available farmland in the entire foodshed. Ashland and Lorain Counties occupy about 30% of the available farmland with the remaining 19% split between Erie and Medina counties.

	Farm Acres	% Farm Acre
Ashland	150,534.00	55.61%
Erie	84,085.00	52.14%
Huron	219,369.00	69.25%
Lorain	124,100.00	39.49%
Medina	95,493.00	35.44%
Wayne	248,409.00	69.93%
TOTAL	**921,990.00**	





Return to Table of Contents

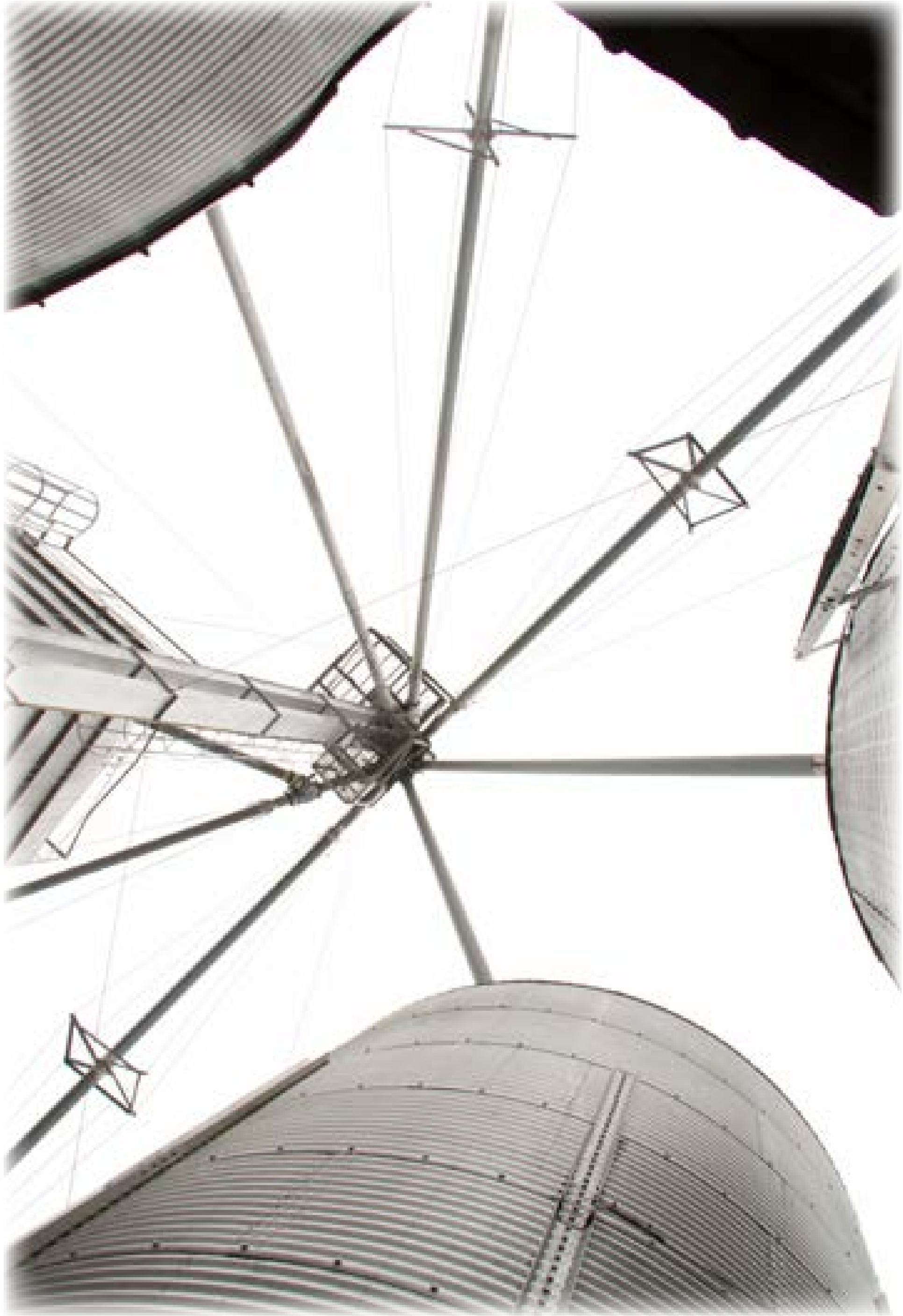
The total farmland acreage only tells a portion of the story of the food production capacity for each county. It is necessary to consider the types of agriculture taking place to determine how much production could actually be suitable for local markets. Production of commodity feed grains (primarily corn and soybeans) are mostly utilized for livestock and could not be directly consumed by people. Commodity feed grains present an example of "extensive" agriculture, meaning that they occupy significant areas of land with relatively low per acre cash yields. To be viable, a farmer has to farm a significant amount of acreage for corn or soybeans. By contrast, vegetable or fruit production present examples of "intensive" agriculture which rely on much more production per acre, generally smaller acreage operations, and significantly more labor. The charts below show the distribution of crops by acres by county.

FARMS	Ohio	Ohio %	Ashland	Ashland %	Erie	Erie %
Corn for Grain	24,436	21.43%	403	19.83%	174	22.80%
Corn for Silage	3,928	3.45%	93	4.58%	13	1.70%
Wheat	11,485	10.07%	224	11.02%	99	12.98%
Winter Wheat for Grain	11,485	10.07%	224	11.02%	99	12.98%
Oats for Grain	2,800	2.46%	120	5.91%	7	0.92%
Barley for Grain	210	0.18%	11	0.54%	0	0.00%
Soybeans for Beans	23,892	20.96%	355	17.47%	196	25.69%
Hay	31,440	27.58%	521	25.64%	105	13.76%
Vegetables	2,873	2.52%	57	2.81%	49	6.42%
Orchards	1,462	1.28%	24	1.18%	21	2.75%
TOTAL	**114,011**	**100.00%**	**2,032**	**100.00%**	**763**	
ACRES	**Ohio**		**Ashland**		**Erie**	
Corn for Grain	3,606,246	34%	34,870	32%	29,214	38%
Corn for Silage	182,935	2%	3,521	3%	336	0%
Wheat	732,106	7%	8,924	8%	6,994	9%
Winter Wheat for Grain	732,106	7%	8,924	8%	6,994	9%
Oats for Grain	46,348	0%	1,663	2%	275	0%
Barley for Grain	2,994	0%	111	0%	0	0%
Soybeans for Beans	4,236,337	39%	33061	30%	30257	39%
Hay	1,156,523	11%	17736	16%	2352	3%
Vegetables	47,014	0%	360	0%	735	1%
Orchards	10,367	0%	105	0%	523	1%
TOTAL	**10,752,976**	**100.00%**	**109,275**	**100.00%**	**77,680**	**100.00%**

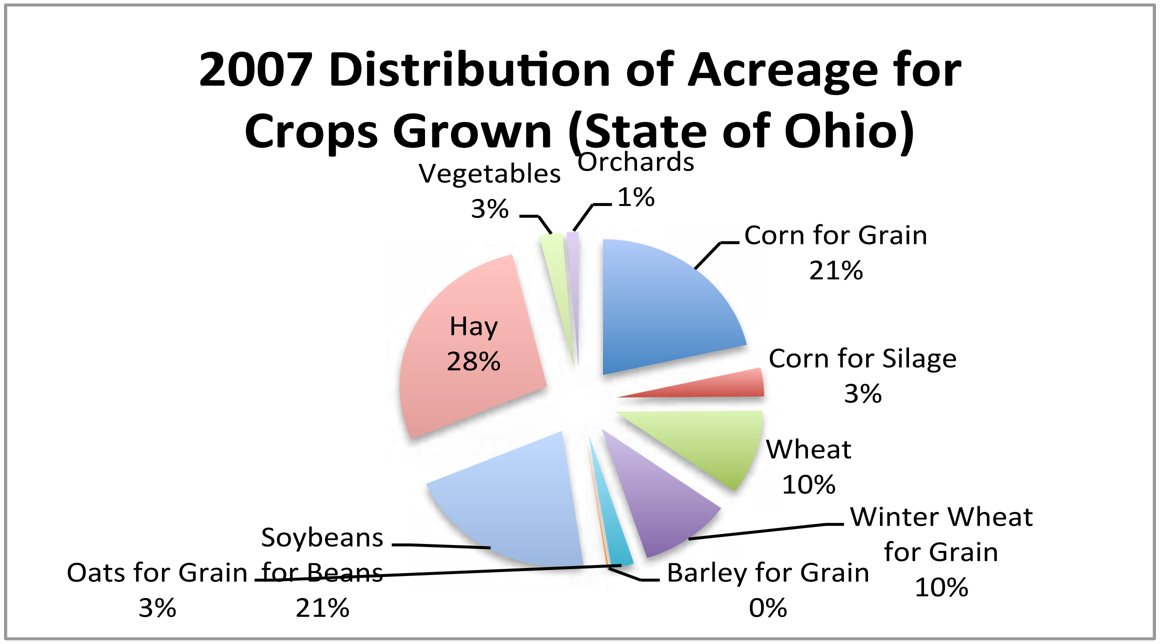
FARMS	Huron	Huron%	Lorain	Lorain %	Medina	Medina %
Corn for Grain	289	21.57%	174	15.54%	200	15.30%
Corn for Silage	31	2.31%	31	2.77%	57	4.36%
Wheat	212	15.82%	100	8.93%	112	8.57%
Winter Wheat for Grain	212	15.82%	100	8.93%	112	8.57%
Oats for Grain	12	0.90%	23	2.05%	44	3.37%
Barley for Grain	3	0.22%	1	0.09%	3	0.23%
Soybeans for Beans	314	23.43%	288	25.71%	189	14.46%
Hay	234	17.46%	291	25.98%	448	34.28%
Vegetables	22	1.64%	73	6.52%	89	6.81%
Orchards	11	0.82%	39	3.48%	53	4.06%
TOTAL	**1,340**		**1,120**		**1,307**	
ACRES	**Huron**		**Lorain**		**Medina**	
Corn for Grain	67,887	34%	25,625	25%	20,434	27%
Corn for Silage	1,277	1%	2,011	2%	2,001	3%
Wheat	22,470	11%	6,282	6%	5,836	8%
Winter Wheat for Grain	22,470	11%	6,282	6%	5,836	8%
Oats for Grain	299	0%	333	0%	494	1%
Barley for Grain	50	0%	0	0%	53	0%
Soybeans for Beans	76376	38%	50512	49%	24982	33%
Hay	6363	3%	9560	9%	14216	19%
Vegetables	4054	2%	983	1%	863	1%
Orchards	39	0%	571	1%	166	0%
TOTAL	**201,285**	**100.00%**	**102,159**	**100.00%**	**74,881**	**100.00%**

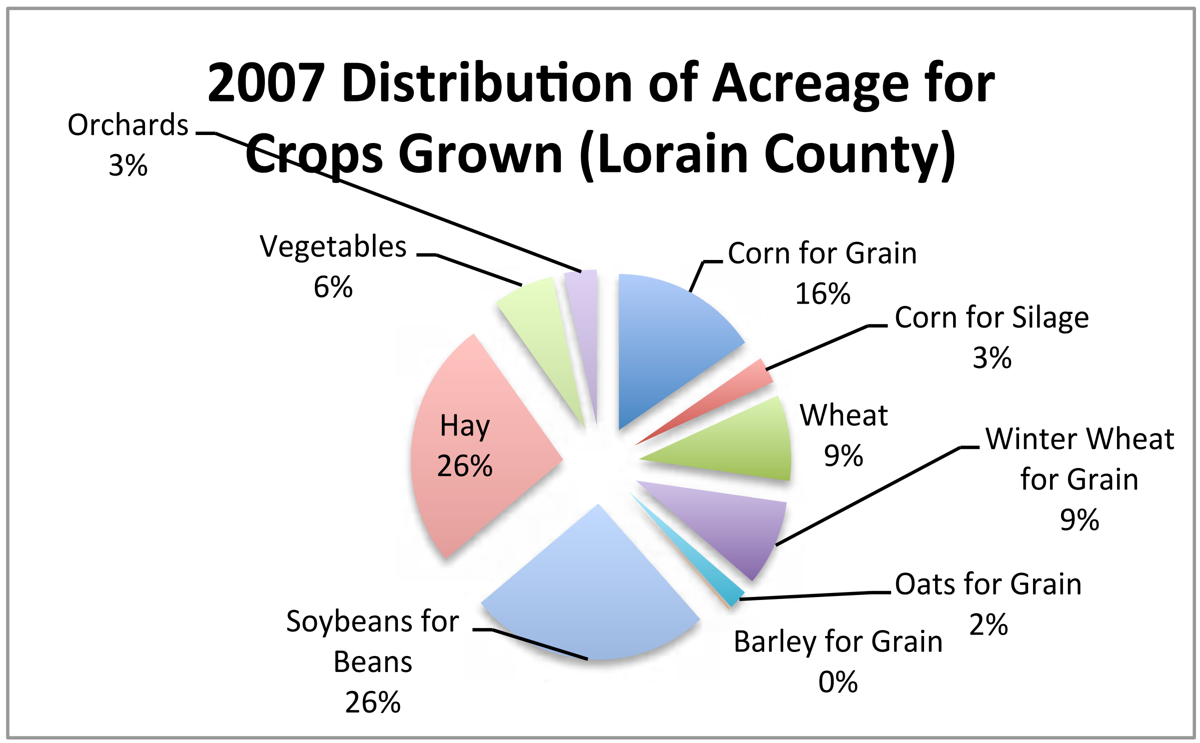
FARMS	Wayne	Wayne %
Corn for Grain	792	20.36%
Corn for Silage	435	11.18%
Wheat	339	8.71%
Winter Wheat for Grain	339	8.71%
Oats for Grain	314	8.07%
Barley for Grain	32	0.82%
Soybeans for Beans	472	12.13%
Hay	1027	26.40%
Vegetables	94	2.42%
Orchards	46	1.18%
TOTAL	**3,890**	

ACRES	Wayne	
Corn for Grain	60,097	30%
Corn for Silage	17,468	9%
Wheat	12,506	6%
Winter Wheat for Grain	12,506	6%
Oats for Grain	5,399	3%
Barley for Grain	413	0%
Soybeans for Beans	41271	21%
Hay	46295	23%
Vegetables	1396	1%
Orchards	354	0%
TOTAL	**197,705**	**1**

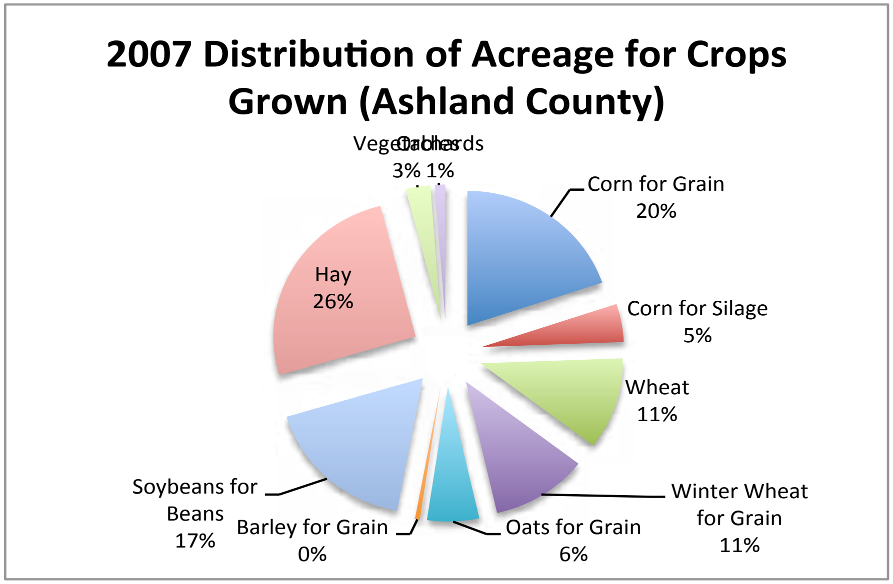


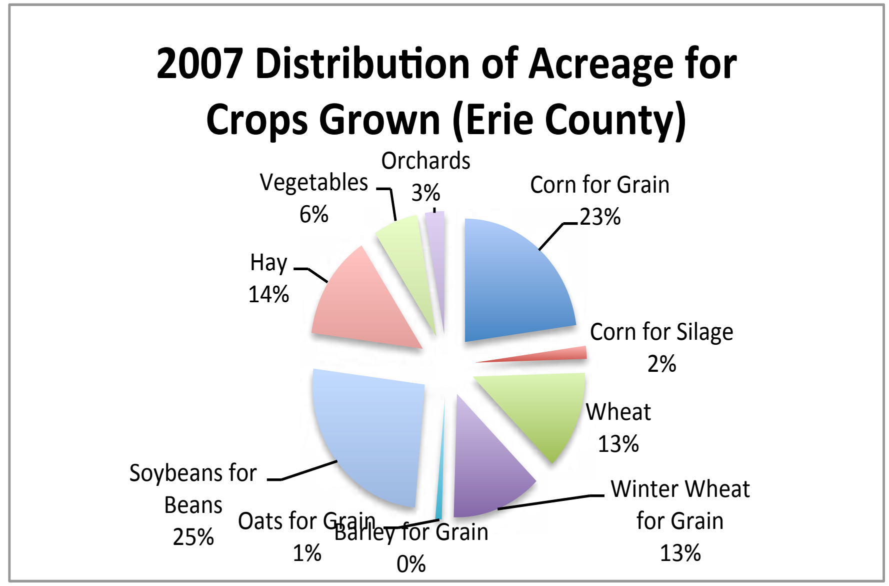
Return to Table of Contents

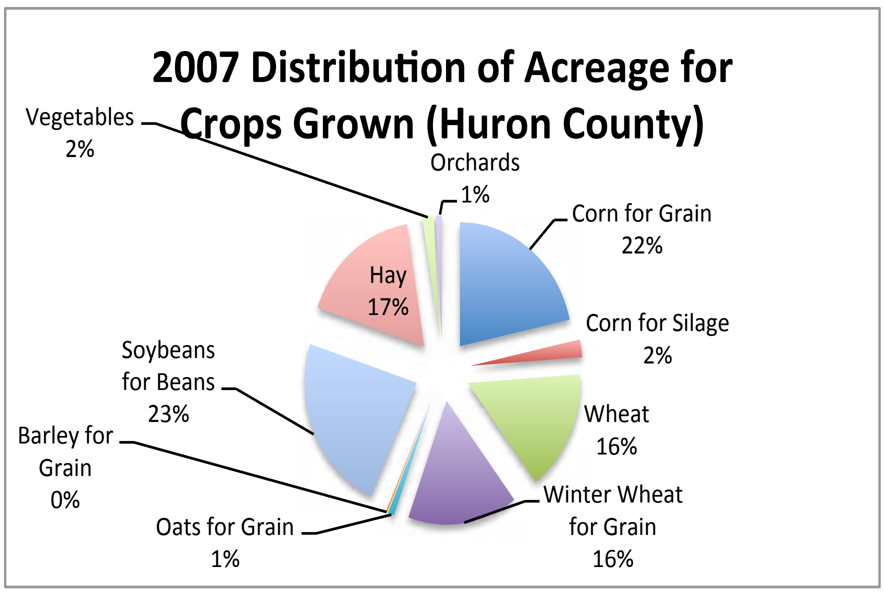


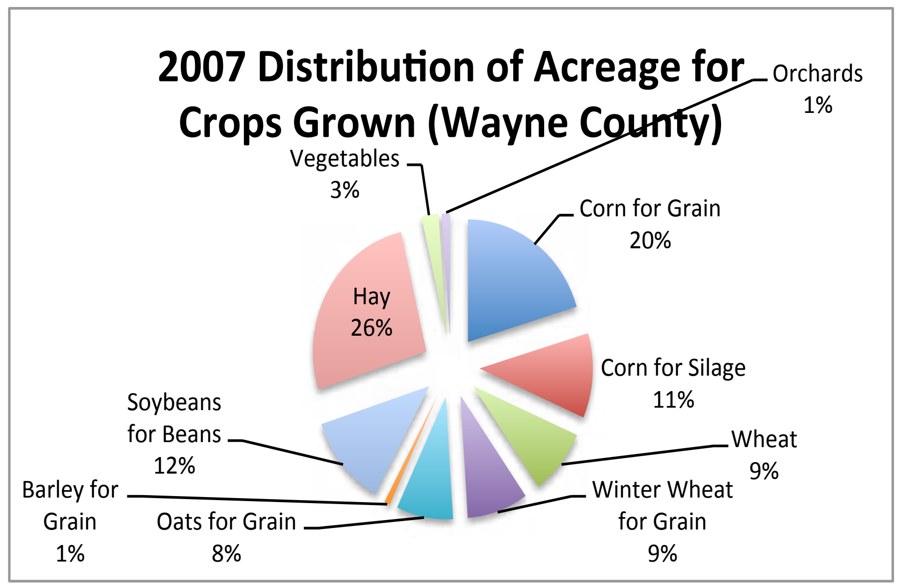


Return to Table of Contents


2007 Distribution of Acreage for Crops Grown (Ashland County)
Vegetables 3%
Orchards 1%
Corn for Grain 20%
Corn for Silage 5%
Wheat 11%
Winter Wheat for Grain 11%
Oats for Grain 6%
Barley for Grain 0%
Soybeans for Beans 17%
Hay 26%


2007 Distribution of Acreage for Crops Grown (Erie County)
Orchards 3%
Vegetables 6%
Corn for Grain 23%
Hay 14%
Corn for Silage 2%
Wheat 13%
Soybeans for Beans 25%
Winter Wheat for Grain 13%
Oats for Grain 1%
Barley for Grain 0%


2007 Distribution of Acreage for Crops Grown (Huron County)
Vegetables 2%
Orchards 1%
Corn for Grain 22%
Hay 17%
Corn for Silage 2%
Soybeans for Beans 23%
Wheat 16%
Barley for Grain 0%
Winter Wheat for Grain 16%
Oats for Grain 1%


2007 Distribution of Acreage for Crops Grown (Wayne County)
Orchards 1%
Vegetables 3%
Corn for Grain 20%
Hay 26%
Corn for Silage 11%
Soybeans for Beans 12%
Wheat 9%
Barley for Grain 1%
Winter Wheat for Grain 9%
Oats for Grain 8%

The chart below shows the distribution of acreage in the Oberlin Foodshed on the basis of crops grown. Of the 921,000 crop acres in the foodshed, about 65% of the land is devoted to corn and soybean production. About 15% is devoted to feed for direct animal consumption (hay and silage corn) and about 18% are devoted to grains, also mostly for animal feed. About 1% of the total land area is devoted to vegetable crops or orchards.

ACRES IN OBERLIN FOODSHED

Corn for Grain	31%
Corn for Silage	3%
Wheat	8%
Winter Wheat for Grain	8%
Oats for Grain	1%
Barley for Grain	1%
Soybeans for Beans	34%
Hay	12%
Vegetables	1%
Orchards	0%

The chart above would imply that there is little to no vegetable or orchard activity within the Oberlin Foodshed. While corn and soybeans occupy the lion's share of productive cropland, fruits and vegetables remain a significant agricultural activity for the Oberlin Foodshed. The six counties comprising the Oberlin Foodshed collectively occupy about 7% of the total cropland of the state of Ohio.

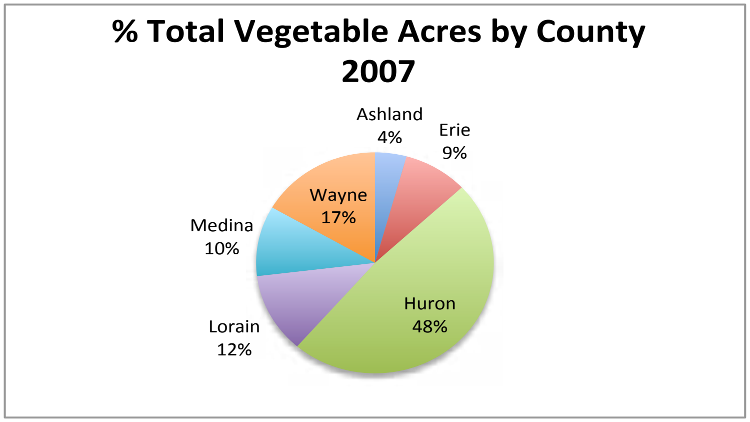
The chart below shows the total acreage devoted to each crop within the six county Oberlin Foodshed followed by the percentage of the overall land area reported state-wide for each crop that fills within the Oberlin Foodshed.

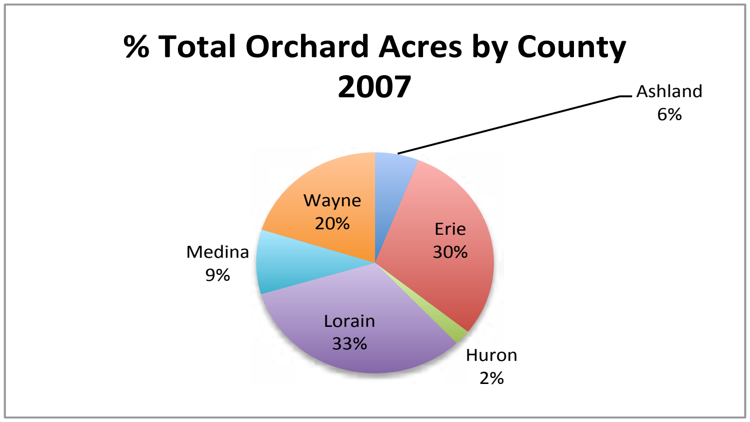
CROP	TOTAL ACRES	% State
Corn for Grain	238,127	6.60%
Corn for Silage	26,614	15.00%
Wheat	63,012	8.60%
Winter Wheat for Grain	63,012	8.60%
Oats for Grain	8,463	18.00%
Barley for Grain	627	21.00%
Soybeans for Beans	256,459	6.10%
Hay	96,522	8.40%
Vegetables	8,391	18.00%
Orchards	1,758	17.00%

Compared to the state of Ohio totals, the Oberlin foodshed is responsible for 15% of the corn silage, 18% of the oats, 21% of barley, 18% of vegetables, and 17% of orchards. In all of these crop areas, the Oberlin foodshed is producing a proportionally higher percentage of each crop than the rest of the state. With about 6-9% of the state's land area for corn, wheat, soybeans, and hay, the Oberlin Foodshed is proportionately consistent with the rest of the state of Ohio.

To dig in a bit deeper, the chart below shows the total vegetable and orchard acres of the Oberlin Foodshed. Huron County has 48% of the total vegetable production acres in the foodshed, largely based on the prevalence of "muck soils" which lend themselves to vegetable production. For orchards, Lorain County and Erie County together comprise almost 2/3 of the orchard acres in the Oberlin Foodshed with Wayne County possessing about 20% of the orchard acres. Again, geography is a factor here, given the prevalence of beach ridge soils in the northern portions of Erie and Lorain Counties. These beach ridges were formed when Lake Erie's ancestral lakes occupied a much larger land area than today. The remnant beach ridges provide optimal conditions for orchards, with sandy soils and higher elevations contributing the optimal drainage conditions. Other crops that grow well in these micro-climates along Lake Erie are grapes. This accounts for the growth in wine-making enterprises in counties along the Lake front.

2007	Vegetables	Orchards
Ashland	360	105
Erie	735	523
Huron	4054	39
Lorain	983	571
Medina	863	166
Wayne	1396	354
TOTAL	**8391**	**1758**





In conclusion, the Oberlin Foodshed offers a fair degree of diversity of crops, compared to the state of Ohio as a whole. The foodshed has significant acreage for vegetables and orchards compared to the rest of the state as well as higher than average levels of barley, oats, and other grains. The high percentage of corn grown for silage also indicates a more localized capacity for supporting livestock (as opposed to shipping in feed grains from outside of the region). Given these fairly general numbers, you can conclude that the Oberlin Foodshed possesses the capacity for a production of many of the foods needed for a complete diet:

- *Strong capacity for growing grains, including barley and oats, and other grains that could be provided for direct human consumption,*
- *Strong base of vegetable and orchard acres indicating large supply of fruits and vegetables*
- *Capacity for feed and silage that could be used to support livestock.*

Trends in National Agriculture

According to the national 2007 Census of Agriculture, there are about 2.2 million operating farms in the United States, representing a 4% increase from 2002. The census defines a farm as any place that produces $1,000 or more of agricultural products produced and sold during the census year. This represents a change from nationwide farm statistics since World War II, when the number of farms nationwide has steadily declined. During the last five years, a net increase of 75,810 farms has been reported.

The majority of this growth comes from smaller operations where more than 50% of the production value could not be attributed to one commodity. Additional growth occurred with large farms posting sales of more than $500,000, growing by 46,000 while operations with sales of less than $1,000 grew by 118,000. Farms reporting $250,000 or more in sales grew from 2002-2007 as did operations with less than $1,000 in sales. Farms between $1,000 to $249,000 in sales declined overall during this same time period. Overall, these trends indicate a continuation of two growth trajectories observed in other recent census years: an increase in number of large, mostly commodity farm operations and a growth in small, mostly direct market operations. The "farms in the middle", representing the majority of farm operations in the country, showed a continuous decline.

In terms of products, the following products showed growth from 2002-2007:

- *Hay*
- *Aquaculture*
- *Fruits and nuts*
- *Sheep and goats*
- *Poultry and eggs*
- *Vegetables*

The following products showed reduced growth from 2002-2007:

- *Cattle and calves*
- *Grains and oilseeds*
- *Milk*
- *Nursery and greenhouse crops*
- *Cattle feedlots*
- *Hogs and pigs*
- *Cotton*
- *Tobacco*

Overall, since the 2002 census, 291,329 new farms have begun operation. According to the United States Department of Agriculture (USDA), these farms tend to be smaller and have lower than average sales compared to farms nationwide. About 13% of all farms are "new farms", initiated since 2002. The average acreage of these new farms is 201 acres, compared to 418 acres nation-wide. The average value of products sold is $71,000 for new farms compared to $135,000 nation-wide. The average age of the new farmer is 48, compared to 57 nation-wide. New farmers tend to be engaged in occupations other than farming. Only 33% of new farms can claim farming as a primary occupation, compared to 45% of farmers nation-

wide.

Despite a notable growth in smaller farms and younger operators, concentration in the agricultural sector has continued to increase since 2002. In 2002, 144,000 farms produced 75% of the total value of agricultural production. In 2007, 125,000 farms produced 75% of the total agricultural value, representing a decline of 13% of the operations needed to generate this value in 2007. Concentration is also indicated by looking at farms which produce more than $1 million in sales. In 2007, farms in this class produced 59% of total U.S. agricultural production compared to the same class of farms producing 47% of all production in 2002.

Another sub-division can be noted in the types of farms operating. According to the census, the two largest groups of reported farms include "residential/lifestyle farms" and "retirement farms". Together, these two farms account for 57% of all farms in the United States. Residential/lifestyle farms (36% of total) include all operations that produce less than $250,000 in sales where operators report something other than farming as a primary occupation. Retirement farms (21% of total) include all farms that produce less then $250,000 in sales and principal operators are retired. Large-scale family farms (where farming is listed as the full-time vocation) comprise only 9% of all farms, but account for 63% of the value of agricultural products sold.

From the previous section, we can summarize these key trends in agriculture nationally:
Growth of small farm operations, many engaged with direct marketing
Increasing concentration in agriculture with fewer farmers producing more overall output
Growth in small operations generally younger, engaged with direct marketing, and often as a secondary or supplementary business
Growth in products suitable for direct marketing, including hay, fruits and nuts, vegetables, and smaller livestock (goats, sheep, chickens)

Does the Oberlin Foodshed reflect these national trends? How closely does it mirror these national trends? How will this affect planning for food localization efforts? We will look in-depth at the Oberlin Foodshed and consider historic changes, including:

- *Changes the past 50 years in the number of farmers, farmland acreage, and the average size of farms;*
- *Change in farms for the past 30 years in terms of size (acreage) of operations; and*
- *Change in volume of sales for the past 30 years*

CHANGE IN NUMBER OF FARMS 1959-2007

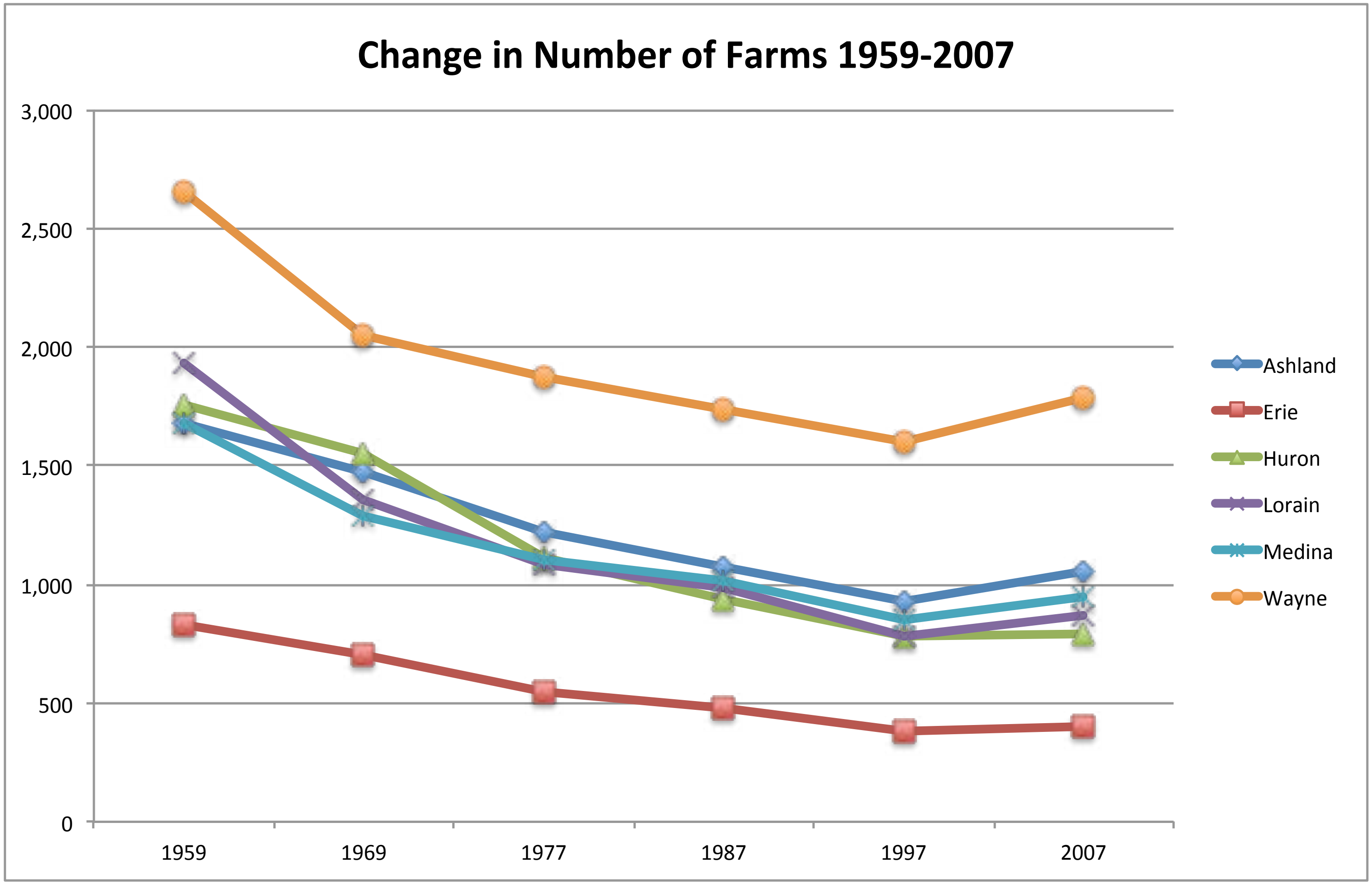
Change in # of Farms 1959-2007

	1959	1969	1977	1987	1997	2007
Ashland	1,676	1,476	1,216	1,078	929	1,058
Erie	832	702	550	480	380	403
Huron	1,758	1,557	1,117	934	782	793
Lorain	1,929	1,354	1,085	985	778	873
Medina	1,677	1,288	1,107	1,012	851	951
Wayne	2,655	2,051	1,874	1,734	1,601	1,788

Percent Change in Number of Farms over 50 Years

	% 50 YR	%30 YR	%20 YR	%10 YR
Ashland	-36.87%	-12.99%	-1.86%	13.89%
Erie	-51.56%	-26.73%	-16.04%	6.05%
Huron	-54.89%	-29.01%	-15.10%	1.41%
Lorain	-54.74%	-19.54%	-11.37%	12.21%
Medina	-43.29%	-14.09%	-6.03%	11.75%
Wayne	-32.66%	-4.59%	3.11%	11.68%

Return to Table of Contents



The change in the number of farms (indicated by all agricultural operations posting $1,000 or more in income) in the Oberlin Foodshed mirrors national trends. Over the past fifty years, all counties in the Oberlin Foodshed lost between 1/3 to ½ of their farm populations, with the most noticeable declines taking place in Erie, Huron, and Lorain Counties. Wayne and Ashland counties still faced significant loss of farmland, but at much less of a rate than the other counties in the foodshed. Overall declines are noted for all counties over the past 20-30 years, with the exception of Wayne County which increased farmers from 1987 to 2007.

The past 10 years have seen a reversal in a fifty year trend toward overall decline in the number of farms, with all counties in the Oberlin Foodshed experiencing sizable rates of growth in the number of new farms. Ashland, Lorain, Medina, and Wayne Counties all saw an 11-13% increase in the number of farms. Huron and Erie counties both experienced growth as well, but at about half the rate as the other counties.

Return to Table of Contents

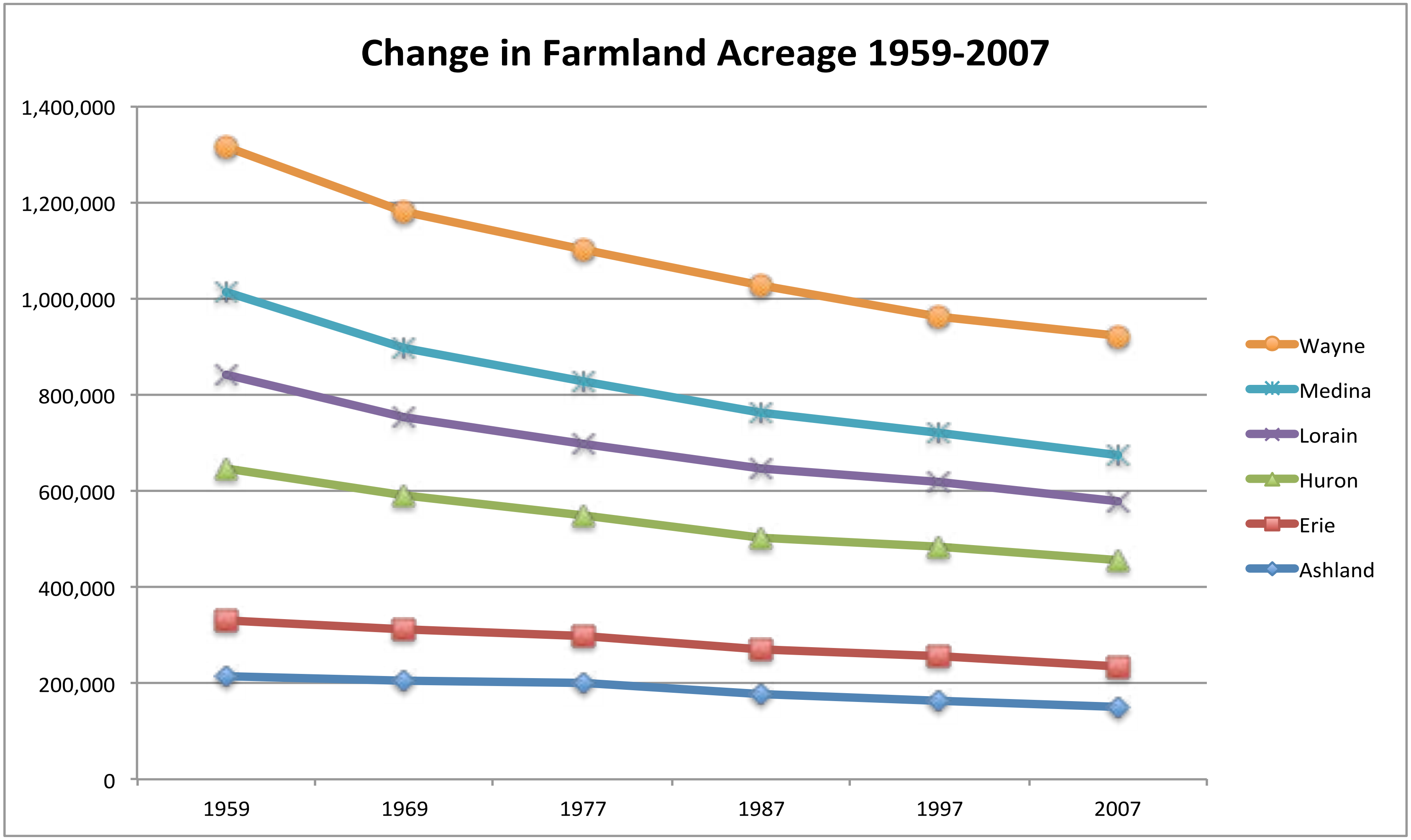
Farmland Acreage 1959-2007						
	1959	1969	1977	1987	1997	2007
Ashland	214,151	205,255	201,040	179,361	163,948	150,534
Erie	114,018	106,733	97,208	90,106	89,871	84,085
Huron	318,080	278,241	251,397	234,317	231,586	219,369
Lorain	192,656	161,001	147,805	143,639	130,631	124,100
Medina	174,970	144,178	127,350	115,890	104,060	95,493
Wayne	298,938	282,434	274,832	263,457	240,905	248,409

Percentage Change in Farmland Acreage over 50 Years				
	% 50 YR	%30 YR	%20 YR	%10 YR
Ashland	-29.71%	-25.12%	-16.07%	-8.18%
Erie	-26.25%	-13.50%	-6.68%	-6.44%
Huron	-31.03%	-12.74%	-6.38%	-5.28%
Lorain	-35.58%	-16.04%	-13.60%	-5.00%
Medina	-45.42%	-25.02%	-17.60%	-8.23%
Wayne	-16.90%	-9.61%	-5.71%	3.11%

The change in the number of farms by county shows us overall trends in the number of actual farm operators over a fifty year period of time. Change in farmland acreage shows overall shifts in the land area devoted to farming in each county. Comparing these numbers to changes in the number of farms helps to determine if counties converted large amounts of farmland to other uses or if farmland acres remained steady, but with fewer actual farm operations.

By these measures, we can see that the greatest loss of overall farmland acreage (35-45%) occurred in Medina (45%) and Lorain (36%) counties. Counties losing between 25-35% include Ashland, Erie, and Huron counties. Wayne county lost about 17% of its overall farmland acreage, the lowest among the counties in the foodshed. The majority of farmland loss can be attributed to two factors. First, increasing urbanization or conversion of farmland to residential or commercial uses affected all counties, but Lorain and Medina counties in particular faced significant residential and commercial growth, mostly from populations shifting from the traditional urban cores of Northeastern Ohio (as opposed to residents moving in from outside of the region). The second factor includes the large number of failed or bankrupt farming operations, connected to the 33-50% loss of farmers observed over the past 50 years in the foodshed. Much farmland acreage continued, either being leased to another farmer or acquired by a neighboring farmer to expand the scale of their operation. Other farmland went fallow.

The past decade has seen a continuing rate of decline in overall farmland acreage for all counties, mostly consistent with the trends of prior decades. Only Wayne County has increased (by 3%) the amount of farmland acreage. Ashland, Lorain, and Medina counties all saw rates of decline consistent with the previous decade. Huron and Erie counties experienced less overall decline in the same 20 year period.

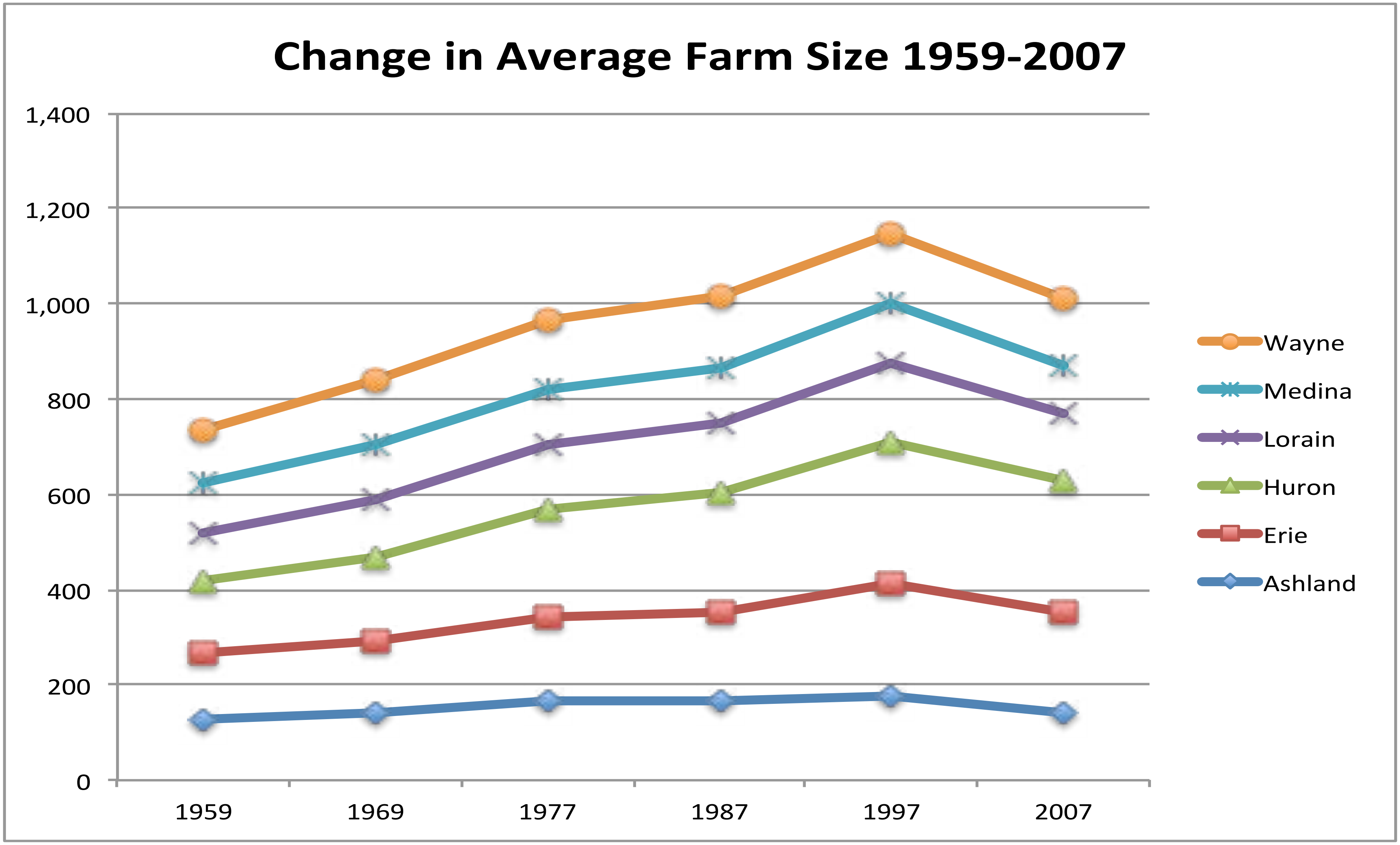


Change in Average Farm Size 1959-2007						
	1959	**1969**	**1977**	**1987**	**1997**	**2007**
Ashland	128	139	165	166	176	142
Erie	137	152	177	188	237	209
Huron	154	179	225	251	296	277
Lorain	100	120	136	146	168	142
Medina	104	112	115	115	122	100
Wayne	112	138	147	152	150	139

	Percent Change in Average Farm Size Over 50 Years			
	% 50 YR	**%30 YR**	**%20 YR**	**%10 YR**
Ashland	10.94%	-13.94%	-14.46%	-19.32%
Erie	52.55%	18.08%	11.17%	-11.81%
Huron	79.87%	23.11%	10.36%	-6.42%
Lorain	42.00%	4.41%	-2.74%	-15.48%
Medina	-3.85%	-13.04%	-13.04%	-18.03%
Wayne	24.11%	-5.44%	-8.55%	-7.33%

The change in the average size of farms provides a measure for concentration in the agriculture sector in which fewer farmers are producing on increasingly large acreages of farmland. Here, we can see, with the exception of Medina County, a general increase in the average size of farms for the Oberlin Foodshed. Medina County actually experienced a reduction in average farm size. This owes in part to the significant amount of farmland converted to urban usages and the presence of sizable populations of Amish farmers in the northeastern part of the county. Erie and Huron counties experienced the greatest increase in average farm sizes with a rate of increase of 50-80% for each. Lorain County experienced a sizable increase at 42%. Wayne (24%) and Ashland (11%) counties experienced less overall change in average farmsize

While fifty year trends show an overall concentration, we have seen a reversal of these trends in the past decade, with all counties experiencing a reduction in average farm size from 1997 to 2007. Ashland, Erie, Lorain, and Medina counties all experienced a 10-20% reduction in average farm size with Huron and Wayne counties each experiencing less than 10% reduction in farm size. It is reasonable to conclude that the change in average farm size is mostly attributable to the growth in the number of smaller acreage farms. We will confirm this assumption in the next two sections.


Change in Average Farm Size 1959-2007
1,400
1,200
1,000
800
600
400
200
0
1959
1969
1977
1987
1997
2007
Wayne
Medina
Lorain
Huron
Erie
Ashland

Change in Number of Farms by Scale (Acreage)

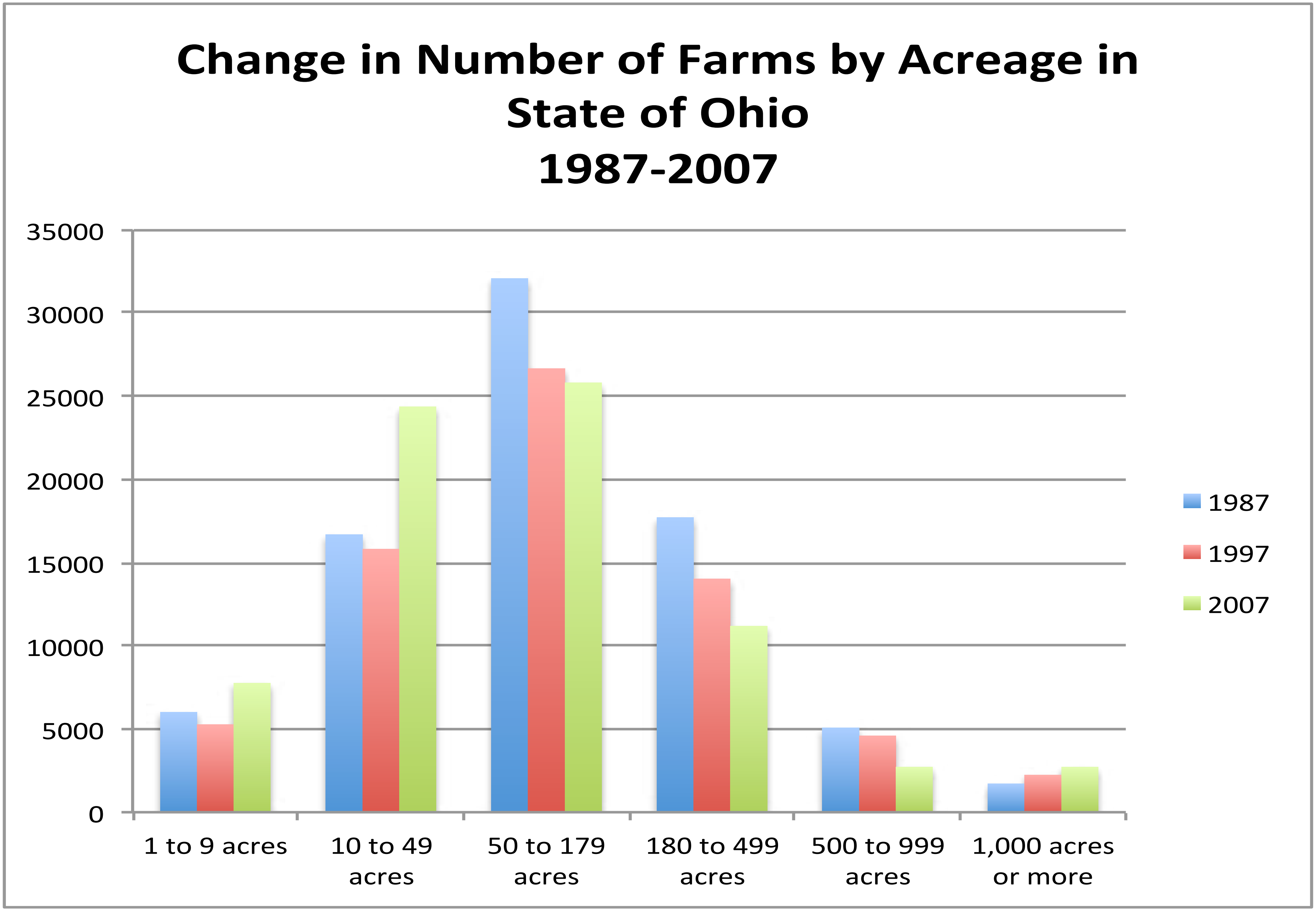
To get more granular detail on the rates of change, the USDA national census of agricultural collects statistics about all operating farms. These statistics include information about the acreage of operating farms. The following charts show the growth rates of farms by acreage from 1987 to 2007. The chart sub-divides the number of farmers operating at the following scales:

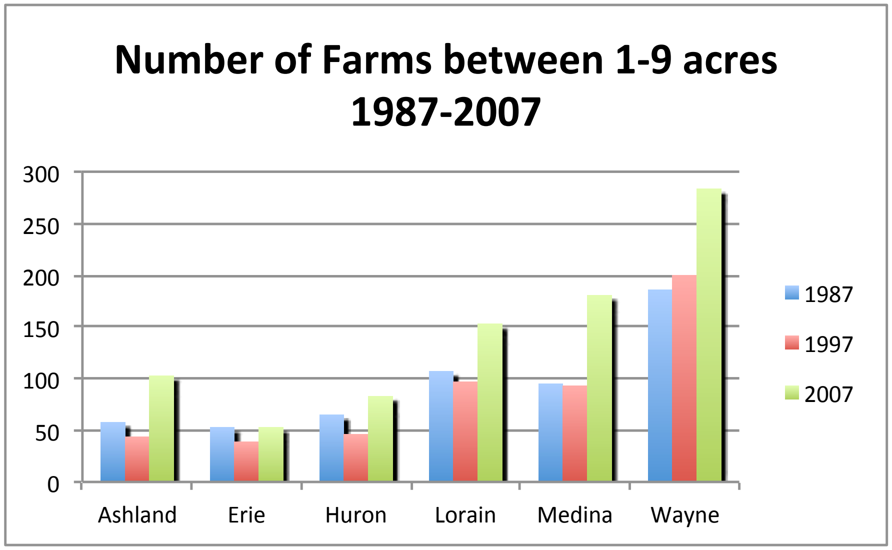
- ***1 to 9 acres***
- ***10 to 49 acres***
- ***50 to 179 acres***
- ***180 to 499 acres***
- ***500 to 999 acres***
- ***1,000 acres or more***

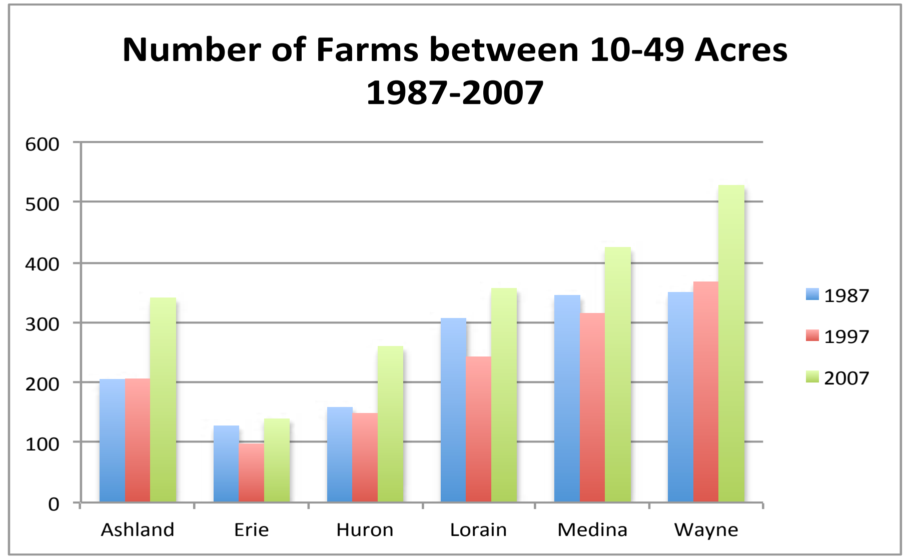
1 to 9 acres	**1987**	**1997**	**2007**	
Ashland	58	44	103	78%
Erie	53	39	53	0%
Huron	65	46	83	28%
Lorain	107	97	153	43%
Medina	95	93	181	91%
Wayne	186	200	284	53%
10 to 49 Acres				
	1987	**1997**	**2007**	
Ashland	205	206	341	66%
Erie	128	98	140	9%
Huron	159	149	260	64%
Lorain	307	243	357	16%
Medina	345	315	425	23%
Wayne	350	368	529	51%
50 to 179 acres				
	1987	**1997**	**2007**	
Ashland	533	433	413	-23%
Erie	157	118	108	-31%
Huron	321	276	234	-27%
Lorain	343	253	217	-37%
Medina	406	309	244	-40%
Wayne	742	638	599	-19%

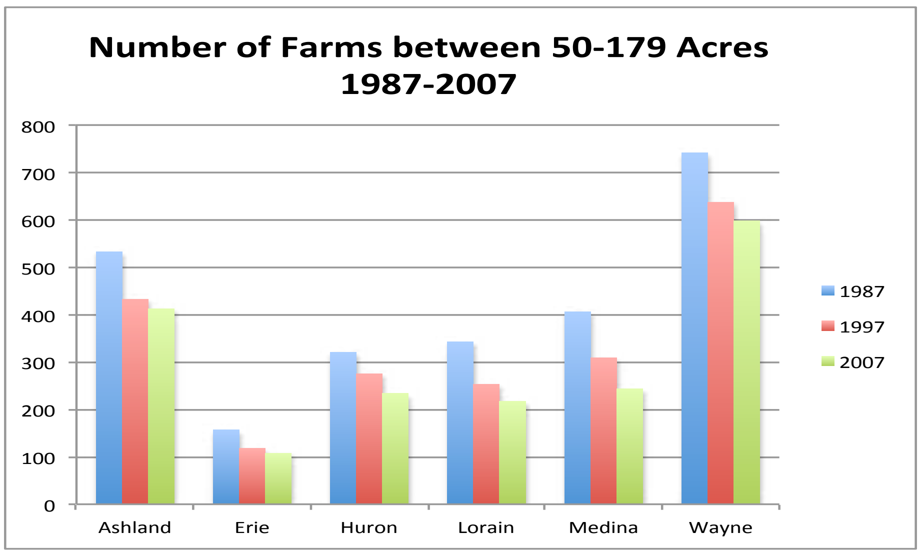
180 to 499 acres				
	1987	**1997**	**2007**	
Ashland	205	174	142	-31%
Erie	87	68	55	-37%
Huron	269	186	108	-60%
Lorain	165	132	89	-46%
Medina	132	95	66	-50%
Wayne	370	302	277	-25%
500 to 999 acres				
	1987	**1997**	**2007**	
Ashland	68	53	19	-72%
Erie	40	42	22	-45%
Huron	83	68	51	-39%
Lorain	47	31	28	-40%
Medina	24	25	22	-8%
Wayne	67	74	29	-57%
1,000 acres or more				
	1987	**1997**	**2007**	
Ashland	9	19	19	111%
Erie	15	15	22	47%
Huron	37	57	51	38%
Lorain	16	22	28	75%
Medina	10	14	22	120%
Wayne	19	19	29	53%
OHIO ACREAGE				
	1987	**1997**	**2007**	
1 to 9 acres	6007	5271	7,767	29%
10 to 49 acres	16688	15811	24,361	46%
50 to 179 acres	32074	26658	25,809	-20%
180 to 499 acres	17718	14018	11,190	-37%
500 to 999 acres	5072	4587	2,714	-46%
1,000 acres or more	1718	2246	2,714	58%

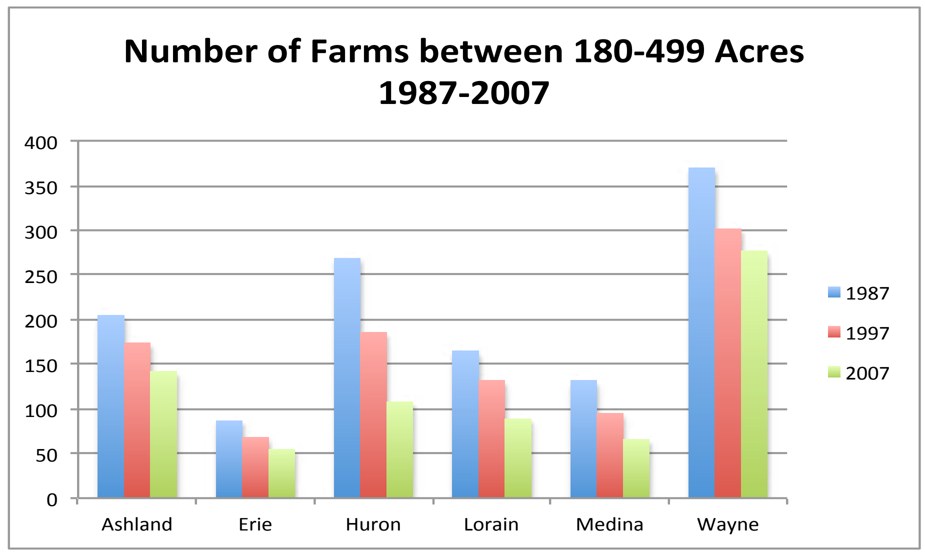
Return to Table of Contents

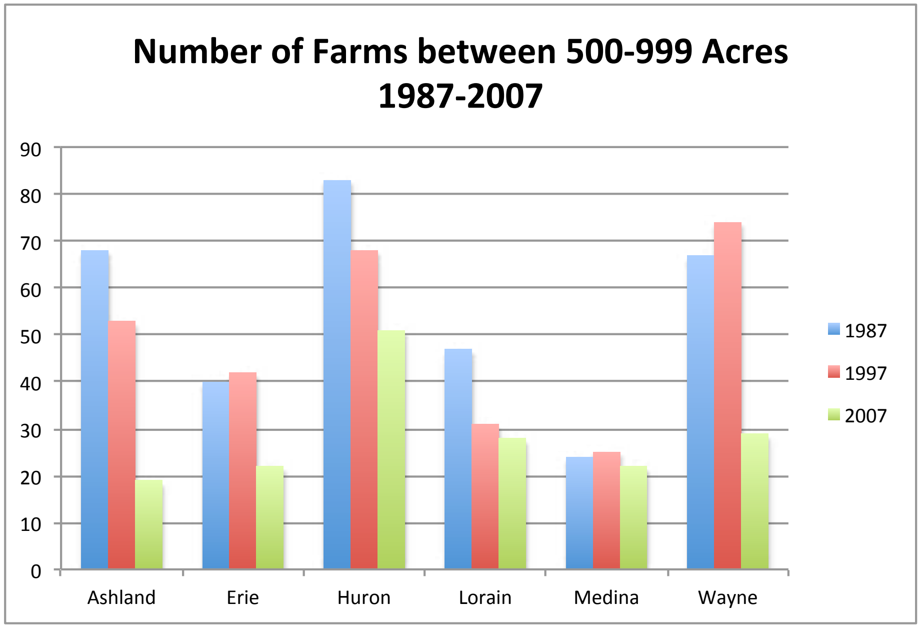

Change in Number of Farms by Acreage in State of Ohio 1987-2007
35000
30000
25000
20000
15000
10000
5000
0
1 to 9 acres
10 to 49 acres
50 to 179 acres
180 to 499 acres
500 to 999 acres
1,000 acres or more
1987
1997
2007

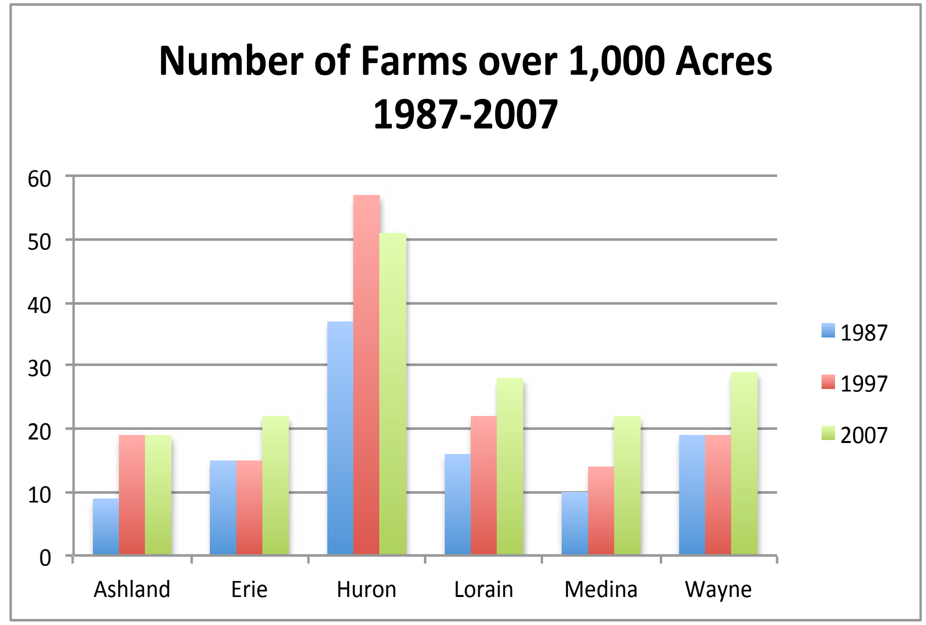

Number of Farms between 1-9 acres 1987-2007
300
250
200
150
100
50
0
Ashland
Erie
Huron
Lorain
Medina
Wayne
1987
1997
2007


Number of Farms between 10-49 Acres 1987-2007
600
500
400
300
200
100
0
Ashland
Erie
Huron
Lorain
Medina
Wayne
1987
1997
2007


Number of Farms between 50-179 Acres 1987-2007
800
700
600
500
400
300
200
100
0
Ashland
Erie
Huron
Lorain
Medina
Wayne
1987
1997
2007


Number of Farms between 180-499 Acres 1987-2007
400
350
300
250
200
150
100
50
0
Ashland
Erie
Huron
Lorain
Medina
Wayne
1987
1997
2007





As was demonstrated in earlier sections that looked at changes in overall farmland acreage and average farm sizes, we see again an overall pattern of growth at the two extreme ends of the spectrum. All counties in the Oberlin foodshed experienced overall growth for farms between 1 to 49 acres in size. This growth rates was significant, ranging from 28 to 91% growth for farms between 1 to 9 acres and rates of growth of 9-66% in the number of farmers operating between 10 to 49 acres of land. Similarly, all counties experienced sizable growth in the number of farms operating on 1,000 or more acres of land. These growth rates ranged from 38-120% for the Oberlin Foodshed. These growth trends mirror overall trends for the State of Ohio and nationally.

What is striking about these figures is the extent to which farms between 50 to 999 acres have declined during the same 20 year period. Not a single county in the Oberlin foodshed showed any rate of growth for farms of this scale between 1987 to 2007. The loss of farmland in the middle categories is significant, ranging from 19-40% for farms between 50 to 17 acres, 25-60% for farms between 180-499 acres, and 8-72% for farms between 500 to 999 acres.

Interestingly, Ashland and Medina counties topped the list both for the growth rate of farms between 1 to 9 acres and the growth of farms of 1,000 acres or more.

Return to Table of Contents

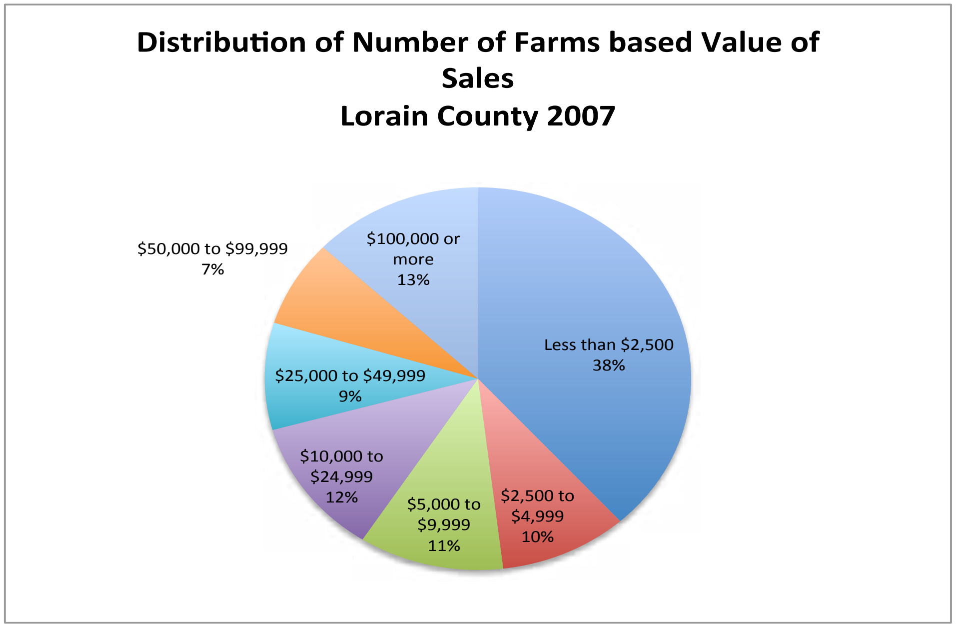
Change in Farms by Volume of Sales

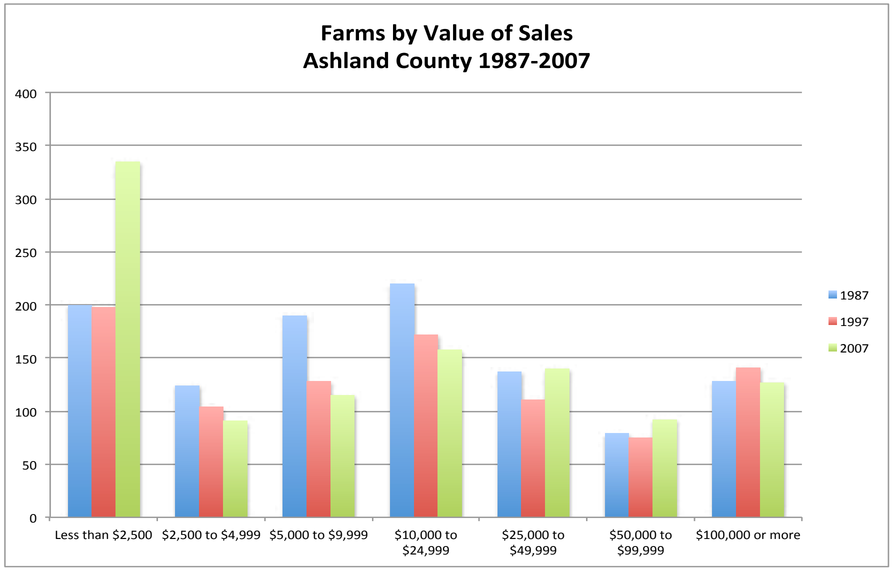
The same trends observed in the scale of farms is similarly reflected in the change in the value of sales by county from 1987 to 2007. Values of sales have similarly shown an across-the-board growth of farms selling less than $2,500 and growth for farms selling $100,000 or more. Farms selling between $2,500 to 99,000 for the most part have declined over the same 20 year period of time.

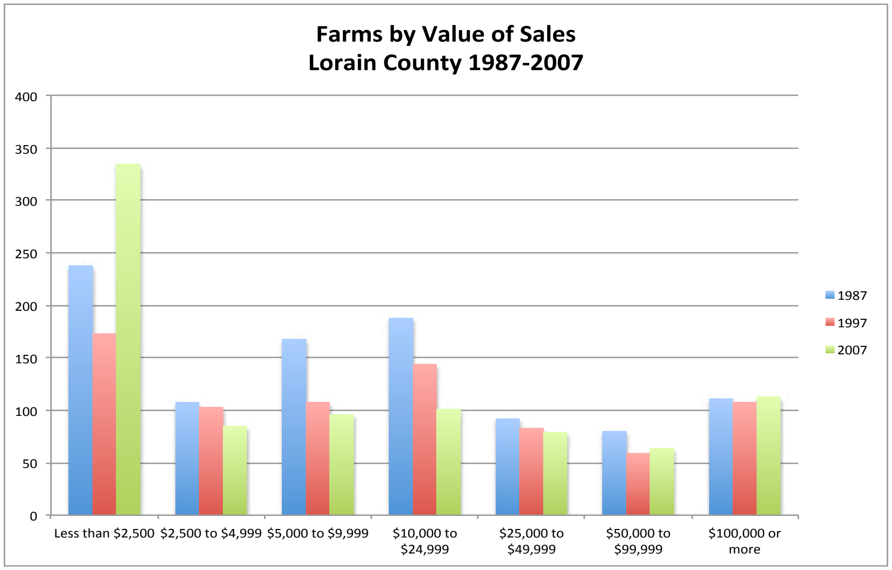
ASHLAND				
Farms by value of sales:				
	1987	**1997**	**2007**	**% CHANGE**
Less than $2,500	200	198	335	67.50%
$2,500 to $4,999	124	104	91	-26.61%
$5,000 to $9,999	190	128	115	-39.47%
$10,000 to $24,999	220	172	158	-28.18%
$25,000 to $49,999	137	111	140	2.19%
$50,000 to $99,999	79	75	92	16.46%
$100,000 or more	128	141	127	-0.78%
ERIE				
Farms by value of sales:				
	1987	**1997**	**2007**	
Less than $2,500	92	61	106	15.22%
$2,500 to $4,999	53	40	44	-16.98%
$5,000 to $9,999	70	37	28	-60.00%
$10,000 to $24,999	91	62	48	-47.25%
$25,000 to $49,999	51	54	46	-9.80%
$50,000 to $99,999	40	40	46	15.00%
$100,000 or more	83	86	85	2.41%
HURON				
Farms by value of sales:				
	1987	**1997**	**2007**	
Less than $2,500	125	140	324	159.20%
$2,500 to $4,999	71	61	36	-49.30%
$5,000 to $9,999	133	80	54	-59.40%
$10,000 to $24,999	220	127	77	-65.00%
$25,000 to $49,999	148	112	64	-56.76%
$50,000 to $99,999	109	105	54	-50.46%
$100,000 or more	128	157	184	43.75%

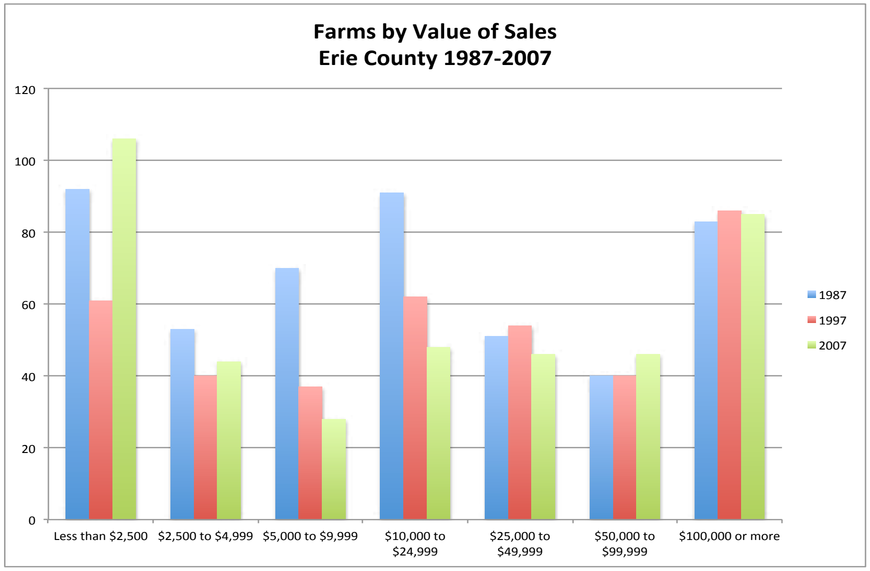
LORAIN				
Farms by value of sales:				
	1987	**1997**	**2007**	
Less than $2,500	238	173	335	40.76%
$2,500 to $4,999	108	103	85	-21.30%
$5,000 to $9,999	168	108	96	-42.86%
$10,000 to $24,999	188	144	101	-46.28%
$25,000 to $49,999	92	83	79	-14.13%
$50,000 to $99,999	80	59	64	-20.00%
$100,000 or more	111	108	113	1.80%
MEDINA				
Farms by value of sales:				
	1987	**1997**	**2007**	
Less than $2,500	344	248	386	12.21%
$2,500 to $4,999	133	129	108	-18.80%
$5,000 to $9,999	153	139	100	-34.64%
$10,000 to $24,999	160	148	146	-8.75%
$25,000 to $49,999	78	67	74	-5.13%
$50,000 to $99,999	68	45	55	-19.12%
$100,000 or more	76	75	82	7.89%
WAYNE				
Farms by value of sales:				
	1987	**1997**	**2007**	
Less than $2,500	241	256	429	78.01%
$2,500 to $4,999	172	143	136	-20.93%
$5,000 to $9,999	206	162	172	-16.50%
$10,000 to $24,999	300	266	230	-23.33%
$25,000 to $49,999	227	235	173	-23.79%
$50,000 to $99,999	237	141	196	-17.30%
$100,000 or more	351	398	452	28.77%

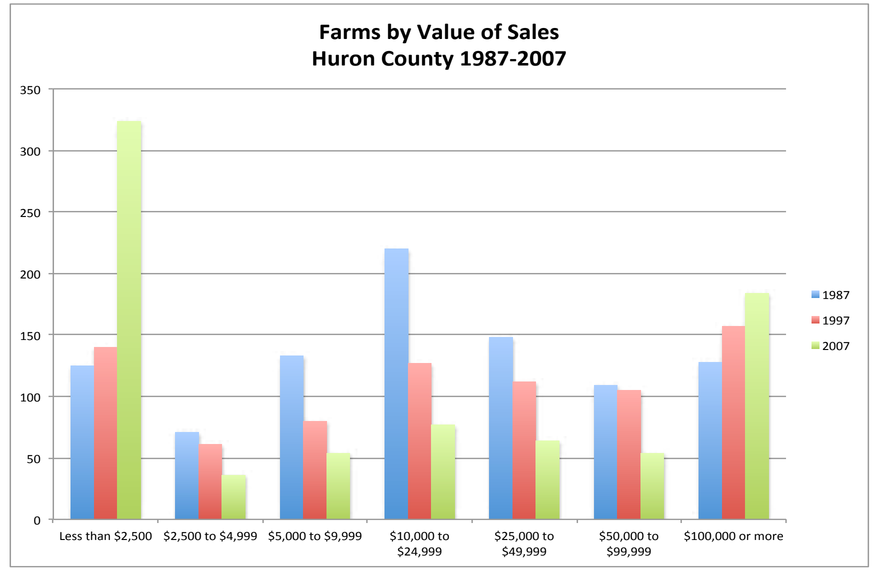
These figures demonstrate the recent growth of smaller-scale and diversified farms engaged in more direct marketing activities and large-acreage operations focusing mostly on commodity grain production. The "farms in the middle" have been disappearing rapidly. In many ways, the farms in the middle have the scale and capacity to feed larger populations of people. They are also ideally matched to larger institutional markets, such as universities or schools. Unique strategies need to be developed to stabilize rates of loss for farms in the middle or we will see a continuing bifurcation of the food system.

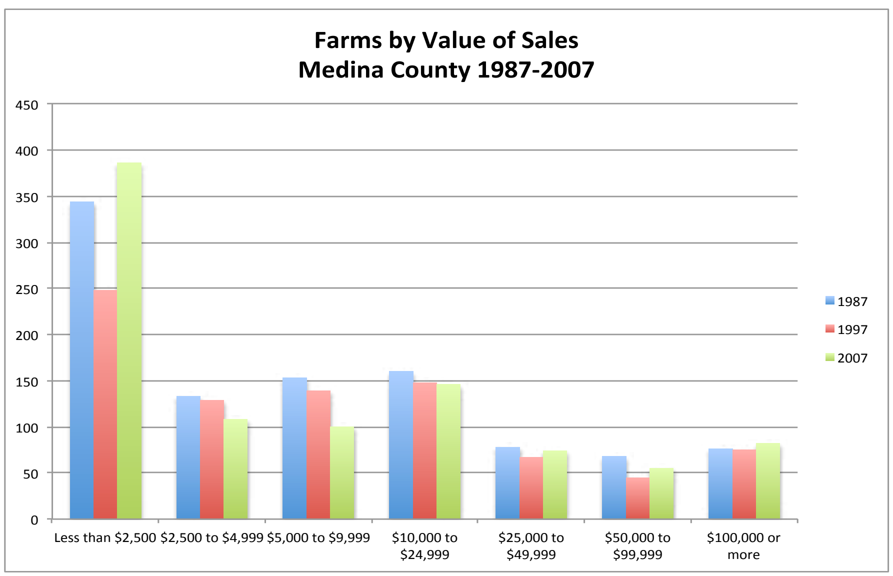

Distribution of Number of Farms based Value of Sales
Lorain County 2007
$100,000 or more 13%
$50,000 to $99,999 7%
Less than $2,500 38%
$25,000 to $49,999 9%
$10,000 to $24,999 12%
$5,000 to $9,999 11%
$2,500 to $4,999 10%

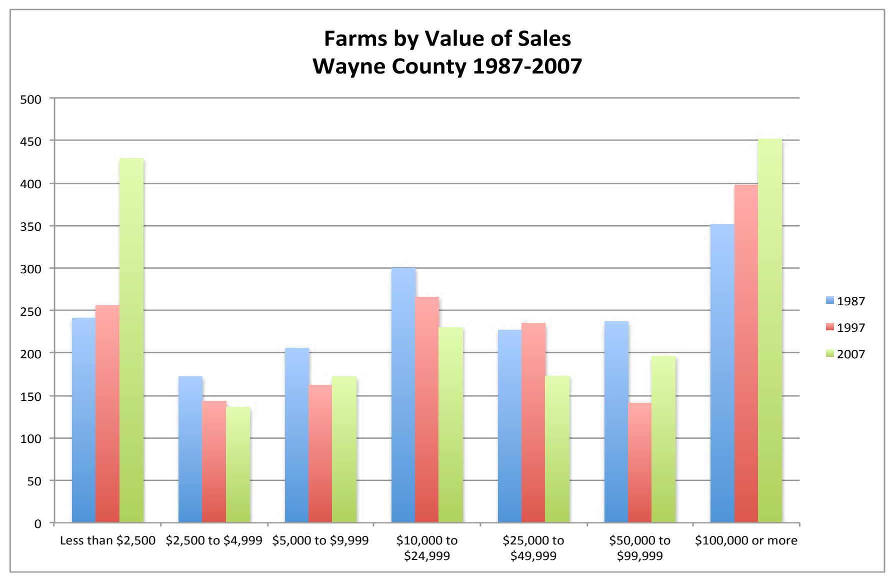

Farms by Value of Sales
Ashland County 1987-2007
400
350
300
250
200
150
100
50
0
Less than $2,500
$2,500 to $4,999
$5,000 to $9,999
$10,000 to $24,999
$25,000 to $49,999
$50,000 to $99,999
$100,000 or more
1987
1997
2007

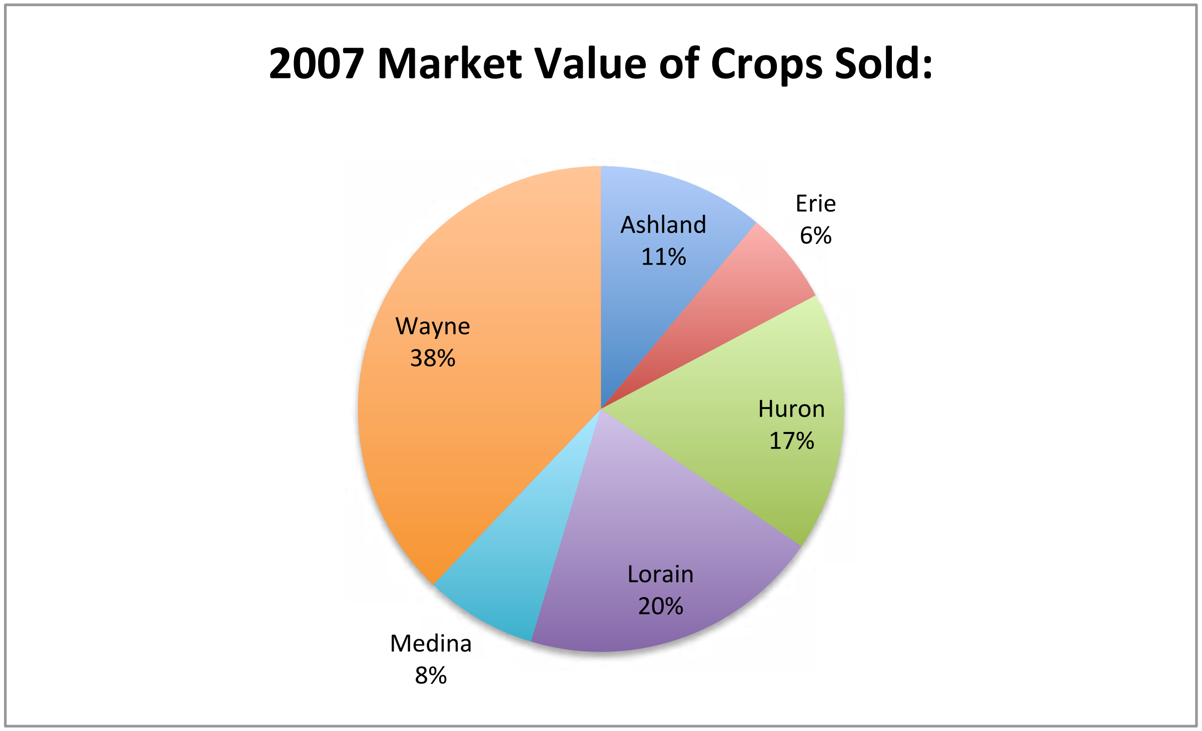

Farms by Value of Sales
Lorain County 1987-2007
400
350
300
250
200
150
100
50
0
Less than $2,500
$2,500 to $4,999
$5,000 to $9,999
$10,000 to $24,999
$25,000 to $49,999
$50,000 to $99,999
$100,000 or more
1987
1997
2007

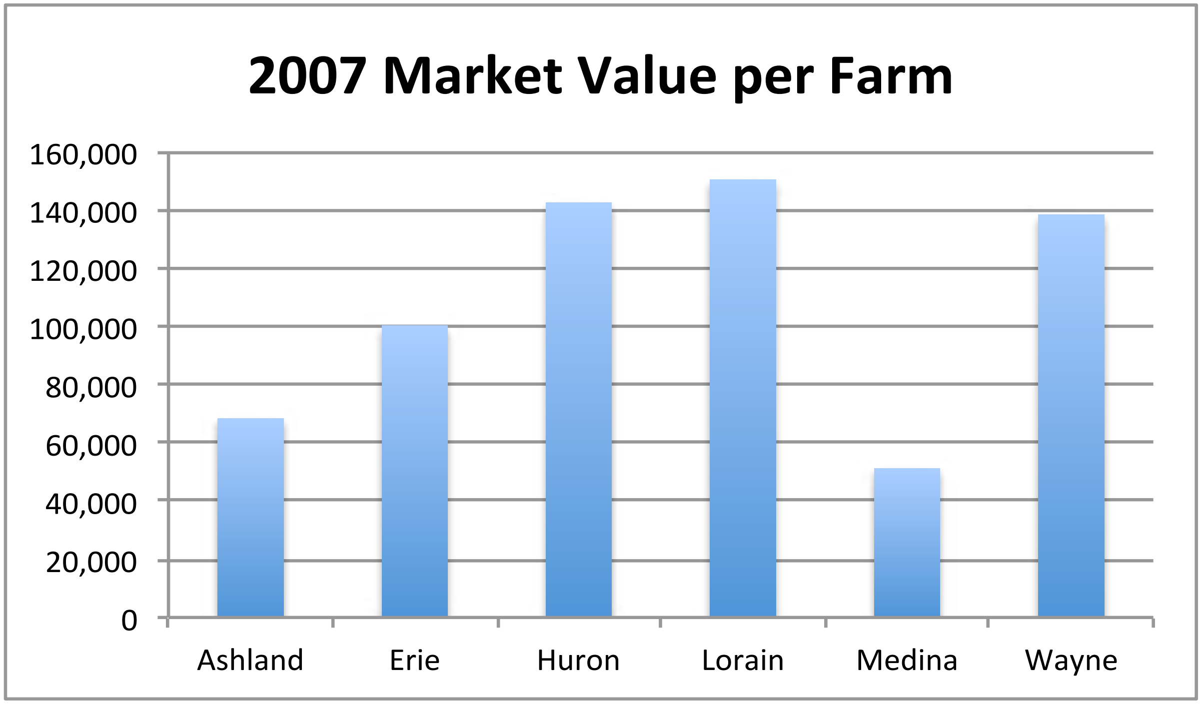

Farms by Value of Sales
Erie County 1987-2007
120
100
80
60
40
20
0
Less than $2,500
$2,500 to $4,999
$5,000 to $9,999
$10,000 to $24,999
$25,000 to $49,999
$50,000 to $99,999
$100,000 or more
1987
1997
2007


Farms by Value of Sales
Huron County 1987-2007
350
300
250
200
150
100
50
0
Less than $2,500
$2,500 to $4,999
$5,000 to $9,999
$10,000 to $24,999
$25,000 to $49,999
$50,000 to $99,999
$100,000 or more
1987
1997
2007


Farms by Value of Sales
Medina County 1987-2007
450
400
350
300
250
200
150
100
50
0
Less than $2,500
$2,500 to $4,999
$5,000 to $9,999
$10,000 to $24,999
$25,000 to $49,999
$50,000 to $99,999
$100,000 or more
1987
1997
2007


Farms by Value of Sales
Wayne County 1987-2007
500
450
400
350
300
250
200
150
100
50
0
Less than $2,500
$2,500 to $4,999
$5,000 to $9,999
$10,000 to $24,999
$25,000 to $49,999
$50,000 to $99,999
$100,000 or more
1987
1997
2007





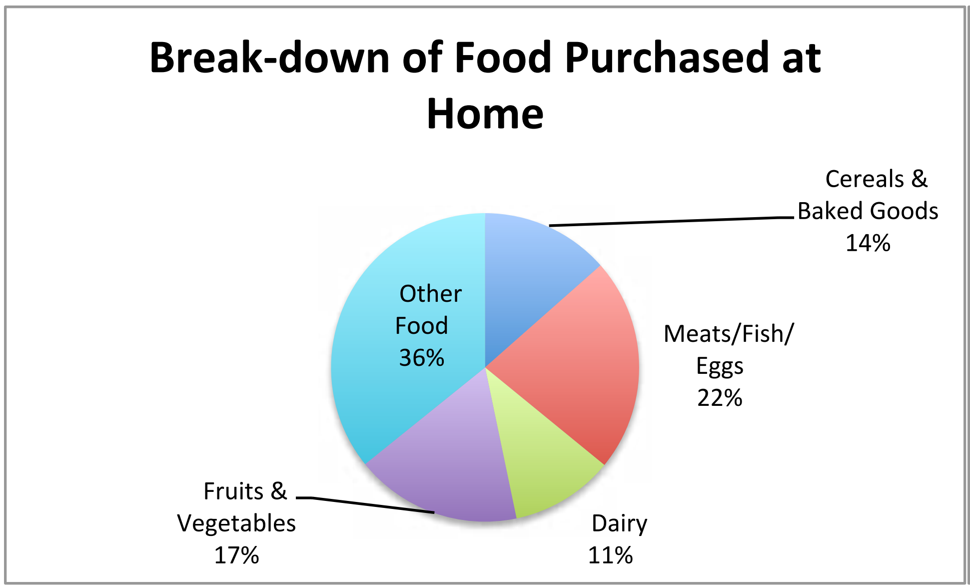
Return to Table of Contents

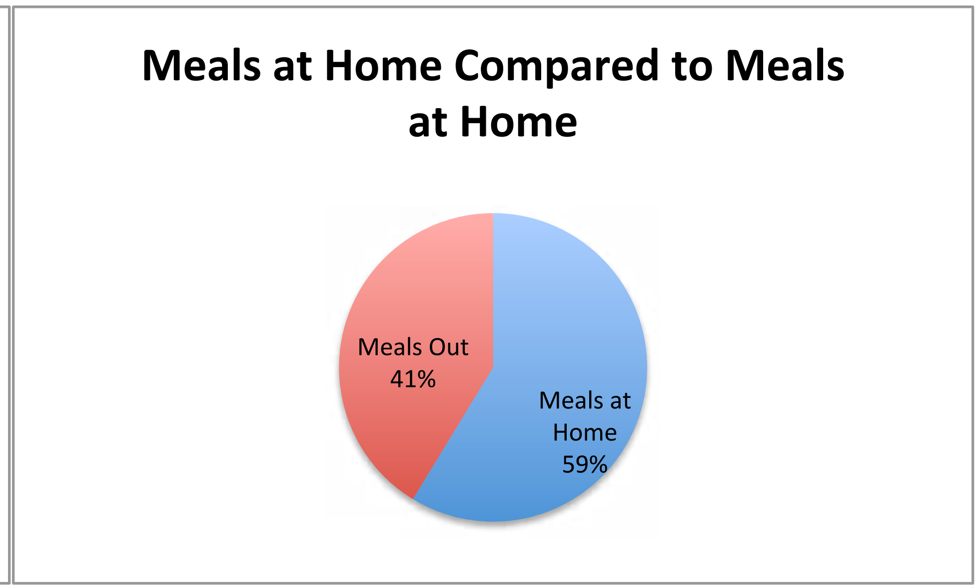
Aggregate Consumer Spending (Oberlin/Lorain County/Oberlin Foodshed)

Coming up with an exact number for food spending for a given city, county, or region would be an exhaustive process. Fortunately, the Consumer Expenditure Index (C.E.I.) provides one method for looking at overall consumer spending trends. This analysis is based on household spending. Every household will spend food dollars for meals prepared at home or homes eaten out, either in restaurants or institutional food service.

Based on the CEI, the average household will spend around $6,372 per year on food. About 41% of this spending will go meals eaten out. The remaining 59% of spending will focus on food eaten at home. The overall distribution of spending includes:

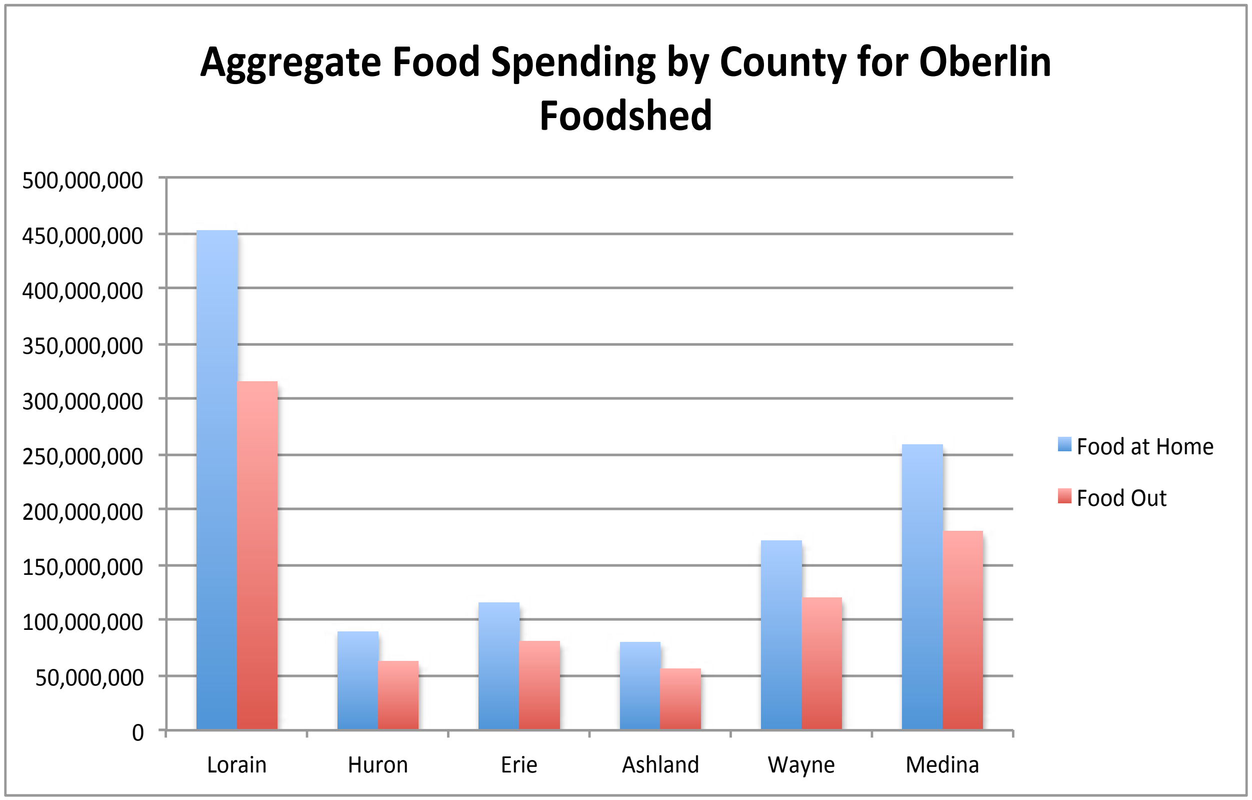
- ***8% will be spent on cereals and baked goods for at-home consumption;***
- ***13% will be spent on meat, fish, and eggs for at-home consumption;***
- ***6% will be spent on dairy products for at-home consumption;***
- ***10% will be spent on vegetables and fruits for at-home consumption;***
- ***21% will be spent on "other food" including processed, pre-packaged foods; and***
- ***41% will be spent on eating food out.***





To magnify these household purchasing impacts to a broader area, such as a city, county, or region, the number of "consumer units" needs to be determined. This assumes that food spending occurs on the basis of a household and not by individuals within a given population. For the Cleveland-Akron and Elyria-Lorain Metropolitan Statistical Area (MSA), a consumer unit consists of 2.5 people. This accounts for households with multiple occupants, married couples or children.

According to the CEI, total spending in the Oberlin Foodshed area is around $1.9 billion annually. About half of this spending ($768 million) takes place in Lorain County, with Medina ($439 million) and Wayne ($291 million) also spending significant dollars on food. Naturally, these figures are driven by the density of populations around urban centers or large suburban areas. The most urbanized county in the Oberlin Foodshed (Lorain County) also has the greatest amount of spending.



	Ashland	Erie	Huron	Lorain	Wayne	Medina	TOTAL
Population	53,139	77,079	59,626	301,356	114,520	172,332	778,052
Consumer Units	21,256	30,832	23,850	120,542	45,808	68,933	311,221
Food Spending (TOTAL)	135,440,683	196,458,955	151,974,749	768,096,173	291,888,576	439,239,802	1,983,098,938
Food at Home	79,772,267	115,710,995	89,510,551	452,395,627	171,917,424	258,704,798	1,168,011,662
Cereals & Baked Goods	10,755,334	15,600,790	12,068,302	60,994,454	23,178,848	34,879,997	157,477,725
Meats/Fish/Eggs	17,875,960	25,929,376	20,058,186	101,376,158	38,524,528	57,972,485	261,736,693
Dairy	8,629,774	12,517,630	9,683,262	48,940,214	18,598,048	27,986,717	126,355,645
Fruits & Vegetables	13,943,674	20,225,530	15,645,862	79,075,814	30,050,048	45,219,917	204,160,845
Other Food	28,546,271	41,406,839	32,031,087	161,888,443	61,520,144	92,576,750	417,969,534
Food Away from Home	55,668,416	80,747,960	62,464,198	315,700,546	119,971,152	180,535,003	815,087,275

While those are impressive numbers, it is difficult to get traction on how more of these dollars could be spent supporting local farms or locally-owned food businesses in the Northeast Ohio region. Looking at Oberlin, a town with a population of 5,398 year-round residents and about 3,000 students provides a more tangible scale for understanding purchasing impacts and food localization opportunities.

OBERLIN SPENDING DETAIL

At-Home Food Spending	8,103,478
Food Out Spending	5,654,945
College Food Purchases	3,048,709
TOTAL	**16,807,131**

To determine the total spending estimate for the community of Oberlin, we had to subtract students from the total reported census population, arriving at around 5,398 year-round residents. Households will spend approximately $13.5 million on food annually, with $5,654,945 million spent on meals out. College purchasing includes the combined purchasing of the Oberlin Student Cooperative Association (about 25% of the student body eats meals in eight student-owned and operated dining cooperatives) and the additional students eat in institutional dining services. Given these numbers, the Oberlin community spent at least $16.8 million on food in 2010. This figure is likely higher, given that the estimate does not include meals that students might eat at restaurants in the city nor does it include spending by students who do not participate in on-campus dining systems or cooperatives.

A way to check the accuracy of food spending based on the Consumer Expenditure Index is to look at business spending in the same targeted counties or regions. This provides the aggregate sales of food items posted by grocery stores, restaurants, and other business outlets that primarily sell food items. This data is based on the Economic Census from 2007.

	ASHLAND		**ERIE**		**HURON**		**LORAIN**		**MEDINA**		**WAYNE**		***TOTAL***
LORAIN COUNTY	**# Outlets**	**Sales**	**# Outlets**	**Sales**	**# Outlets**	**Sales**	**# Outlets**	**Sales**	**# Outlets**	**Sales**	**# Outlets**	**Sales**	
Food & Beverage Stores	25	58,445	39	82,518	38	65,369	123	430,622	50	269,736	59	136,011	***1,042,701***
Grocery Stores	0	0	25	76,025	0	0	88	410,233	33	257,703	33	113,506	***857,467***
Supermarkets	0	56,658	25	76,025	0	65,369	57	370,263	24	253,740	28	111,041	***933,096***
Convenience Stores	0	0	0	0	0	0	31	39,970	0	0	0	0	***39,970***
													0
Specialty Food Stores	4	1,787	7	8,168	4	1,137	13	8,168	11	6,149	11	8,524	***33,933***
													0
TOTAL Food Sales	**4**	**58,445**	**32**	**84,193**	**4**	**66,506**	**101**	**418,401**	**35**	**259,889**	**39**	**119,565**	***1,006,999***
Food Services													
FOOD SERVICES & DRINKING	82	44458			100	47299			285	173293	152	103282	***368,332***
Full-Service Restaurants	0	44458	86	68739	45	17141	166	104430	99	81476	0	43991	***360,235***
Limited-service restaurants	39	0	91	54828	55	30158	264	154021	135	77131	70	51095	***367,233***
Food service contractors	0	0	0	32804	0	0	32	32804	0	0	0	0	***65,608***
Cafeterias, grill Buffets	0	0	3	4762	0	0	13	4762	4	0	3	2956	***12,480***
Snack/beverage bars	0	0	0	13091	0	0	36	13091	0	0	0	0	***26,182***
Special food services	4	1787	10	3129	6	1909	49	40554	26	9660	12	5240	***62,279***
													0
Total Food Services	**43**	**46245**	**190**	**177353**	**106**	**49208**	**560**	**349662**	**264**	**168267**	**85**	**103282**	***894,017***
													0
TOTAL FOOD SALES	**47**	**104,690**	**222**	**261,546**	**110**	**115,714**	**661**	**768,063**	**299**	**428,156**	**124**	**222,847**	***1,901,016***
% Restaurants		**0.441733**		**0.678095**		**0.425255**		**0.455252**		**0.393004**		**0.463466**	**0.470284**

The above chart shows overall sales reported by businesses specializing in the sale of foodstuff. The first part of the chart, which includes supermarkets, convenience stores, and specialty food stores comprises mostly food purchased for at-home consumption. Food purchased at full-service (sit-down) restaurants, limited service (fast food) restaurants, food service contractors, and cafeterias/snack bars.

Most counties show between 39-46% of total food purchasing eaten out, with the exception of Erie County which shows 67% of meals eaten out. Most of this is attributable to the large presence of tourism-oriented businesses at Cedar Point relative to the smaller overall population of Erie County. In aggregate, these numbers show about 41% of all food sales taking place where people go out to eat, corresponding with the 41% reported for the Consumer Expenditure Index.

Looking at the aggregate distribution of food sales provides a better guide for consumer spending behavior. Within the Oberlin Foodshed:

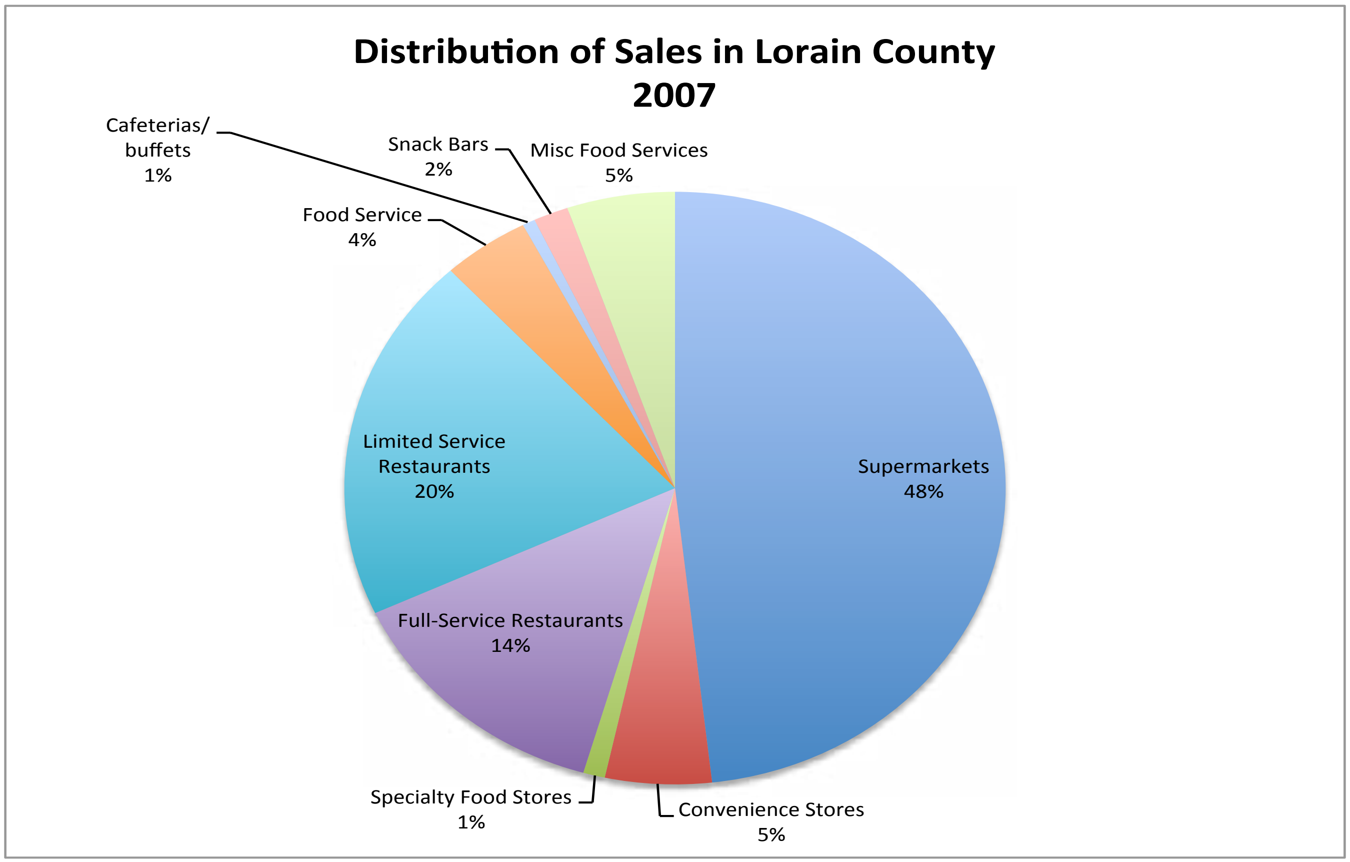
- ***55% of food sales are in supermarkets;***
- ***2% of food sales are in are in specialty food stores;***
- ***2% of food sales are in are in convenience stores;***
- ***12% of food sales are in are in full-service restaurants***
- ***19% of food sales are in are in limited-service restaurants***
- ***10% of food sales are in food service or cafeteria establishments***

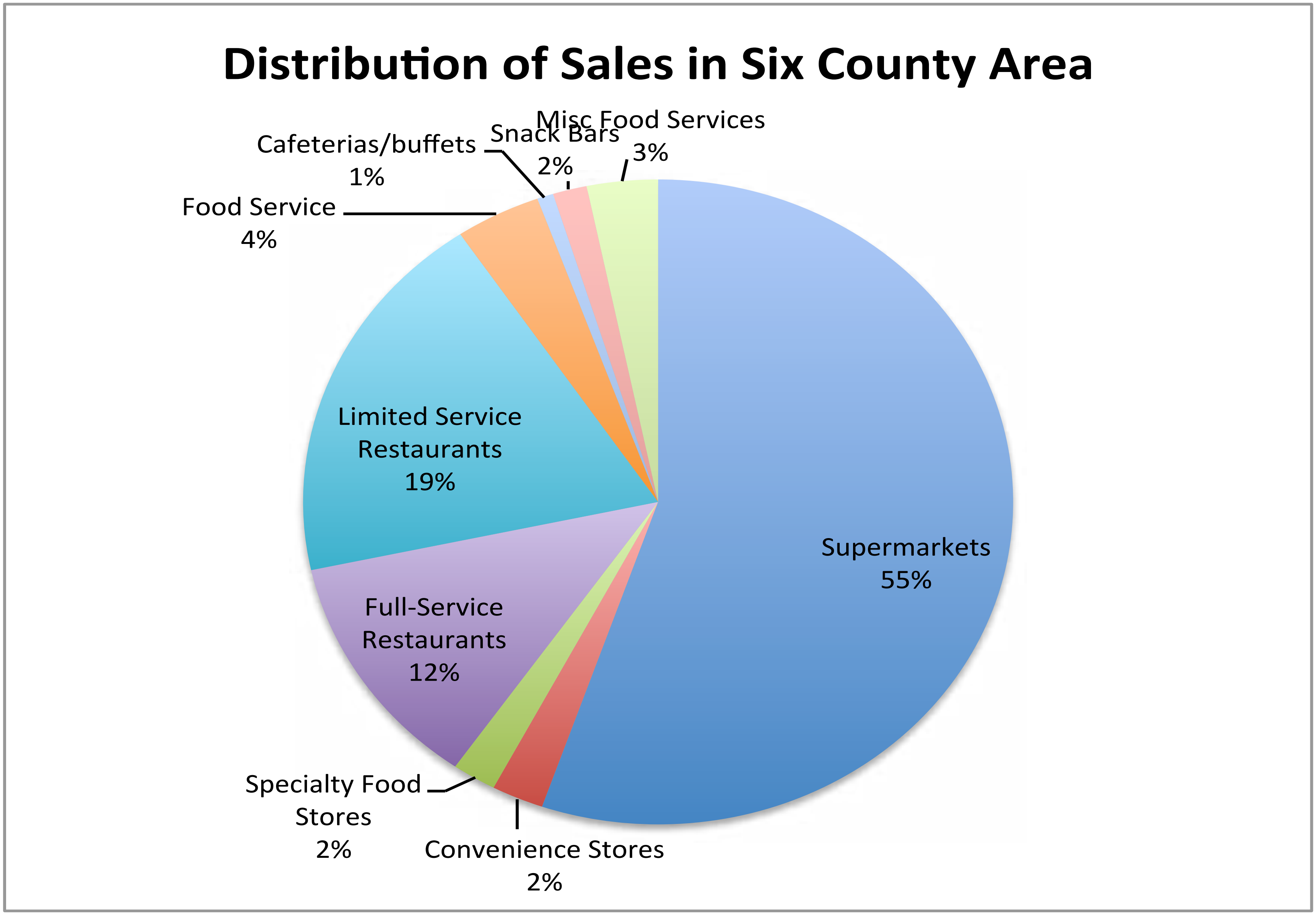
Within Lorain County, these numbers are a bit different:

- *48% of food sales are in supermarkets;*
- *1% of food sales are in are in specialty food stores;*
- *5% of food sales are in are in convenience stores;*
- *14% of food sales are in are in full-service restaurants*
- *20% of food sales are in are in limited-service restaurants*
- *12% of food sales are in food service or cafeteria establishments*

Overall food sales reported by businesses in the Oberlin Foodshed total $1.9 billion, which mirrors the $1.9 billion reported through the CEI.

There might be a small discrepancy, given that food sales were reported for the 2007 Economic Census and the CEI analysis considered 2010 census figures. However, the time period is close-enough to be fairly accurate. Overall, we can say with a reasonable amount of confidence that $1.9 billion is spent on food each year in the six counties comprising the Oberlin Foodshed.




Distribution of Sales in Six County Area
Misc Food Services 3%
Snack Bars 2%
Cafeterias/buffets 1%
Food Service 4%
Limited Service Restaurants 19%
Supermarkets 55%
Full-Service Restaurants 12%
Specialty Food Stores 2%
Convenience Stores 2%

Because of the small size of the city, specific spending figures for different food-related sectors are suppressed to protect private financial information. The chart below shows the number of establishments, organized by gross sales.

Grocery Stores	
All establishments	4
Est for year-round	4
$250-$499,000 sales	1
$500-999,000 sales	**1**
$1 million + sales	2
Full-Service Restaurants	
All establishments	9
Est for year-round	8
$250-$499,000 sales	1
$500-999,000 sales	2
$1 million + sales	4
Limited Serivce Restaurants	
All establishments	13
Est for year-round	8
$250-$499,000 sales	2
$500-999,000 sales	5
$1 million + sales	1

Special Food Stores	
All establishments	7
Est for year-round	7
$250-$499,000 sales	3
$500-999,000 sales	2
$1 million + sales	2
Food Service Contractors	
All establishments	7
Est for year-round	7
$250-$499,000 sales	3
$500-999,000 sales	2
$1 million + sales	2
Snack & Beverage Bars	
All establishments	3
Est for year-round	1
$250-$499,000 sales	1
$500-999,000 sales	0
$1 million + sales	0

According to this chart, we know a minimum of $20 million is spent each year collectively by the businesses and institutions that are in Oberlin. There are seven listed food service contractors, most likely providing meal services to Oberlin College, public schools, the hospital, Kendal of Oberlin, and the FAA control center. Of the 9 full-service restaurants in 2007, 4 reported sales of $1 million or more. These sales figures exceed the $16 million of spending estimated by the CEI index.

Local Food Purchasing Trends Among Residents

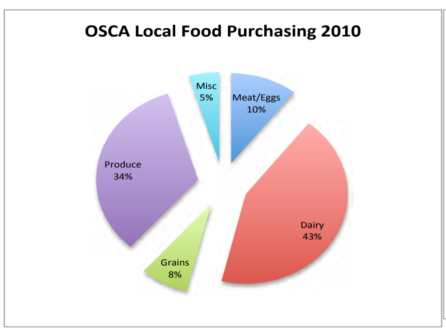
Unlike the CEI estimates, however, these figures will include expenditures by students in off-campus restaurants as well as food expenditures by individuals employed in Oberlin that do not live in Oberlin or people shopping or dining in Oberlin from outside of the community.

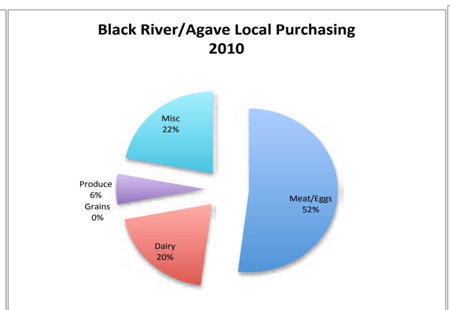
According to CEI data, the $1.03 million spent by the five largest purchasers of local food in Oberlin (Agave Café, Black River Café, City Fresh, Oberlin College, and the Oberlin Student Cooperative Association) comprise roughly 6% of the total annual food spending among year-round residents and students at Oberlin College. This figure is likely higher if it includes local food spending by other businesses around Oberlin.

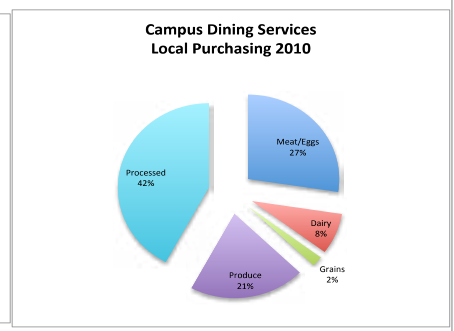
Thus, it is fair to estimate that total annual food spending in Oberlin ranges from between $16.8 to $20 million per year. The higher end of the range accounts for spending by individuals that work in, but do not live in Oberlin or by visitors.

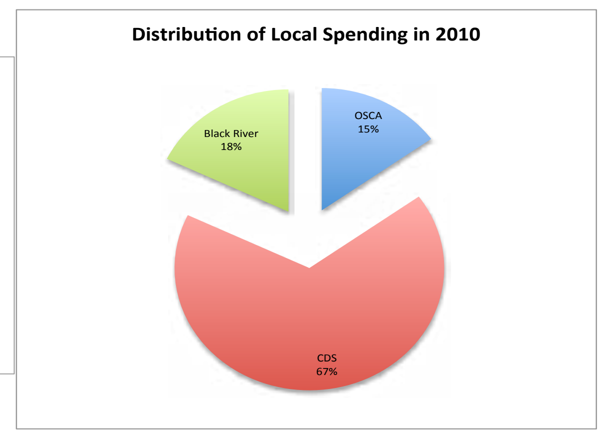
OBERLIN SPENDING DETAIL

At-Home Food Spending	8,103,478
Food Out Spending	5,654,945
College Food Purchases	3,048,709
TOTAL	**16,807,131**
Local Food Purchasing	1,029,028
% Total Purchasing that's local	6.12%



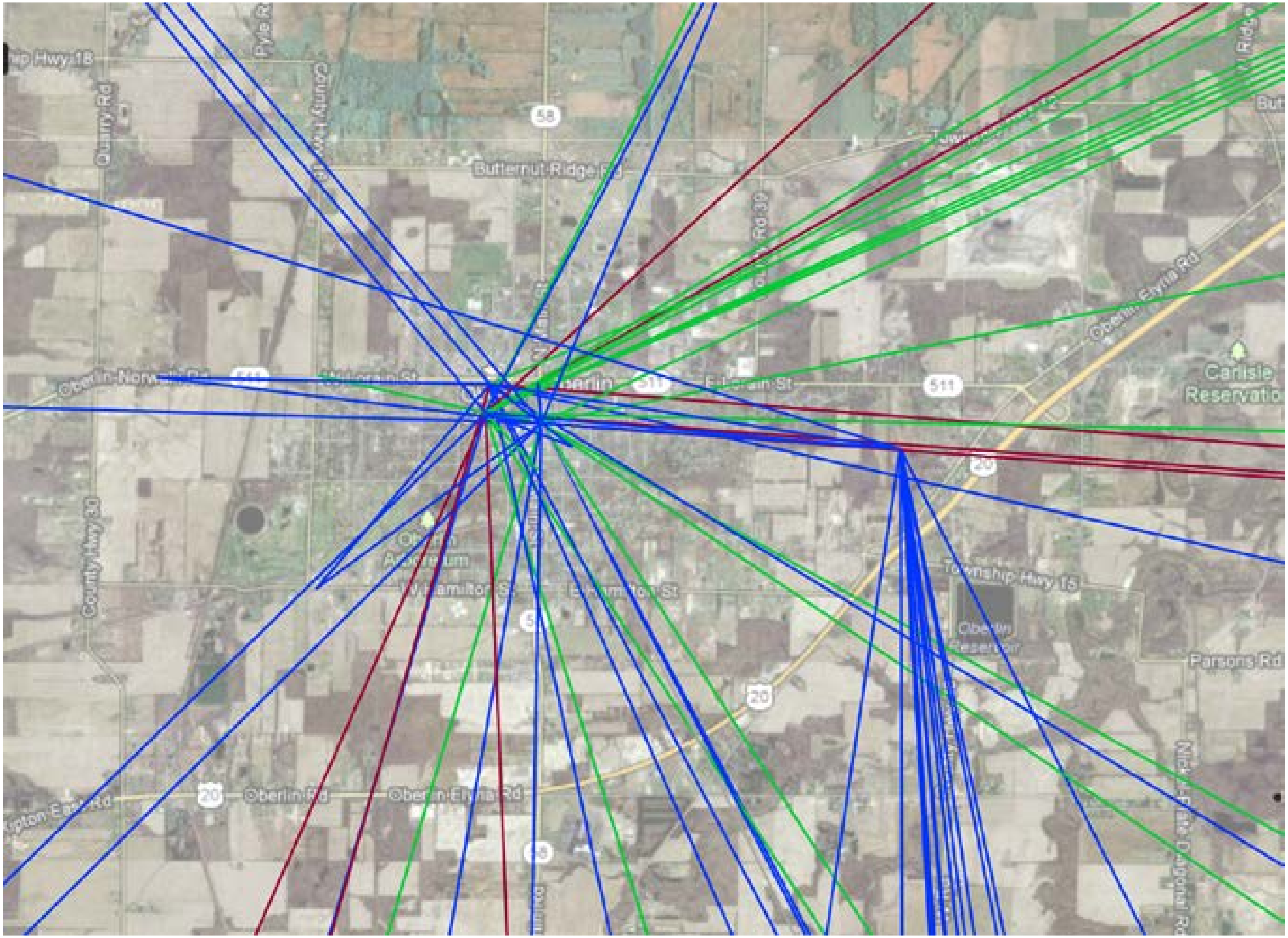






Oberlin Supply Network Map

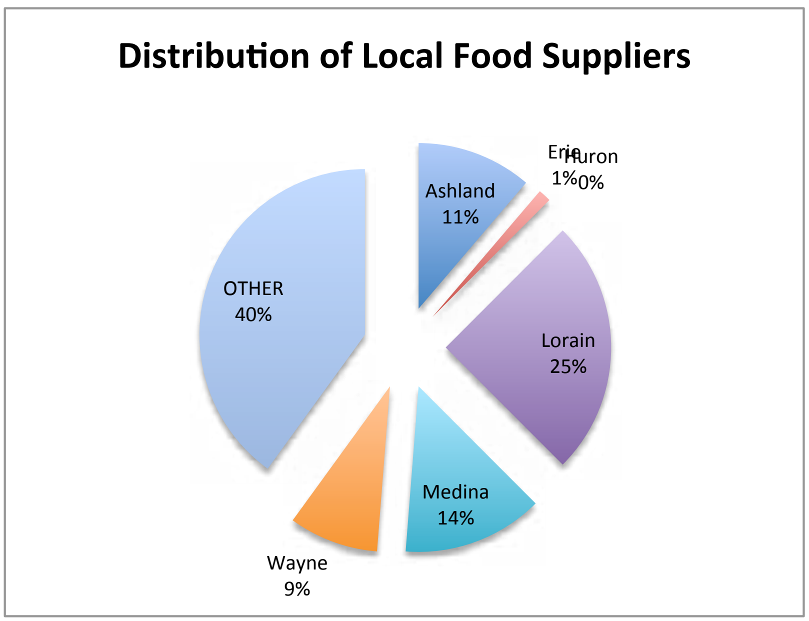
Blue= Direct to farmer *Green= Local Food Processor or Manufacturer)* *Red= Through a Distributor*

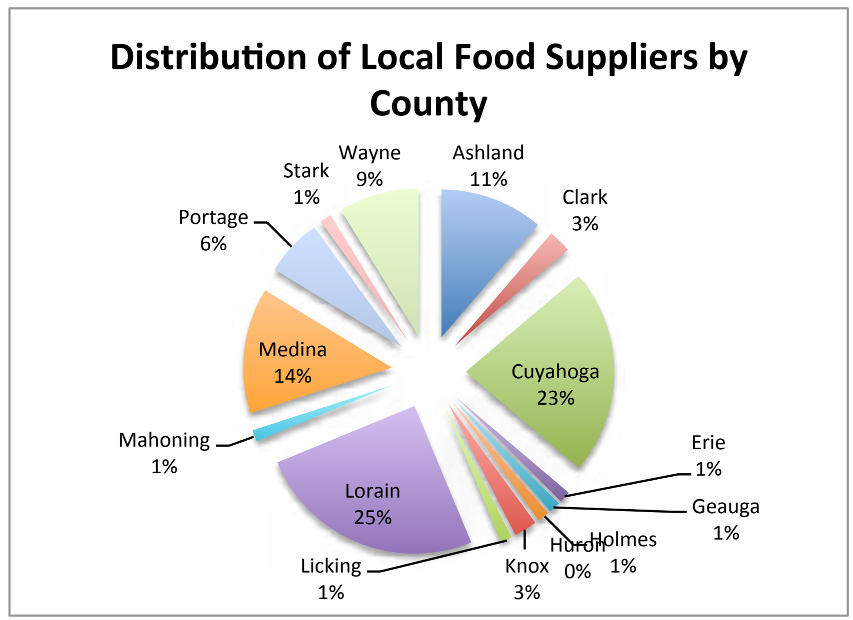


Distribution of Individual Local Food Suppliers by Product and County

COUNTY STATS:

	# Oper	Produce	Meat	Processed	Dairy	Grains
Ashland	9	8	1	0	0	0
Clark	2	0	2	0	0	0
Cuyahoga	18	0	0	17	1	0
Erie	1	1	0	0	0	0
Geauga	1	0	0	0	1	0
Holmes	1	0	0	0	1	0
Huron	0	0	0	0	0	0
Knox	2	0	1	0	1	0
Licking	1	0	0	1	0	0
Lorain	20	14	2	4	0	0
Mahoning	1	0	0	1	0	0
Medina	11	11	0	0	0	0
Portage	5	3	0	1	2	1
Stark	1	0	0	0	1	0
Wayne	7	3	2		2	0
	80	**40**	**8**	**24**	**9**	**1**





Of the operators, 60% of them come from counties targeted in the Oberlin Foodshed with 40% coming from counties outside of the Oberlin Foodshed. Cuyahoga County has about 18 operations that supply Oberlin markets. Most other counties outside of the Oberlin Foodshed include only 1-2 operators.

In terms of products offered, the following defines the different categories:

- *Produce- Includes fruits, vegetables, nuts, and specialty items like honey or syrup*
- *Meat- Includes meats processed in certified facilities, including beef, pork, turkey, chicken, and lamb*
- *Dairy- Includes milk, cheese, yogurt, and eggs*
- *Processed- Includes breads, pastas, coffee, beer, tortilla, pita, and other locally manufactured items that may or may not feature locally grown ingredients*

In terms of product clusters, Lorain, Medina, and Ashland counties provide the majority of produce to Oberlin markets. Clark, Lorain, and Wayne counties provide most of the meats. Processed products primarily originate from Cuyahoga County with Lorain County also providing processed goods. Wayne county provides much of the dairy with dairy operators coming from five other counties as well.

While a majority of operations supplying Oberlin markets come from within the Oberlin Foodshed, when you look at volume of sales, a different picture emerges. Overall, of the $900,000 of local spending analyzed for purchasing (excluding the Oberlin Student Cooperative Association), 30% of spending went toward produce, 29% went to meat, 29% went to processed products, and 12% went to dairy.

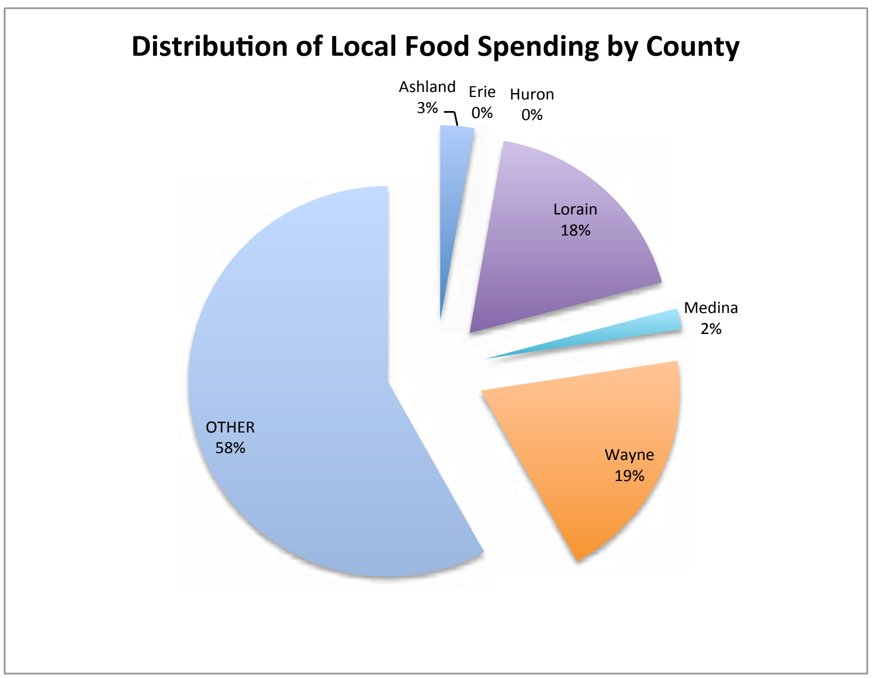
The following chart shows a detailed break-down of spending by county as well to provide a sense of how money flows from Oberlin accounts through the regional economy.

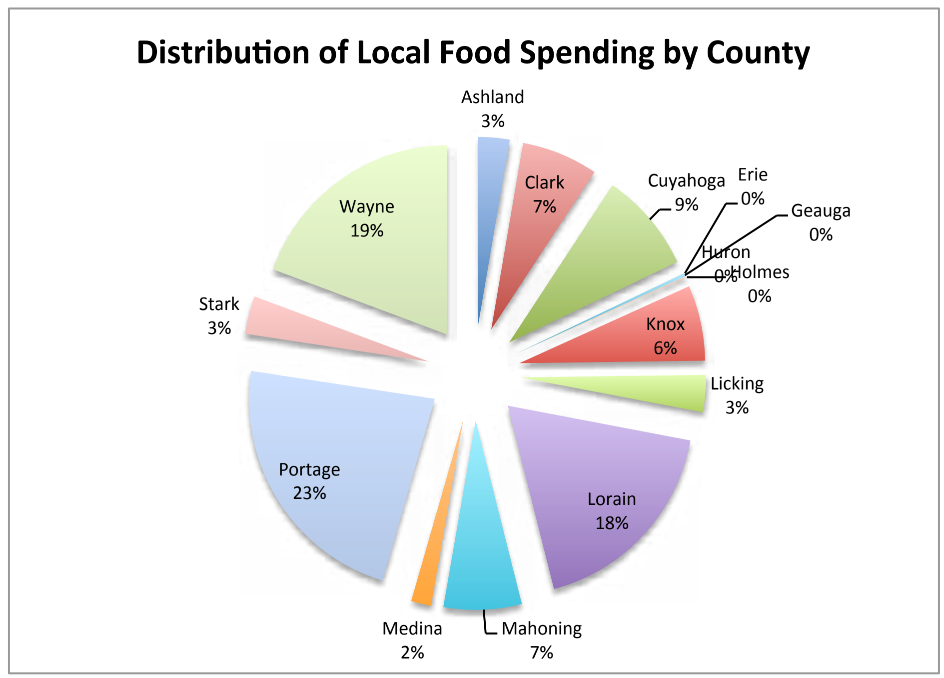
SALES						
County	**Produce**	**Meat**	**Processed**	**Dairy/Eggs**	**Grains**	**TOTAL**
Ashland	7,722.00	2,684.55	0.00	13,195.00	0.00	23,601.55
Clark	0.00	57,028.32	0.00	0.00	0.00	57,028.32
Cuyahoga	0.00	0.00	73,523.54	565.18	0.00	74,088.72
Erie	12.50	0.00	0.00	0.00	0.00	12.50
Geauga	0.00	0.00	0.00	2,422.00	0.00	2,422.00
Holmes	0.00	0.00	0.00	436.00	0.00	436.00
Huron	0.00	0.00	0.00	0.00	0.00	0.00
Knox	0.00	55,416.78	0.00	0.00	0.00	55,416.78
Licking	0.00	0.00	27,129.78	0.00	0.00	27,129.78
Lorain	20,669.50	33.98	134,515.21	0.00	0.00	155,218.69
Mahoning	0.00	0.00	58,295.90	0.00	0.00	58,295.90
Medina	15,000.00	0.00	0.00	0.00	0.00	15,000.00
Portage	126,085.67	0.00	0.00	53,982.73	14,070.99	194,139.39
Stark	0.00	0.00	0.00	27,872.87	0.00	27,872.87
Wayne	0.00	162,341.01	0.00	4,376.54	0.00	166,717.55
TOTAL	**169,489.67**	**277,504.64**	**293,464.43**	**102,850.32**	**14,070.99**	**857,380.05**

According to this chart, about 58% of purchases originate from counties outside of the Oberlin Foodshed, with the majority of non-foodshed spending going to Portage County (23%) and Cuyahoga County (9%) and Mahoning County (7%). All Cuyahoga County sales include processed foods, such as roasted coffee, baked goods, pasta, tortillas, and pita. Also, Portage County provides the base of operations for Surna and Sons and Ag Access, two distribution companies that work with a large number of local farmers. While the spending was tagged to Portage County, distribution includes farmers from multiple counties in Northeast Ohio. It is not possible at this time to determine how their spending splits between counties, but it would provide useful information to further clarify where local food originates.

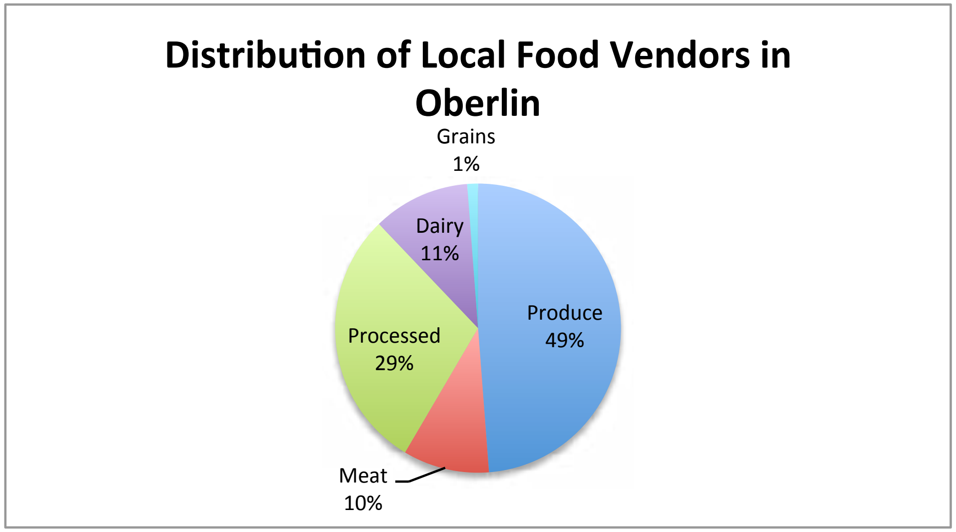
It is also important to know whether food is purchased directly from farmers, purchased from food manufacturers, or conveyed through a third-party distributor. Typically, distributors will consolidate inventories from a larger number of farms, reducing the transaction costs to the buyer. Food that is purchased directly from farmers incur higher transaction costs for the buyer, since they have to manage ordering, delivery schedules, and invoicing for a greater number of smaller suppliers.

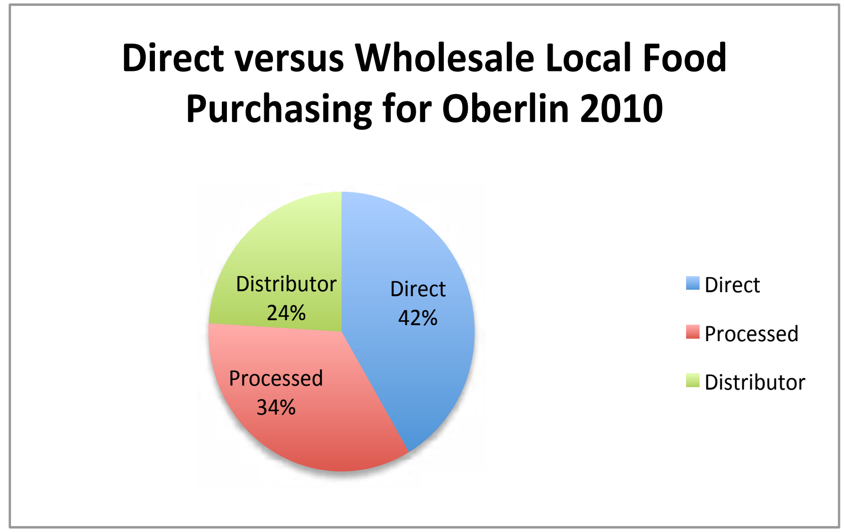
According to a further analysis of spending, the following contacts methods are used for getting food to markets:
- *42% of food comes direct from farmers or food businesses*
- *34% of food comes direct from a manufacturer*
- *24% of food purchasing occurs through a distributor*

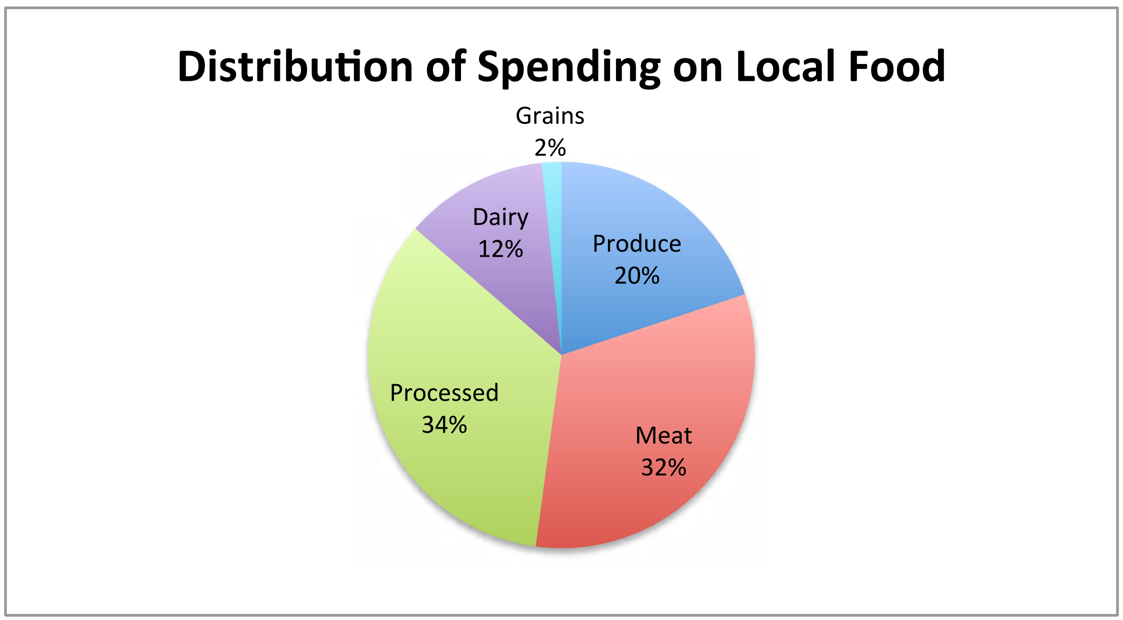




In terms of the overall structure of food purchasing, a significant amount of food is still purchased directly from farmers or manufacturers with a little less than a quarter coming from third-party distributors. This was confirmed through interviews with each of the establishments who purchase local. All mentioned that they like to see more dollars going directly to farmers and all mentioned that they manage a large number of smaller accounts individually. However, all also acknowledged the inefficiency of managing a number of smaller accounts and favored third-party distributors or aggregators as a way to increase the amount of local food purchased.







We can draw the following conclusions from the supply-network analysis:

1. ***The majority of local food entering into Oberlin markets comes from south, east, and northeast of the town. Most of the processed items come from Northeast (Cuyahoga County) and most produce, meats, and dairy come from south of the town. Very little food comes in from the west, despite significant growing capacity west of town.***
2. ***Consideration should be given to including Cuyahoga County as a part of the "Oberlin Foodshed" given the large amount of local spending and processed products that originate from Cleveland.***
3. ***Distributors play a role in facilitating local food transport to Oberlin markets, but most of the transactions occur directly with farmers or food manufacturers.***
4. ***There is relatively little overlap between entities purchasing local food, with only a small number of farmers of local food businesses supplying more than one account to Oberlin.***
5. ***Oberlin markets exhibit significant differentiation, with some markets favoring higher volume and more pre-processed foods and others favoring more raw ingredients or smaller volume orders.***
6. ***Consideration should be given to a third party distribution and aggregation system that can supply multiple markets in Oberlin. However, it would need to be nimble in terms of volume and quantities of food, given the differentiated nature of Oberlin markets.***
7. ***Cooperatives could also cluster larger numbers of farmers to achieve aggregation and distribution efficiencies, ease ordering and invoicing, and keep more dollars going directly to farmers.***

APPENDIX TWO- LOCAL FOOD HUB DETAILS

Food hubs can have a number of positive impacts on farmers, businesses, local communities, and broader regional economies. This section will look at how food hubs can be operationalized.

Services Typical of Food Hubs

Food hubs present a new form of social enterprise, combining elements of economic development, education, and network cultivation. The USDA guide to food hubs lists the types of services and activities typically conducted in local food hubs combine business operations, producer services, and community or environmental services:

Business Operations:
Food hubs can combine any of the below activities as a part of their business operation:

- **Distribution-** managing transportation of food products from food hubs to local or regional market outlets or partnering with distribution businesses to facilitate transportation.
- **Aggregation-** combining food products from a number of different sources to create capacity for higher-volume sales and to ease fluctuations in supply.
- **Product Storage-** providing dry, cold, or frozen storage facilities for inventorying local food products, including long-term storage of local foods for sale in the off-season.
- **Brokering-** Helping to facilitate transactions between farmers and market outlets. Some food hubs just play a coordinating role, but allow farmers and market outlets to coordinate their own physical distribution.
- **Branding and Market Promotion-** Food hubs can create product differentiation by coming up with region-specific brands and promoting the consumption of locally grown foods to grow market demand.
- **Packaging and Repackaging-** Food hubs can package foods under a common label while reducing the time and expense for farmers to package foods for market.
- **Light Processing-** Some food hubs offer more intensive food processing (such as canning or thermal processing). Others support more limited processing such as trimming, cutting, or freezing foods, which meets the needs of some institutional buyers for limited processing of raw food products.

Producer Services:
Food hubs offer the following services to support local farmers or businesses.

- **Linking Producers and Buyers-** Food hubs often have more time and resources to cultivate market outlets than farmers might have if they were doing it on their own.
- **On-farm Pick-up-** In some cases, food hubs provide trucks that can pick-up foods from farms, creating greater distribution efficiencies and permitting market access to farmers that might lack resources for transportation.
- **Post-Harvest handling -** Providing training for farmers in harvesting and washing techniques to better prepare food for market.
- **Business Management -** Providing business planning and financial management training or mentorship to improve farm business operations.
- **Value-added Product Development-** Working with farmers to identify opportunities to add more value to products through packaging or combining ingredients to make a processed product.
- **Food Safety and Good Agricultural Practices-** As food safety becomes a greater area of concern, food hubs can provide training for safe food handling and best practices for field production.
- **Liability insurance-** Offering liability coverage for food and providing facilities for safe handling reduces costs and barriers to entry for some farmers.

Community/Environmental Services:
Food hubs can offer the following services to local communities:

- **Community Awareness -** Supporting buy-local campaigns and consumer education about the benefits of local and healthy food consumption.
- **Food Deserts-** Intervening in the market place to foster distribution to under-served urban or rural markets.
- **Food Bank -** Increasing the supply of healthy local foods for food banks or purchasing seconds from area farmers for emergency food relief.
- **Youth and Community Employment-** Providing employment opportunities for youth, adults with developmental disabilities, or other groups that might otherwise struggle with employment.
- **SNAP Redemption-** Taking Food Stamps or Senior vouchers to improve the accessibility of local food for any retail components of a food hub or training participating market partners to accept food stamps.
- **Health and Cooking Education-** Strengthening market demand by raising awareness of health and teaching consumers how to prepare local foods in a healthy manner.
- **Transportation for Consumers-** Working with transportation planning to improve access to food for individuals relying on public transit or pedestrian movement.
- **Recycling or Composting -** Facilitating recovery and re-use of wastes, including packaging, or composting programs or biodigesters that return energy, organic matter, or nutrients back to participating farms.

Food Hub Market Models

The first step in establishing a local food hub is clarity on the type of markets that will be served. Most food hubs follow one of the following three market models:

- **Farm-to-Business/Institutional Model-** this favors more of a wholesale marketing model in which commercial or institutional buyers seek lower prices for higher volume purchasing. Typical markets in this category might include colleges, public schools, hospitals, grocery stores, or restaurants.
- **Farm-to-Consumer Model-** Other food hubs focus on marketing directly to the consumer, typically charging closer to retail prices for food. The food hub helps to aggregate, package, and distribute products directly to consumers. Typical markets in this category might include large-scale CSA's, food cooperatives, on-line buying clubs, mobile markets, or direct food delivery companies.
- **Hybrid Model-** Many food hubs are hybrid models, featuring a mix of wholesale and direct sales to consumers. For example, a food hub might operate a 400 member CSA while selling wholesale to a network of restaurants and institutions.

The National Food Hub Collaboration, based on its survey of 168 food hubs, identified the following national break down of market models among food hubs across the country:

Market Model	Number	Percentage
Farm-to-business/institution	70	42%
Farm to consumer	60	36%
Hybrid	38	22%

Legal Structure

The next step in establishing a food hub is to determine an appropriate legal structure for the operation. This will be driven by such factors as:

a) **Where does investment capital originate?** Non-profit organizations will have more access to philanthropic, government, or program-related investment support. If capital is originating from one individual or a small group of individuals, then a privately held structure would make more sense. If capital might be generated by a larger group of founding members, then a cooperative might make more sense.

b) **What is the ownership structure?** Are individual investors looking for a return on their own investment or will profits be cycled back into the operation itself?

c) **What will be the primary functions of the local food hub?** Will the food hub be focused more exclusively on logistics and operations of food warehousing and distribution or will it play more of a coordinating, supporting, and training role? Will there be a mix? A more traditional business might function better as a privately held operation. Cooperatives and non-profit organizations tend to feature more education and training in their efforts.

d) **Decision Making Authority-** Privately held companies have a more simple decision-making process, with primary authority residing with owners. Cooperatives tend to have boards and leadership elected by the membership itself, lending to a more participatory decision-making process. Non-profit organizations have a board of directors comprised of stakeholders, experts, and supporters in the community. Both coops and non-profit organizations have more complex decision-making processes which often take more time, but allow for more input and community ownership.

The following list indicates the types of legal structures that food hubs report:

- **Privately Held-** a legal organization owned by an individual or small group of partners. Includes private corporation, limited liability company, business trust, or sole proprietorship
- **Non-profit-** a tax-exempt 501(c)3 organization which distributes surplus back into the organization and has a mission involving education, charity, research, or religion.
- **Cooperative-** a structure that distributes surplus to member-owners or back into the cooperative. Examples might include farmer cooperatives, business or consumer cooperatives, or a hybrid that includes both farmers and consumers as member-owners.
- **Publicly Held-** Companies that offer securities for sale to the general public in the form of stocks/shares, bonds/loans.
- **Informal-** A handful of food hubs do not have formal legal status and are comprised of loose associations of partners or informal networks. An example might include an individual farmer offering a facility on their farm to support aggregation for neighboring farms.

According to National Food Hub Coalition, the break-down of ownership among food hubs in its network is:

Legal Structure	Number	Percentage
Privately held	67	40%
Non-profit	54	32%
Cooperative	36	21%
Publicly Held	8	5%
Informal	3	2%

EXAMPLES OF FOOD HUBS RELEVANT TO OBERLIN

The following list includes local food hubs in other communities in the United States that might present potential models for Oberlin:

Common Market, Philadelphia Pennsylvania- Common Market works with 15 producers in a 90 mile radius around Philadelphia who supply fresh produce, meat, poultry, and eggs. Common Market follows a farm-to-institution model, supplying food to 60-75 customers that include colleges, universities, hospitals, food cooperatives, and restaurants. With $580,000 in sales in 2010, they focus on market partners that serve low-income residents. www.commonmarketphila.org

Eastern Carolina Organics, North Carolina- Founded and run by Oberlin graduate Sandi Kronick, Eastern Carolina Organics has more than 40 producers selling to 150 customers in the southeast, including restaurants, grocers, food service, and cooperatives. They offer producer services, including planning, safe food handling, and liability coverage. www.easterncarolinaorganics.com

Eastern Market, Detroit- One of the nation's oldest public markets, Eastern market includes both retail (customers) and wholesale (grocers, restaurants, distributors). The market supports 250 vendors and they coordinate aggregation, distribution, and processing for many small to mid-sized farmers. www.detroiteasternmarket.com

Intervale Food Hub, Burlington Vermont- A non-profit organization that includes an Oberlin graduate, Intervale works with 22 farmers to aggregate, distribute, and market a wide-range of products. They operate a year-round CSA and supply products to restaurants, schools, and hospitals. The site includes an incubator farm that leases land, equipment, greenhouses, storage, and irrigation to small farmers. www.intervalefoodhub.com/home

Local Food Hub, Charlottesville Virginia- This non-profit food hub distributes produce, frozen meat, and value added products from a network of 70 small producers to over 120 businesses and institutions. Growers receive technical and business planning support as well as liability coverage. The hub includes a 3,500 square foot warehouse and a 60 acre educational farm that provides training and internships for beginning farmers. www.localfoodhub.org

Town of Hardwick, Vermont- This town of 3,200 residents includes a diverse base of "agrepreneurs" that offer several complementary businesses that support a local food economy, including a community-owned food coop, a local food restaurant, an organic seed company, a compost producer, mobile butchers, a distillery, and a number of organic farms. This working-class town emerged from the collapse of the granite industry to embrace local foods as an economic renewal strategy, supporting a vibrant downtown businesses and shipping products to markets across the Northeast. http://www.hardwickagriculture.org/index.html

Economic Viability of Local Food Hubs

Whether for-profit or non-profit, food hubs need to achieve long-term economic viability. Subsidies or grants may help to build capacity for the development of a food hub and supporting networks, but should not be relied upon for long-term operations. Grants can help to build capacity, grow networks, or provide training and education. These activities, if done well, can contribute to the long-term viability for the food hub and its participating partners.

Regardless of legal structure, the long-term viability of food hubs will depend upon attention to the following challenges common to most food-hub operations:

- **Balancing Supply and Demand-** This is the core challenge facing food-hub enterprises. Often, regional demand for local foods exceeds what the region can produce. Seasonality of many foods, particularly produce, present another challenge. As demand for locally grown foods grows, local supply needs to increase. Many food hubs will work with farmers to increase their capacity to grow food through season extension, training, and capital investment.
- **Price Sensitivity-** Food can be subject to significant price volatility. As a result, there can be some buyer resistance to purchasing regional food when non-local products can be acquired for less cost. This price variability limits the willingness of many businesses to make long-term purchasing commitments. Businesses, like specialty food stores or locavore restaurants, often have clients willing to pay a premium for locally-grown foods. Other businesses, particularly in the retail grocery sector, have thin margins, face stiff competition, and often will go with the lowest cost options

at any given time.

- **Managing Growth**- Given the high demand for local food, many food hub operators noted rapid growth that exceeded the capacity of their physical infrastructure or business management systems. Food hubs need to systematically manage their growth, insuring that increased sales and membership correlate with physical infrastructure improvements.
- **Access to Capital-**. Many food hub operators sited a lack of access to capital as the greatest impediment to growth. Food-hubs are generally capital intensive, particularly at the front-end, requiring investments in warehousing, cold storage, forklifts, trucks, and other handling equipment. Lack of access to capital is similarly a challenge for many farmers who might be limited in their ability to grow their operations to supply food hubs.
- **Support Needs**- Food hub operators noted the following critical areas of needed support to grow the stability of their operations:
    - Financial Support
    - Innovative and flexible business strategies
    - Business development services
    - Technical assistance on facility design and operations
    - Community support and stakeholder engagement
    - Building stronger networks between food hubs and supporting peer-to-peer learning

Food Hub Development Pathways

Having gained significant traction in the past five years, there is now more support available for the development of local food hubs. A number of government funding programs focus on local food infrastructure development or addressing public health challenges through improved healthy food access.

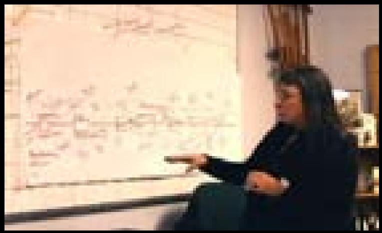
Regardless of the type of support being sought, a critical factor for securing development resources will be the strength of collaborative partnerships with community stakeholders, farmers, local organizations, businesses, and local government. More than creating something new in a community, a food hub adds value to assets, networks, and skills already present in most communities. Food hubs will be successful to the extent that collaborative networks can come together and consolidate their assets. More funders will want to see strong evidence of healthy collaborative partnerships before considering funding.

Legal structures can afford greater or less access to some of the following development funding:

- **Government Support**- Government grants, mostly at the federal level, can provide a variety of forms of support for local food hub development, including feasibility studies, business planning, construction, land acquisition, working capital, facilities development, and training and technical assistance. There are a variety of government loan programs as well that can be helpful with the development of food hubs.
- **Philanthropic Support**- Philanthropic support tends to be more limited to programmatic aspects of food hub development. Support will typically favor more training and technical assistance, education, or network cultivation.
- **Local Investment Opportunities-** Increasingly, communities are looking to themselves to find hidden assets and sources of support for their own local economic development. Some creative ways to raise local capital through food hubs include:
    - Community banks or credit unions (targeted CD's)
    - Cooperatives and member capital

INTERACTIVE FILM CLIPS

Jim Converse from Youngstown describes conversion of a vacant restaurant and bar to a local food hub and processing center.



Leslie Schaller from ACENet explains a food value chain and how it can maximize opportunity in local food systems.

Leslie Schaller describes how ACENet supports a warehouse and processing kitchen and network cultivation.

GRAIN TRAIN STAPLE FOODS INITIATIVE

Beginning as a Winter Term internship with the Oberlin Project, Ben Agsten worked with fellow students Sarah Bollinger and Megan Leary to organize the Grain Train- a social enterprise focused on increasing consumption of locally grown and processed grains, flours, dried beans, and other staple foods. Pursued as an independent study sponsored by Brad Masi in the Environmental Studies Program at Oberlin College, the mission for the Grain Train was identified as “making connections between the producers, processors, and purchasers of grains in order to facilitate a local grain market”.

The impetus for the project came out of the analysis of locally purchased foods in Oberlin referenced earlier in this study. Among Oberlin College, the Oberlin Student Cooperative Association, and the Black River and Agave Cafes in downtown Oberlin, local purchasing of grains or other staple foods represented only a tiny portion of overall local food spending. Yet, they comprise a regular part of the daily diet and a significant percentage of food purchasing budgets.

In planning for a local food hub, consideration should be given to the provision of grains and staple foods. Specific staple foods that might be considered include: wheat, buckwheat, rye, or spelt flours, oats, dried beans, and whole grains like oats, spelt berries, wheat berries, amaranth, or quinoa.

Staple grains have the advantage of being more shelf-stable than meats, dairy, produce, or most other local foods. Therefore, the key infrastructure need is securing adequate space for storage that is free from rodents and moisture. Additionally, small to medium scale processing infrastructure, such as bean cleaners or grinding mills will be needed to make flours or prepare dry beans for market.

The Grain Train project evaluated the best options for accessing, storing, and processing local grains. There are basically four options for developing more demand for grains:

- α) **On-Farm Production and Processing-** Work with farmers who have both storage and processing capacity on-farm. Breakneck Acres outside of Kent and Twin Parks Farm outside of Wooster are both certified organic grain and bean farms that have capacity for storing and processing grains and beans. Arrangements with these farmers can focus on higher volume purchasing, but will not require the investment in infrastructure in the community.
- β) **Work with Distributor-** AgAccess, a local food distribution company, works with Stuzman mill based in Holmes County. Stuzman both grows grains himself and works with a network of other Amish farmers who produce grains. They offer a wide-range of dried beans, flours, and other products (i.e. puffed spelt cereal). Both OSCA and Oberlin College source most of their local grains through AgAccess.
- χ) **Off-Farm Production and Processing-** Work with milling operations such as Shagbark Seed and Mill in Athens or Stuzman Mill to source processed grain products. Both mills work with larger networks of farmers and can offer a wide-range of prepared foods. Distribution can be a challenge, especially for Shagbark.
- δ) **Investment in Community Grain Mill-** Oberlin could invest in its own milling and bean cleaning facility and then source raw products directly from farmers. This would duplicate facilities that already exist through Shagbark or Stuzman mills, but would give Oberlin more capacity to store and process its own staple foods.

The Grain Train team ultimately concluded that it would make more sense to focus on sourcing staple food products either from farmers currently equipped with milling facilities or from existing mills like Stutzman and Shagbark. Distribution will remain a challenge, as Shagbark has limited distribution capacity in Northeast Ohio and AgAccess can only make deliveries once every two weeks.

The Grain Train team recommended that the most important investment for the Oberlin community to make would be in a facility that would enable longer-term aggregation and storage of grain and bean products. AgAccess and Shagbark Seed and Mill both indicated support for a central facility that could involve less frequent drop-offs of higher volumes of food for distribution in Oberlin or elsewhere. Both Breakneck Acres and Twin Park farms also indicated a preference for less frequent and larger deliveries. Having a central food hub that includes storage for drie

Oberlin students Ben Agsten and Sarah Bollinger visit organic grain farmer Dean McIlvane’s Twin Parks Farm outside of Wooster as part of the “Grain Train” project.

- Local investment by churches or large businesses
- Crowdsourcing through kickstarter or IndieGoGo
- Micro-loans
- Pre-selling of goods or services
- Non-profit revolving loan funds
- Investment clubs
- Self-directed IRA's

A more complete list of foundations and government programs that can support local food hub development is included in the pages that follow.

Return to Table of Contents

APPENDIX I-A
FOOD HUB DEVELOPMENT FRAMEWORK:

- **Audience**- Who would be the primary users?
- **Ownership**- What is the ownership structure?
- **Purpose**- What is the overall goal or mission of the food hub?
- **Design and Siting**- Where would it be located?
- **Scale**- What is the foodshed or market catch-basin that it will serve?

CRITERIA	Oberlin City as Food Hub	Regional Food Hub
Audience	Households, businesses, institutions	Businesses, institutions, food desert neighborhoods
Ownership	Mixed ownership, distributed facilities, multiple network hubs that include diverse mix of stakeholders	Multi-stakeholder owned facility as either cooperative of non-profit social enterprise
Purpose	Foster a long-term goal of 70% localization through the formation of projects to promote home production, consumption, urban farming, urban-rural linkages, food processing and storage infrastructure	Centralization of food aggregation, warehousing, processing, and training in facility based in Oberlin to facilitate access to local foods by Oberlin-based businesses and institutions and network of small businesses or coops facilitating local food retail in Elyria, Lorain, and elsewhere
Design and Siting	Organize network hubs that specialize in education/research, business/institutional markets, waste processing, and promotion of carbon-neutral farming and food systems	Site in central location with adequate truck access to and close-proximity to neighborhood for walkable employment opportunities
Scale	City wide core networks with peripheral network connections with rural communities in six county area	Connecting farmers and businesses in sixteen county region with markets in Oberlin, Lorain County, and western Cuyahoga County

Appendix II-B
GRANT OR LOAN PROGRAMS SUPPORTING LOCAL FOOD HUB DEVELOPMENTS

PROGRAM NAME	FUNDER	ELIGIBLE APPS	SUPPORT TYPES	RANGE	CONTACT
Rural Business Enterprise Grants	USDA- Rural Development	Rural public entities, rural non profits	Feasibility Studies, business planning, construction, land-lease, equipment, working capital, T&TA	$10,000-$500,000	www.rurdev.usda.gov
Rural Business Opportunity Grant	USDA- Rural Development	Public bodies, non-profit, rural coops	Research, feasibility studies, business planning, T&TA	$50,000	www.rurdev.usda.gov
Value-Added Producer Grants	USDA- Rural Development	Producers, funders, farmers, coops	Research, feasibility studies, business planning, working capital		www.rurdev.usda.gov
Business & Industry Guarenteed Loan Program	USDA- Rural Development	Coops, corporations, partnerships, non-profits	Construction, land-lease or purchase, equipment, working capital	$10 million max	www.rurdev.usda.gov
Community Facilities Grants and Loans Programs	USDA- Rural Development	Public bodies, non-profits	Construction, enlargement, or extension of community facilities	$1.1 million avg loan	www.rurdev.usda.gov
Rural Development Loan and Grant Program	USDA- Rural Development	Local utilities	Research, feasibility, business planning, construction, T&TA	$300K grant, $740K loan	www.rurdev.usda.gov
Intermediary Relending Program	USDA- Rural Development	Local governments, non-profits	Research & feasibility, business planning, construction, land-lesae/purchase, equipment, T&TA	$2 million loan max	www.rurdev.usda.gov
Rural Microentrepreneur Assistance Program	USDA- Rural Development	Non profits, public universities	Research, feasibility studies, business planning, construction, land lease/purchase, equipment, T&TA	$50K to $500K loans	www.rurdev.usda.gov
Rural Energy for America Program Grants/Renewable Energy/ Energy Efficiency	USDA- Rural Development	Farmers, ranchers, small rural businesses	Research & feasibility, business planning, construction, land, equipment, T&TA	$500K renew. En, $250K er. Eff	www.rurdev.usda.gov

Farmers Market Promiton Program	USDA- Agricultural Marketing Service	Coops, producer, networks, government, nono-profits	Research & feasibility, business planning, equipment purchase, and T&TA	$100K max	www.ams.usda.gov
Community Food Projects Competitive Grant Program	USDA-National Institute of Food & Agriculture	Non-profits	Research & Feasbility, business planning, construction, working capial, marketing/promotion	$10K to $300K	www.nifa.usda.gov
Sustainable Agriculture Research & Education	USDA-National Institute of Food & Agriculture	Non profits, universities, producers	Research, feasibility, T&TA	$10K to $200K	www.nifa.usda.gov
Beginning Farmer & Rancher Development Program	USDA-National Institute of Food & Agriculture	Public, coop extension, universities, non-profits	T&TA, equipment	$250 max	www.nifa.usda.gov
Agriculture & Food Rsearch Initiative	USDA- National Institute of Food & Agriculture	Universities	Research, education, extension, conferences	$1 million max	www.nifa.usda.gov
Farm Storage Facility Loan Program	USDA- Farm Service Agency	Farmers	Research, feasibility, business planning, construction, equipment	$500K max	www.fsa.usda.gov
Conservation Innovation Grants	USDA-Natural Resource Conservation Service	Nonp-profits, local governments	Feasibility studies, marketing & promotion, T&TA	$75K max	www.nrcs.usda.gov
Community Economic Development Block Grants	Health & Human Services	CDC,'s	Construction, marketing & promotion, working capital, T&TA, equipment, land lease	$800K Max	www.hhs.gov
Communities Putting Prevention to Work	Health & Human Services	State & local health depts	T&TA	$1 to 16 million	www.hhs.gov

Community Transformation Grants	Health & Human Services	Local government, non-profits	T&TA, evaluation	$500K to $10 million	www.hhs.gov
Rural Housing & Economic Development Program	Housing and Urban Development	Rural non-profits, CDC's, government	Constructio, land, equipmnet, working capital T&TA	Funding in question	www.hud.gov
Public Works and Economic Development Program	Economic Development Administration	Government, universities, non-profits	Construction and Equipment	$1.7 million avg	www.commerce.gov
Ben & Jerry's	National Grassroots Grant Program	Non-profits	Programming in sustianable food systems	$15K max	www.benandjerrysfoundation.org
Cedar Tree Foundation	Sustainable Agricutlure Education	Non-profits	Programming on conservation, envir. Justice, urban agriculture emphasis	$10K to $100K	www.cedartreefoundorg
Claneil Foundation	Special Project Fund	Non-profits	Hunger, nutrition food systems programming	$30K to $100K	www.claneilfoundation.org
Kresge Foundation	Community Development	Non-profits	Replicable models for equitable re-investment	$700K to $3 million	www.kresge.org/programs/community-development
Kresge Foundation	Environment	Non-profits	Place based initiatives on uncertain climate future	$60K to $1.2 million	www.kresge.org/programs/community-development
Kresge Foundation	Health	Non-profits	Reducing health disparitie	$250K to $750K	www.kresge.org/programs/community-development
Schmidt Family Foundation	Environment	Non-profits	Transform environmental & energy practices	$15K to $1.25 mill	www.theschmidt.org

Surdna Foundation	Sustainable local economies	Non-profits	Reducing greenhouse gases, jobs & training in sustainable business	n/a	www.surdna.org
W.K. Kellogg Foundation	Healthy Kids	Non-profits	Improve food systems for healthy access for children	$5K to $3 million	www.wkkf.org/what-we-support/healthy-kids.aspx
Wholesome Wave Foundation	Healtlhy Food Commerce Initiative	Non-profits	Food Hub business consulting support	Expertise	www.wholesomewave.org/hfci

Appendix II-C
SUMMARY OF OBERLIN RESTAURANT SURVEY RESULTS

At the start of 2012, Mary Santana, an intern from the Lorain County Community College, worked with Brad Masi and Heather Adelman from the Oberlin Project to administer a survey to restaurants in Oberlin to gauge current activity and interest in supporting local food systems. The results of this survey can give us a sense of how a food hub might facilitate connections with restaurants or institutions.

The survey include ten respondents that broke into three groups: two food service providers (Lorain County Community College and Oberlin Early Childhood Center), seven restaurants or specialty food stores (The Feve, Fresh Start Diner, Lornzo's Pizzaria, Oberlin Market, Cowhaus Creamery, Café Sprouts, and the Oberlin Inn) and one catering/delivery business (Single-Speed Baking).

Current Activity and Interest

Of those surveyed, 90% indicated that they currently seek or **prefer purveyors of local food** when possible. Of the total:

- 70% indicated that they presently purchase locally grown food and would like to source more,
- 20% indicated that they did not currently source local, but would be interested in local purchasing, and
- 10% had no interest in local purchasing.

Of total **spending**, 50% indicated that they spent between 0-10% of their food budget on local food, 40% spent between 10-25% of their budget, and 1 spent 25-50% on local suppliers.

The total **annual amount spent** was:

- 40% spent between $0-2,499 per year on local food
- 20% spent between $2,500-4,999 per year
- 20% spent between $5000-14,999 per year
- 20% spent between $25,000-50,000 per year

In terms of **arrangements for coordination** of ordering and delivery, the following were noted:

- 70% of respondents indicated spending time to identify and work with local farmers;
- 60% spent time picking-up food directly from farmers; and
- 60% work with a distributor that sources food locally

Respondents were asked if **local food tended to be more expensive.** 40% agreed that it is more expensive, 40% said it was comparable to non-local, 20% said it was less expensive, and 10% said that it was significantly less expensive.

Respondents were asked if **local food was of importance to their customers**. 20% said it was very important to their customers that food be sourced locally, 30% said it was important, 40% said customers were neutral, and 10% said it was not important at all to customers.

Respondents were asked if they **adjust their menus to feature seasonal foods** or if they prefer more of a consistent menu that does not change. 50% shift menus according to seasonal availability, 20% feature some local products as specials, and 30% prefer to not change their menus at all.

Future Arrangements for local food purchasing:

Preferences for **direct purchasing** from farmers versus working with a **distributor**:

- 40% prefer working through a distributor

- 40% prefer working both directly with farmers and through a distributor
- 10% prefer working with farmers directly
- 10% do not plan to source locally grown food

Respondents indicated preferences for a list of **options for procuring** local foods, with the option of selecting any that were favorable to them:
- 70% favored purchasing through a central brand that identifies local
- 60% favored direct coordination/communication with farmers
- 50% favored on-line ordering
- 50% favored working with a for-profit distributor
- 50% favored working through a grower cooperative
- 20% favored working with other restaurants to coordinate/cluster purchasing
- 20% favored investing in a fund for local food start-ups/expansions

Respondents identified the following **significant barriers** to local food, with the option of checking any of the options that limited access:
- 70% indicated seasonal availability limits access,
- 70% said efficient means of distribution,
- 70% said consistency of volume,
- 60% said consistency of quality,
- 50% said the time it takes to communicate with farmers,
- 50% said pricing,
- 30% said finding farmers to supply them, and
- 10% said customers did not care about local sourcing.

In terms of the **types of foods** preferred to be purchased locally, respondents said:
- 100% preferred locally grown produce
- 60% preferred local grains and flours
- 40% preferred local meats
- 40% preferred local dairy and dairy products
- 30% preferred locally processed foods

Respondents were asked if they would be willing to **utilize frozen or preserved foods** in the off-season or if they preferred to work with raw ingredients. 70% of respondents indicated that they would utilize canned or frozen products that originated from local sources over fresh ingredients from afar. 30% preferred working with raw ingredients throughout the year.

In terms of **follow-up activities** in the development of local foods, 80% of respondents indicated a willingness to share more detailed purchasing information to aid in identifying options for local farmers and 90% expressed willingness to participate in a follow-up meeting.

Analysis/Discussion:

Overall, surveys were distributed to 20 outlets with a 50% return on surveys. Some of the conclusions reached after analyzing results include:
- **Demonstrated Interest in buying local-** Those responding to surveys demonstrated strong support for local food procurement, with 70% actively seeking local foods and 90% interested in seeking or expanding locally grown foods to feature in their restaurants.
- **Preference for distribution system-** 80% of those responding indicated that they would prefer working with a distributor, with 40% desiring a mix of direct farmer relations and work with a distributor and 40% preferring to just work with a distributor. Either way, more organized distribution is seen as necessary for increasing local food purchased by restaurants

Return to Table of Contents

- **Restaurants exhibit flexibility in menus-** Seasonal variation indicates that some local foods will not be available year round and 70% of respondents indicated flexibility in changing menus or featuring local food items as specials.
- **Price competitiveness for local is mixed-** Respondents were almost split down the middle between those who indicated that local food tends to be more expensive and those who indicate that it is less expensive. More detailed inquiry into what factors affect expense can help with understanding how to more effectively position local food in the marketplace.
- **Intermediary or local food hub would be helpful-** Of the most significant barriers to accessing local food, most respondents indicated efficient distribution, consistency of volume, and consistency of quality as the most significant barriers. Half of respondents indicated time involved with communicating with farmers and price as a barriers. A food hub will support better consistency of quality and volume, better access through coordinated distribution, and potential price competitiveness through cost efficiencies in distribution. Thus, investment in a local food hub will address most of the primary barriers indicated by respondents.
- **Processing of local foods would be supported**. Seasonal availability was indicated as a significant barrier by 70% of respondents. 70% also indicated that they would be willing to utilize frozen or canned products that came from local sources in the off-season. This indicates support for processing infrastructure that could either be incorporated into a food hub or in a separate facility.
- **Produce and grains are in highest demand.** Produce was indicated by 100% of respondents as something desired from local sources and 60% favored grains and flours. The lower responses for meat and dairy products may in part be influenced by the fact that 2 of the respondents serve only vegetarian or non-meat-based products.

Based on responses, there is a definite business case to be made for developing a local food hub that can support distribution, storage, ordering, and processing. The majority of respondents indicated a willingness to share information and participate in meetings, so their involvement as stakeholders should be included in planning processes.

APPENDIX II-D
COMMUNITY KITCHEN IN OBERLIN SURVEY SUMMARY
Compiled by Brad Masi on November 20, 2012

The following tables summarizes the results of an on-line survey sponsored on the NEOFoodWeb.org web-site to determine interest in development of a community kitchen incubator facility in or around Oberlin. The survey determined the types of activities, equipment, facilities, training, and support desired by potential users of a kitchen incubator. Users include a mix of area farmers and existing or potential local food entrepreneurs. The survey results are drawn from 18 responses.

Current Enterprise:
30-40%- Farmer with value-added product, church, civic group/non-profit
20-30%- bakery, specialty food producer
10-20%- butcher, cart/food truck
10% >- caterer, school/university

TYPES OF ACTIVITIES	High Int	Med Int	Low Int	Curr. Act.	Weight
Preserving raw fruit or vege	56%	17%	0%	6%	2.02
Preparing Sauces or Salsa	44%	11%	11%	6%	1.65
Fermentation	22%	28%	11%	6%	1.33
Baking	33%	0%	22%	11%	1.21
Preparing/processing meats	17%	28%	11%	0%	1.18
Dairy products	17%	17%	22%	0%	1.07
Dry mixes	17%	11%	33%	0%	1.06
Beverages	11%	22%	22%	0%	.99
Preparing Pasta	6%	11%	39%	0%	.79
Catering Meals	0%	11%	28%	0%	.5

OTHER ACTIVITIES: Liquor/distilling, deer butchering, kombucha, frozen take-home meals

Return to Table of Contents

TYPES OF EQUIPMENT	High Int	Med Int	Low Int	Weight
Standard Range Oven	67%	6%	0%	2.14
Stainless Steel Table	67%	6%	0%	2.13
Walk-in Coolers	44%	11%	11%	1.65
Filling and Packing Equip.	39%	17%	6%	1.57
Commercial Mixer	33%	28%	0%	1.55
Dish Washer	17%	39%	11%	1.4
Dehydrator/Drying Equip.	28%	17%	6%	1.24
Vegetable Washer	22%	11%	6%	.94
Convection Oven	0%	28%	6%	.62
Steam Jacketed Kettle	6%	6%	22%	.52
Bread Slicer	6%	0%	11%	.29
Flat top grill	0%	11%	6%	.28
Vegetable Sorter	0%	11%	6%	.28
Deep fryer	0%	6%	11%	.23

OTHER EQUIPMENT: Vacuum sealer, proofing box, counter space, canners, steam injection stone oven, vegetable choppers, measuring cups and spoons, food processor, freezer, juicer, immersion blender, pressure cooker, butcher block, induction cooker, large pots and pans, food saver

TYPES OF FACILITIES	High Int	Med Int	Low Int	Weight
Shared-use production kitchen	56%	17%	6%	2.08
Cold Storage	33%	33%	6%	1.71
Retail Space	22%	22%	11%	1.21
Vegetable wash station	17%	22%	6%	1.01
Warehouse Space	11%	11%	17%	.72
Co-packing facilities	6%	22%	6%	.68
Thermal processing room	0%	11%	11%	.33
Office Space	0%	6%	17%	.29

DESIRED SKILLS/TRAINING TO SUPPORT ENTERPRISE	%
Safe Food Handling	67%

Cooperative Development/Collaborative Marketing	44%
Business Planning/Development	39%
Farming/Gardening/Food Production	33%
Financial Management	28%
Product Development	28%
Marketing and Branding	22%

OTHER: Efficient product processing

EDUCATIONAL ACTIVITIES/APPROACHES	%
Intensive Topical Workshops	61%
Mentoring/Learning from Experienced Entrepreneurs	61%
Peer-to-Peer Learning	61%
Receiving Training Directly from Experienced Teacher	56%
Informal networking events to learn from others	56%
Classes as part of formal curriculum	33%
On-line or virtual learning resources	28%

OTHER: Potlucks, community events, nutrition and food choices, permitting

OVERALL INTEREST IN UTILIZING KITCHEN FACILITY:
78% High Interest
17% Medium Interest
6% Low Interest

OTHER CONCERNS:
Security for on-site storage of products
Involving farm families outside of Oberlin
High school or college clubs or organizations develop healthy alternatives to traditional fundraisers (i.e. candy)

APPENDIX THREE- HISTORY OF COMPOSTING IN OBERLIN

Interest and activities to support composting in Oberlin go back at least 20 years. As early as 1990, the Oberlin Student Cooperative Association (OSCA) created a composting initiative for their student-operated dining cooperatives. Early efforts focused on food waste composting for two coops who established compost coordinators. The coordinators started a compost pile by Johnson House at the former site of the Farm Coop (a student run 1 acre farm that operated until 1988). Unfortunately, the program was short-lived, as students were not able to maintain the pile during the summer, creating problems with odors and attraction of rats.

In 1996, OSCA started to work with the Oberlin Sustainable Agriculture Project (OSAP), a newly created Community-Supported Agriculture farm located 3.5 miles northwest of Oberlin. OSAP formed through a collaboration between college students, faculty, and local town residents. The coops maintained a small (about 1 cubic yard) pile at the OSAP farm. The coops dropped off the materials and the pile was maintained with a tractor bucket by OSAP farm staff and utilized in market garden plots at the farm. In turn, OSAP sold food back to the coops, helping to complete a nutrient loop.

Interest and activities to support composting in Oberlin go back at least 20 years. As early as 1990, the Oberlin Student Cooperative Association (OSCA) created a composting initiative for their student-operated dining cooperatives.

In 2000, OSAP moved its operations to the George Jones Farm and Nature Preserve, a 70 acre farmstead owned by Oberlin College and located 1 mile east of campus. OSAP joined with the newly established New Agrarian Center (NAC) to operate its CSA farm operation on the Jones Farm. OSAP dissolved in 2004 and merged with the NAC. OSCA assumed a more active role in composting given the closer proximity of the George Jones Farm to the campus. The coops invested in a trike with a trailer to enable compost materials to be biked to the farm. Mostly, they used a truck dedicated to food waste composting to move materials to the farm. Each of the eight dining coops that are part of OSCA elected their own compost coordinators who provided the labor to manage the program. Students collected food waste, trucked it to the farm, mixed it with leaves and other organic materials, and added worms to support vermicomposting. The Jones Farm growers added the composted materials to the heavy clay soils to support improved crop productivity. In some years, OSCA students applied compost to small plots that they maintained themselves to grow food for the coops.

Oberlin students compost food waste from their dining coops.

2003- Consideration of a Centralized Composting System

In 2003, after having served as a farm intern at the George Jones Farm and a compost coordinator for OSCA, Oberlin student Lucian Eisenhauer devoted his Senior Honors Thesis in Environmental Studies to a feasibility study for developing an in-vessel composting system. His proposal was to develop a system that could handle food waste generated by Oberlin College.

Lucian's study revealed some important conclusions to justify both cost-savings and improvement of Ohio's clay soils, as detailed below.

- According to a waste audit, OSCA and the college's Campus Dining Service (CDS) produced an average of 438 and 941 pounds per day respectively. Combined, this food waste varies between 872 to 1,886 pounds per day and between 103 to 206 tons of food waste each year, with an average of 154 tons per year.
- The college employs garbage disposals to remove food waste from dining halls. Dish room disposals consume about 480 gallons of water per hour with about five hours of daily operation. Reducing the waste stream going down the garbage disposal by 50% would save the college $19,827 and a 100% reduction would save nearly $40,000 per year.
- 154 tons of raw food waste and 77 tons of a bulking agent would generate about 92.4 tons of finished compost per year, or $5,330 worth of material (assuming $15.95/yard)
- A tipping fee would have to be charged at the front-end, because sales of product alone will not cover the costs of an in-vessel composting system
- About 30 tons of compost per acre would need to be applied over several

Students in an Environmental Studies class install a mobile "worm tractor" to process compost.

- years to raise the soil organic matter content in heavy clay soils necessary for organic farm production. For a 3 acre farm, this would cost $3,115.
- Optimizing the system for financial viability would require a significantly larger scale of throughput than what is generated by the college.
- Capital costs for an in-vessel composting unit would be about $324,550 with an estimated annual cost of operation ranging from $39,500 to $69,500.

Lucian presented a proposal for development of an in-vessel composting system to the Senior Staff of Oberlin College. Given financial difficulties and recent staff reductions, the college was not in position to invest or consider staffing such an operation and recommended that it be developed and operated by a third-party entity. Overall, the project was challenged by a gap between projected revenues and operating costs, leading to consideration of a larger, community-wide system.

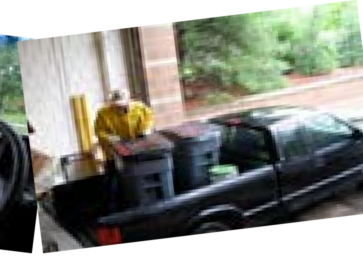
2006- Growing Power and Distributed Composting Concept

Given the high capital and operating costs of a centralized, in-vessel composting system, later efforts focused on the efficacy of a more distributed system of composting involving more simple technology and lower capital costs. In 2006, the NAC received funding from the Ohio EPA to study the development of a distributed composting system. The concept of "distributed composting" involves dispersal of food waste and other organic wastes to a variety of smaller-scale applications. Compost becomes more effectively captured as a "food source" for a number of different sources on a farm, from pigs to worms. Capital and operating costs are assumed by users who directly benefit from the use of composted materials.

Much of the innovation for distributed composting were being developed in inner-city areas developing urban agriculture, such as Cleveland and Milwaukee. In city environments, vacant lots with unfertile and highly compacted soils were able to utilize the abundant food and organic wastes generated in urban neighborhoods to quickly improve soil quality and growing conditions.

In the summer of 2006, the NAC worked with Will Allen, CEO of Growing Power in Milwaukee, to organize a compost training that involved installation of a vermicomposting system at the Jones Farm. A second day featured workshops with Will Allen and Cleveland urban farmer Maurice Small, who focused on installation of growing beds on asphalt at Full Circle Fuels, an alternative fuel station in Oberlin. The asphalt garden installation showed the potential for utilizing organic materials in a more distributed fashion to enhance food production in urban areas.

Overall, the EPA study developed working systems of distributed composting at both the George Jones Farm, a working organic farm operated by the NAC, and a variety of urban sites in downtown Oberlin and Cleveland. The following applica



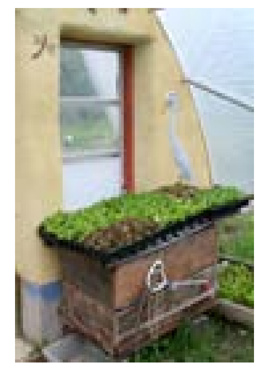
Distributed Composting Pilot

"Distributed composting" involves dispersal of food waste and other organic wastes to a variety of smaller-scale applications.

The New Agrarian Center developed a distributed composting pilot with the support of the Ohio EPA in 2006.

In the program, food waste was picked up at college dining halls and utilized through a number of waste-to-food streams on the farm. Kitchen scraps were fed to pigs, processed into castings in "worm tractors" (mobile field vermicomposting systems), and utilized for the installation of urban gardens in Oberlin, Elyria, and Cleveland.

The Jones Farm growers also constructed a number of smaller vermicomposting bins in greenhouses. The bins fit well under growing tables or in un-used corners. The castings from the bins were used in a potting mix for seedlings or distributed in growing beds. Leachate from the bins was collected and used as a follier feed for seedlings.



tions fully utilized the kitchen food waste generated by OSCA and kitchen preparation waste from the college's dining halls:

α) Plate scrapings from college dining halls were fed to a herd of four pigs maintained at the Jones Farm;

β) Kitchen prep waste from the college's four dining halls and coffee grounds from the student union were fed into a variety of vermicompost systems at the Jones Farm, including:

  a. a compact system of containers used to produce worm castings in a seedling greenhouse for seedling starts and greens production;
  b. a series of enclosed, one-yard outdoor containers constructed around the perimeter of the greenhouse to produce worm castings utilized in growing beds in and around the greenhouses;
  c. leachate collection systems installed for each vermicompost container to reduce nutrient run-off and collect and utilize nutrient-rich leachate;
  d. a worm tractor lined with strawbales and a wood-mulch base to absorb leachate processed about 15 cubic yards of compost, operating throughout the winter to produce worm castings for immediate application in the spring;
  e. four raised beds built on the asphalt of Full Circle Fuels, an alternative fuel gas station in downtown Oberlin, to demonstrate how this method of composting can also be used to make completely infertile spaces (asphalt parking lot) highly productive;
  f. application of these techniques to a number of urban market garden sites around Cleveland;
  g. other applications of organic material, including testing a compost-based heating system for a greenhouse and constructed a highly insulated walk-in cooler using recycled strawbales; and
  h. formation of social networks to connect sources of organic waste materials to end-users, including composting of food waste from Oberlin College dining halls, leaf mulch contributed by the City of Oberlin, and landscape waste (mulch and leaves) from two landscaping companies.

Following this pilot project, most of these systems continued in subsequent years at the George Jones Farm, leading to a significant improvement of organic matter conditions in the soil and overall crop productivity.

Another use of food waste- kitchen prep waste was fed to pigs at the Jones Farm.

Growing Power Vermicomposting Workshop

In 2006, the George Jones Farm hosted Growing Power CEO and McArthur Genius award recipient Will Allen to lead the installation of a vermicomposting system for the farm. The system introduces worms to open-field piles or containers filled with food and landscape waste. The worms consume the organic material and produce castings, a nutrient rich amendment that improves soil fertility.

The workshop involved about 30 participants from Cleveland and Oberlin. With just a few hours of work and the placement of worms from Will Allen's farm in Milwaukee, the system was established.

2011-
Challenges and Opportunities for Community-Wide Composting

Since the 2006 initiative to form a distributed composting system, the pre-consumer food waste from OSCA, Oberlin College dining halls, and the organic waste from several landscapers were processed at the George Jones Farm and a number of other urban farm sites in the city. The system worked well with a lot of volunteer labor from students and dedicated time from Jones Farm staff.

In 2011, Oberlin College installed a grinder/pulper unit in one of its dining halls. This unit processes both kitchen prep-waste and plate scrapings and other bio-degradable waste such as napkins, paper towels, cardboard, and cutlery. The system can also handle meat and dairy products which are frequently excluded from most composting systems. The unit extracts moisture from the food waste, creating a slurry that is lighter, occupies less volume, and decomposes more quickly. The output from the grinder/pulper was directed to the vermicompost piles at the George Jones Farm.

However, four set-backs in 2011 caused a disruption in the composting process:

- Due to rising insurance costs, OSCA had to retire its truck and greatly limit the number of people who could operate their truck fleet, eliminating the means for students to transport compost to the Jones Farm;
- The grinder/pulper increased the volume of food waste beyond what the vermicompost system at the Jones Farm could handle;
- The grinder/pulper food waste contained a different bio-chemical composition than kitchen prep waste and created too much heat for the worm-based system;
- The Jones Farm could no longer accept waste from the college grinder/pulper unit.

To continue its commitment to food waste composting, the college and OSCA presently employ the services of Rosby's Composting operation, based on the west-side of Cleveland. The expense and fuel-use for food waste to be regularly picked-up and sent to Cleveland is considerable and there is interest in finding a more permanent solution that keeps the food waste circulating in the local food system in and around Oberlin.

Led by a group of students from the CDS recyclers and Resource Conservation team, a variety of stakeholders from the college and local community came together to plan a compost summit in April of 2012. The summit organizers utilized the summit as an opportunity to engage the broader Oberlin community in an effort to begin to develop a solution to the community's organic waste challenges.

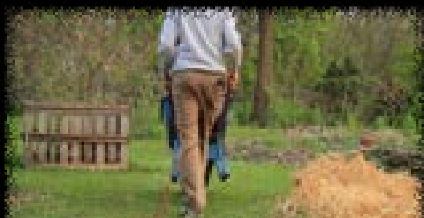
Multiple Approaches to Composting

For the composting summit, Brad Masi produced and edited a film montage that introduced to the community a number of different approaches to consider in forming a community-wide composting system. The examples were drawn from videographies conducted in the community and around the state over the past three years. The topics included:

- **Mobile Composting-** moving compost piles around a site to spread micro-organisms and fertility more effectively with less labor involved in moving materials;
- **Large-Scale Commercial Composting-** review of Pork-Q-Pine Farm, a hog farm that includes a permitted composting facility outside of Columbus that operates year-round and processes large quantities of municipal waste;
- **On-Farm Composting-** learning about Perry Klutz's family farm in Circleville, where they mix on-farm dairy manure with municipal yard waste to support improved fertility in his pastures;
- **On-Farm, Small-Scale Bio-Digester-** utilizing animal-waste at Ohio State University's Waterman research farm in Columbus to generate natural gas through an anaerobic digester that can be used for cooking, heating, or electricity;
- **On-Farm Vermicomposting-** review of the use of worms at the Jones Farm to process food waste through small-scale systems both on the farm and in greenhouses;
- **Compost Heating Systems-** demonstration of a compost-heated shower built at the Jones Farm as a part of a 3 week permaculture design training;
- **Vermicompost Burrito-** introducing a method developed by urban farmer Maurice Small of wrapping kitchen waste in newspaper to make compost burritos which are stacked in raised beds to build fertility in urban spaces;
- **Compost as Community Art-** looking at a project by Oberlin Art Professor and local artist Johnny Coleman who created artful composting containers that also grow food in tight urban spaces;
- **Raised Bed Composting-** layering organic waste, food waste, and soil to form fertile raised beds on compacted or denuded urban sites

In addition to these methods, the film features an explanation of basic composting processes by Jones Farm operations manager Evelyn Bryant and Professor of Environmental Studies David Orr reading from *Deserts on the March*, a book about soil erosion during the Dust Bowl.

-Composting Around Ohio-



A) Mobile backyard composting
Oberlin, OH

B) Large-Scale Commercial Composting
Delaware, OH

C) On-Farm Composting
Circleville, OH

Interactive Film Page

D) Small-scale biodigestion
Columbus, OH

E) On-Farm Vermicomposting
Oberlin, OH

F) Compost Heated Shower
Oberlin, OH

Click any frame to see the story!

G) Vermicompost Buritto
Elyria, OH

H) Compost as Community Art
Cleveland, OH

I) Raised Bed Garden Composting
East Cleveland, OH

Waste-to-Food-Energy: Pre-Assessment of Bio-Digestion Pathways for Oberlin

Prepared by:
Brad Masi Consulting
September 26, 2012

In Partnership with:
Oberlin College Office of Community Affairs
The Oberlin Project

All photos and diagrams by Brad Masi unless otherwise indicated

WASTE-TO-FOOD-AND-ENERGY

Table of Contents

The contents are interactive- click any section below. Return to contents from any page

Contents are interactive!

Just click any heading to go to that section.

Overview of Anaerobic Digestion

- ◊ Interest in Biodigestion at Oberlin (4)
- ◊ The Anaerobic Digestion Process (5)
- ◊ Applications of Biodigestion By-Products (8)
- ◊ General Operations and Infrastructure for Biodigestion (11)
- ◊ Testing and Evaluation of Feedstocks (13)
- ◊ Considerations for Biodigestion (14)
- ◊ Safety Concerns (14)
- ◊ Rules and Regulations (16)

Case Studies of Anaerobic Digestion

- ◊ Carbon Harvest Energy in Vermont (18)
- ◊ Quasar Energy Partners in Wooster, Ohio (20)
- ◊ The Plant in Chicago, Illinois (22)
- ◊ Waterman Research Farm in Columbus, Ohio (28)

Evaluating Anaerobic Digestion Options in Oberlin

- ◊ Review of Community Assets (32)
- ◊ Bio-gas Production Potential of Oberlin Food Waste (32)
- ◊ Waste Collection and Consolidation (33)
- ◊ Capacity Development and Community Investment (38)
- ◊ Stakeholder Feedback (47)
- ◊ Next Steps and Recommendations (49)
- ◊ References (51)

Interactive Content

- ◊ The Plant in Chicago to power a local food hub with a digester (27)
- ◊ Professor Jay Martin provides an overview of biodigestion processes for small-scale systems (31)

Click this tab to return to the contents from anywhere in the report

EXECUTIVE SUMMARY

Researchers at the University of Pennsylvania define an anaerobic digester as "an air-tight, oxygen-free container that is fed an organic material, such as animal manure or food scraps. A biological process occurs to this mixture to produce methane gas, commonly known as bio-gas, along with an odor-reduced effluent. Microbes convert the waste into bio-gas and a nutrient-rich effluent."

In April of 2012, a collaborative of students and community members organized a Waste-to-Food Summit to learn, discuss, and strategize options for increasing the productive re-use of food waste on-campus and in the Oberlin community. A group of clusters formed at the event to look at different options for connecting the abundant food waste streams in the community to the growth of local food systems. One of the clusters focused on a Waste-to-Food-and-Energy initiative that would utilize anaerobic digestion technology to convert food waste into energy (bio-gas) and nutrients (digestate remaining after bio-digestion).

This report serves as a preliminary assessment for developing anaerobic digestion systems in the Oberlin community. Three sections in the report provide an overview of anaerobic digestion processes, case-studies of four projects that link anaerobic digestion to local food systems, and an evaluation of anaerobic digestions for consideration by the Oberlin community. This preliminary assessment was conducted by Brad Masi Consulting in collaboration with the Oberlin Project and the Oberlin College Office of Government and Community Relations.

SECTION ONE- OVERVIEW OF ANAEROBIC DIGESTION

This section summarizes interest in bio-digestion both for the State of Ohio and in the Oberlin community, including recommendations from the Waste-to-Food-and-Energy cluster from the April 2012 summit. This section then provides an overview of the basic anaerobic digestion process and applications of bio-digestion by-products, including bio-gas and nutrient-rich digestate. The section also covers a broad range of considerations for developing and successfully operating an anaerobic digester, including general operations, testing and evaluation of feedstocks (waste inputs), community considerations, safety concerns, and applicable rules and regulations.

SECTION TWO- CASE STUDIES OF ANAEROBIC DIGESTION

This section summarizes four case studies of anaerobic digestion projects in Ohio, Illinois, and Vermont. The projects vary in terms of their overall scale, but the lessons from each provide a good overview of options to consider for Oberlin.

The case studies include Carbon Harvest Energy (CHE), based in Burlington Vermont, which involves development of intensive greenhouse operations that capture waste heat from landfill-gas-to-energy systems. The next study features the Quasar Energy Partners group at the Ohio Agriculture Research and Development Center where they operate a 550,000 gallon anaerobic digester that turns food and farm waste into electricity for the campus, heat for the facility, and natural gas for use in vehicles. The third example covers The Plant in Chicago, a project focused on conversion of a 100,000 square foot abandoned meat packing facility as a center for urban agriculture and local food production that will be powered by an anaerobic digester that runs on food waste from across Chicago. The fourth case study comes from the Waterman Research Farm at Ohio State University in Columbus which is researching anaerobic digesters designed for small-scale farms.

SECTION THREE- ANAEROBIC DIGESTION OPTIONS IN OBERLIN

The third section focuses on a review of anaerobic digestion options for the Oberlin community. This section reviews community assets, evaluates bio-gas production potential from food waste samples collected on-campus, and reviews waste collection options. This section then identifies five development scenarios for anaerobic digestion in Oberlin. Some scenarios rely on existing infrastructure in the community and others require more investment and capacity building:

1. **Quasar Energy Facility**: deliver food waste to anaerobic digester located in Shefield.
2. **Oberlin Waste Water Treatment Plant**: utilize existing anaerobic digester at WWTP to provide heat and electricity for the treatment plant and bio-solids for local agricultural production
3. **Local Food Hub**: develop an anaerobic digester to support development of a local food hub in Oberlin that could provide energy for heating, cooling, and food preparation.
4. **On-Farm Biodigester**: develop small-scale, farm-based biodigester that can provide heat that can be used to extend seasonal production in greenhouses.
5. **Lewis Environmental Studies Center**: utilize anaerobic digester that is a part of the Living Machine to capture bio-gas for use in heating a high performance greenhouse in the Lewis Center landscape

This section also includes the feedback from a group of eight community stakeholders who reviewed and discussed these five scenarios. On the basis of stakeholder input and a review of case studies and a preliminary review of bio-gas production potential in Oberlin, the following is recommended: conduct a community-wide waste audit to better understand volumes and bio-gas potential of local feedstocks; research and evaluate development of anaerobic digestion at the Living Machine to create a system that integrates food and sewage processing, energy generation, and year-round food production; and consider options for bio-digestion that could supplement future local food developments, such as a food hub or year-round production on local farms.

Overview and Context for Bio-Digestion

Small-scale anaerobic digesters are common in countries like Mexico, China, and India. They are especially important in rural areas where the lack of a utility grid makes energy scarce. Bio-gas digesters in China were developed in the 1970's to place animal manure, human sewage, and crop residue into large, underground fermentation tanks that produced bio-gas. The gas was utilized for cooking, heating, or operating equipment. Bio-gas generation also reduced pressure on forestry resources while also sanitizing manure and yielding a slurry of nutrients that could be applied to agricultural fields. These small-scale systems are typically installed utilizing locally available materials with low capital costs.

More recently, the organization and development of a bio-gas industry to produce larger-scale bio-gas generators occurred over the past 10 years. In Germany, one of the leading innovators of bio-gas technology, 7,000 bio-gas generators produce mostly electricity to support households and businesses throughout the country. The rapid development of bio-gas technology in Germany is supported in large part by subsidies provided by the government. There is also a higher value placed on energy, with a charge of up to 30 cents per kilowatt hour. Government subsidies have also been a part of an industrial policy which has led to the development of technology that can now be shipped abroad.

In the United States, bio-digestion has been more difficult to make viable. The State of Ohio offers few subsidies for the development of bio-gas technology. Compared to the higher price of energy in Germany, a bio-digester recently constructed in Zanesville, Ohio brings in about 2 cents per kilowatt hour. The recent boom in the extraction of shale gas has also driven down prices for natural gas, making bio-digestion less competitive.

Thus, three factors challenge the development of bio-gas systems in Ohio:

1) a lack of public investment or subsidy to support the emergence of the industry;
2) the cheap price of energy makes covering the costs of bio-digestion difficult to cover; and
3) the cost of components for bio-digestion systems are high, owing to the lack of domestic manufacturing for bio-digester systems.

Making bio-digestion viable in Ohio requires charging a tipping fee to businesses that generate waste. According to Mark Suchan with Quasar energy, 90% of the revenues for the bio-digesters that they operate come from tipping fees charged for hauling away the waste. Tipping fees also challenge the efficacy of processing agricultural wastes. The cost and logistics of collecting and transporting farm waste into bio-digesters is high and most farmers cannot afford to pay a large tip. This speaks to the need for farm-based bio-digestion systems.

Biodigestion Interest in Oberlin

The interest in anaerobic digestion at Oberlin began in April of 2012 when a community-wide composting summit brought together stakeholders from across Oberlin to consider options for more effectively utilizing the organic wastes on-campus and in the community as inputs for local agriculture. Interest in anaerobic digestion stemmed from an informal student group that was meeting to consider options for anaerobic digestion to process food and other organic wastes generated on-campus or in the community.

At the compost summit, participants formed four interest clusters to discuss more in-depth the following options for utilizing food waste: home and urban scale composting, large-scale commercial composting, on-farm composting, and options for anaerobic digestion.

Several cluster members have experience with biodigestion, including Sean Hayes who has built a bio-digester and can provide resources and expertise in the development of a bio-digestion system. Two students have done research or worked with companies that specialize in bio-digestion.

The cluster identified the following next steps to take in developing a bio-digestion project in Oberlin:

- identification of a site to locate a bio-digestor, with several suggesting the George Jones Farm or other local farm and a site in close proximity to the grinder/pulper to reduce waste hauling;
- determination of scale appropriate for Oberlin's waste stream which will help to determine the cost of installing a bio-digester;
- quantification of waste streams to get a sense of the throughput and seasonality of waste;
- acquisition of a truck would be needed to move waste;
- identifying options for supplemental heat in order for a bio-digester to function optimally during the cold months;
- a more thorough analysis of the waste output from the grinder/pulper to determine ratios (waste, gas, sludge) for optimal anaerobic digestion;
- identification of end-users of bio-digester outputs;
- determination of whether or not energy could be used directly from the bio-digester or if some form of compression and storage would be required (which raises costs as well as safety concerns); and
- investigation into the EPA P3 grant program once a project is defined (funding amounts for developing a proposal start at $10,000 and a prize of $75,000 for project implementation).

Return to Table of Contents

The Anaerobic Digestion Process

Pennsylvania State University defines an anaerobic digester as "an air-tight, oxygen-free container that is fed an organic material, such as animal manure or food scraps. A biological process occurs to this mixture to produce methane gas, commonly known as bio-gas, along with an odor-reduced effluent. Microbes break down waste into bio-gas and a nutrient-rich effluent."

An anaerobic bio-digester provides an environment conducive to bacteria and micro-organisms that convert waste through a process of anaerobic (without oxygen) digestion. The by-products of bio-digestion include methane (energy source) and digestate (nutrient rich effluent). Biodigestion differs from composting. Composting processes encourage aerobic digestion which involves micro-organsims that require oxygen to convert organic materials into carbon dioxide, nutrients and carbon-rich organic matter.

Anaerobic Digestion: The anaerobic digestion involves the conversion of complex organic materials into methane and nutrients. The anaerobic digestion process occurs through four primary phases, each of which has an accompanying assembly of specialized micro-organisms. The four phases are:

- **Hydrolysis**- Compounds, including cellulose, proteins, and fats are cracked into monomers (water-soluble fragments) including sugars, fatty acids, and amino acids.
- **Acidogenesis**- Monomers are converted by anaerobic bacteria into short-chain organic acids, ketones (ethanol, methanol, etc.) and alcohols.
- **Acetogenesis**- Intermediate products from acidogenesis are converted into acetic acid, carbon dioxide, and hydrogen.
- **Methanogenesis**- Methane formation takes place in anaerobic conditions. Bacteria convert compounds into methane.

A more simple explanation of the biodigestion process would be the conversion of complex organic materials (manure or food waste) into two phases of decomposition. During the liquefaction stage, acid-forming bacteria convert complex organic materials (waste feedstock) into simple organic materials (acids, alcohols). During the gasification phase, methane-forming bacteria convert volatile acids into methane, carbon dioxide, and a nutrient rich effluent. These then become the primary by-products of bio-digestion. Methane can be used to generate energy and heat and nutrient-rich effluent can be applied to agricultural fields.

There are two types of bio-digestion, driven by anaerobic micro-organisms that function under different temperature conditions. Mesophlic digesters operate in temperature ranges of 68 to 104 degrees Fahrenheit. Mesophilic digestion is the most common type of digester in the world, with most located in tropical countries such as India and Brazil. Thermophilic digesters, by contrast, require operating temperatures of 122 degrees Fahrenheit or higher. Thermophilic digesters convert materials more quickly, but are also more sensitive to temperature swings.

In cold climate regions, both mesophilic and thermophilic digestion require consistent temperatures to remain effective. This will require the addition of supplemental heat to maintain optimal conditions for anaerobic digestion, particularly during the cold months.

Feedstocks: Feedstocks describe the incoming materials that will feed a bio-digestion system. In terms of overall bio-gas production potential, agricultural wastes (including hog and cow manure or crop residues) have a lower overall bio-gas production potential. Biosolids have moderate potential. Food waste, FOG (Fats, Oils, and Grease), and glycerin all have the highest potential energy value. The more valuable feedstocks for bio-gas generation also happen to be the ones that can capture the highest tipping fees.

There is also a distinction between wet versus dry bio-digestion processing. Wet processing involves materials that have a much higher liquid content, including manure. Dry digestion involves processing carbon-heavy biomass that will generally have a longer digestion time to release gas, including most food wastes.

Contamination remains a major issue for many feedstocks. Contamination includes anything that is not organic in nature (including plastic, metal, glass, sand, etc.). Contamination in feedstocks can lead to damaged receiving equipment, unscheduled maintenance on pumps, or unhappy farmers from contaminated effluent or fertilizer. Digesters also cannot process petroleum-based products. Reducing or eliminating contamination needs to be negotiated between the bio-digester operators and businesses. The collection of waste should be monitored by the business to insure that improper materials do not end-up in the waste stream. There needs to be quality control at the receiving end as well, where bio-digester operators inspect and remove contamination as part of the pre-processing for bio-digestion.

Products of Anaerobic Digestion

There are two primary by-products that result from the anaerobic digestion process, including:

- **Bio-gas**- natural gas and other components that can be used to produce electricity, heat, or power engines and
- **Digestate**- nutrient rich by-product that provides an amendment for agricultural production.

Bio-gas can be utilized for just about any process that presently utilizes natural gas. The primary uses of bio-gas products include:

- **Bio-Gas Generation**- AD facilities will typically utilize some of the energy

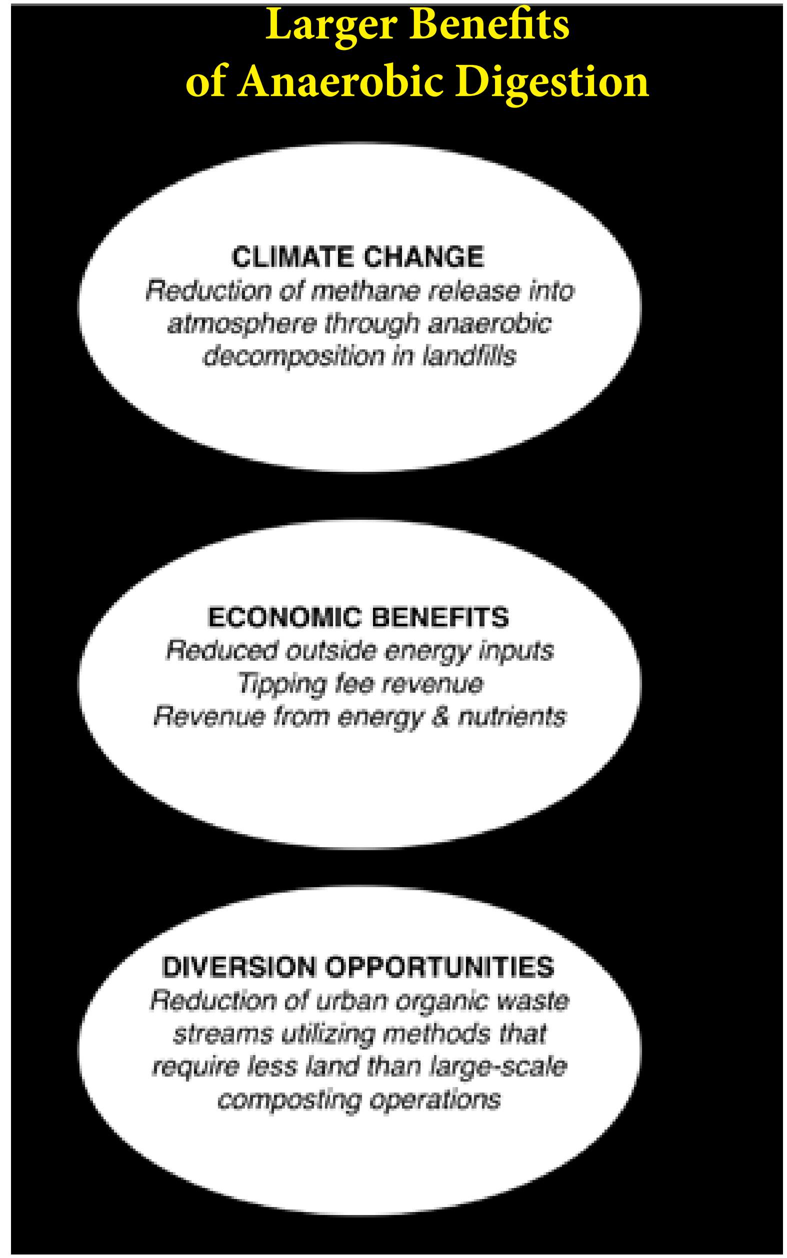
WHY ANAEROBIC BIO-DIGESTION?

OHIO DIVISION OF MATERIALS AND WASTE MANAGEMENT:

Alternative Energy Law- By 2025, 25% of Ohio's energy must be generated from alternative energy sources

Ohio Food Scraps Recovery Initiative- State support for efforts to compost or develop anaerobic digester facilities since 2007 have led to 38% increase in recovered food scraps.

Ohio Solid Waste Plan- State-wide effort to encourage waste-to-fuel conversion facilities to reduce landfill gas emissions. Also promotes recovery of landfill gases for energy generation.



BASIC BIODIGESTION PROCESS

FEEDSTOCKS + **ANAEROBIC DIGESTION** = **BIOGAS** **FERTILIZER**

Return to Table of Contents

generated by the bio-gas to operate the facility itself, capturing both heat and electricity to operate different components of the system.

- **Heating-** Bio-gas can be used to generate low-grade heat, ideally utilized in hot-water boilers. Bio-gas cannot generate steam heat directly and typically maximizes at about 180 degrees F.
- **Electricity-** Bio-gas can be run through a Combined Heat and Power (CHP) generator to produce electrical energy. Waste heat results as a by-product of CHP electrical generation and can be used to heat AD facilities or can be captured for use in adjoining buildings.
- **Fertilizer-** The by-product remaining from the biodigestion process, called digestate, is a nutrient rich slurry that can be direct land-applied for agriculture or can be mixed with compost to raise fertility and nutrient content.

Typically, bio-gas generated through anaerobic digestion is 50-70% methane with the remaining balance comprising carbon dioxide. By comparison, commercially available natural gas is typically 90% or greater methane and other hydrocarbons. A cubic foot of 100% methane contains 950 BTU of energy. A cubic foot of bio-gas is less dense than natural gas, containing between 500 to 650 BTU of energy. By comparison, a gallon of gasoline contains about 114,000 BTU of energy (approximately 125 cubic feet of natural gas).

Bio-gas can be utilized directly for some applications. More advanced applications, such as Compressed Natural Gas (CNG) for automobile or truck use or operating a generator will require some cleaning of the bio-gas. Some of the components that have to be cleaned from the bio-gas (depending upon end-use), include:

- **Water Vapor-** Often, water vapor will come with the gas. Water vapor can be burned off with the gas for more basic configurations, such as a hot water boiler. Running bio-gas through an engine will require water vapor to be removed.
- **Particulates and Sludge-** Gas can be filtered when vacuumed to capture any particulates or sludge that might be in the gas.
- **Hydrogen-Sulfide-** Hydrogen sulfide produces a rotten-egg odor and is a common by-product of anaerobic bio-digestion. Hydrogen-sulfide can be burned in a boiler situation. For cooking gas or other uses, it should be cleaned in order to reduce odor in work areas.

Applications need to be evaluated on the basis of the best capture of energy. The most efficient application of bio-digestion would be direct combustion, such as burning bio-gas for a hot-water boiler or utilizing bio-gas for kitchens or cooking usage (although this would require some cleaning of bio-gas material for commercial-scale applications). About 80% of the available energy for these direct applications is converted into usable energy. Utilizing bio-gas to power a CHP generator results in about 35% capture of the energy in bio-gas for electrical generation. The remaining 65% of energy is used up in the conversion process. For this process to maximize efficiency, the waste heat needs to be fully utilized and captured.

Applications of By-Products of Biodigestion

<u>Anaerobic Digestion Facilities</u>: One of the most critical energy needs for an AD facility is heat. Feedstocks typically enter a biodigestion facility at around 50 degrees F (ground temperature). The feedstock temperature needs to be raised to about 90-100 degrees F for thermophilic digestion, requiring supplemental heat. The temperature needs to be maintained throughout the bio-digestion process as well, which requires more heat during the winter. Over the course of a year, about 10% of the energy produced by the plant is generally utilized by the plant itself.

The other demand for AD facilities is electrical energy , mostly used to operate pumps or mixers in the facility. About 4% of the energy generated by a plant will be utilized by the plant itself.

Overall, a typical plant in a northern climate can be expected to have about 85% of its energy available for commercial sale with the remaining 15% utilized by the plant itself. This represents a significantly more efficient process than ethanol production.

<u>Burn Bio-gas in Boilers for Usable Heat</u>: This process is about 80% efficient and is most typically used in a low-pressure hot water boiler. This heat can be used to heat the biodigestion facility itself or can be captured for other economic processes, including industrial applications (such as an asphalt plant), heating greenhouses for agricultural usage, or heating commercial or residential buildings in proximity to the bio-digester. Most low-grade heat boilers can tolerate about 5% variation in the methane content of bio-gas.

Another common application for heat is through waste water treatment plants which utilize anaerobic digestion to heat the WWTP itself, especially in the winter. This is advantageous, as it is a low capital equipment investment, requires minimal maintenance costs, relies on existing expertise, and significantly off-sets the energy demands for wastewater treatment. The Oberlin WWTP facility utilizes anaerobic digestion to heat bio-solids for reduced retention times and improved sanitation.

<u>Burn Bio-gas for Electricity</u>: Most electrical generation from bio-gas occurs through a Combined Heat and Power (CHP) unit. This process converts about 35% of the energy in bio-gas to electricity with the remaining energy in the form of heat. Heat results from the following components of a CHP unit: intercooler, lube oil, jacket, and exhaust.

Most commercially available CHP units are set-up to run on low-BTU fuels that are typical with bio-digesters. The engine technology does not differ significantly from typical natural gas engines. Currently, there are a number of government subsidies

Return to Table of Contents

that exist to promote bio-gas usage, providing a guaranteed buy-back rate. The two most important factors to consider for CHP units include:

- **Power purchase agreement with utility-** Does a local utility have the capability of accepting electrical energy generated remotely for grid-usage?
- **Packager-** Does the company providing the engine block also provide the control package needed to switch between facility and grid usage. Many packagers do not include the control packages, which is not generally available domestically and must be purchased from German companies.

<u>Gas for Transport</u>- Bio-gas can be utilized to power vehicles. However, this requires infrastructure for both cleaning and for compression. Cleaning bio-gas involves upgrading it by removing excess carbon dioxide and raising the energy density of the gas. Removal of carbon dioxide presents a major expense in both infrastructure, skills, and operations. Removing carbon dioxide can be accomplished by passing the bio-gas through activated carbon micro-pores that absorb carbon dioxide. The gas can also be scrubbed with a chemical solvent. Hydrogen sulfide also needs to be removed through a chemical process. After bio-gas is upgraded, it can be compressed to provide a motor vehicle fuel or can be inter-changed with a pipeline that delivers natural gas.

<u>Utilize Digestate as Agricultural Input</u>: Digestate comprises the material remaining after the generation of bio-gas. Digestate is a solid material with a high concentration of nutrients which can be utilized as an alternative to synthetic or organic fertilizers in agriculture. The actual nutrient content will vary depending upon the feedstock. Forms of nutrients include ammonia, phosphate, and pot-ash (potassium), the primary macro-nutrients needed for crop production. Typically, the digestate will include about 50% organic matter on a dry weight basis (excluding moisture content). Variables to be considered for agricultural applications include:

- the total concentrations of nitrogen, phosphorus, and potassium,
- the percent of total solids,
- the types of crops being produced,
- farming practices being utilized (no-till, subsurface drainage, etc.), and
- Ohio EPA stipulations around nutrient regulations and stormwater run-off.

<u>Direct Land Application</u>: The application of digestate needs to be administered on the basis of the farm field in which it is being applied. A soil test should be taken for the farm where the digestate will be applied to determine the nutrient balance in the soil. If excess nutrients are being applied (nutrients that exceed the requirements of the crops being grown), there can be run-off of nutrients which affects water quality. This is particularly important in distressed watersheds, including any applications in the Lake Erie basin where surplus nutrients are causing significant algae blooms. There are two types of common land application of digestate, including broadcast application where the digestate is applied on the land surface. This process results in about 50% loss of available nitrogen which is volatilized in the air as it is being applied. This form of nitrogen is a significant greenhouse gas and one of the primary greenhouse emissions resulting from production agriculture. Digestate can also be injected in the soil which reduces volatilization of nitrogen and also reduces the quantity of phosphorus or potassium that might run-off. Phosphorus is the primary nutrient that leads to eutrophication in water bodies like Lake Erie. If there is already a high concentration of phosphorus in the soil, then there is a greater risk of run-off. No-till farming also results in a higher chance of run-off. The types of crops being grown also needs to be factored. Soybeans, for example, fix their own nitrogen, reducing the uptake of nitrogen that might be present in digestate. Corn, as a heavy nitrogen feeder, will benefit from digestate that has higher nitrogen content.

Land application tends to be more cost-effective in the short-term, as most digestate will have a high water content. Producing dry material would require facilities for de-watering the digestate. Most bio-digestion facilities do not have de-watering capability due to the higher cost of capital and operation for these facilities.

<u>Composting</u>: Another option for utilization of digestate is mixing it into compost. This is particularly advantageous if the compost operation has a high quantity of high-carbon materials, such as wood mulch, sawdust, shredded paper, or leaves. Compost products can have more application as an input to organic farming operations or urban gardens. Compost will also help to sequester and hold many of the nutrients available in the digestate, reducing run-off while increasing the soil organic matter content of the fields where it is applied. The dis-advantage of this approach is that it will typically require de-watering of the digestate. This process concentrates the nutrients and reduces the burden of leachate generation and management for compost operations. While solids separation imposes additional cost for the bio-digestion facility, it can reduce costs long-term for trucking and transport of materials. For facilities that need options to store the digestate material more long-term (which can be advantageous since nutrient applications on farms occur typically in the fall or spring), solids separation can allow for more cost-effective storage. Decisions about de-watering infrastructure will be in large part based on the distance that digestate material needs to travel for its final source and the length of time that materials need to be stored.

<u>Class A and B Bio-Solids:</u> Other common by-products of bio-digestion include Class A or B bio-solids, a common method for returning nutrients to agriculture. Bio-solids can include a mix of processed sewage waste and food waste.

Class A bio-solids include much higher quality nutrients and typically result from feedstocks that include food waste, grease, or glycerin. Class A bio-solids do not require EPA permitting and their application is less regulated. However, buffer zones will still be needed with the application of Class A bio-solids to insure that nutrients do not pollute nearby water bodies or drainage. Proper application processes still need to follow best-management practices, including Comprehensive Nutrient Management Plans.

Return to Table of Contents

COMMON USES OF ANAEROBIC DIGESTION BY-PRODUCTS

Usage	By-Product	Description
Bio-gas Generation	Bio-gas	In cold climates, bio-digesters will utilize some bio-gas to heat itself (about 10% typical of gas)
Heating	Bio-gas	Hot water boilers most efficient and lead to about 80% utilization of available energy. Requires less cleaning.
Cooling	Bio-gas	Cooling units have been developed that operate off of natural gas. Requires less cleaning.
Cooking	Bio-gas	Can be utilized for cooking, which is one of the more common utilizations in developing world systems.
Electricity	Bio-gas	Requires a generator to convert and typically utilizes about 35% available energy. Releases waste heat. Requires more significant cleaning.
Fuel (CNG)	Bio-gas	Requires significant cleaning and infrastructure for compression. Can be utilized to operate motor vehicles.
Fertilizer	Digestate	Nutrient rich, inorganic fertilizers provide input to local agricultural production or can be mixed with composting or blended with soil

The Many Uses of BioGas

Cooking Gas

Fuel for Transport

Electrical Generation

Heat

Class B bio-solids tend to be lower-grade nutrients. Most sewage sludge produced by Waste Water Treatment Plants is Class B. Class B bio-solids will typically result from bio-digestion of animal or human waste. Class B materials require EPA permitting and more strict regulation of soil pH levels, phosphorus levels, depth of application, and review of hydrological soil types. Application of Class B materials also need to have signage up 30 days prior to and following application. The EPA also regulates Class B bio-solids for heavy metals, including arsenic, cadmium, copper, lead, mercury, molybdenum, nickel, selenium, and zinc. These materials need to be at or below the thresholds stipulated by the EPA. Because of permitting requirements and the potential for heavy metal contamination, Class B bio-solids are more difficult to market and may limit opportunities for bio-digestion plants to monetize waste streams.

Anaerobic Digester General Operations and Infrastructure

There are four basic infrastructure needs to support a successful biodigestion operation:

1) **Collection and Logistics-** collection system to gather feedstocks and transport them to facility for processing;
2) **Pre-Digestion-** lab testing and monitoring of feedstocks, sorting waste to remove contaminants, and grinder and pulverizing of feedstocks;
3) **Biodigestion and Energy Generation-** process of producing and storing gas and utilizing it for energy generation (electricity, heat, gas); and
4) **Leachate and Nutrient Handling-** collecting, testing, storing, transporting, and land-applying leachate.

Collection and Logistics

- Collection and Transport- Food waste needs to be collected in easily transportable bins. 35-55 gallon trash containers with sealable lids and wheels are best for collection. Materials then need to be located on loading docks or other locations that facilitate quick transfer of waste bins onto a truck for hauling. For larger quantities, pumpable holding tanks can be utilized.

Pre-Digestion

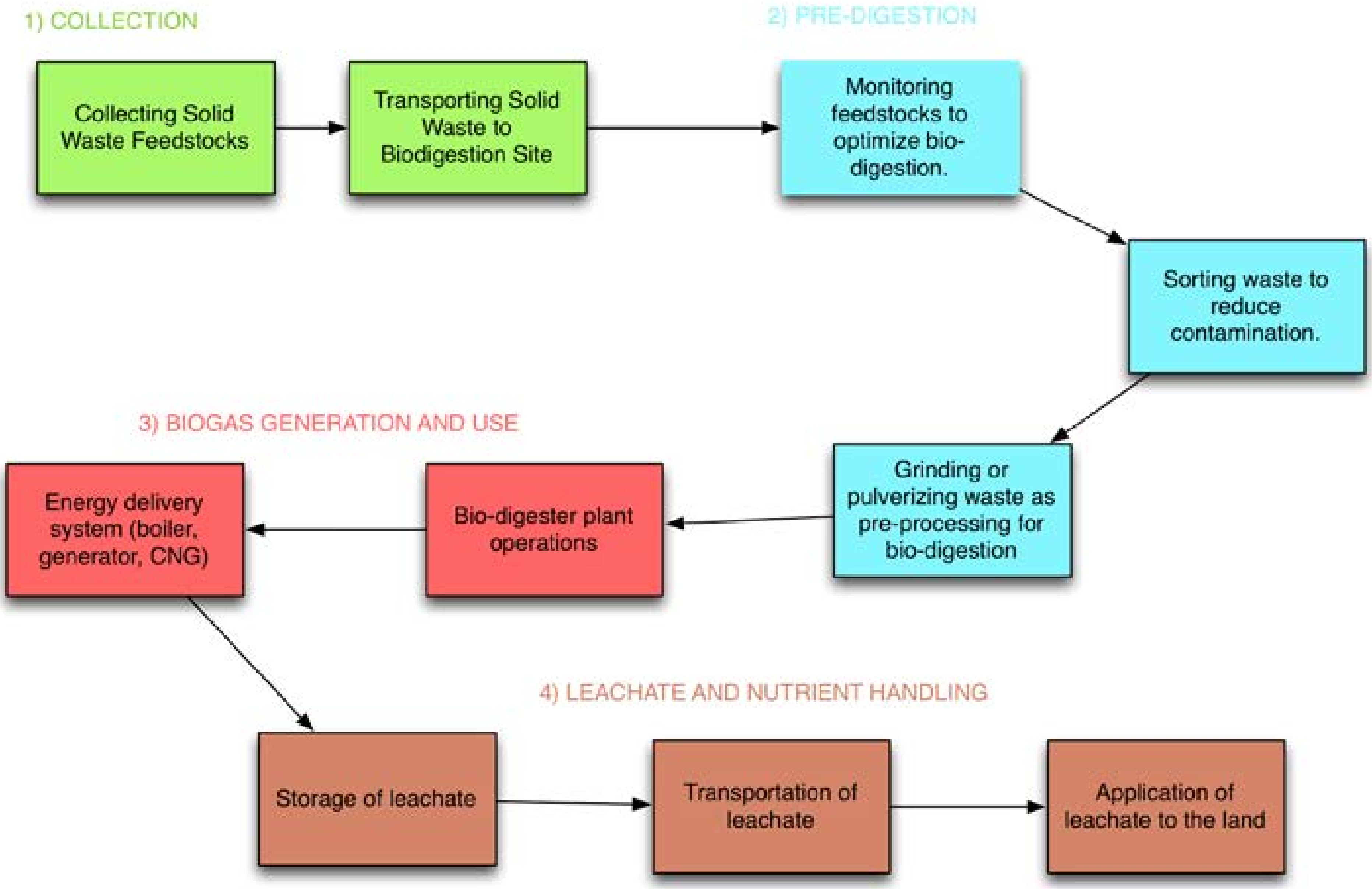
- Storing Feedstocks- Storage of incoming feedstocks will be important to regulate materials going into the bio-digester. If feedstocks vary considerably, regular testing should be conducted prior to introducing any new feedstock into the bio-digester. This can enable the feedstock to be evaluated and prevent problematic materials from entering the stream that might disrupt the bio-digestion process. Feedstocks also need to be inspected to insure any materials that might damage machinery are removed.
- Grinding Feedstocks- Feedstocks, such as raw food waste, will need to be ground up or pulverized. This will help to speed the biodigestion process and also makes it easier to move or pump materials through the system. Grinding and pulping can either occur where the waste originates (such as a dining hall or restaurant equipped with a pulper unit) or as a part of the bio-digester system. Pulping before transport reduces weight and volume, increasing the efficiency of transportation.

Digestion and Energy Generation

- Seeding- Starting the biodigestion process requires seeding the system with materials that contain the micro-organisms that conduct the bio-digestion process. Without seeding, the bio-digestion process will take much longer and some needed microorganism colonies may not form. Examples of seeding stock include the digestate from another bio-digester or sewage sludge. The seed stock should be similar to the kinds of feedstock materials being used. Seed stock will also be important if the bio-digester goes down for maintenance or cleaning or if the bio-digestion mix goes sour and kills off micro-organism communities.
- Feeding Biodigester- Once the material is analyzed, it can be pumped into the biodigester. Most industrial or larger-scale bio-digesters feature bottom feeding systems. This can be helpful especially in the colder climates of Ohio where pipes can be buried underground with less chance of freezing. Feed rates will also need to be regulated to insure that the mix of materials in the digester does not swing rapidly. Some feedstocks can alter the pH of the system, such as the introduction of volatile fatty acids which can alter the pH.
- Mixing- Biodigesters will require mixing to optimize system performance. Types of mixing include pumping material from the bottom to the top of the bio-digester or a mechanical auger. Smaller scale systems can be mixed by hand. Mixing helps to improve the surface area of feedstocks exposed to anaerobic micro-organisms. It also helps to release bio-gas which will remain trapped within the material if it stagnates. Mixing also helps to maintain a more consistent temperature throughout the feedstock.
- Monitoring Temperature -Regular monitoring of pH and temperature are essential to maintaining optimal system performance. Anaerobic micro-organisms work optimally within particular **temperature** ranges. Mesophilic bacteria require temperatures of around 40 degrees C and thermophilic bacteria require temperatures of around 60 degrees Celsius. If there are swings in temperature in the system, it can destabilize bacteria and slow down or halt decomposition. Many bio-digesters utilize the by-products of bio-digestion itself to maintain temperatures. Heat can come from the combustion of methane in a boiler system connected to a radiant system that can heat the system, particularly in cold months. If methane is being used in a Combined Heat and Power unit, the waste heat from this process can be captured to heat the bio-digester. A **pH** range of 6.5-8.2 should be maintained to insure optimal performance. An accumulation of volatile fatty acids (common to food waste, grease, or glycerin) will acidify the environment and can shutdown microbial activity. Variations in feedstocks can also alter pH.
- Bio-gas Production- Bio-gas needs to be collected from the system and

Return to Table of Contents

The BioDigestion Process- Basic Steps



stored in a separate container. More basic systems can draw bio-gas directly from the system and store it in flexible plastic containers or even in large inner tubes. Industrial systems commonly feature a flexible membrane which sits on top of the bio-digester. The membrane is a double-layered system with a protective layer filled with air. This helps to insulate and protect the bio-gas and prevents the bio-gas layer from being compromised and releasing bio-gas into the atmosphere.

Digestate and Nutrient Handling

- Cleaning- The digestate remaining at the end of the bio-digestion process needs to be pumped out of the system and stored. In the event that a mix goes sour, it may be necessary to purge the system. A plan needs to be in place to deliver sour material to an appropriate facility, such as a Waste Water Treatment Plant.
- Digestion and Transport- The digestate needs to be stored and then transported to a site where it can be land-applied or mixed with compost materials.

Testing and Evaluation of Feedstocks

Lo Niee Liew, the lab manager for quasar energy group, discussed the importance of regular lab analysis throughout the bio-digestion process. All feedstocks are analyzed by their laboratory at the Ohio Agriculture Research and Development Station in Wooster before being processed.

Lo Niee describes the importance of the lab analysis as feedback to optimizing the bio-digestion process. The main purposes that she describes include:

- **Determine feedstock characteristics-** analyzing feedstocks on a regular basis to track changes in the chemical composition of materials and to assess potential output and duration of bio-digestion;
- **Process control and monitoring during biodigestion-** regular testing of the material in the digester provides feedback to system performance. Some factors, such as the accumulation of fatty acids or changes in pH or temperature can affect micro-organisms conducting the bio-digestion;
- **Process troubleshooting and improvement-** adjusting the mix of feedstocks entering into the system or changing management processes to optimize system performance;
- **Legal compliance-** monitoring for heavy metals for compliance with EPA restrictions;
- **Feasibility studies-** running a feasibility study to determine the efficacy of different feedstocks or project potential production based on analysis of feedstocks; and
- **Digestate evaluation and management-** conducting analyses of leachate to determine nutrient composition and pH for agricultural land application.

Types of tests to run:

- **Total solids content (TS)-** the percentage of a feedstock that is solid (as opposed to liquid)
- **Volatile solids content (VS)** the percentage of the solids that include volatile carbon that can be converted to methane
- **Carbon/Nitrogen/Sulfur content-** Carbon indicates the potential for methane production, nitrogen can turn into ammonia and inhibit microbial activity, and sulfur can create hydrogen sulfite which creates an odor with the gas.
- **Chemical oxygen demand-** indicates the energy content of feedstocks or

COMMON TESTING PARAMETERS FOR BIODIGESTION

GAS ANALYSIS:	DEFINITION:
Total Solids	Percentage of feedstock that is solid (as opposed to liquid)
Volatile solids	Percentage of solids with volatile carbon that converts to methane
pH	Acid/Alkalinity balance
Carbon	Carbon indicates potential methane production
Nitrogen	Nitrogen can turn into ammonia and inhibit microbial activity
Sulfur	Can create hydrogen sulfite which creates odor in gas
C/N Ratio	Ratio of carbon to nitrogen elements. Optimal ratio of 25:1
Chemical Oxygen Demand (COD)	Indicates energy content of feedstock based on how much O_2 needed to breakdown

Return to Table of Contents

digestate by determining how much oxygen is needed to breakdown feedstocks. This provides a gauge for how much of a feedstock will be turned into bio-gas in anaerobic conditions.

- **Feedstock composition-** ***Cellulose, hemicellulose, lignin*** all refer to the characteristics of carbon materials originating from agricultural crop residue or yard waste. Higher cellulose material (such as wood) will take a longer time to break down. Lignin can inhibit bio-digestion processes. ***Starches*** present materials that quickly convert to bio-gas. ***Oils*** also have high bio-gas potential but are slower to break down and can cause problems with the accumulation of fatty acids. ***Proteins*** can lead to problems with creating ammonia which will inhibit microbial function.
- **Nutrients (phosphorus, potassium, calcium, etc.)-** These are nutrients that become concentrated following the generation of bio-gas. These nutrients can be land-applied as fertilizer, reducing the need to import fertilizer from outside of the system.
- **Alkalinity-** indicates the buffering capacity of the bio-digester. A high alkalinity will limit bacterial activity.
- **Volatile Free Fatty Acids-** The accumulation of fatty acids indicates low bio-digestor performance and potential for acidification of the system.
- **pH-** A pH range of about 7-8.5 is optimal for bio-digestion.
- **Gas composition-** Determination of the mix of gases in the bio-gas. Determining the percentage of methane versus carbon dioxide will provide an assessment of how many BTU's of energy your sample contains.
- **Heavy metals-** Heavy metals need to be closely monitored and are also regulated by the EPA. Both incoming feedstocks and digestate need to be analyzed for the presence of heavy metals. Some heavy metals (including iron and nickel) act as micro-nutrients for microbial communities, so some presence is desired.

Considerations for Biodigester Development

Other factors affecting the use of bio-solids include:

- **Public Perception-** Since many bio-solids result from human waste, there is the perception that it is full of diseases and pathogens. However, the bio-digestion process eliminates pathogens. Odors also present a problem. While odors are greatly reduced through bio-digestion, there is still odor from ammonia in the material which can cause problems. Overall, bio-digestion is a relatively new process that has emerged in the last decade. Public awareness of bio-digestion and waste-to-energy programs is limited.
- **Farmer Relationships-** Utilization of bio-digestion by-products requires a willingness on the part of farmers to change their current practices. Many farmers will resist changing the practices with which they are already familiar. Regular testing of digestate needs to be conducted so that the farmers know what they are putting into their fields. The utilization of digestate also has to match the schedules of farmers who are managing a variety of variables, mostly related to weather. Digestate cannot be applied during rain events or prior to rain events. A period of relatively dry weather is needed both to get equipment into the field to apply materials and to reduce the chance of nutrient run-off. The distance of receiving farms from the digestate is also a factor that will affect the cost of transportation. Another factor of concern to many farms, particularly those with high-clay soils, is compaction. Compaction occurs when fields are wet, heavy equipment is used, or repeated loading increases truck or tractor movement across fields. Utilization of drag-lines where the tractor has a long line of tubing that connects to the truck with digestate can greatly reduce problems with compaction. Drag-lines can also enable a more efficient application since it reduces that amount of time and fuel used when tractors need to continue to re-load from the delivery truck.

Despite these challenges, utilization of digestate presents a significant opportunity for local agriculture. It saves farmers money by reducing their input costs. The cost of fertilizer typically follows the cost of energy. Fertilizer production and distribution requires significant energy inputs. As input costs rise, alternative sources of fertility, such as digestate, will become more cost-effective while building the regional self-reliance of agriculture. The digestate also presents a long-term opportunity for bio-digestion facilities to develop a more diversified revenue stream, reducing dependency on tipping fees to cover most of the costs of bio-digestion. In Germany, there is more effort to create closed-loop biodigestion facilities in which crop residue and farm waste is collected from the farms and processed in a nearby bio-digester for energy. The nutrients and organic matter remaining from the bio-digestion process is then returned to those same farms, creating a more closed-loop cycle of nutrient and organic matter recovery.

For more information on the rise of costs of fertilizer, see http:/www.ers.usda.gov/data-products/fertilizer-use-and-price.aspx

Safety Concerns for Biodigester Facilities

There are a number of safety concerns that need to be addressed with bio-digestion facilities to insure the safety of operators and the general public. The three primary areas to be addressed in bio-digesters include: safety concerns of confined spaces (such as cleaning bio-digester units), safety within the system process, and emergency action plans.

<u>Confined Spaces</u>: Typical confined spaces in bio-digestion might include manure pits, covered manure storage areas, and bulk tanks. These are mostly facilities associated with bio-digesters that process animal manure. The most immediate hazard associated with confined spaces is air quality, including elements that are

flammable, toxic, or can cause asphyxiation or engulfment. More than 130 fatalities have occurred as a result of manure storage and handling, mostly from asphyxiation or engulfment.

Safety of System Processes: Most safety concerns stem from the accumulation of gases common to the biodigestion process. Accumulation occurs in confined or indoor spaces. These gases include:

- **Carbon dioxide-** While a non-toxic and relatively harmless gas, it can displace oxygen in high quantities, leading to asphyxiation. The IDLH (Immediate and Dangerous to Life or Health) concentration of Carbon Dioxide is 50,000 parts per million.
- **Methane**: Also a relatively non-toxic gas that disperses quickly in open-air, methane can present a problem with asphyxiation if concentrations become high in a confined space. Methane can also form explosions in the air if ignited.
- **Ammonia**: Ammonia is an irritant that is easily detected by a strong urine-like smell. Ammonia can irritate the eyes and throat and higher concentrations can lead to wheezing and shortness of breath and can become toxic in situations of prolonged exposure. The strong odor and bodily effects generally prevent long-term contact.
- **Hydrogen Sulfide-** Hydrogen sulfide has a rotten egg smell, although high concentrations can deaden the sense of smell. Hydrogen sulfide is highly toxic and heavier than air, so it can accumulate easily in confined spaces. The IDLH range for hydrogen sulfide is 300 ppm. A few breaths of hydrogen sulfide at 600ppm can cause loss of consciousness and death. Hydrogen sulfide concentrations can soar during agitation or mixing in bio-digestion.

Without proper ventilation, gases are likely to stratify in the atmosphere. Particular attention needs to be given to these gases during mixing or pumping out operations.

Recommendations for insuring a safe environment include electronic reading instruments that provide instantaneous readings of elements in the atmosphere. Respiratory protection is also recommended when engaging in processes that might involve the release of toxic chemicals. Respirators need to be selected on the basis of potential exposures. Air purifying respirators remove particulates, gases and vapor. Supplied air respirators (such as SCUBA equipment) can also be used and are more safe. Dust masks are not effective for most operations. Care must be taken to insure that respirators are not stored in areas that might involve continued exposure to toxic gases. They need to be fitted to the user to insure a tight fit and need to be cleaned and maintained after each usage.

To protect from the potential of engulfment in manure or digestate storage pits, it is recommended that embankments be strong enough to insure that tractors or other equipment will not slide into the pit while dumping, mixing, or extracting material. A sturdy embankment will reduce risk of collapse under the weight of heavy equipment. It is also recommended that storage lagoons or ponds are surrounded by sturdy fencing with warning signs of potential hazard.

The overall bio-digestor system should be assessed for all potential hazards beyond air quality, including:

- mechanical hazards with grinders, mixers, or engines,
- entanglement hazards with any spinning or moving parts that might catch loose clothing,
- thermal hazards such as hot water or high temperatures,
- electrical hazards,
- slipping or falling hazards, and
- skin or chemical exposure hazards.

Emergency Action Plan: An emergency action plan is basic, yet thorough, and customized for the particular operation. All operators and users should be familiar with the action plan and trained where necessary to address any potential hazard. Emergency action plans should also be written and available to all employees, as they will guide people during emergency situations where irrational judgments often prevail.

Elements of a good emergency plan include a walk-through inspection of any hazards and easy-to-understand response plans. It is also helpful to provide tours of the facility for emergency responders and make sure that employees have proper training.

An effective emergency plan will include:

- Emergency exit routes
- Emergency contact numbers for owners/operators, fire/sheriff/squad, equipment dealers, gas/electric suppliers, and neighbors or others familiar with the operation. Even though cell phones might contain a lot of this information, it is still recommended that the emergency contact numbers be printed and easily accessed in the facility. Ideally, they will be posted in any location where hazards might be most significant.
- Property maps should be included that show directions to facility, maps with access points to the facility, all buildings or equipment labeled on the map, and a landscape map that identifies ponds, wells, lagoons, storage tanks, electric poles, and other features of the operation.
- An inventory list should be included that shows the names of any chemicals, locations of chemicals, equipment that might contain any chemicals, fuel or bio-gas storage locations, and locations of fire extinguishers, first aid kits, respirators, or any other safety equipment.
- Fire prevention plans should include a listing of all major fire hazards,

proper handling and storage procedures for any hazardous materials, potential ignition sources and controls, and types of fire protection available. Procedures should also be in place to control the accumulation of flammable or combustible materials, such as methane. Procedures should also be in place for regular maintenance of safeguards on any heat-producing equipment or equipment that might be a source of ignition. A good fire protection plan will include portable fire extinguishers, standpipe and hose systems, automatic sprinkler systems, fixed extinguishing systems, fire detection systems, and employee alarms. Fire extinguishers should be Class A or B extinguishers and should be checked at least annually for pressure. All employees should receive training on the operation of a fire extinguisher.

- Community agencies in the community should be familiar with the operations and aware of potential risks within the operation.

Regulations and Rules

According to the Division of Materials and Waste Management, three recent policy drivers in the State of Ohio provide support for the development of Anaerobic Digesters, including:

a) **Alternative Energy Law (SB 221)-** This law states that by the year 2025, 25% must be generated from alternative energy sources. About 12.5% must come from renewable energy sources such as wind, hydro, biomass, or solar. The remaining 12.5% can come from what are termed “advanced energy sources”, including clean coal or nuclear energy.

b) **Oho Food Scraps Recovery Initiative-** Since its launch in 2007, infrastructure for composting and anaerobic digester facilities have developed considerably. Collectively, residential and food scrap collection programs have led to a 38% increase in recovered food scraps from 2009 to 2010. Most of these scraps are handled in composting facilities and not bio-digesters.

c) **Ohio Solid Waste Plan-** This plan supports and encourages the use of technologies that produce energy. The Ohio EPA has developed policies for the regulation of waste-to-fuel conversion facilities as a way to reduce landfill gas emissions and recovery of landfill gas for energy generation. The Ohio EPA is particularly concerned about monitoring and reducing the impact that Ohio landfills have on greenhouse gases, mostly methane.

Ohio regulates solid waste transfer facilities and disposal facilities, including landfills, composting facilities, and incinerators. However, Ohio solid waste laws do not include disposal that involves thermal or biological processes used to convert solid waste into fuel. Under its laws, Ohio does not regulate facilities that store, process or recycle solid waste unless those activities include open dumping or burning.

Anaerobic digesters are not considered solid waste transfer facilities, compost facilities, landfilling facilities, or incineration facilities. Most regulations applying to anaerobic digesters apply to the use and application of digestate, which contain high nutrient content and are regulated under Clean Water Act rules. Digesters are also subject to air pollution control requirements.

<u>Federal and State Rules Overview</u>: Several federal regulations apply to the operation of biodigetser facilities. The regulations are administered by the Ohio Environmental Protection Agency. Relevant rules include:

a) **CLEAN WATER ACT:** National Pollution Discharge Elimination System (NPDES)- The NPDES permit allows the facility to discharge waste. In the case of digestate, this regulates the beneficial use of the digestate, since that is the only discharge resulting from a bio-digester. **STORMWATER**: Prior to construction, coverage must be sought under the State General Stormwater Permit, which is required to reduce potential run-off problems resulting from construction. Comprehensive Nutrient Management Plan (CNMP) is required for operations that land apply digestate. This includes a detailed evaluation of beneficial uses of nutrients while minimizing run-off. This is particularly important for any applications in the Lake Erie basin, which is considered a distressed watershed due to nutrient loading which has been causing toxic algae blooms in the western portion of Lake Erie. The St Mary River watershed (west of Toledo) alone, an area with extensive livestock, produces the equivalent amount of sewage as the entire population of the State of Ohio.

b) **CLEAN AIR ACT**: Permit to Install and Operate- A PTIO permit is required for air releases from the bio-digester. A General Permit can be submitted for digesters at the beginning of the process. A PTI permit is also required prior to construction of a facility. Detailed engineering drawings with a PFD and hydraulic flows are required as a part of this.

In addition to the above federal and state laws, several local laws will apply to anaerobic digesters, including:

c) **Local Zoning-** Review Local Zoning Laws first to determine which zones will allow for a bio-digester. Typically, bio-digesters will be permitted in areas zoned Industrial or Agricultural. Commercial zoning may or may not permit bio-digester facilities.

d) **Building Code-** Farms are exempt from many building codes. For construction in municipal areas, a building permit will be required for construction and city building departments can be consulted about any special requirements.

e) **Nuisance Laws-** Digesters can be subject to local nuisance laws, which cover any uses or facilities that might be detrimental to the general health of the community, present a fire hazard, are unsafe for occupancy, or are an attractive nuisance to children.

f) **Electrical Grid-** For any bio-digesters that produce surplus electrical energy, the local utility can be consulted about procedures for installing a grid interconnect system.

g) **Transport-** For townships or rural counties especially, officials should be consulted about potential truck routes where materials will be conveyed to insure that roads and bridge weights can accommodate anticipated loads.

Quasar Energy Partners anaerobic digester at the Ohio Agriculture Research and Development Center.

BioGas Testing Labs at Ohio Agriculture Research and Development Center

Return to Table of Contents

Case Study 1- Carbon Harvest Energy in Vermont

OVERVIEW: Carbon Harvest Energy (CHE) is a business based in Burlington, Vermont dedicated to replicating a system that connects landfill gas energy generation with local agricultural production. The system includes a number of pathways that combine local energy production from waste (landfill gas, waste heat, bio-diesel) and food production (vegetables, greens, fish). Their system focuses on maximizing energy from waste and the sun while greatly reducing carbon emissions. Their first project is in the early phases of development in Brattleboro, Vermont. They also have active projects in Chicago and elsewhere in Vermont.

SYSTEM: Their system features the following components, all of which reinforce each other:

1) **Combined Heat and Power-** utilizing waste methane from landfills, which they describe as gigantic anaerobic digesters, to generate electricity for the local grid;
2) **Waste Heat-** capturing waste heat from the generation of electricity for circulation in a complex of greenhouses;
3) **Greenhouse Production-** capturing waste carbon dioxide to support vegetable, greens, and seedling production;
4) **Recirculating Aquaculture-** growing tanks for fish that recirculate fish effluent to produce algae for energy or fish food and support production of hydroponic plants; and
5) **Algae Culture-** utilizing fish emulsion to cultivate algae which can be used to produce bio-diesel fuel or dried and utilized for fish food

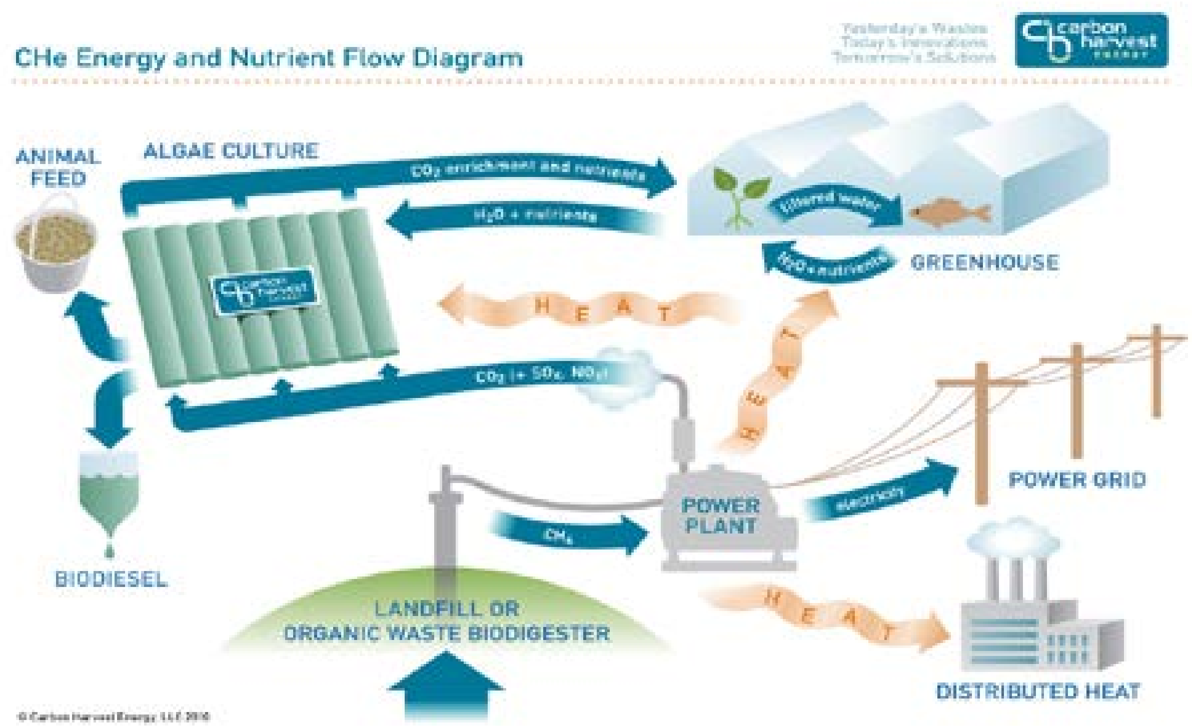
1) Bio-Digestion/Combined Heat and Power- Their system is based on maximizing the benefits of landfill gas. Methane results from the anaerobic decomposition of organic material embedded in solid waste streams. Instead of methane being flared or emitted into the atmosphere, methane is captured and run through a series of generators to produce electricity. Electricity can be fed into a municipal grid system or utilized by surrounding buildings. Waste heat produced through the generation of electricity is captured to support a variety of ancillary agricultural production systems, mostly vegetable and fish production.

2) Waste Heat- Their business model is based on utilization of waste heat from energy generation. They site the cost of greenhouse heating as the number one limiting factor for aqua-ponic greenhouse systems in northern cold-climate regions. Residual heat is used for:

1) greenhouse heating,
2) aquaculture system heating,
3) offices,
4) algae processing,
5) plant and algae drying, and
6) distribution to adjacent businesses or buildings

They have also developed a seasonal cycle for utilization of heat, focusing summer heat to stimulate algae growth and to dry algae and plants. Winter time heat is utilized to heat greenhouses and other spaces when heating demands are highest.

3, 4) Greenhouse Production/Recirculating Aquaculture- Greenhouses are utilized to create a controlled growing environment to produce food year round, a particular challenge in cold-climate areas. The CHE system is based on their CEO's prior work at the Laughing Duck Farm where he established a 3,500 square foot



greenhouse that produced $250,000 worth of product through intensive vegetable and fish production. The system includes the following components:

1) **fish tanks** for production of fish,
2) **bio-filter** which traps solids and contains micro-organisms that convert fish waste to plant nutrients,
3) **hydroponic feed line** delivers nutrient rich water to plants,
4) **grow trays** are also filled and drained to allow plants to take up nutrients, and
5) **return line** delivers clear, clean water back into fish tanks, eliminating overall discharge.

The Carbon Harvest Energy system builds on this initial system to maximize utilization of waste heat as an input to greenhouse production while utilizing algae culture to further process wastes and create a self-reliant feed loop for fish.

5) Algae Culture- Algae provides a number of contributions, first and foremost in the productive utilization of waste nutrients and emulsion from fish farming. Algae can be used to produce bio-diesel or provide fish feed. Algae are also utilized through a unique bio-filtration system that filters and captures NO_x, CO_2, and other gases emitted from the landfill gas. This minimizes carbon emissions, either in the form of methane or carbon dioxide resulting from methane combustion.

EDUCATIONAL PARTNERSHIPS- Embedded in all CHE systems is extensive education and research. Primary research partners include the University of Vermont and Dartmouth College. Research projects utilize academic labs and faculty/student research projects to evaluate and improve system processes. In the case of Dartmouth, their CHP project will both power the campus and provide local food to the larger region. Research projects include:

a) research on cultivation of native algae species,
b) gas containment and filtration potential utilizing algae,
c) algae biomass as bio-fuel feedstock, and
d) optimization of feed properties of algae in aquaculture.

ADVANTAGES OF SYSTEM- The CHE system addresses a variety of larger environmental and social issues, including:

a) Carbon Emissions- The system comes close to eliminating carbon emissions connected to food and energy generation.
b) Displacement of Fossil Fuels- The system creates an alternative energy and food production system that does not require extensive fossil fuel inputs.
c) Zero Waste- The system helps to create a zero waste model where the waste of one process is optimized as an input to support other processes
d) Water Conservation- The aqua-ponic systems involve a continuous recycling of water, greatly reducing the extensive water inputs common to most forms of agricultural production.
e) Nutrient Capture- Nutrient run-off from farms is the number one source of non-point source water pollution in the United States. Instead of wasting or dumping nutrients, the nutrients are re-circulated to produce additional food (plants and algae for fish food or liquid fuel)
f) Oceans and Fisheries- Fish populations have been in significant decline as a result of over-harvesting. Nutrient pollution from agriculture has also impacted fish spawning areas through excessive algal blooms. This system can create a new source of sea food while allowing recovery of ocean fisheries and protection of fish bio-diversity.
g) Local Food Access- The proximity of these projects to urban areas provides a local source of food with minimal transportation costs.
h) Employment- Landfill gas systems, with the exception of short-term construction jobs, have a minimal impact on local employment. They typically require one primary operator. Connecting the systems to greenhouse production can have a significant local job impact. A system being developed outside of Chicago is looking at a 25 acre greenhouse complex with a 3.5 MW generating facility that can employ an estimated 110 people.
i) Land Use- The CHE system produces a significant amount of food with a relatively small overall acreage foot-print. These kinds of models are critical for reducing the land and environmental foot-print of agricultural production, which is the number one contributing factor to the loss of bio-diversity world-wide.

CHALLENGES OF SYSTEM- The CHE system includes a variety of challenges, including:

a) Landfill Gas Time Horizons- Most landfill gas systems will be productive for a limited window of time, about 30 years or less depending upon the size and configuration of the site. However, continual capture and utilization of municipal solid waste and sewage fed into a large-scale bio-digester can eventually replace landfill gas, although it is not clear that the same levels of output will be possible.
b) Engineering- These systems rely on a variety of complex and inter-connected systems that all have to work for the system to function. This creates a significant engineering challenge that will require qualified engineering expertise to address.
c) Finances- These systems are not cheap. The 25 acre, 3.5 MegaWatt system in Chicago is expected to cost about $36 million to develop. However, it is estimated that it will produce about $18 million in revenues.
d) Undercutting Local Farms- These systems focus on high volume production, minimizing costs of heat inputs that would normally make these systems cost-prohibitive. They need to be developed in collaboration with area farmers to insure market differentiation. These systems are ideal for higher volume markets such as institutions or schools that might be inaccessible to smaller producers.

Case Study Two- OARDC Quasar Biodigester Energy System

Quasar Energy Partners developed a prototype anaerobic digester system at the Ohio Agriculture Research and Development Center in Wooster, Ohio. The system is based on bio-digester designs developed and widely deployed in Germany. The Quasar system includes three primary phases which characterize any bio-digestion system: pre-digestion, digestion, and by-product use.

The pre-digestion phase includes three primary steps.

1) Feedstocks and Testing: The OARDC Quasar system runs off of four primary feedstocks, most of which are by-products of food manufacturing, including crop residue, cheese whey, food waste, and waste grease. Samples of all incoming materials are tested in the OARDC testing labs on the same campus before they are introduced to the system.
2) Receiving: Materials are dumped into a receiving tank and mixed with water if the solids content is too high.
3) Grinding/Pulverizing: Feedstock materials run through a large grinder that pulverizes and further liquefies materials. They are then pumped into a large insulated silo where feedstocks are stored until they can be fed into the bio-digester.

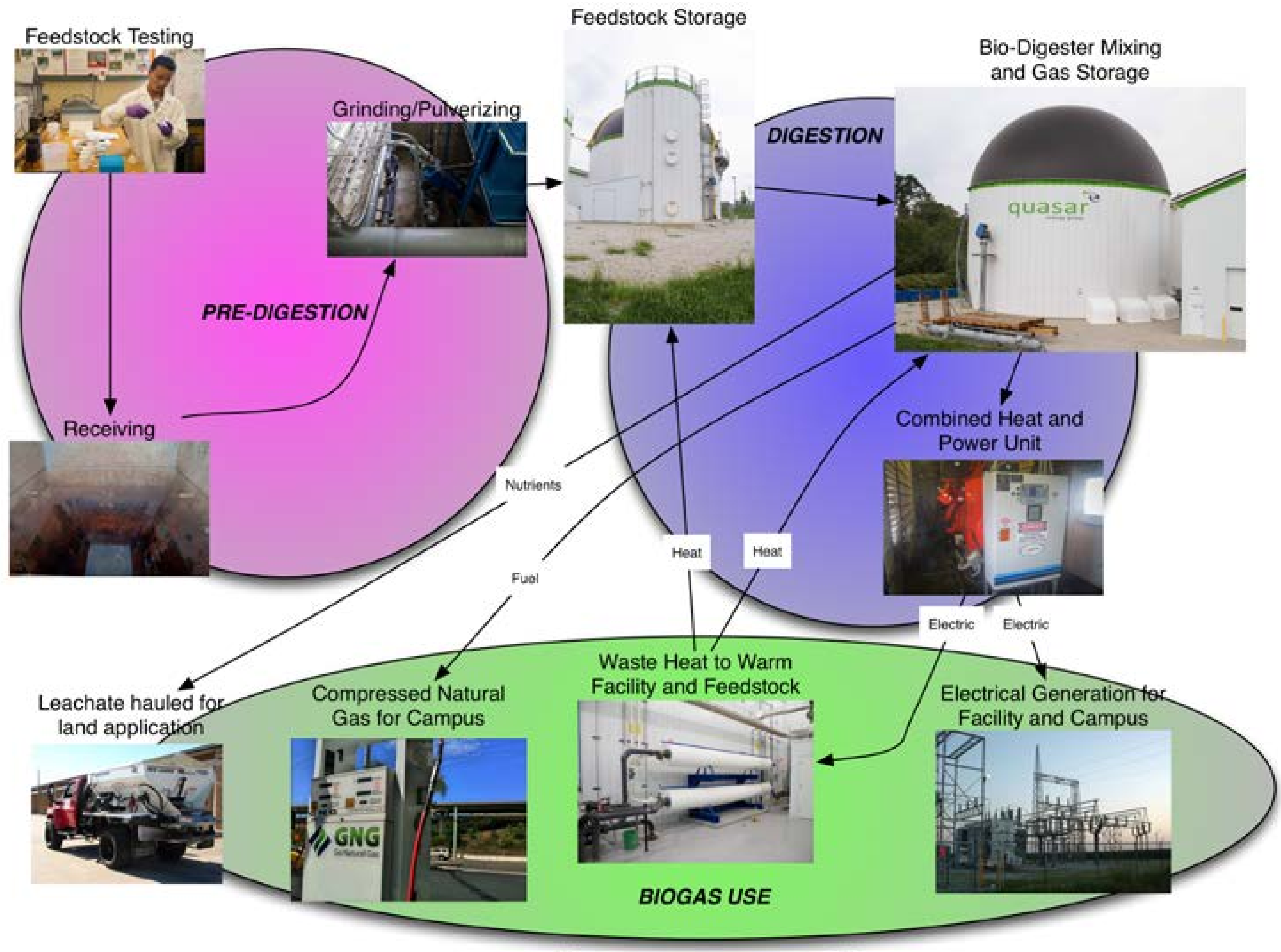
The digestion includes three primary phases:

1) Feedstock Heating and Pumping: Feedstocks are stored in a large vertical silo. During the cold months, heat waste produced by a Combined Heat and Power (CHP) is used to keep the feedstocks at a steady temperature. The feedstocks are then pumped through a series of underground, insulated pipes into the bio-digester.
2) Bio-Digestion: The feedstocks enter at the bottom of the bio-digester with a 550,000 gallon capacity. A separate series of pipes will draw material from the bottom of the digester tank and release it into the top of the tank. This helps to keep the material mixed. The mixing is essential both to reducing retention times (by increasing microbial activity) and also releasing bio-gas. Bio gas accumulates in a double-hulled plastic membrane affixed to the top of the digester. The outer membrane contains air and provides both insulation and a consistent shape to the bio-digester. The interior membrane contains the bio-gas. Its shape will vary according to how much bio-gas fills up the membrane. A flare unit is attached to the bio-gas tank and enables excess bio-gas to be flared (burned and converted to carbon dioxide) if the pressure builds up too high. A secondary release valve is also attached to the bio-gas membrane and will allow excess gas to be released to the atmosphere if the flare unit does not work. Flaring bio-gas will reduce the potency of bio-gas as a greenhouse gas by converting it to carbon dioxide through combustion.
3) Combined Heat and Power Unit (CHP): A CHP generator burns bio-gas to produce both electricity and heat. Electrical energy feeds the electrical power grid, providing electricity for the OARDC campus. The waste heat is captured and utilized to both heat the facility and to heat the feedstock and digester tanks. Quasar staff said that about 10% of electrical energy goes to the facility. All of the waste heat is utilized by the facility.

The anaerobic digester produces four primary by-products which provide value:

1) Electricity: Electricity powers the Quasar facility and provides electrical energy for the campus grid.
2) Heat: Waste heat from electrical generation is used to heat the facility and maintain the temperature of the feedstock and digestion tanks.
3) Compressed Natural Gas: Bio-gas is cleaned (increasing methane content and eliminating elements such as hydrogen sulfides) and compressed and made available to fuel transportation, mostly of campus vehicles.
4) Leachate: A local farmer collects and hauls digestate for land application for farms in proximity to the OARDC facility.

Overall the Quasar facility is a multi-million dollar facility that requires a high degree of expertise in the maintenance and management of the facility. Complete logic controls enable all aspects of the system to be monitored. Any problems with temperature, pH, leakage, pressure build-up, or any other problems for the system are sent to the system operator’s phone as a text message. All of the system controls can be managed and maintained through a cell phone application.


Feedstock Testing
Grinding/Pulverizing
PRE-DIGESTION
Receiving
Feedstock Storage
DIGESTION
Bio-Digester Mixing
and Gas Storage
quasar
Combined Heat and
Power Unit
Nutrients
Fuel
Heat
Heat
Electric
Electric
Leachate hauled for
land application
Compressed Natural
Gas for Campus
GNG
Waste Heat to Warm
Facility and Feedstock
Electrical Generation for
Facility and Campus
BIOGAS USE

Case Study 3- The Plant in Chicago

Up until the early 2000's, most urban agriculture outside of home gardening predominantly focused on community gardening, with most harvest going toward self-consumption. Community gardens encourage social mixing, exercise, and better nutrition while moving individuals and families a small step toward self-reliance.

In the mid-2000's, a number of projects in urban centers moved toward more sophisticated models of urban food production. These projects include re-use of abandoned or under-utilized commercial or industrial buildings, production for local markets (rather than self-consumption), and utilization of the abundant wastes present in any urban center.

The Plant in Chicago echoes this emerging trend for urban food production in the Great Lakes Region. Located at a 100,000 square foot industrial facility, the Plant occupies a space that once linked with the Stockyards south of Chicago, providing a meat processing and packing facility to prepare meats for urban markets and broader commerce.

For the Plant's Founder, John Edel, the vision for the Plant is to provide a new model for urban food production linked to local economic development. The Plant is working to transition this space into an urban food center that generates jobs, new enterprises, education, and research. The Plant is split between both non-profit and for-profit entities. The For-Profit company, called Bubbly Dynamics, will own the physical building and equipment, including facilities for aquaculture production (fish farming), renewable energy systems, a micro-brewery and tasting room, and a range of specialized commercial kitchens. The non-profit entity, called Plant Chicago, provides space for a variety of non-profit or educational activities, including a community kitchen incubator to support new local food entrepreneurs and education and research functions aimed at improving urban food production techniques. The rooftop and surrounding 3 acres of mostly asphalt include a number of organic vegetable gardens and beehives.

The centerpiece for the Plant operation will be an anaerobic digester that will utilize a variety of waste streams, both from the Plant operations and surrounding businesses in the Chicago area, to produce energy for use in the Plant.

The bio-digester is being developed by Eisenman Company, who is working with Crystal Lake, a local manufacturer, to fabricate the primary parts for the bio-digester. The bio-digester will include 2 plug flows as the primary digesters. These are long, horizontal structures or tubes with a central auger that moves feedstock from one end of the digester to a digestion chamber which will produce bio-gas. The plug flow system will have a 5:1 ratio with 5 times greater length than width. The tube includes an insulated and heated steel tank with a gas tight cover that captures bio-gas. Material fed into one end of the digester advances to the outlet as new material is added with digestate coming out of the other end.

The leachate remaining at the end of the process will be stored temporarily until it can be utilized as a local source of fertilizers and nutrients. The unit has the capacity to process 32 tons of organic waste material per day through two separate plug flows.

<u>Feedstocks</u>: The primary feedstocks for the Plant biodigester will include spent grains from a micro-brewery being developed in the facility. The Plant is also working with a number of micro-breweries and distillers in the Chicago area to process their spent grains. They are also working with Chicago Bio-diesel, a company that produces bio-diesel from waste vegetable oil, to process glycerin, a by-product of bio-diesel production. They will also accept food waste from a Testa Food Indus-

Return to Table of Contents

tries, a food manufacturer next door to their facility. They will be collecting food waste from other sites around the city as well. The predominant waste streams will include spent grains and glycerin, both relatively consistent feedstocks for bio-digestion. Food waste tends to be more variable. However, because this is a small portion of food waste in their waste stream, the system can handle some variation.

The feedstocks will be picked-up and delivered to the Plant both through a combination of their own truck fleets and sub-contracts with other haulers. They are working with Chicago Bio-Diesel to develop a waste hauling system that would enable pick-up and transport of both food waste and vegetable oil waste at the same time. They will charge a tipping fee for pick-up of waste materials, a fee that will be comparable to standard waste management charges, estimated at this time to be about $25 per ton. The overall cost of disposal in the Chicago area is relatively cheap in comparison to other parts of the country, limiting tipping fees to a modest rate.

The feedstocks will be delivered to two receiving hoppers, which are basically ground pits. A diversion switch can be utilized to send materials to a heavy-duty grinder that can break-up larger materials, such as raw food waste. Distillery and brewery grains are already processed to the point where they can be directly fed into the biodigester without additional pre-processing. The micro-brewery at the Plant is engineered to directly feed brewery waste through a pipe into the bio-digester.

<u>Bio-Digestion Process</u>: The plug flow system features two tubes, each 100 feet in length. Paddle augers move material down the tubes to keep a good mix of materials and to release bio-gas during anaerobic digestion. The system follows thermophilic digestion, a generally more efficient process than mesophillic digestion. However, the micro-organisms in thermophilic digestion require consistent high temperatures to operate.

<u>Bio-Gas Utilization</u>: The bio-gas produced by the digester will support the following uses for the Plant:

- **Brewery**: Bio-gas will be burned directly for steam boilers that are a part of the brewing process
- **Combined Heat-Power Unit (CHP):** A combined heat and power generator will be used to produce electricity from the bio-gas. The electricity will be utilized by a variety of Plant functions, including grow lights for basement aquaponic systems, mechanical systems, pumps, and blowers.
- **Bio-Digester**: Hot water capturing waste heat from the CHP unit will be circulated back into the bio-digester, particularly in the winter, to maintain consistent temperatures for optimal digestion.
- **Heating and Cooling**: Waste heat from the CHP turbine will also support cooling and heating systems for the overall facility. The facility features old masonry with two-foot thick brick walls which naturally keeps the interior temperatures more consistent within the building.

Edel also considered utilization of bio-gas to provide cooking fuel for their commercial kitchen facilities. However, he determined that utilization of bio-gas for cooking would not be worth the amount of effort it would take to clean and compress the gas for usage. Kitchen equipment could utilize bio-gas, but the orifices that control gas flow and burning have to be modified to accommodate the mix of methane present in the bio-gas. If methane content is inconsistent or the bio-digester is not operating, it will be difficult to re-convert the equipment to operate off of traditional natural gas sources.

<u>Operations</u>: Edel anticipates hiring at least one specialist to oversee and operate the bio-digester unit. This person will be responsible for monitoring the system to insure consistent quality of feedstocks for bio-gas generation. Eisemann, the company fabricating the bio-digester system, will monitor and control the facility during the first year, transitioning its management to an on-site manager. A maintenance contract will be maintained with Eisenmann to provide specialized maintenance of the facility. Employees will also be needed for hauling and delivery of feedstocks to the unit.

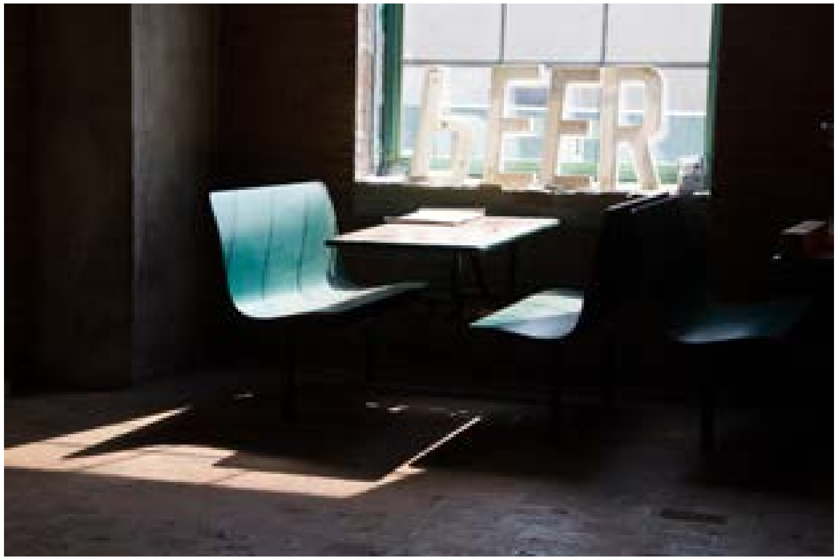
The cost of operating the facility will be a shared expense between the commercial tenants using the facility. Charges will be based on the amount of energy utilized from the CHP or the heat from the system.

<u>Capital</u>: A bio-digester of this scale can generally be expected to cost around $4 million. The actual cost of the bio-digester under development for the Plant was not available, as some of the details are still being worked out with the manufacturer. The Plant received $1.55 million in state financing to support development of the building. A loan was received from the Chicago Community Loan Fund which supports projects in Chicago that have difficulty accessing financing from traditional lenders. Because the Plant building is a derelict building, it has no mortgage value and cannot be used for collateral. Edel's company purchased the building and 3 acres of land for about $540,000.

<u>Permitting and Regulations</u>: Regulations and permitting apply mostly to air emissions and digestate. Because the air quality impacts of bio-digestion are minimal, the facility is regulated as a low-emissions facility with little fee. Illinois EPA regulations will apply to collection and application of the digestate, including safe storage and transport to prevent leaching and land application protocols to insure that excess nutrients do not pollute waterways. A Class III special waste handling permit also had to be obtained from the Illinois EPA in order for them to accept waste from commercial sources. The state operates an incentive program to encourage composting or anaerobic digestion of organic solid wastes. This means that the cost of a waste handling permit are a fraction of the cost that traditional waste haulers would have to pay. As far as zoning, the plant had to petition the City of

Return to Table of Contents

THE PLANT- ENTERPRISES UNDER DEVELOPMENT

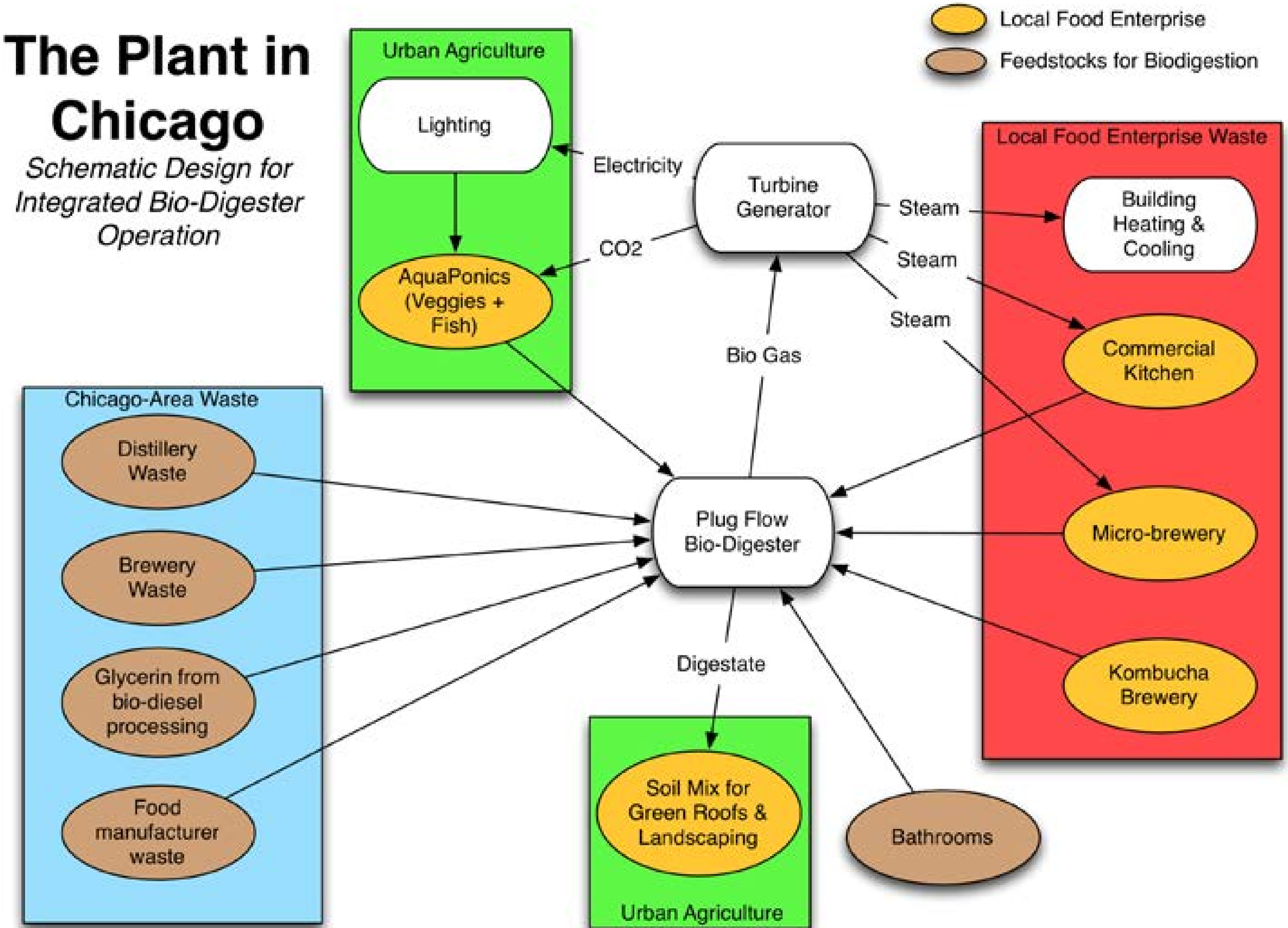


A micro-brewery will provide a neighborhood pub. The brewery waste will fee the bio-digester on site.

A number of commercial kitchens are being developed to serve individual entrepreneurs. A shared-used kitchen will help to incubate new local food entrepreneurs.

The landscape surrounding the plant is mostly asphalt and concrete. Urban gardens utilizing municipal leaves and wood mulch are built right on top of the asphalt.

The flatroof for the Plant facility is being utilized to support a variety of roof-top gardening applications.


The Plant in Chicago
Schematic Design for Integrated Bio-Digester Operation
Local Food Enterprise
Feedstocks for Biodigestion
Urban Agriculture
Lighting
AquaPonics (Veggies + Fish)
Electricity
CO2
Turbine Generator
Steam
Steam
Steam
Bio Gas
Local Food Enterprise Waste
Building Heating & Cooling
Commercial Kitchen
Micro-brewery
Kombucha Brewery
Chicago-Area Waste
Distillery Waste
Brewery Waste
Glycerin from bio-diesel processing
Food manufacturer waste
Plug Flow Bio-Digester
Digestate
Soil Mix for Green Roofs & Landscaping
Urban Agriculture
Bathrooms

Chicago for a zoning designation change. The site moved from a zoning designation of M2-3 to M3-2 to accommodate the intended uses of the Plant facility. Anaerobic digestion plants are permissible only in industrially-zoned cites with the city. The Plant has overall received strong support from the City of Chicago's Mayor's office which considers it an important approach to linking local food systems with economic development and ob creation.

Digestate: The digestate presents the largest challenge to the bio-digestion operation. Edel notes the difficulty of storing large amounts of digestate in a more constrained site in a city. The optimal location for storage would be a large lagoon. These types of sites are best situated in rural areas where land area is not as constrained. They are currently working with a Chicago-based landscape company that will mix digestate into a specialized soil mix that will be used for greenroof development or other urban agriculture or landscape applications. They expect to sell the digestate at about $10 per cubic yard. However, given the precise nutrient requirements of the soil mix, the nutrient content of the digestate needs to be consistent. Their emphasis on sources like distillery or brewery waste or glycerin were chosen due to their ability to produce a more consistent digestate. Because food waste is a small percentage of the overall mix, it's inconsistent quality will have less effect on the overall material. Digestate will be collected and stored on site, although an alternative storage location will likely be needed given the seasonal nature of soil mixtures or any land applications that might occur on area farms. The off-season storage of digestate remains one of the largest challenges to anaerobic digestion efforts. Edel noted that a vertical stirred unit is less expensive than the Plug Flow, but the vertical units result in more liquid digestate to manage.

Overall, the Plant is working to create a more closed-loop model for urban food production in which the waste of one source is converted into food and energy for other processes. Just like the energy needed to operate the local food enterprises in the facility will be provided by conversion of urban wastes into bio-gas, the emulsion from fish in the aquaculture systems will be captured to provide nutrients for hydroponic vegetable production. Edel refers to the importance of co-location of local food enterprises to produce more closed-loop nutrient and energy flows while generating greater efficiencies.

The aquaponic system at the Plant, located in the basement of the facility, features a series of fish tanks producing tilapia or perch. The fish effluent is circulated through growing beds to raise a variety of vegetables. The bio-digester for the Plant will generate electricity for indoor grow lights and heat for the aquaculture tanks.

However, Edel notes the difficulty of local food production. Given very tight margins and a complex range of system variables, from temperature to diseases or pests, Edel remarks that food production is probably one of the most difficult economies to support.

Rooftop beehives at The Plant.

GROWING POWER FOOD HUB IN CHICAGO

About 12 blocks away from the Plant is the headquarters of Growing Power Chicago. This converted warehouse features indoor vermicomposting and aquaponic systems and about 7 acres of growing space. The facility produces worm compost for distribution to its 7 urban gardens. Plans are underway to develop a food waste bio-digester to heat and power the facility.

Case Study Four- Waterman Farm On-Farm Biodigestion

The Waterman Farm is a 200 acre research and education farm located in Columbus, Ohio on the Ohio State University Campus. Jay Martin, Associate Professor of Ecological Engineering in the Food, Agriculture, and Biological Engineering department, has been conducting research on small-scale, on-farm bio-digestion since 2009.

His research project focuses on the adaptation of small-scale bio-digestion systems to cold climate conditions in Ohio. These systems are common to rural farming villages in China, India, Mexico, and Central America where a lack of energy generation infrastructure supports small-scale bio-digesters that mix animal and human waste with agricultural crop waste to produce bio-gas. With the majority of research and development for bio-digestion in America focused on large-scale farms or municipal applications such as Wastewater Treatment Plants, Martin's focus is on researching the efficacy of bio-digestion scaled for smaller farm operations. With 95% of the farms in the United States involving small to mid-scale production (400 acres or less), Martin is interested in how bio-digestion can be scaled to the majority of farms in the United States.

Their experimental system features a 600 gallon digestion tank that is buried in the ground and enclosed with a non-heated high-tunnel greenhouse. Cow manure is gathered from a nearby dairy cow operation and fed into the digester. The solids content of the raw cow manure is about 14%. In order to achieve the 7% solid content appropriate to the liquid digester, the raw cow manure is mixed and diluted with water at approximately a 1:1 ratio. The slurry is poured into a receiving inlet for the bio-digester every other day.

The digestion tank itself needs to be filled with around 85% liquid, although the actual water level will fluctuate as bio-gas accumulates or is withdrawn from the system. Bio-gas accumulates in the air pocket of the tank above the water level. As the gas pressure builds up, it pushes the water level down. This fluctuation of the water level as gas accumulates or is extracted allows the tank to self-mix. Because the tanks need to be completely airtight to contain methane and prevent the introduction of oxygen to the system (which disrupts the anaerobic digestion process), it is difficult to place a mechanical or hand-powered mixer into the system.

The water level in the inlet tank can be measured to determine the amount of gas that has been generated. Gas is pulled out of the system through a vinyl tube. As an experimental system, collected gas is released into the atmosphere and is not utilized for any energy generation.

A displacement tank sits at the other end of the system. The nutrient rich digestate will accumulate in the displacement tank. The digestate is periodically pumped out of the system and returned to a manure collection tank at the Waterman farm. In a working farm situation, the digestate could be direct land-applied.

Overall, the digester produces bio-gas that has a methane content of about 65-70%. This content is appropriate for use in cooking stoves or hot water boilers that might be common for most on-farm applications. The most common applications include stoves for home-cooking or limited food-processing or hot water boilers that provide hot water for use in dairy operations or for heating dairy parlors, greenhouses, or other farm buildings. The bio-digester slows down considerably in the winter, with the digester producing bio-gas with about 40-50% methane content when it is operating. The system shut down entirely during the peak winter months and, in prior years, had to be re-inoculated with anaerobic micro-organisms to resume operation in the spring.

Based on three years of research, Martin had a number of recommendations for improving the performance of these systems, as summarized below:

1) Winter Performance: Given that the winter months will provide the highest demand for bio-gas for heating purposes, Martin recommended some system modifications that could improve system performance. First, the digestion tank should be placed above ground or only partially buried. The ground temperature remains consistent at around 55-60 degrees. While this works for the summer-time, this temperature is too cool to allow for adequate bio-digestion in the winter. Second, he recommends insulating the bio-digestion tank or placing it in an insulated space. He did caution that tighter spaces would need to be equipped with gas sensors to monitor potential accumulation of toxic gases, mostly hydrogen-sulfide or methane. Third, he recommended utilizing some of the bio-gas generated by the system to heat the digestion tank itself in an effort to maintain more consistent temperature conditions.
2) Co-Digestion: Given that Oberlin is primarily focused on bio-digestion of food waste, Martin recommended finding a source of cow or hog manure that could be mixed in with the food waste. He recommended diluting the food waste which, at a solids content of around 23%, is too high for most liquid digesters. Martin suggested that mixing cow manure would increase the carbon ratio of the mix, moving the Carbon:Nitrogen ratio to 15/25:1 for optimal digestion. He also said that the manure will help to buffer the pH, getting it closer to the 7-8.5pH range.
3) Sizing: Martin suggested that determining appropriate sizing will depend both upon the quantity of waste feeding the system and the anticipated retention time for material to break down. In optimal temperature and pH conditions, it could take as little as 5 days retention time for waste to be converted to gas. However, the high percentage of lignin in the food waste from the college (from napkins and paper towels) will lead to a higher retention time. This would require a longer retention time to produce the

Return to Table of Contents

WATERMAN RESEARCH FARM:
Ohio State University
Columbus, OH

Small-Scale, On-Farm Biodigestion

View of Digester Chamber


Liquifying manure mix


Feeding the Digester


Mixing the Digester


Cow Manure Collection


Maintaining Temperature


Collecting BioGas

Waterman Farm Digester Design

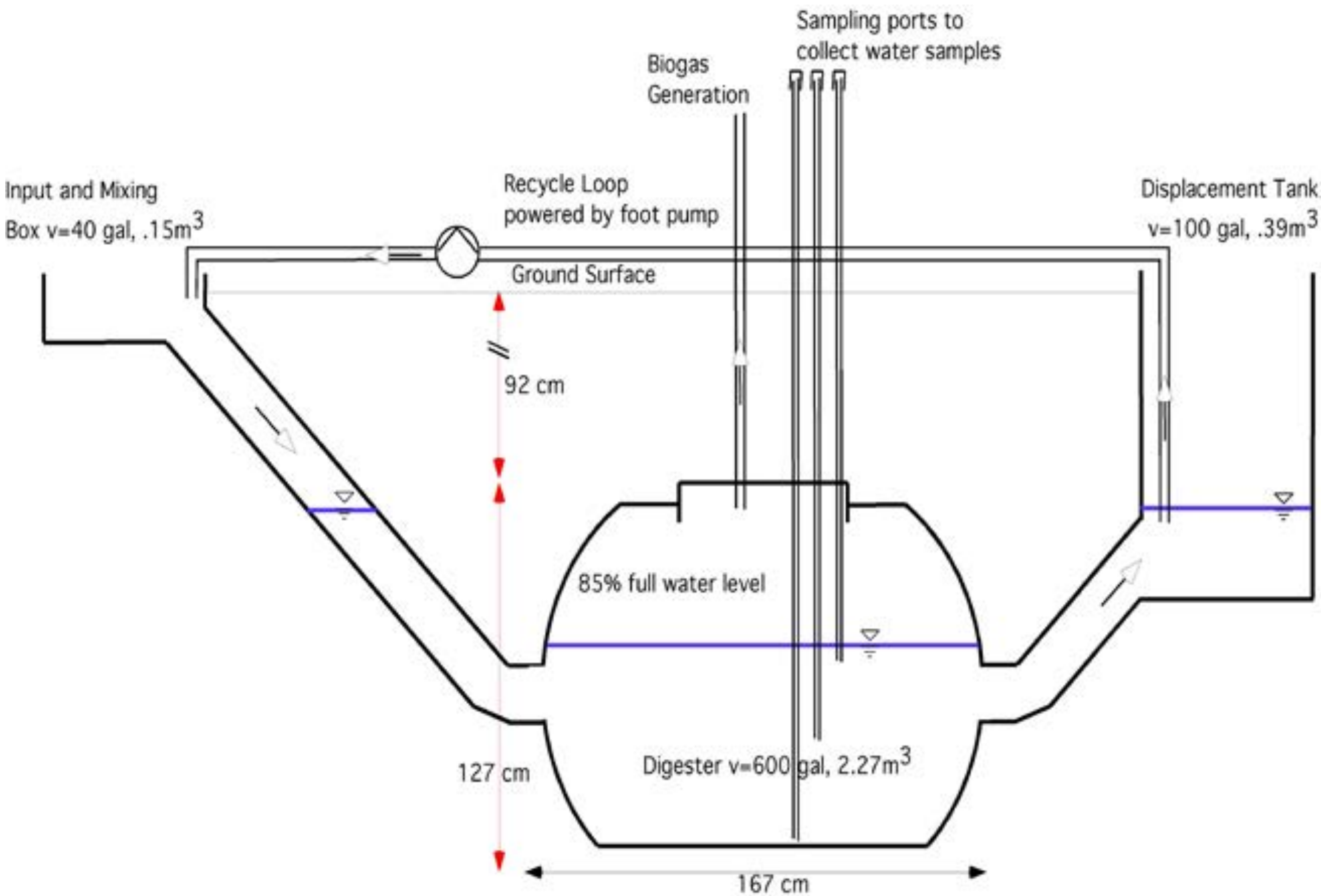
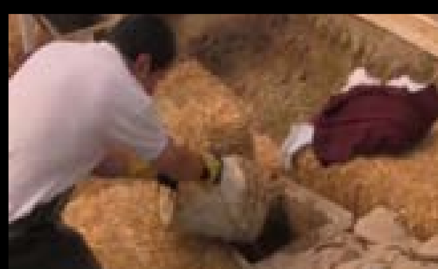


Diagram courtesy of Jay Martin, Ohio State University same volume of gas. Martin also suggested looking into smaller-scale plug-flow digesters that have two separate tanks and provide an easier method for removing digestate. The two plug systems are also designed for more optimal microbial communities. The two basic stages of bio-digestion require different colonies of microbes and the two plug system helps to separate these communities.

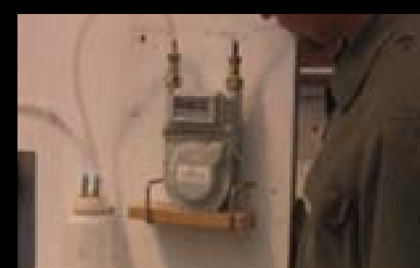
4) OARDC: Martin recommended connecting with Yebo Li at the Ohio Agriculture Research and Development (OARDC) center in Wooster. He is engaged in two research projects that could inform bio-digestion efforts in Oberlin. He is working on developing a dry-digester system that would be capable of handing food waste with a solids content of 20% or greater. He is also working on some pre-treatment of feedstocks that have high lignin content to identify some ways of breaking it down to reduce retention times.
5) Equipment and Supplies: Martin mentioned that finding equipment and supplies both for building bio-digesters and for cook-stoves or heaters that are set-up to run on bio-gas can be difficult. Due to the heavy emphasis on large-scale bio-digestion in the United States, equipment suited to smaller scale bio-digestion is typically obtained from outside of the United States. Presently, China is probably the best source of most materials, given that small-scale bio-digestion has been commonly practiced throughout the country since the 1970's. Martin identified Living Arts Systems in Colorado as one of the suppliers for the equipment that he needed for his system. Many of their components are imported from China or other countries.
6) Summer Usage: To keep a bio-digester functioning, it is important that it be fed and maintained throughout the year. The use of bio-gas for heating in the winter will be one of the most productive inputs to a farm. However, identifying a summer-time use for bio-gas will be important to the system design. Martin recommended further research on some chillers or cooling units designed to run on bio-gas. He also suggested other activities, such as cooking or processing food harvested on the farm or utilizing bio-gas to support dehydration.
7) Maintenance: Martin suggested that bio-digesters will require a higher degree of maintenance during the establishment phase of the digester. It will take time to optimize the system, get the right mix for feedstocks, and insure that the system is air-tight and water-tight. Once established, maintenance time is reduced to regular feeding of the digester, monitoring temperature and pH, and extracting and using bio-gas and digestate. For the system at the Waterman farm, the third year required minimal time for labor and maintenance. Much more time was spent the first two years getting the system working correctly. For this reason, it is ideal to establish a bio-digester in a location that will have continuity with systems operations and management. Students can assist with research and monitoring, but the system will need to be overseen by someone who has more skill and on-going experience with operations.
8) Small-Scale Pilot: Martin recommended starting with a smaller-scale pilot project that will enable greater flexibility in determining appropriate feedstock mixes and operating conditions. Digestate can also be tested to determine its nutrient content and its most appropriate application. This pilot-phase system can inform the development of a larger system that might be integrated with a working farm or commercial local food operation.
9) Key Variables: Martin suggested close monitoring of three key variables to optimize operations: temperature, pH, and air-tightness of digestion chamber. These three variables will have the greatest influence on retention times, the quality of bio-gas, and the nutrient-content of digestate.

INTERACTIVE FILM CLIPS FROM THE WATERMAN FARM



The Process of Small Scale

Adapting Digesters to Cold Climate Conditions



Storage and Use of Bio-gas

Return to Table of Contents

Options for Biodigestion in Oberlin

Oberlin has a number of options to consider for bio-digestion. Some options require further investment and capacity building while others build on already existing infrastructure and assets within the community.

As a starting point, the following community networks and physical infrastructure is in place to support the development of anaerobic digestion of food waste materials:

Community networks that could support a project include:

- Oberlin Project and networks to support local food and energy development,
- potential partnership with Oberlin College for materials testing/monitoring,
- strong regional and state research and development interest in bio-digestion n Ohio,
- Oberlin has strong connections to China through Shansi program that could potentially be leveraged for technology transfer of small-scale bio-gas production,
- potential for student and/or faculty research dedicated to biodigestion development, and
- New Agrarian Center and working farm as potential site.

Physical infrastructure in the community includes:

- Labor for collection and movement of materials,
- already experience in community in collecting and moving materials for composting,
- grinder-pulper unit could be utilized, but may need to be re-located to optimize its value to broader composting, and
- two active anaerobic digesters already functioning in the community, including the Oberlin Wastewater Treatment Plant and the Living Machine at the Environmental Studies Center.

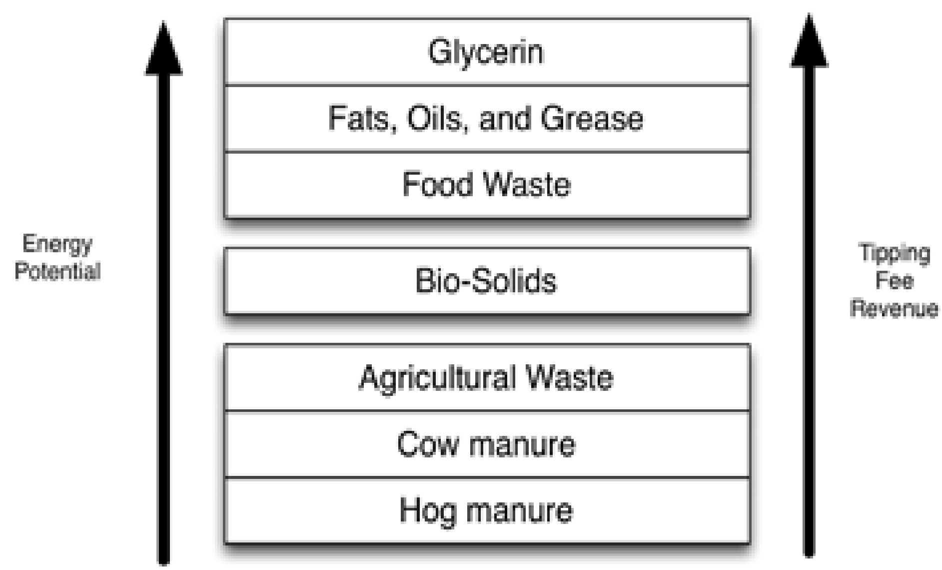
BioGas Potential of Oberlin Food Waste

Bio-gas represents the captured energy that results from the digestion and conversion of waste materials or feedstocks. Common feedstocks for anaerobic digestion include agricultural wastes (crop resides and animal manure), bio-solids (treated sewage waste), and food waste. The accompanying chart indicates both the energy potential and the revenue potential for each form of solid wastes.

Hog and cow manure, agricultural waste, and bio-solids are feasible materials to undergo anaerobic digestion, but have the lowest embodied energy potential of any group on the list. Because they also generally have a lower percentage of volatile solids, there will be a higher percentage of digestate remaining after bio-digestion is complete.

Food waste tends to have the highest embodied energy that can be converted into bio-gas. Because of the high percentage of volatile solids, food waste produces less digestate. Food waste includes waste from institutional dining, restaurants, or food manufacturing. It typically includes both pre and post-consumer waste. Pre-consumer waste includes mostly kitchen prep waste, such as the scraps remaining from vegetable or fruit processing. Post-consumer waste includes any remaining prepared foods, including unconsumed food, food that has expired, or organic wastes such as napkins or paper towels. Fats, oils, and grease contain more potential energy than food waste. Fats and oils can be difficult to manage in a bio-digester and might be better off utilized as fuel. It can either be filtered and utilized as straight vegetable oil or can be processed into bio-diesel. The glycerin remaining after bio-diesel production contains the highest embodied energy of any food waste material. The ability to process glycerin through bio-digestion provides an effective way of handling a material that can be difficult to compost or otherwise dispose of.

In mid-September of 2012, samples of food waste were collected from the grinder-pulper that is used to process and mix both pre and post consumer food waste at Stevenson Dining hall at Oberlin College. Mixed samples were collected from both lunch and dinner. Each meal features a different throughput of food wastes, so



Source: *Quasar Energy Group*

OARDC BIODIGESTION LAB REPORT
9/17/12

GAS ANALYSIS:	RESULTS	RANGE	COMMENT
Total Solids	23.50%		High solids content, not pumpable
Volatile solids	95.46%	85-90%	High methane generation, low residual
pH	4.51	7-8.5	Low initially, but will adjust in digestion
Carbon	11.45%		
Nitrogen	1.02%		
Sulfur	0.15%		Very low, not likely to produce high H_2S
C/N Ratio	11.19	15 to 25	Need to mix in higher carbon feedstock
Chemical Oxygen Demand (COD)	949,000 mg/L	400-500,000	Indicates high energy, but also longer digestion time

it was important to combine samples from both lunch and dinner for testing.

The results are in-line with what you would expect from food waste.

Total Solids: At 23.5%, the total solids content is high. It would not be possible to pump material with this content of solids, so it would likely need to be supplemented with water in the bio-digester to bring total solids down in level. Most liquid digesters have a total solid content of about 7% (common with manures). There is some research at the OARDC underway to develop digestion techniques that can handle feedstocks with total solid content of 20% or greater, but this technology is still under development.

Volatile Solids: The volatile solids came in at 95.5%. That means that 95.5% of the total solids in the mix are volatile and can be converted into methane. That means that there will be little significantly less residual remaining after biodigestion is complete.

pH: The pH came in at 4.51. This number is a bit low, as optimal biodigestion occurs when the pH is between 7-8.5. The pH will adjust, however, through the bio-digestion process, so it would be ideal to further run this material through a complete bio-digestion process to determine if the pH would need to be adjusted. Co-digesting manure could also help to bring pH more in line with optimal conditions.

Carbon/Nitrogen (C/N) Ratio: The sample is a bit nitrogen-rich, with 11.45% carbon and 1.02% nitrogen in the sample. Typically, bio-digestion will be optimal at a C/N ratio of 15:1 to 25:1. If there is too much nitrogen, there is a higher risk of ammonia accumulation which will be unfavorable to the anaerobic microorganisms. Again, co-digesting with manure will provide another way to bring the C/N ratio more in line with where it needs to be. Manure tends to have a lot of residual straw or other high-carbon materials.

Sulfur: At 0.15%, the concentration of sulfur in the sample is small enough to not warrant concern for the accumulation of hydrogen sulfides which produce strong odors and, in high concentrations, can slow down the anaerobic digestion process.

Chemical Oxygen Demand (COD): At a COD of 949,000 mg/L, there is a very high COD in the sample. This means that there is a large amount of energy potential. However, some of this energy may take a longer residency time in order to be fully processed. For example, ground-up napkins or paper towels have a high percentage of woody materials containing lignin. Lignin is the element that provides structure to woody materials. It takes a long time for lignin to break down. Even though there is strong energy potential, it is not necessarily immediately available.

Waste Collection and Consolidation

According to two food waste audits of college dining waste (2003 and 2012), we can expect an average generation of between 1,400 to 1,500 pounds of food waste per day. This includes the four dining halls operated by Bon Appetit and the eight dining cooperatives operated by the Oberlin Student Cooperative Association (OSCA) for a total of 12 food waste outlets on the Oberlin College campus.

The table on the next page provides a break down of the food waste audit for 2012. The food audit included both pre-consumer (kitchen prep waste) and post-consumer (plate scrapings, napkins) generated at three institutional dining halls and a café at the student union. The audit conducted by OSCA was done in 2003. The 438 pound total for OSCA represents an aggregate number. More detailed waste generation by each individual coop was not available.

Since 2006, both OSCA and the Campus Dining Services have participated in food

Food Waste Generation at Oberlin College

	Stevenson		Dascomb		Wilder	
	7 day a week Lunch and Dinner		6 day a week Breakfast, Lunch Dinner and a late night		7 day a week retail some food prep	
	Daily	Weekly	Daily	Weekly	Daily	Weekly
Preconsumer	150	1050	200	1200	25	175
Post Consumer	250	1750	250	1500	10	70
Totals	400	2800	450	2700	35	245

** Jones farm would pick up 2-3 times a week

SOURCE	Daily	Weekly
OSCA	438	3066
CDS	990	6270
TOTAL	**1428**	**9336**

waste collection of pre-consumer waste streams for vermicomposting (composting with worms) that takes place at the George Jones Farm and Nature Preserve, a college-owned farmstead about 1.5 miles east of campus. The system worked well with a lot of volunteer labor from students and dedicated time from Jones Farm staff. In 2011, Oberlin College installed a grinder/pulper unit in one of its dining halls. This unit can process both kitchen prep-waste and plate scrapings as well as other bio-degradable waste such as napkins, paper towels, cardboard, and cutlery. The unit extracts moisture from the food waste, creating a slurry that is lighter, occupies less volume, and decomposes more quickly. The output from the grinder/pulper was directed to the vermicompost systems at the George Jones Farm.

However, four set-backs in 2011 caused a disruption in the composting process:

a) Due to rising insurance costs, OSCA had to retire its truck and greatly limit the number of people who could operate their truck fleet, eliminating the means for students to transport compost to the Jones Farm;
b) The grinder/pulper increased the volume of food waste beyond what the vermicompost system at the Jones Farm could handle;
c) The grinder/pulper food waste contained a different bio-chemical composition with significant nitrogen content and acidic pH that turned out to be toxic to the worms;
d) The Jones Farm could no longer accept waste from the college grinder/pulper unit.

To continue its commitment to food waste composting, the college and OSCA presently employ the services of Rosby's Composting operation, based on the west-side of Cleveland. The expense and fuel-use for food waste to be regularly picked-up and sent to Cleveland are considerable and there is interest in finding a more permanent solution that keeps the food waste circulating in the local food system in and around Oberlin. Led by a group of students from the CDS recyclers and Resource Conservation team, a variety of stakeholders from the college and local community came together to plan a compost summit in April of 2012. The summit organizers utilized the summit as an opportunity to engage the broader Oberlin community in an effort to develop solutions to the community's organic waste challenges. Out of this summit came the recommendation to pursue bio-digestion of waste materials as one possible solution to food waste challenges.

Given the recent loss of a compost-hauling truck for OSCA and difficulty in accessing transport for movement of CDS materials, at present, food waste is brought in source-separated bins outside of the dining halls for direct pick-up by Rosby's.

One of the first steps in supporting a broader bio-digestion initiative (or any food waste composting initiative as well) would be to organize a more effective system of collection, transport, and pre-processing of food waste. There are presently two bottle-necks in the collection of waste material:

a) the fuel costs and labor time of an individual truck making 12 stops to pick-up smaller amounts of food waste is inefficient;
b) the grinder/pulper unit, which is an essential pre-processing and quality control step for bio-digestion, is accessible to only one of the 12 dining halls on campus.

Thus, organization of an efficient system for collecting, pulping, and storing feedstocks would be one of the first priorities for biodigestion. The maps on the following pages show two consolidation locations identified at the composting summit. At the time, these areas were being mostly considered for active composting and not bio-digestion. The table on the next page also details current and potential food waste outlets in the community that could also provide food waste.

The first waste consolidation site was the area around the Grounds Department at Oberlin College where there is land-area that could potentially be used for storage of organic materials to support composting. Presently, Oberlin College already utilizes this site for storage and composting of wood mulch from campus landscaping. The second location under consideration was the Oberlin Wastewater Treatment Plant facility. At present, the City of Oberlin operates a Class IV composting facility at the location that processes leaves and wood mulch. It's proximity to the landfill and Wastewater Treatment Plant and remoteness from any residential properties makes this an ideal site for consideration.

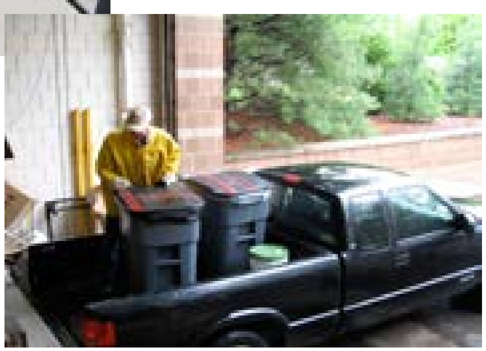
The average distance between the 12 food waste outlets on campus to a north fields site is about 2/3 of a mile. The average distance between the 12 food waste outlets and the Wastewater Treatment Plant site is about 1.5 miles. Even though these are relatively short distances to travel, the inefficiency of a hauling truck gathering materials and then transporting them these longer distances will increase fuel costs and carbon emissions resulting from the project.

Return to Table of Contents

List of Existing and Potential Food Waste Collection Outlets

EXISTING FOOD WASTE COLLECTION SITES:

DINING HALL AND COOP ADDRESSES	
CDS	
Stevenson Hall	155 North Professor Street Oberlin, OH 44074
Dascomb	140 West College Street Oberlin, OH 44074
Lord-Saunders	126 Forest Street Oberlin, OH 44074
Wilder Hall	135 West Lorain Street Oberlin, OH 44074
COOPS	
Tank Hall	110 East College Street Oberlin, OH 44074
Fairchild Hall	93 Elm Street Oberlin, OH 44074
Harkness Cottage	113 West College Street Oberlin, OH 44074
Third World Coop	30 South Professor Street Oberlin, OH 44074
Pyle Inn Coop	40 West Lorain Street Oberlin, OH 44074
Kosher Coop	2 South Professor Street Oberlin, OH 44074
Keep Coop	154 North Main Street Oberlin, OH 44074
Old Barrows Coop	207 South Professor Street Oberlin, OH 44074



POTENTIAL FOOD WASTE COLLECTION SITES:

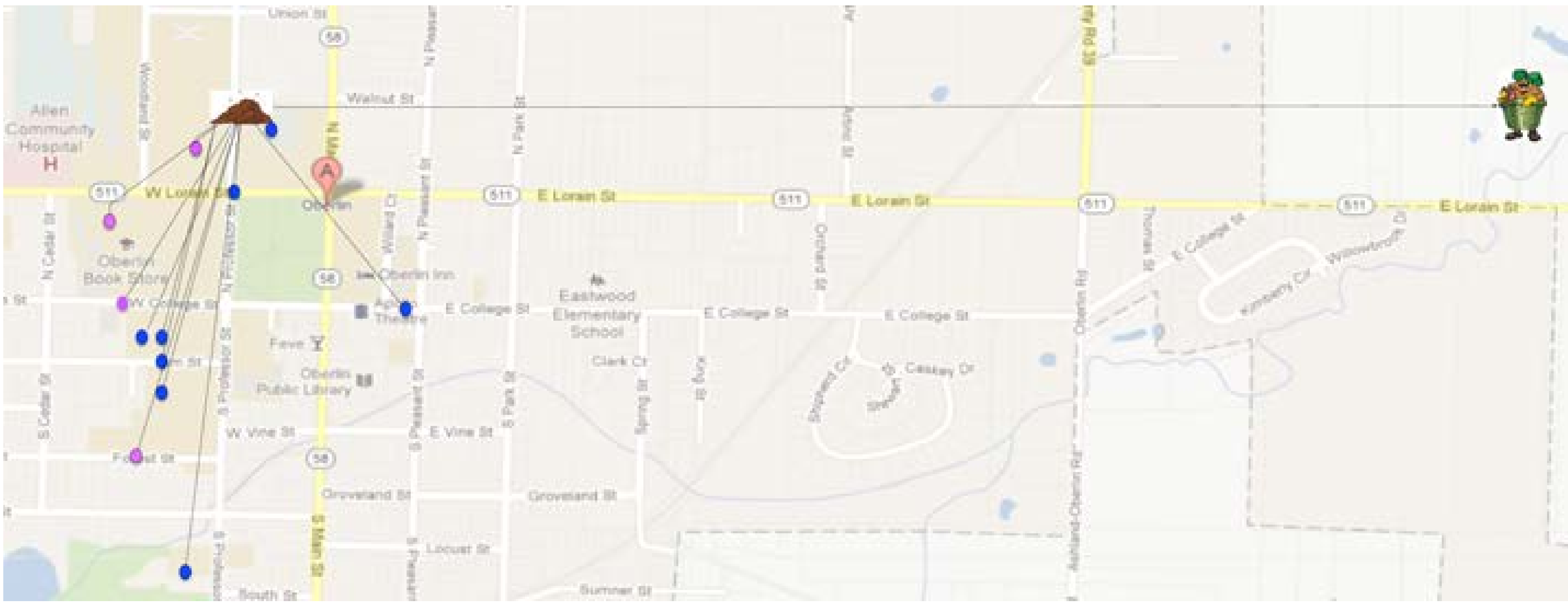
DOWNTOWN RESTAURANTS	
Weia Teia	9 South Main Street Oberlin, OH 44074
The Feve	30 S. Main Street Oberlin, OH 44074
Black River Café	15 S. Main Street Oberlin, OH 44074
Tooo Chinoise	27 W. College Street Oberlin, OH 44074
Mandarin	82 South Main Street Oberlin, OH 44074
Magpie Pizza	65 East College Street Oberlin, OH 44074
Agave Burrito Bar	19 West College Street Oberlin, OH 44074
Fresh Start Diner	51 South Main Street Oberlin, OH 44074
Oberlin Inn	7 North Main Street Oberlin, OH 44074
McDonald's	265 South Main Street Oberlin, OH 44074
Aladdin's Eatery	5 West College Street Oberlin, OH 44074
Lorenzo's Pizza	52 South Main Street Oberlin, OH 44074
Presti's of Oberlin	580 West Lorain Street Oberlin, OH 44074
Kim's Grocery	23 Eric Nord Way Oberlin, OH 44074
Lupitas	84 South Main Street Oberlin, OH 44074
Quick and Delicious	311 South Main Street Oberlin, OH 44074
East of Chicago Pizza	175 South Main Street Oberlin, OH 44074
Slow Train Café	55 East College Street Oberlin, OH 44074
Café Sprouts	55 East College Street Oberlin, OH 44074
Oberlin Market	22 Carpenter Court Oberlin, OH 44074
OTHER INSTITUTIONS	
Kendal at Oberlin	600 Kendal Drive Oberlin, OH 44074
Allen Memorial Hospital	200 West Lorain Street Oberlin, OH 44074
Eastwood Elementary School	198 East College Street Oberlin, OH 44074
Prospect Elementary School	36 South Prospect Street Oberlin, OH 44074
Langston Middle School	150 North Pleasant Street Oberlin, OH 44074
Oberlin High School	281 North Pleasant Street Oberlin, OH 44074
FAA Center	326 East Lorain Street Oberlin, OH 44074
NACS Center	528 Esat Lorain Street Oberlin, OH 44074
Oberlin IGA	331 East Lorain Street Oberlin, OH 44074
Walmart	46440 US Route 20 Oberlin, OH 44074

The following recommendations would help to increase the efficiency of collection and transport of materials:

1) Identify a consolidation site in a central location either on the campus or in the city. The site would be used to receive, process, and store materials.
2) Consider movement of the grinder/pulper from the Stevenson dining hall to a more central consolidation location where it can service a larger number of food waste outlets, both on-campus or in the community.
3) Select a location that is remote from regular pedestrian traffic, but safely accessible by bike.
4) Acquire a small fleet of trikes that can be utilized to move compost materials from outlets to the consolidation site. This would greatly reduce fuel costs while providing a source of physical activity for student compost haulers. Consideration would need to be given to safe materials movement in inclement weather.
5) Arrange a secure and odor free storage system of grinder pulp until it can be picked up by a truck for transport to biodigestion site(s). Ideally, the truck would also be operated on an alternative fuel, such as straight vegetable oil or bio-diesel.
6) Consider charging a small tipping fee for food waste pick-up that can help to cover the cost of acquiring and maintaining trikes and the labor to operate them.

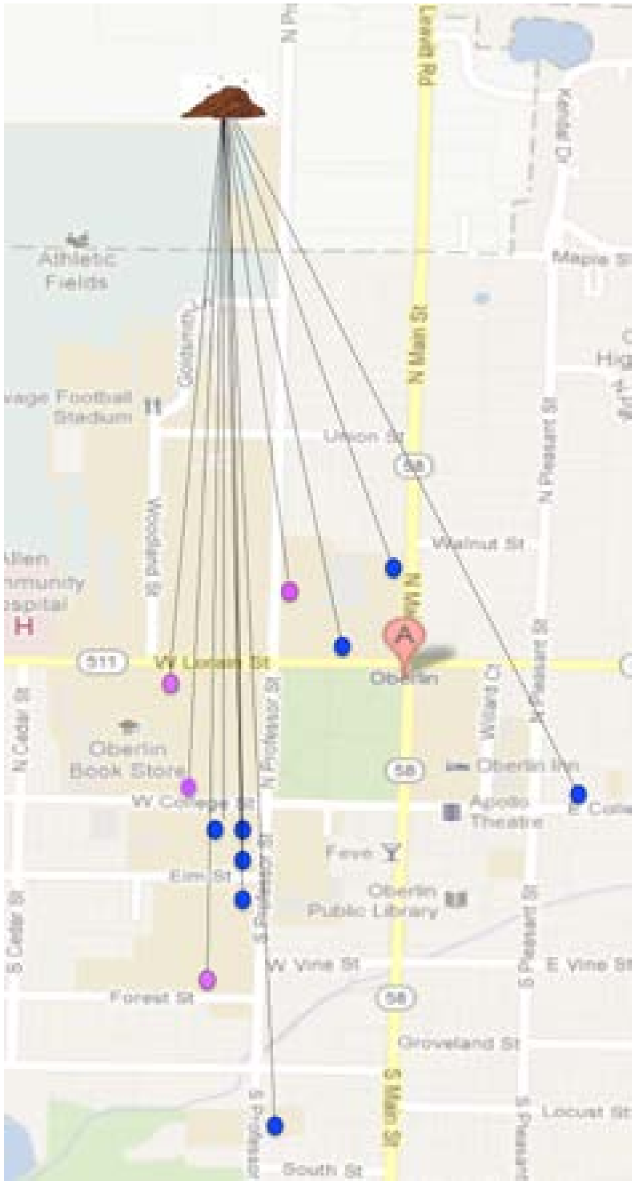
The other advantage of a more central consolidation site would be the ability to eventually service more food waste outlets in Oberlin. In addition to the 12 dining halls and cooperatives on campus, there are 30 other potential food waste outlets within the City of Oberlin, including 19 restaurants and 11 institutions or large businesses. The table on the prior page provides a comprehensive list of potential outlets in the Oberlin community. Selection of a consolidation location should be easily accessible and central to all outlets.

WASTE PROCESSING/AGGREGATION SITE

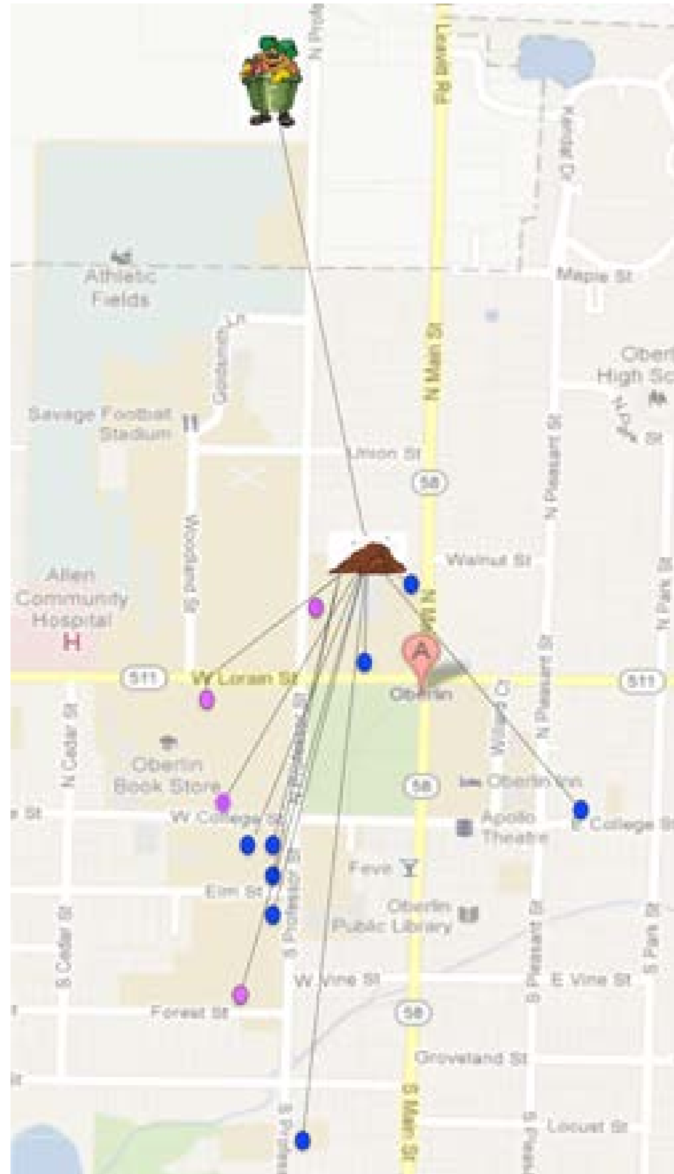


On-Campus or In-Town Waste Aggregation/Grinding with Consolidation Site at WWTP or George Jones Farm

WASTE PROCESSING/AGGREGATION SITE



North Fields Consolidation and Processing Site



North Fields Consolidation with Intermediary Aggregation Site in Town or On-Campus

Capacity Development and Community Investment

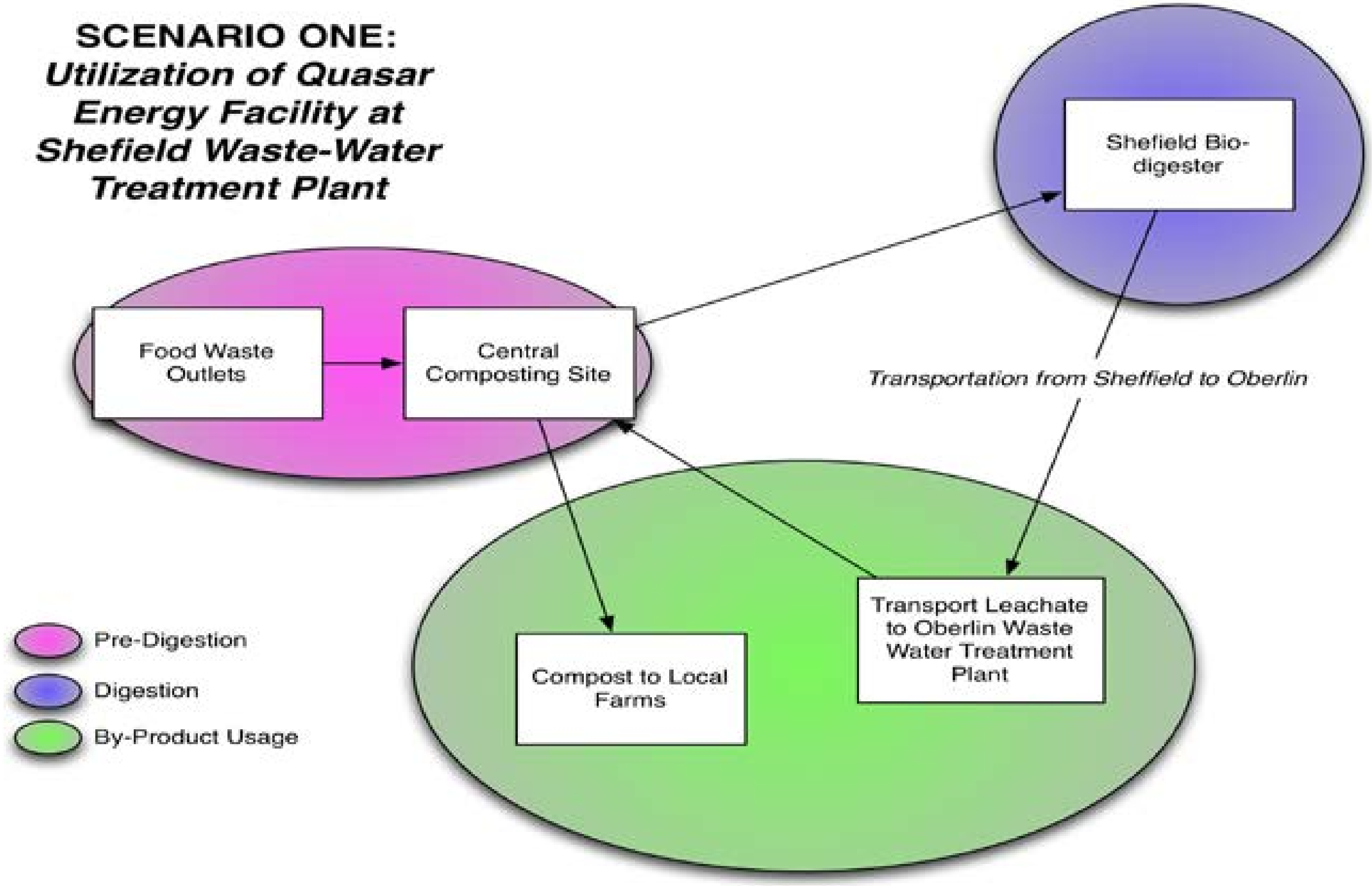
There are five scenarios that the Oberlin community could consider for anaerobic digestion of food waste materials:

1) **Quasar Anaerobic Digester in Sheffield Village-** Quasar Energy Partners are in the process of bringing an anaerobic digester on-line at the Sheffield Wastewater Treatment Plant. This scenario would involve collecting food waste and transporting it to the digester facility in Sheffield. The digester has capacity for grinding food waste, so collection and transport would be the only investments needed to make this option work. A tipping fee would also be charged to cover the cost of transporting and processing material in the facility. While this scenario requires little investment, there would be no energy or nutrient input to support local food systems in Oberlin. Quasar Energy Partners is looking for a location to store leachate from the system and that could potentially be located in Oberlin. However, the Class B bio-solids would mostly be land-applied on larger, commodity-based farms, so there would be no direct nutrient benefit for local farms supplying food to Oberlin markets.

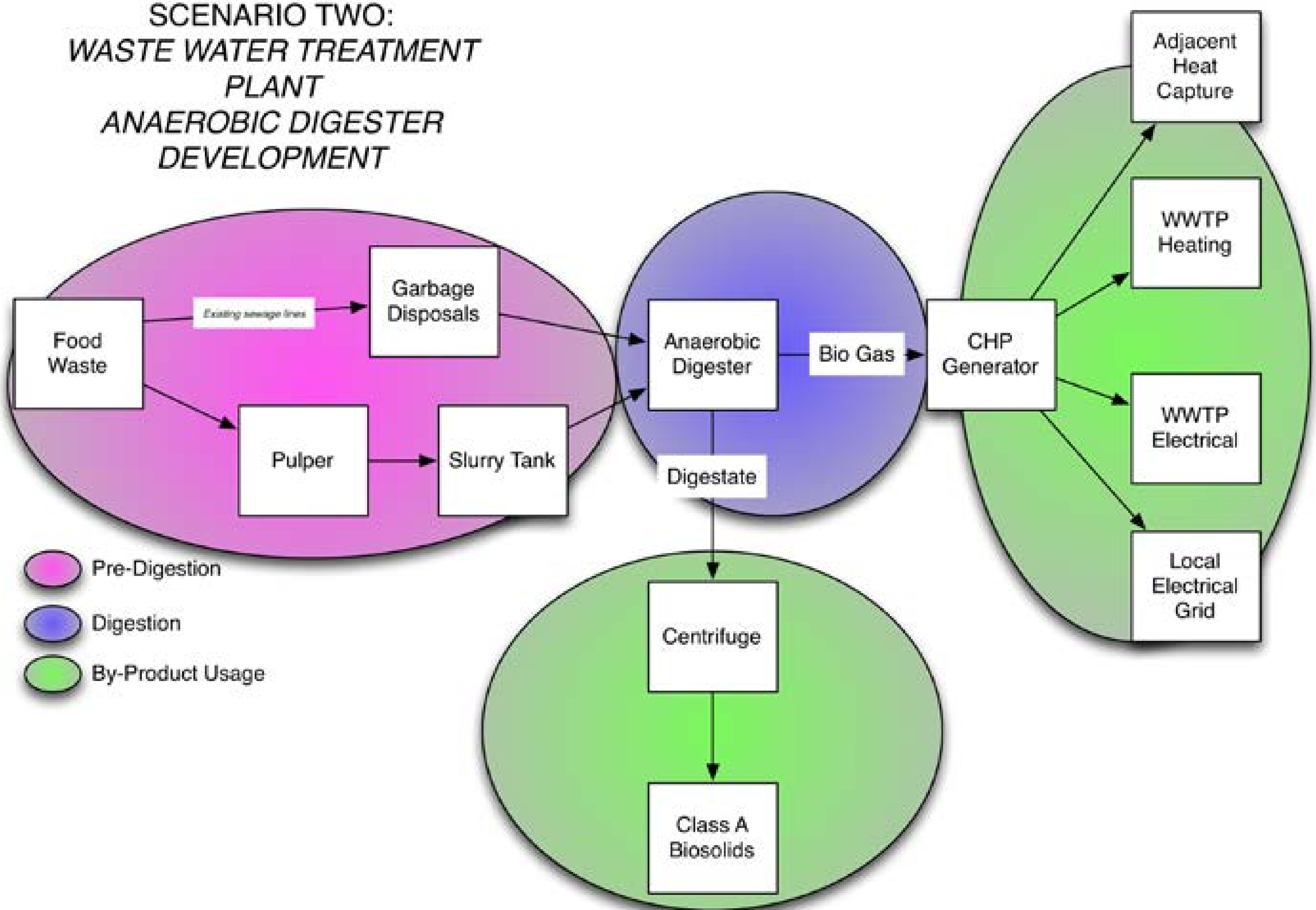
2) **Oberlin Wastewater Treatment Plant (WWTP)-** The Oberlin WWTP is already equipped with an anaerobic digester. At present, bio-gas is collected and utilized by this digester to heat and speed the process of effluent decomposition. Plans are underway to install a Combined Heat and Power unit at the WWTP that could further produce electricity from bio-gas that could be utilized to provide about 30% of the electrical needs for operating the facility. Waste heat recovered from the CHP can further be used to heat bio-solids and heat the overall facility. This scenario would also require little investment. Food waste could be delivered directly to the facility or it can be ground-up in garbage disposals at dining halls or restaurants to directly feed the system through the sewage system. The WWTP is considering development of the equipment to produce Class A bio-solids which could provide a direct nutrient feed to local farms supplying food to Oberlin. However, there would be no utilization of energy inputs that could benefit local farms or local food processing facilities.

3) **Oberlin Local Food Hub-** The Oberlin Project is presently working on an effort to develop a Local Food Hub in the Oberlin community. Like the Plant in Chicago, this facility could provide a location to aggregate food from a variety of farms or local food businesses for more efficient distribution to Oberlin market outlets. The Local Food Hub could also include urban agriculture production (greenhouses supporting vegetable or fish production) as well as facilities for local food processing (food preparation, thermal processing, freezing, dehydration, fermentation, or baking). A bio-digester at a local food hub could potentially provide heat that could be utilized for heating the food hub buildings or greenhouses. Bio-gas could also potentially be utilized as a cooking fuel to support a commercial

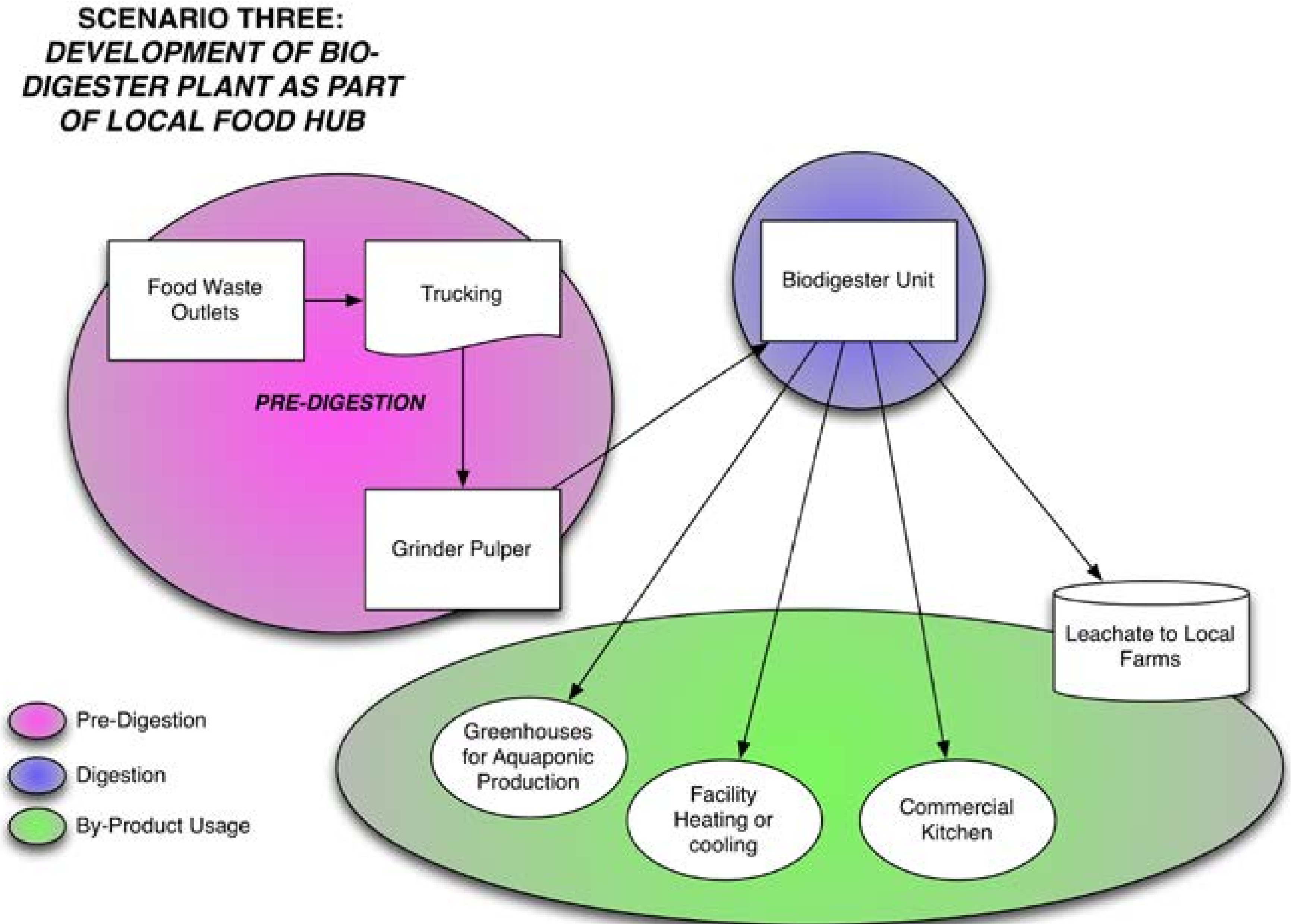
Process	Infrastructure	Operations
Collection	Collection bins	Labor to collect and move bins
Pre-Digestion/Grinding	Grinder/Pupler	Labor to operate grinder/pulper, move materials
Transport	Trucks or trikes	Labor to operate trucks or trikes
Feedstock Storage & Monitoring	Slurry tank or lagoon and testing equipment	Labor to fill tank and monitor feedstocks
Digester feeding and mixing	Digester tank	Labor to fill, monitor digester system
Energy generation	Hot water boiler, CHP generator, cooking stove, compression (all dependent upon usage)	For more advanced operations, like CHP generators, skilled expertise needed. Simpler applications like hot water boilers or stoves to not require additional expertise.
Effluent extraction and storage	Pump system to extract effluent and storage tank or lagoon	Labor needed to extract effluent and pump into storage system. May need additional monitoring for outdoor storage lagoons to protect from run-off
Effluent application	Manure spreader, liquid manure tank	Usually labor for application of effluent would be provided by partnering farm operation.


SCENARIO ONE:
Utilization of Quasar
Energy Facility at
Shefield Waste-Water
Treatment Plant
Shefield Bio-digester
Food Waste Outlets
Central Composting Site
Transportation from Sheffield to Oberlin
Transport Leachate to Oberlin Waste Water Treatment Plant
Compost to Local Farms
Pre-Digestion
Digestion
By-Product Usage

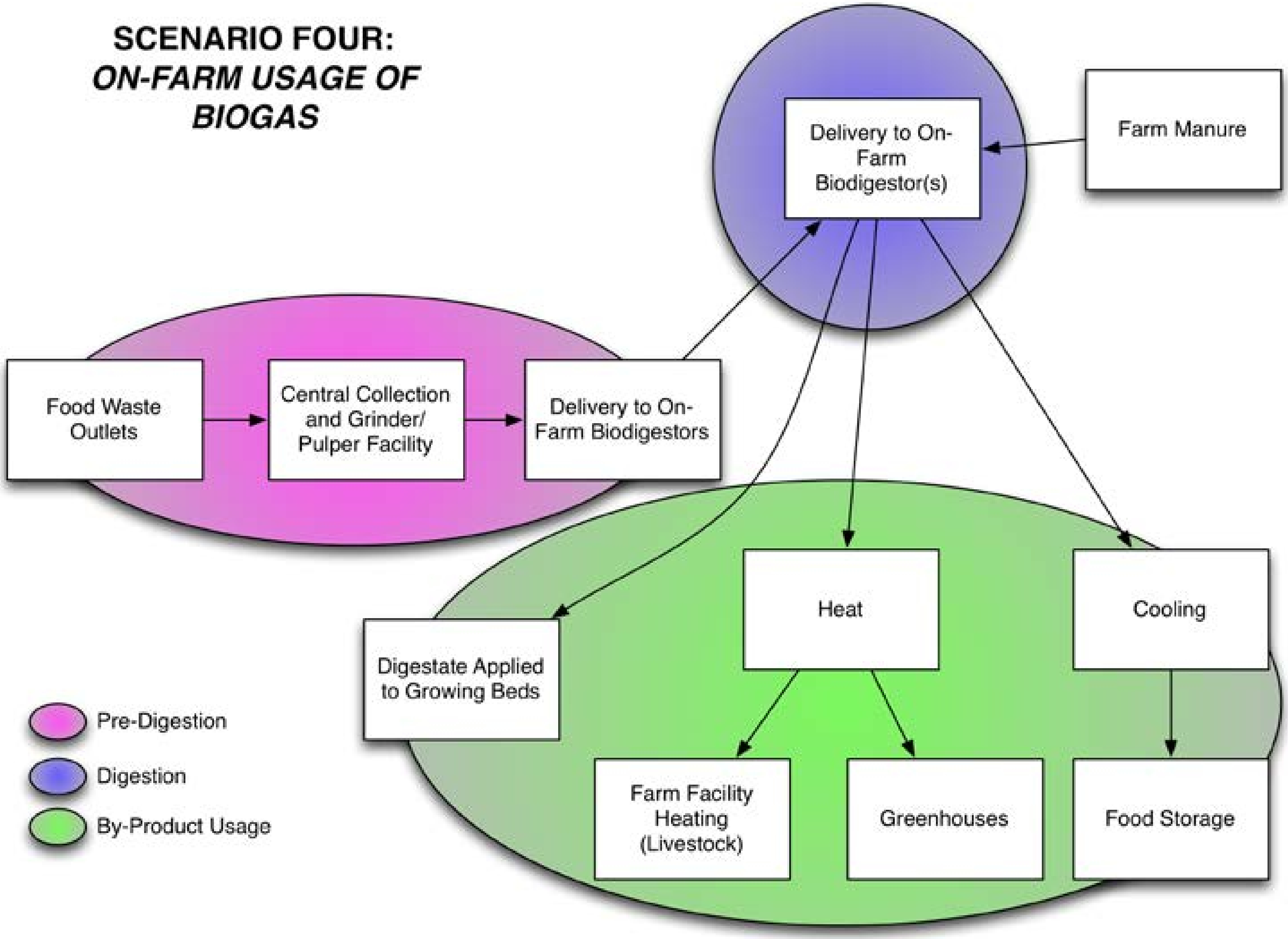
SCENARIO TWO:
WASTE WATER TREATMENT PLANT ANAEROBIC DIGESTER DEVELOPMENT

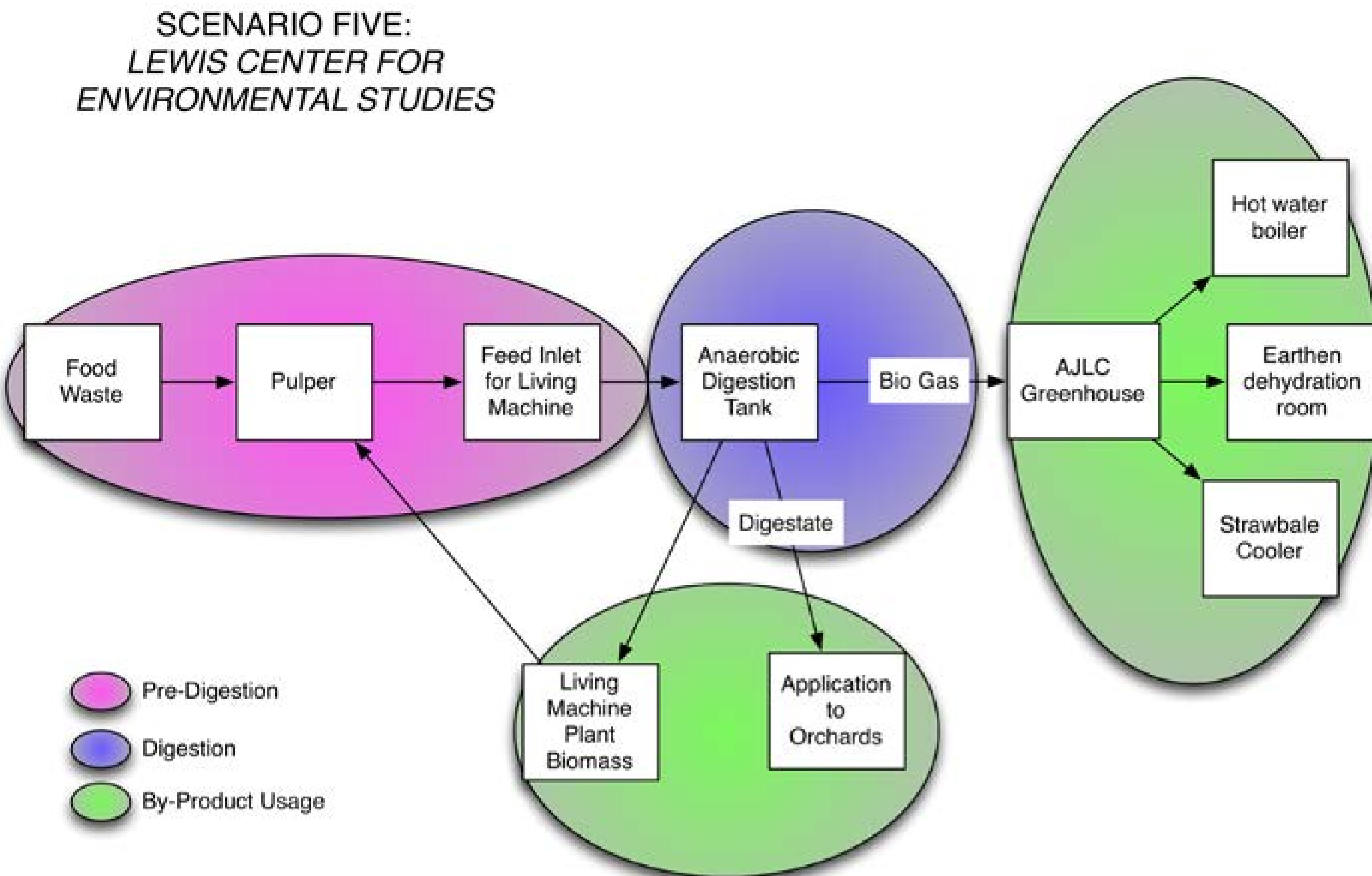


Return to Table of Contents


SCENARIO THREE:
DEVELOPMENT OF BIO-DIGESTER PLANT AS PART OF LOCAL FOOD HUB
Food Waste Outlets
Trucking
PRE-DIGESTION
Grinder Pulper
Biodigester Unit
Leachate to Local Farms
Greenhouses for Aquaponic Production
Facility Heating or cooling
Commercial Kitchen
Pre-Digestion
Digestion
By-Product Usage

SCENARIO FOUR: *ON-FARM USAGE OF BIOGAS*





Return to Table of Contents

kitchen, although it is not clear that the bio-gas would be consistent enough in methane content to support such an application. Electrical generation would be possible, but it is unlikely that the smaller quantities of available feedstocks available in Oberlin could justify this investment. Food waste generated by local food enterprises located in the food hub could be utilized by the digester. Additionally, food waste could also be collected from outlets in the Oberlin community. While this presents a more direct utilization of both energy and nutrients to support local food production, the city presently will only allow a bio-digester in industrially-zoned areas which will limit options. Additionally, a local food hub does not presently exist, so this option would require substantial investment in facilities and experienced staff to operate the facility.

4) **On-Farm Digester-** This option would involve collection of food waste to feed on-farm digesters that could provide both energy and nutrients to support local agricultural production. Bio-gas produced in on-farm digesters could be utilized to heat farm facilities (including greenhouses, dairy parlors, or farm buildings), hot water (for use in any kitchen or dairy parlor), cooling (cooling units designed to operate with natural gas), cooking (value-added food processing), or dehydration of food products or algae to produce energy or fish food. Given the cost of equipment to generate electricity or fuel, these two options would likely be cost-prohibitive for an on-farm system. Like the Local Food Hub, this scenario would provide direct utilization of bio-gas to support local food production. However, it will also require investment of time and facilities. The overall investment costs of a small-scale digester would be minimal compared to a commercially available bio-digester system. However, on-farm systems are still more experimental and would require research and development to operate effectively, especially during the colder months.

5) **Adam Joseph Lewis Center-** This option would involve collection and grinding of food waste to feed the Living Machine system at the Adam Joseph Lewis Center. At present, the Living Machine is operating at about 10% of its designed capacity, so the food waste could help to optimize system performance. The AJLC already has the infrastructure in place to support anaerobic digestion. Modifications would need to be made to the system to enable it to collect bio-gas which presently is released into the atmosphere. An engineering study would also need to be made to determine any system modifications that would be necessary to handle food waste. There is presently interest at the Environmental Studies Program to design and construct a greenhouse on the AJLC property. This greenhouse could utilize bio-gas produced by the Living Machine. Consideration would need to be made for utilization of bio-gas during the summer. Also, the impacts on the Living Machine of low periods of food waste inputs during campus breaks (summer and winter) would also need to be assessed. While this scenario would require some further assessment, it would tap into expertise and student labor already available through the Environmental Studies Program.

The accompanying two tables summarize the required investment and local food tie-ins for each of the scenarios as well as some consideration of the pros and cons of each option.

Where do we need to develop capacity and invest resources?

APPLICATION	Collection	Grinding	Transport	Digestion	Biogas Use	Digestate App
Quasar	Red	Green	Red	Green	Green	Green
Oberlin WWTP	Green	Green	Green	Green	Green	Green
Oberlin Food Hub	Red	Red	Red	Red	Red	Green
On-Farm Digester	Red	Red	Red	Red	Red	Red
AJLC Digester	Red	Red	Red	Green	Red	Green

LEGEND:
- Green: Little investment
- Red: Requires investment

Return to Table of Contents

Comparison of Investments and Feeds to Local Food System for Five Scenarios:

SCENARIO	REQUIRED INVESTMENT	FEED TO LOCAL FOOD SYSTEM
Quasar Facility	**MINIMAL-** transportation/collection	**MINIMAL-** possible effluent could be stored in Oberlin, but would benefit mostly larger-scale commodity farms
Oberlin WWTP	**MINIMAL-** transportation/collection, some potential plant modifications if waste delivered. Or food waste can be run through garbage disposals and utilize existing sewage lines requiring no investment.	**MODERATE-** Bio-gas heat and electricity will be utilized by the WWTP without a direct input to local agriculture. However, Class A bio-solids produced as by-product will provide high quality fertilizer for residents or local farmers.
Local Food Hub	**SIGNIFICANT-** investment in increased feedstock collection, CHP generators expensive, plumbing for waste distribution, storage and use of effluent.	**SIGNIFICANT-** Utilization of waste energy to support variety of local food enterprises, including heating, cooling, cooking. Effluent can be input directly utilized by local farms.
On-Farm Bio-digester	**MODERATE-** investment in equipment and materials for small-scale farm digestion minimal compared to more sophisticated operations that produce electricity or CNG. There would need to be a longer period of research and development for relatively untested bio-digestion applications	**SIGNIFICANT-** Utilization of food waste creates a closed-loop cycle with partnering farms. Food waste become energy and nutrient inputs for farms. Can aid season extension through greenhouse heating, provide cooling in the summer, or support other functions such as cooking or value-added processing, dehydration, or bio-diesel production (if heat used to dry algae)
Adam Joseph Lewis Center Living Machine	**MODERATE-** An Anaerobic digestion tank already exists as a part of the AJLC Living Machine system. The tank would need to be equipped to capture and store bio-gas which presently is released into the atmosphere. Additional investments would be needed for potential system modifications to handle food waste and construction of a heated greenhouse	**SIGNIFICANT-** Utilization of bio-gas to heat a greenhouse to provide food for consumption on-campus provides an elegant closed-loop system where food waste generates food on-campus. While the overall production quantity will not likely be high, this system could also serve as a demonstration for on-farm based systems that might operate at a larger scale.

SCENARIO	PROS	CONS
1- Quasar Facility	• Taps already existing infrastructure for bio-digestion • Requires minimal community investment in capital or labor to support • Energy utilized to support WWTP in Lorain County • Leachate could be utilized to make Class A or B bio-solids in Oberlin	• Energy benefits not retained by community • No direct benefits to local food system • Loss of organic materials that could be composted for local food system • Little educational potential for students • Leachate will likely not be usable for local food farms
2- Oberlin WWTP	• Taps already existing infrastructure- plant has expertise to manage biodigester system • Production of Class A bio-solids provides valuable input to local agriculture • Creates more secure and self-reliant treatment	• Less direct feed to local food systems, but reduces outside energy demand of WWTP and improves overall sustainability of community • Most energy retained for plant operations and not as direct energy inputs to supportlocal food systems • Would require additional investment to produce Class A bio-solids
3- Local Food Hub	• Directly retains energy as input to support local food enterprise development • Supports facility that will be critical to 70% localization goal • Nutrients can be retained for use in urban farms or local farms • Provides important regional and national model for connecting waste and food cycles • Some opportunities for education or research	• Significant capital investment will be required • Operations and management capacity need to be developed • Not clear that local feedstocks available in quantities needed to support CHP or commercial-scale opeartions • Higher anticipated costs for local code concerns • Likely restricted to industrial-zoned areas • A local food hub doesn't right now exist! • Will require large amount of feedstock to start
4- On-Farm Bio-digester	• Directly retains energy and nutrients as input to support local farms • Supports facility critical to year-round food production • High opportunities for student education/research • Important model where there is little national research or attention presently • Could contribute significantly to smaller-scale bio-digestion opportunities • Completes the cycle of retaining nutrients locally to benefit the local community • Can lead to co-digestion of food waste with animal waste	• Permitting not clear for agricultural applications • May not be possible for farms residing in city limits • Requires higher capital investment • Will require continuous management and operational support, though this can be minimal • More experimental and less likely to work well immediately • Modular. More biodigesters can be developed as feedstock quantities increase.
5- Adam Joseph Lewis Center Living Machine	• Optimal in terms of least distance traveled between food waste outlets and bio-digester • Infrastructure, equipment, expertise, and student labor assets in place, although additional work would be needed • Could lead to expansion of urban food production activities on the site with year-round production greenhouse build with strawbales • Direct benefits to student and faculty research • Visibility of the AJLC can extend learning from the digester • Plant bio-mass from Living Machine could be pulped and utilized for compost or fed back into the LM • Most of the bio-digestion capacity already in place with the LM • Could enable Living Machine to operate at capacity for which it was designed	• More research would be required to determine the ability of Living Machine to handle food waste under its current configuration • Engineering study would be needed to develop capacity for collection and storage of bio-gas from the Living Machine • Staff and student labor already stretched in covering Living Machine and landscape management • Unclear if there would be code or permitting issues around installation of bio-gas recovery components • Food waste throughput would vary during campus breaks during the summer and winter and could affect system stability • System unlikely capable of handling food waste beyond campus generation

Stakeholder Recommendations

The five scenarios were presented and discussed to a team of local stakeholders for waste-to-food-energy initiatives affiliated with the Oberlin Project on September 24, 2012. The stakeholders included:

- Heather Adelman, Project Manager for the Oberlin Project
- Jeff Baumann, Public Works Director for the City of Oberlin
- Sean Hayes, Facilities Manager for the Lewis Center for Environmental Studies
- Brad Masi, Oberlin Project Local Food Systems Consultant
- Jessica Minor, Oberlin College Office of Government and Community Relations
- Michele Gross, Director of Residential Life and Services at Oberlin College
- Steve Hoffert, Director of Oberlin Waste Water Treatment Plant Facility
- Rick Panfil, General Manager for Bon Appetit Management Company

The presentation included a summary of the information and recommendations contained in this report. It was presented in four parts, including:

- overall summary of the anaerobic digestion process;
- review of case-studies of anaerobic digester projects, with emphasis on those that link to local food systems;
- review of options for anaerobic digestion in Oberlin, including five scenarios for how it could work, and
- feedback from stakeholders to assess favored approaches for Oberlin.

The table below summarizes the results of a brief survey that was handed out after the five scenarios were presented:

BIODIGESTION SURVEY RESULTS:

	MEAN	SD
INNOVATION VERSUS ESTABLISHED INFRASTRUCTURE		
Work with established infrastructure?	2.5	1.19522861
SCENARIO RESPONSES:		
1- Food waste to Quasar Digester	2.1875	1.60217486
2- Food waste to Oberlin WWTP	4.0625	0.56299581
3- Biodigester as part of Local Food Hub	3.25	0.88640526
4- Small-scale/on-farm digester	3	1.06904497
5- AJLC digester	3.8125	0.3720119
Recommend further research?	4	0.75592895

In the table, a higher number indicates greater support.

Overall, stakeholders favored a more conservative approach to bio-digestion that relies on existing infrastructure to conduct bio-digestion rather than the development of new or experimental systems that require more capacity development.

The list below ranks the five scenarios on the basis of most to least interest, based on the mean of responses:

- Food Waste to Waste Water Treatment facility (4.06)
- Food waste to Adam Joseph Lewis Center (3.81)
- Biodigester as part of local food hub (3.25)
- Small-scale/On-Farm Digester (3.0)
- Food waste to Quasar Digester in Sheffield (2.19)

The standard deviation indicates the average distance of responses from the mean and indicates relative consensus or discrepancy between stakeholders. On that basis, the stakeholders were in relative agreement about bio-digestion taking place at the Wastewater Treatment plant, the Lewis Center, or a local food hub. There was less agreement about bio-digestion taking place in small-scale/on-farm systems or at the Quasar facility in Sheffield.

Overall, stakeholders agreed that it was worth continuing the exploration of options for bio-digestion of food waste in the Oberlin community.

Analysis of the Five Scenarios

Much of the discussion around the development of anaerobic digestion revolved around two poles of consideration. The first pole strongly favored an approach that utilized already existing infrastructure for conducting bio-digestion. Both the Waste-water Treatment Plant for the City of Oberlin and the Adam Joseph Lewis Center have the equipment and facilities as well as the staff expertise to develop and operate bio-digestion systems. The Waste-water treatment plant already had an anaerobic digester in operation. The Lewis Center has some of the basic infrastructure that could be modified to support bio-digestion, although on a smaller-scale than what the WWTP would be capable of.

The second pole favored approaches to bio-digestion that contributed to farms or local food businesses that supply local products to the community. There was interest in more closed-loop systems in which the nutrients and energy contained in food waste are re-circulated to local farms to increase their productivity and ability to supply local food products throughout a greater portion of the year. In particular, the heat energy produced through bio-digestion could help to extend the limited growing season of northern Ohio, duplicating on a smaller scale systems like The Plant in Chicago.

Overall, the stakeholders seemed to lean toward processes that rely on already established infrastructure and expertise. While there was general agreement with the concept of connecting food waste to the support of local food systems, it was acknowledged that developing on-farm bio-digesters or integrating bio-digestion systems into a local food hub would require significantly more investment in

Return to Table of Contents

equipment, facilities, and skilled expertise. Stakeholders generally seemed reluctant to invest in the capacities that would be needed to support a more closed-loop system that connects food waste streams to direct input to local agriculture. A strong case was made for tapping into already existing capacities in the community rather than devoting time and expenses in creating new capacities.

Given the interest in connecting food waste streams to local food systems, more consideration needs to be given to how working with the Lewis Center or the Oberlin WWTP could maximize their contributions to local food systems. For the WWTP, the primary benefit to local food systems would be the production of Class A bio-solids that could be directly land applied and acceptable to smaller-scale farms like the Jones Farm. However, this would require additional capacity investment at the Oberlin WWTP to produce Class A bio-solids. The contributions for the Lewis Center were less clear immediately, given that this scenario was recommended as a fifth scenario at the stakeholder meeting itself. Clearly, the Lewis Center could support a smaller-scale pilot digester that connects with student research and education. Sean Hayes, facilities manager for the Lewis Center also has the background necessary to oversee biodigester system. It was less clear how any collected bio-gas might be used. Two options might include a modified burner that one of the adjoining coops could use to test bio-gas for cooking purposes or a small-scale strawbale greenhouse to test the efficacy of utilizing bio-gas for greenhouse heating.

It would be worth keeping the other options of small-scale/farm-based bio-digesters or a bio-digester connected to a food hub on the table. However, the limitations of on-farm systems include the expense of transporting materials to farms and the lack of expertise in installing or operating bio-digesters. A bio-digester connected to a local food hub remains the most remote application, since a food hub does not exist at this time. However, linking a bio-digester to a future food hub development could both enable the facility to provide a portion of its own energy from its own food waste while accepting food waste from other sources in the community. A limitation of this approach remains uncertainty about the ability to operate a bio-digester anywhere outside of an industrially-zoned area within the city.

Recommendations and Next Steps for Anaerobic Digestion Development in Oberlin

On the basis of stakeholder recommendations and a review of potential food waste sources in Oberlin, it is recommended that the Oberlin Project continue assessment and evaluation of options for utilizing anaerobic digestion of food waste to produce energy and nutrient inputs for local food systems. The following next steps are recommended to continue to build on the results of this report:

1) Community-Wide Food Waste Audit: The only reliable information on current food waste rates were from audits conducted for the college's Campus Dining Services and the Oberlin Student Cooperative Association. A community-wide food waste audit would begin to assess food waste generation by restaurants and other institutions in the Oberlin community. In addition to identifying total weight and volume of food waste, samples should be run through the grinder-pulper unit to get an analysis of bio-gas production potential. Food waste collection samples should occur between 4-5 times during the year so that analysis includes fluctuations in the community resulting from summer or winter breaks. Consideration should also be given to the impact of peak events, such as commencement weekend, which will produce an unusually high quantity of food waste. Food waste samples for weight/volume should be taken multiple times over the course of the week to flatten out any fluctuations that might occur between meals. For bio-gas analysis, multiple samples taken over the course of the week should be frozen and combined into one common sample in order to gain a more statistically defensible level of bio-gas generation potential. Consistency in collection and measurement will also be necessary to insure that the results are comparable across the community.

2) Waste-to-Food-Energy Hub: Once data is collected to better understand the volume and weight of materials produced, a waste-to-energy-food-hub or consolidation site should be considered as a location to centralize food waste materials and process them through a grinder-pulper unit. The grinder pulper would provide three useful functions:

   a. It would allow for greater quality control of incoming feedstocks to capture any components that might contaminate the mix, including metal forks, plastic bottles, or other wastes that could damage equipment or interfere with anaerobic digestion.
   b. It pulverizes solid food waste, accelerating the process of decomposition.
   c. It helps to reduce the volume and weight of material to allow more efficient collection and transportation.

   The consolidation site would ideally be located in close proximity to the campus or downtown, in an area that would be central to food waste outlets, but distant from residential areas. If materials are stored indoors in secure containers for short-term storage, they would be considered materials for recycling and not subject to EPA regulation.

3) Incorporate Anaerobic Digestion into More Comprehensive Waste Plan: An analysis of feedstock developed through the waste audit should be conducted to determine feedstocks that might be more appropriate for aerobic composting or vermicomposting and anaerobic digestion. Compared to composting, anaerobic digestion has the following advantages:
   a. more complete break-down of compounds with less residual;
   b. ability to produce energy through renewable sources;
   c. more complete breakdown of pathogens;
   d. potentially lower carbon impact, especially if techniques are utilized to capture carbon from emissions and re-circulate into a greenhouse;
   e. development of residual that has high nutrient content; and
   f. more space intensive, requiring less land-area to conduct.

   However, compared to anaerobic digestion, composting has the advantage of producing higher levels of organic matter content which can provide valuable inputs to local gardens or farms. This organic matter is also a critical component for breaking up and making more productive the heavy clay soils common to Oberlin. Composting, while still requiring oversight and competent management, is a bit more flexible than anaerobic digestion. Composting can also handle more variation in feedstock composition. A more thorough analysis of available feedstocks can enable planning for an appropriate balance between composting and bio-digestion.

4) Work with Existing Infrastructure and Expertise: A discussion of anaerobic digestion with the waste-to-energy stakeholder team weighed the options of working with existing infrastructure versus creating more experimental or innovative systems that would require more capacity development. The team leaned toward working with existing infrastructure and expertise in the community. Of the five scenarios, two were most strongly favored by the stakeholders: utilization of the existing Anaerobic Digester at the Oberlin Wastewater Treatment Plant or connection with the anaerobic digester that is a component of the Living Machine system at the Environmental Studies Center on campus. In both cases, the basic facility for anaerobic digestion is already in place and both systems are staffed by individuals with expertise in operating the systems.

5) Feasibility Study for Retro-fit of the Living Machine for Anaerobic Digestion: On the basis of stakeholder feedback and a review of five scenarios for producing energy and nutrient inputs for local agriculture, it is rec-

ommended that the Lewis Center for Environmental Studies be further considered as a location to support anaerobic digestion. In addition to the existing infrastructure and expertise mentioned above, the Lewis Center could be an ideal location for developing an anaerobic digestion system for the following reasons:

a. Close proximity to sources of food waste makes it the location that would require the least amount of transport. It also would be possible to safely service the facility with a series of non-mechanized trikes to reduce the carbon impacts of transport.
b. The system only operates presently at about 10% of its designed capacity. Increasing the flow of food waste would help raise the system to its intended capacity.
c. The partnership with the Environmental Studies Program would lend greater education and research value to the system.
d. The conversion of waste materials into plant bio-mass in the Living Machine creates a secondary waste flow that could either be used for composting or for further anaerobic digestion activity.
e. Discussions considering development of a greenhouse facility in the AJLC landscape would provide an ideal tie-in to a bio-gas heated water boiler system that could heat the greenhouse and provide a model for 12 month food production. The greenhouse could include a re-circulating aqua-ponic system that could produce both fish and vegetables. It would be ideal to utilize strawbale and earthen plaster systems for greenhouse production to maximize its use of locally available materials that create a high-performance space.
f. As a high-visibility location, the Lewis Center has greater potential for replication of the integrated food/energy/material systems to other applications regionally, nationally, or internationally.

While the Lewis Center emerged as the site that seemed to best blend the goals of utilizing existing infrastructure, maximizing inputs to local food applications, and leveraging potential for education and research, a number of caveats should be considered for feasibility study. First, consultation with Todd Ecological Design will help to navigate any system adaptations that need to be made to allow the living machine to process food waste. Second, an engineering study would need to be conducted to determine the most effective mechanism for capturing bio-gas from anaerobic digestion and utilizing it to heat a hot-water boiler. Third, it's not clear that a sufficient amount of bio-gas could be consistently generated to support a function like heating a greenhouse. Fourth, consideration would need to be given to how the Living Machine could respond to large swings in throughput corresponding to school breaks. Fifth, an analysis of system throughput would need to be conducted to determine the amount of campus food waste the Living Machine could potentially absorb. Sixth, consideration would need to be given to any code or zoning challenges that could potentially restrict development of a bio-gas capture and energy generation system. Finally, co-digestion of food waste with other materials should be considered for optimizing gas generation. It is likely that the proportion of food waste will potentially overwhelm the bio-solids content in the Living Machine. It may be worth considering potential sources of animal manure to mix into the system.

6) Keep Other Options on the Table: Stakeholders favored utilization of existing infrastructure and expertise over bio-digestion systems that might be integrated into a local food hub or developed for on-farm applications. Stakeholders were less inclined to these options due to the higher level of investment, uncertainty, and access to skilled operators. However, plans for anaerobic digestion should continue to be considered a potential component for future local food enterprises, including a Local Food Hub, local food processing facilities, or local farms. As more of these projects come on line in the next 5-10 years, there might be more opportunity to develop anaerobic digestion systems. The experience with the Living Machine could potentially inform these later developments.

7) Solidify Collaborative Partnerships: There is considerable research and industry development in Ohio for anaerobic digestion systems. Oberlin should build and maintain ties to the Ohio Agriculture Research and Development Center and Ohio State University to stay informed of developments and new knowledge in bio-digestion systems. For example, the OARDC is conducting research on techniques for breaking down lignin containing compounds through pre-digestion treatment to reduce the residency time of these materials. They are also researching options for dry-system composting for feedstocks with a total solids content of 20% or higher. This could provide some useful research for handling the higher solid content common to food waste. Oberlin can also identify a research niche in anaerobic digestion tied to smaller scale wastewater treatment systems where there is presently little research taking place.

8) Funding for Feasibility Study: Funding should be sought to conduct a feasibility study and retrofit of the Living Machine to handle food waste and to conduct a more complete waste audit. Potential funding agencies could include: the Green Edge Fund, the Lorain County Solids Waste District offices, the Ohio Environmental Education Fund, the Ohio Department of Natural Resources, or local foundations, including the Nord Family Foundation or the Lorain County Community Foundation.

Return to Table of Contents

References

Books and Articles:

Arsova, Ljupka. “Anaerobic Digestion of Food Waste: Current Status, Problems, and an Alternative Product”. Columbia University Master’s Thesis published in May of 2010.

Dueblein, Dieter and Angelika Steinhauser. *Bio-gas: From Waste and Renewable Resources*. Published by Wiley-VCH Verlag GmbH & Company. Weinheim, Germany. (c) 2008.

H.S. Shin et al. “Performance of UASB Reactor Treating Leachate from Acidogenic Fermenter in the Two-Phase Anaerobic Digestion of Food Waste”. Pergamon Publishers. (c) 2001

Ohio Agriculture Research and Development Center, Anaerobic Digestion Training Course Manual. Assembled in September of 2012

United States Environmental Protection Agency, “Benefits of Anaerobic Digestion at Wastewater Treatment Facilities” published in 2010.

Van Buren, Ariane. *A Chinese Bio-gas Manual- Popularizing Technology in the Countryside*. Published by Intermediate Technology Publications, Ltd. (c) 1979.

Interviews/Consultations:

Allen, Erika. Executive Director of Growing Power in Chicago, Illinois

Baumann. Jeff. Director of Public Works, City of Oberlin in Oberlin, Ohio

Edel, John. Executive Director of Chicago Plants and CEO of Bubbly Dynamics and the Plant in Chicago, Illinois

Gwin, Brian. Program Associate with LocalFoodSystems.org at the Ohio Agriculture Research and Development Center in Wooster, Ohio

Hayes, Sean. Facilities Manager for the Lewis Center for Environmental Studies at Oberlin College in Oberlin, OH.

Johnson, Alan. Quasar Energy Associates in Cleveland, Ohio.

Liew, Lo Niee. Ohio Agriculture Research and Development Center Bio-gas testing laboratory in Wooster, Ohio.

Locke, Kim. Carbon Harvest Energy in Burlington, Vermont

Martin, Jay. Associate Professor of Ecological Engineering, School of Agriculture, Ohio State University, in Columbus, OH.

Nichols, Peter. CEO of Foresight Design in Chicago, IL.

Panfil, Rick. General Manager for Bon Appetit Management Company at Oberlin College in Oberlin, OH.

Project Stakeholders:

Heather Adelman, Project Manager for the Oberlin Project

Jeff Baumann, Public Works Director for the City of Oberlin College

Sean Hayes, Facilities Manager for the Lewis Center for Environmental Studies

Brad Masi, Oberlin Project Local Food Systems Consultant

Jessica Minor, Oberlin College Office of Government and Community Relations

Michele Gross, Director of Residential Life and Services at Oberlin College

Steve Hoffert, Director of Oberlin Waste Water Treatment Plant Facility

Rick Panfil, General Manager for Bon Appetit Management Company

Presentations:

Anaerobic Digestion Training Course at the Ohio Agriculture Research and Development Center (OARDC) in Wooster, Ohio on September 4-5 of 2012, including presentations by: Yebo Li, Mark Suchan, Ned Mast, Lo Niee Liew, Annette Berger, Dee Jepsen, Sam Mullins, Bruce Bailey, Aleksandr Yakhnitskiy, Chris Weaver, and Georg Marien

Perhaps the most important question for urban agriculture is: what potential does it hold to contribute to the food supply of urban residents? To answer this question, we will explore Cleveland, Detroit, Toronto, and Chicago- four Great Lakes cities that share a common climate with Oberlin and who also have vibrant urban agriculture initiatives.

Can Cleveland Feed Itself?

In his study "Can Cities Become Self-Reliant in Food?", Parwinder Grewal investigates the city of Cleveland to determine whether or not the city could approach self-reliance in the provision of several key foods. In this city of 431,363 residents, there are 18,345 vacant lots amounting to 3,414 acres of land. There are also 115,0714 occupied residential lots, at an average of .128 acres per lot. Finally there are about 2,902 acres of industrial and commercial rooftop surface. Given the limitations in urban environments for grain production or larger livestock, the study focuses on vegetables, fruits, chicken, eggs, and honey.

Grewal concludes that if 78% of available vacant land was utilized for agriculture, between 22 to 48% of Cleveland's fresh produce needs could be supplied, 25% of poultry and shell eggs, and 100% of honey. If residential lots were maximized for food production (assuming 7.2% of each occupied lot surface), then 31-68% of fresh produce needs could be supplied, 94% of poultry and shell eggs, and 100% of honey. If you included industrial and commercial roof tops to the mix, then between 46-100% of produce needs could be supplied, 94% of poultry and shell eggs, and 100% of honey could be supplied. This assumes sufficient vegetable and fruit production for year round consumption (with preservation for winter months) and 6 chickens per city parcel (as stipulated by the city's chicken and bee legislation).

The variation in production potential depends upon the types of food production methods being employed. He considers conventional urban gardening (standard beds with single crops), commercial rural farming (row crops), intensive urban farming (small plots with successional planting), and hydroponic rooftop gardening (greenhouse containing hydroponic production). The conventional and rural farming methods require the greatest land area for production. Intensive urban gardening (like Small Plot Intensive or SPIN) requires much less land and hydroponic production can produce the highest yields per acre.

From an economic leakage perspective, Cleveland presently spends $44 million annually on fresh vegetables, $25.7 million on fruit (excluding banana and citrus), $36.4 million on poultry, $9.1 million on eggs, and $2.1 million on honey. This amounts to $115.3 million that Cleveland could potentially produce within the city boundaries given its base of natural and physical resources and climate. Given the scenarios above, Cleveland could retain between $28.9 million and $114.7 million, compared to the estimated $1.5 million that it currently retains.

A couple of conclusions are important to note in this study. First, the type of agricultural techniques practiced have a significant baring on required land area for production. A bio-intensive system with season extension requires around 1/5 the land-area of an area utilizing conventional urban farming techniques. A rooftop hydroponic garden requires about 1/19 the area of conventional urban gardening and about 1/3 the area for bio-intensive urban farming. The second significant conclusion is that, when assessing urban agriculture potential, it is important to include not just vacant lots, but backyards, and rooftops as a part of the land mix. Food grown for self-consumption on a sidelot or backyard plot contributes to the local food economy. It also reduces a portion of the annual food cost that a resident might assume, enabling spending to go further. This can be particularly important for low-income residents that often have to trade-off between food, medical, and housing expenditures.

Assessing the Local Food Supply Capacity of Detroit

Another Great Lakes rust-belt city that shares many characteristics with Cleveland is Detroit. Unlike Cleveland, however, Detroit has a much larger overall land area and a more significant inventory of vacant land. Estimates of the actual vacant land inventory in Detroit vary widely and depend upon criteria used to determine vacancy. Estimates range from 40,000 to 65,000 vacant parcels covering between 17,000 to 25,600 acres. Vacant land in land-bank or other public holdings alone total about 44,085 vacant properties covering nearly 5,000 acres.

A study by Kathryn Colasanti and Michael Hamm, published recently in the *Journal of Agriculture, Food Systems, and Community Development*, assesses the potential capacity for fruits and vegetables to be supplied to Detroit's 835,000 residents. Their study utilizes data from the USDA to estimate potential per acre yields of fruits and vegetables that could be grown in the City of Detroit. Of the 27 vegetables listed by the USDA, only one, artichokes, could not be grown in the Detroit region. However, only 12 of 23 listed fruits could be grown in Detroit's climate, excluding all citrus crops customarily consumed.

Their study uses census data and USDA data on food consumption to estimate the total quantity of vegetables and fruits that would have to be grown to meet the demand for fruit and vegetables among Detroit's population. Their study distinguishes between:

- **Current Demand**: the acreage that would be needed to meet the average daily fruits and vegetables actually consumed by Detroit residents today (which are below the recommended daily intake suggested by the USDA);
- **Recommended Consumption**: the acreage needed if all Detroit residents

- followed the USDA's recommendations for daily fruit and vegetable consumption

Achieving a diet that matches the USDA's daily recommended consumption would actually require more than a 3 fold increase in daily fruit and vegetable consumption. For a population of 835,000, Detroiters currently eat an annual total of 285 million fresh vegetable servings and 98.2 million fruit servings. If dietary patterns matched the USDA's requirements, this would mean consumption levels 4.2 times higher for fruit and 3.0 times higher for vegetables.

To determine the land area needed to meet these current or ideal levels of food consumption the Detroit study, like the Cleveland study, considers two sets of production system variables: seasonality and intensity.

Seasonality variables consider:

- **Field-Only-** crops grown in an open field during the peak production season without additional season extension or storage. This reflects crops usually consumed directly within 2 weeks of harvest.
- **Field and Storage-** crops grown in open field for immediate consumption as well as crops grown for longer-term storage.
- **Field, Storage, and Extension-** crops grown in the open field, longer-term storage, and extended seasonal production through utilization of hoop houses, cold frames, or greenhouses.

Intensity variables consider:

- **High Bio-Intensive-** yields possible for highly experienced, high productivity farmers utilizing bio-intensive production techniques developed by Jon Jeavons.
- **Low Bio-Intensive-** yields possible for beginning farmers and gardeners with less experience with bio-intensive methods.
- **Commercial Yields-** considers yields compiled by Michigan commercial crop producers utilizing larger-scale, mechanized commercial production. This type of production is not necessarily feasible for urban food production, but provides an upper limit on needed acreage.

Given available land area and consumption demand, the authors conclude that Detroit can approach varying degrees of food self-reliance, depending upon types of production systems employed.

At a minimum, their study demonstrates that under high-yield, bi-intensive agricultural production, 31% of vegetables and 17% of fruits could be supplied on less than 300 acres without incorporating post-harvest, storage, or season extension technology. At the upper end, they estimate that employment of storage and season extension technology in combination with high bio-intensive agriculture, about 76% of vegetables and 42% of fruits could be supplied year-round on about 2,014 acres of land. By contrast, that same level of self-reliance would require 12,067 acres utilizing standard commercial row-crop production.

The table below summarizes the acreage requirements under different consumption and production technique scenarios:

Seasonal Scenario	Production Scenario	Acreage needed for current consumption	Acreage needed for recommended consumption	% Annual Vegetable Consumption Possible to Produce	% Annual Fruit Consumption Possible to Produce
FIELD	High Bio	263	916	0.31	0.17
	Low Bio	894	3001		
	Commercial	1660	5549		
FIELD & STORAGE	High Bio	511	1831	0.65	0.39
	Low Bio	1839	6174		
	Commercial	3063	10210		
FIELD & STORAGE &	High Bio	568	2014	0.76	0.42
EXTENSION	Low Bio	2086	6976		
	Commercial	3602	12067		

Source: "Assessing the Local Food Supply Capacity of Detroit, Michigan". *Journal of Agriculture, Food Systems, and Community Development*, Volume 1, Issue 2, 2010.

Toronto Urban Agriculture Study

Given their large land inventories in combination with declining populations, both Cleveland and Detroit hold the land resources to achieve substantial self-reliance in the production of their own food (although labor and people to tend these urban farming spaces is a different story). But how would this apply in a higher-growth city that has a much smaller inventory of available vacant land? The following summary investigates an assessment of local food production potential in the City of Toronto in Ontario, Canada.

A 2010 article titled "Could Toronto Provide 10% of its fresh vegetable requirements from within its own boundaries" appeared in the *Journal of Agriculture, Food Systems, and Community Development*. In this article, the authors looked solely at the potential for meeting 10% of the demand for vegetables within the city limits of Toronto, Ontario. With a population of 2.5 million and a denser urban footprint, Toronto has more intensive pressure on urban land-use than neighboring Detroit or Cleveland.

The Toronto study, unlike the Detroit and Cleveland studies, focuses solely on organic vegetable production without season extension and without bio-intensive growing methods. Further, the study considers available public or institutional lands and roof-top space, but does not include land area for potential home production. Toronto reports a high degree of participation in household gardening, with 40% of residents within the Greater Toronto Area reporting that they produced some of their own food. The city presently has about 1,606 acres of urban gardens under cultivation, about 1% of the city's land surface.

Unlike their American counter-parts, the city of Toronto has a much more active, municipally-drive process for preserving potential farmland and greenspace. The Toronto and Region Conservation Agency (TRCA) is one of the largest landholders in the Greater Toronto Area, preserving thousands of acres of farmland and leasing them to farmers. These spaces support a broader effort to intensify urban land-use while preserving critical agricultural land and open space. The city also manages an 8 acre urban farm for education and local food production and working with the Toronto School District Board to develop a cooperative management and education arrangement on urban school properties (although this has not moved beyond feasibility study as of 2010).

Differing from the Cleveland and Detroit studies, the Toronto study focused on only 13 vegetable crops. These crops were chosen on the basis of provincial statistics of average vegetable consumption for Ontario. The 13 crops identified comprise about 78% of the vegetables consumed by the average resident.

Their study concludes that meeting 10% of the demand of commonly consumed vegetable crops would require 5,725 acres based on current demand. Of this, they

Estimated Optimal Amounts of Specific Foods by Weight Required by Toronto Residents

Vegetable	Current Intake (lbs/person per year)	Total Requirement (Millions pounds/year	10% Total Requirement (Millions lbs)	Current Yields (lbs per acre)	Organic Yields @ 75% Conventional (lbs/acre)	Area Required (Acres)
Broccoli	6.31	15.76	1.6	5746	4300	324
Cabbage	10.71	26.79	2.7	21560	16200	146
Bok Choy	1.63	4.08	0.41	15664	11800	29
Green Beans	2.38	5.95	0.6	3546	2600	198
Carrots	15.43	38.58	3.86	33704	25300	134
Squash	5.91	14.77	1.48	9856	7400	176
Peas	0.73	1.81	0.18	3872	2900	53
Sweet Peppers	9.19	22.93	2.29	15664	11800	172
Tomatoes	16.84	42.1	4.21	15312	11400	324
Lettuce	23.3	58.25	5.83	15752	11800	434
Asparagus	1.32	3.3	0.33	1971	1500	196
Sweet Corn	7.47	18.7	1.87	4338	3300	507
Potatoes	66.23	165.57	16.56	18040	13600	1076
			41.92			3769

estimate that 2,652 acres could be available from existing land currently zoned for food production, certain areas for industrial uses, and about 200 scattered small plots in the city. Given land constraints within the city's footprint, this area would have to be supplemented by institutional land and rooftop production. The maximum rooftop area would have to be 3,073 acres, about 25% of the rooftop area identified as suitable for rooftop gardening within the City of Toronto. Their study further analyzes the growth requirements, seasonality, and yields of each of the 13 vegetable crops, summarized in the preceding table.

Some crops can be grown in more land intensive environments with multiple harvests available throughout the growing season. Other crops (corn, squash, potatoes) have limited seasonality and typically produce one yield annually. Urban land areas for food production can be further assessed for suitability of different types of crops.

Chicago- The Plant Case Study

All of the examples above focus on the utilization of urban land or roof-top space for agricultural production. Clearly, the type of production systems employed can greatly influence the intensity of land-use. For urban agricultural production, it is essential to maximize the output of calories on the lowest possible footprint of area. The Plant in Chicago provides a model for a highly integrated local food production system. The Plant is a project to convert a 93,000 square foot building that used to serve as a slaughter house and meat processing facility for the historic Stockyards south of downtown Chicago. Their model includes several urban agriculture applications, including vertical farming, intensive raised beds, rooftop agriculture, and aquaponics (a hybrid system that combines fish farming and hydroponic vegetable production). Their facility integrates these urban-intensive growing systems with other enterprises to support broader local food production and connections with the surrounding region, including a micro-brewery and a commercial processing kitchen. While still in the early stages of development, their model presents an integrated approach to urban food production as well as creating a business ecosystem in which the wastes of one production system become the inputs to another.

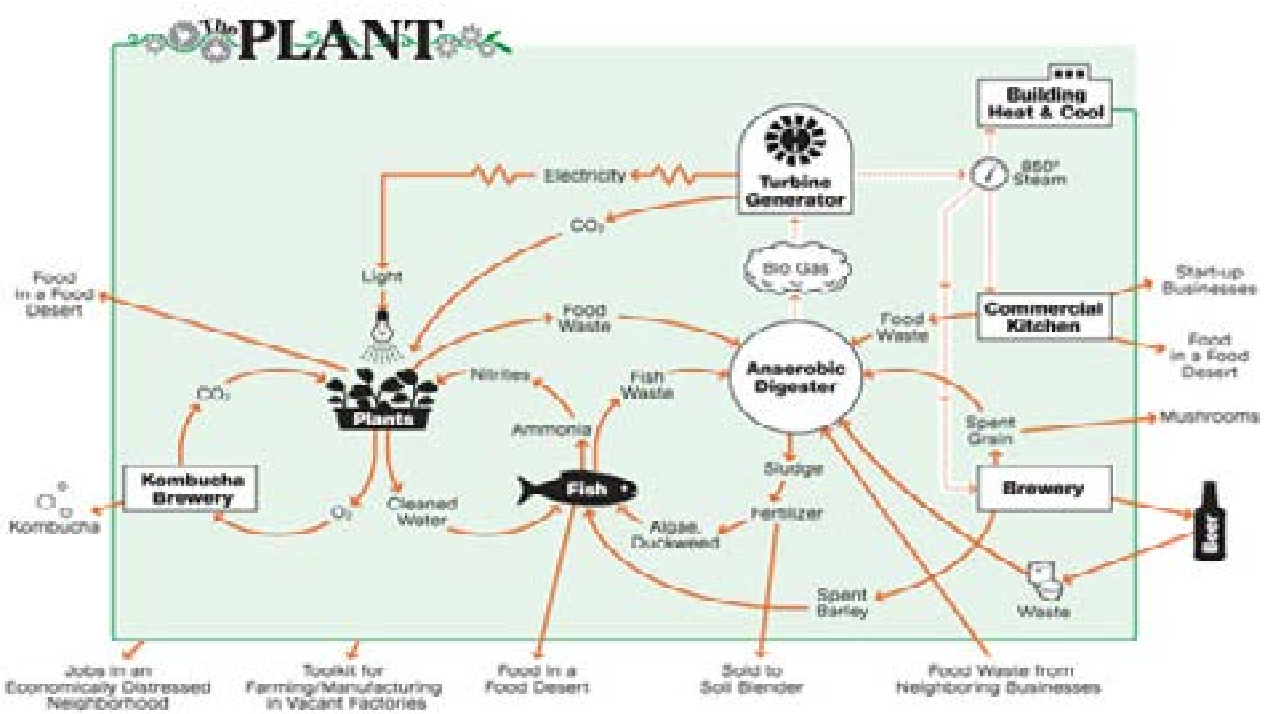
The main enterprises housed in the facility include:

- **A Kombucha Brewery**- Kombucha is a fermented tea product
- **Plants**- Plants include vegetables, micro-greens, lettuce, and plant seedlings
- **Fish**- Include Talapia and perch grown in indoor tanks
- **Micro-brewery**- A micro-brewery and restaurant will provide a commercial component to the facility.
- **Commercial Kitchen**- A commercial kitchen will support value-added processing opportunities for local farmers or food entrepreneurs

A bio-digester comprises a central component of the Plant operation, utilizing a variety of waste streams to generate energy. The waste streams include food waste from the commercial kitchen and micro-brewery, fish emulsion, sewage waste, and spent grain from the micro-brewery. The bio-digester produces two waste streams: bio-gas and sludge. The bio-gas runs through a turbine to create electricity for grow lights and general building use. The bio-gas will also produce steam heat that can be used for the commercial kitchen and general building heating purposes. The sludge can be sold to a fertilizer manufacturer and also used to stimulate growth of duck-weed and algae which feed fish in aqua-ponic systems. Carbon dioxide produced by the turbine is captured and used to stimulate the growth of plants while also providing inputs to the Kombucha brewery. Spent grains from the micro-brewery can also provide a growth medium for mushrooms and spent barley can provide a feed for fish.

The outputs of the plant itself will produce a variety of economic and social benefits, including:

- jobs in an economically distressed neighborhood;
- a toolkit for farming/manufacturing in vacant factory buildings;
- nutrients for a plant fertilizer manufacturer;
- acceptance of food waste from other nearby businesses;
- start-up businesses utilizing the commercial kitchen; and
- fish, vegetables, seedlings, and mushrooms for distribution to food desert neighborhoods or other retail or wholesale outlets.



APPENDIX SIX- URBAN FARMING MODULES FOR OBERLIN

As the previous studies reveal, the feasibility of urban food production will be driven by the intensity of food production. Focusing on standard commercial row crop production or rectangular bed production for annual vegetables will require much greater land area to feed an urban population. Conversely, systems that involve more season extensive and intensive production methods (producing more calories on a smaller footprint of land-area) hold greater potential for feeding urban populations. However, these more intensive systems will require significant upfront investment in season extension, crop storage, soil building, and small-farm equipment. They will also require reliable labor for a greater portion of the year.

Consideration can be given to promoting different types of urban farming modules that could be developed within the City of Oberlin:

- **Organic vegetable (annuals)-** standard production of annual vegetables during the growing season for 6-7 months of production.
- **Organic fruit production (perennials**)- incorporation of perennial fruit plants
- **Mixed urban livestock/fruit/vegetable production-** mixed system includes small livestock (goats, chickens, ducks, turkeys) for manure and food, vegetables, and fruits
- **Permaculture/Food Forests-** multi-layered, mostly perennial food production system that utilizes 7 layers of mixed-production (primary trees, below-canopy trees, shrubs, vines, ground covers, ground-level annuals or perennials, and root crops).
- **Native Habitat Restoration-** restoring native wetland, wooded, or wildflower/prairie patches to add to bio-diversity and attract pollinators or other beneficial organisms
- **Water Gardening-** collecting and holding rain-water shed from roofs or yards to add biodiversity and the production of water-based crops.
- **Greenhouse Production-** utilization of cold frames or greenhouses, heated or unheated, to extend the seasonal window of production.
- **Compost/Energy Production-** utilization of organic household, animal, or community wastes to generate compost or support small-scale bio-digestion (methane gas and inorganic nutrients).
- **Rooftop Production-** Utilization of roof-top space to increase available acreage for intensive urban production, either incorporating growing beds, hydroponic systems, or greenhouses.
- **Hydroponic Production-** water-based system of food production in which water-soluble nutrients from organic or chemical fertilizers or from natural sources like seaweed emulsion are used to raise crops in water.
- **AquaPonic Production-** Incorporating fish production with hydro-ponic vegetable growing system that utilizes nutrients from fish effluent to create a more closed loop system for waste recycling and food production.

The following table identifies the land and labor intensity of different modules and appropriate types of locations:

MODULE	MAINTENANCE INTENSITY	LAND INTENSITY	LAND-USE TYPES
Annual Organic Vegetable Gardens	High	Low to Medium	Home gardens, city land, institutional land
Organic Fruit Production	Low	Medium	Home gardens, city land, institutional land
Mixed Urban Livestock/Vegetable and Fruit	High	High	Home gardens (1/4 acre or more)
Permaculture/ Food Forests	Low	High	Home gardens (1/4 acre or more), institutional land, city land
Native Habitat	Low	Low to High	Homes, institutional, city
Greenhouses	High	High	Home, institutional
Compost/Energy Production	Medium	Low to High	Home, institutional, city
Rooftop Production	High	High	Private businesses or land owners
Hydroponic	High	High	Home, institutional, private business
AquaPonic	High	High	Home, institutional, private business

Another important factor in considering urban food production in Oberlin is to consider different types of land ownership or land access models. The following list indicates the types of land ownership options that would be possible in the city:

- Private land owned by user
- Private land leased to another user
- Public Land leased to another user
- Institutional land leased to another user
- Institutional land incorporated into institutional programming
- Common land or Conservancy
- Urban-Edge Farmland

A review of existing urban agricultural projects in Oberlin reveals that all but two of the above models are presently in use: common or conservancy land and urban edge farmland.

The table on the next page shows each of the urban agriculture applications in Oberlin and purpose, types of ownership, seasonality, and usage.
Reviewing the potential for urban agriculture in Oberlin, the available land resources exist to support a significant amount of agricultural production within

Project	Ownership	Seasonality	Usage
George Jones Farm	Institutional land leasing to outside non-profit organization	Season extension through heated and unheated greenhouses	Direct and wholesale market sales
Oberlin High School Farm Collaborative	Institutional land devoted to institutional program	No season extension	Sales to high school cafeteria
Johnson House Gardens	Institutional land used by student group	No season extension	Donations and limited sales
Prospect Elementary School	Institutional land used by outside group	No season extension	Perennial Flowers, Limited Food Production
Eastwood Elementary School	Institutional land used by outside group	No season extension	Perennial Flowers, Limited Food Production
Zion CDC Legion Field Community Garden	Municipal land utilized by outside group and residents	No season extension	Self-consumption
Oberlin Early Childhood Center	Institutional land used for institutional program	No season extension, but seedling greenhouse	Use by school cafeteria with limited sales
Village Garden	Institutional land used by outside group	No season extension, but seedling greenhouse	Mix of self-consumption, market sales, donations
Oberlin Community Service Center	Institutional land used for institutional program	No season extension	Donation of food to clients served by agency
Lewis Center for Environmental Studies	Institutional land used for institutional program	No season extension	Self-consumption, donations

the city. There is also significant market potential for households, institutions, and businesses looking to source food locally. The most significant challenges include: finding leadership, willing labor, and raising the skill-level to encourage high-yielding, bio-intensive farm systems.

The following next steps can be considered to begin to expand urban agriculture activities within Oberlin:

1) Work with city government to assess the usefulness of the following changes in zoning code to better support urban farming within the city:
    a. **County Land Bank for Vacant Parcels-** Work with Lorain County land-bank system (in the process of development) to provide a land-bank for vacant parcels in Oberlin. Develop urban agriculture and market gardening as acceptable temporary or permanent uses of vacant land.
    b. **Urban Farm Zoning-** Develop new zoning category for urban agriculture that can enable individual parcels to be zoned for agricultural use. This enables properties to be permanently designated for agricultural use, protecting them from future development.
    c. **Urban Farm District-** An urban farm district will include a more extensive acreage of urban land, often including multiple vacant parcels clustered in a common area. Urban farm districts can involve larger livestock or compost operations that might be more difficult to do in more densely populated neighborhoods.
    d. **Urban Edge Commons-** Acquire and hold land on the urban edge (within 1 mile of Oberlin city limits) that can be designated as permanent agricultural land or green space. Land is developed with infrastructure for agriculture and then leased to individuals, businesses, or groups that utilize the land to support the local food economy. Ownership stays with a land conservancy or other appropriate land-holding entity.

2) **Develop Learning Infrastructure to Advance Urban agricultural techniques.** Work with formal and informal educational partners to develop workshops, mentoring, and formal classes that raise the ability of urban growers to increase production on the same given land area. Courses should focus on such techniques as bio-intensive, square-foot gardening, SPIN (Small Plot Intensive or SPIN) farming, permaculture, greenhouse management, cold frames, urban livestock, and bio-intensive shelter design. Use the following techniques to raise the collective literacy on advanced urban farming techniques:
    a. **Neighbor-to-Neighbor or Peer-to-Peer networking** and mentoring to encourage more collaboration and information sharing at the neighborhood or peer-group scale.
    b. Utilize **digital media** to highlight particularly successful or innovative urban farming techniques and broadcast them through a variety of social media channels. A "garden-of-the-month" contest city-wide could also highlight some of Oberlin's most green thumbs and spread ideas for successful gardening.
    c. Organize **intensive learning workshops** drawing on the expertise of regional, national, or international practitioners. Offer workshops either for credit as a part of the LCCC sustainable agriculture certification or other accredited programs.
    d. Develop **applied courses** in intensive urban agriculture at LCCC's sustainable agriculture certification program, the Joint Vocational Schools, or Oberlin College's Environmental Studies Program.

3) Establish position for an **urban agriculture trainer** that can be housed in Oberlin. This person would be available to assist with urban agriculture projects in Oberlin, focusing efforts on training, technical assistance, collaboration, and education.
4) Develop **market garden training** module, particularly focused on youth education, that combines business planning with horticultural training. Expand individual, group, or educational gardens that sell food to local market while creating financially viable urban agriculture enterprises.
5) Organize a **community network** of individuals engaged with urban agri

Return to Table of Contents

1) culture that can provide input into educational priorities and needs. This group can also help to organize labor for urban agriculture, including mutual aid support groups (urban gardeners helping other urban gardeners) or community volunteers (students or others volunteering time to help with urban agriculture projects).
2) Create a **community map** as a part of the bio-regional dashboard that identifies urban farming sites throughout the city.
3) Work with **community composting** initiative to facilitate transfer or municipal leaf mulch or other materials that can be utilized to condition soils and build the productivity of urban farm sites.
4) Develop a **community investment** portfolio that includes growth and expansion of urban agriculture, mostly focused on infrastructure development such as water collection systems, food storage, greenhouses, and soil development.

APPENDIX SEVEN- LEVERAGING THE POWER OF NETWORKS- CASE STUDY ON ATHENS, OHIO

One of the best examples of leveraging the power of networks to cultivate stronger local food economies is right here in Ohio. Located in the Athens, the Appalachian Center for Economic Networks (ACENet) has been cultivating the development of a sustainable local food system since its formation in the mid-1980's. Based in Southeastern Ohio, ACENet works with the 18 Ohio counties that are part of an extended Appalachian region that spans 11 states. While rich in natural resources, Appalachia has struggled with high rates of economic poverty, mostly related to the collapse of the coal and timber companies that brought a large number of short-term jobs to the region, but not long-term economic stability. This largely rural region of Ohio has among the highest poverty rates in the country, with about 35% of its residents at or below the poverty level.

In this context, a group of small-scale farmers approached ACENet director June Holley in 1992 looking for support for an effort to make value-added products. They were not able to make enough money just selling vegetables, but were overwhelmed with the high cost of building a licensed facility for food processing. A few months later, Holley was attending a National Business Incubation Association conference n Washington where she met Verona LaMunyon who had gotten access to a kitchen space at an abandoned army base and converted it to what she referred to as a "kitchen incubator"- a licensed facility where start-up entrepreneurs could access food processors, ovens, or bottling equipment to make and label their own creative food products.

For Holley, learning about this story immediately made her think of the farmers back at home. Instead of raising large amounts of capital to support each individual farmer, she realized that a shared-use facility could be developed and shared by a group of area farmers, distributing the capital costs over a much larger network.

Over the following three years, Holley helped to convene a number of "joint design sessions", gatherings of local farmers, grocery store managers, restaurant owners, university extension staff, and others to develop the different aspects of the facility, from equipment lists to warehouse design. Each design session met only a few times and each were composed of a different set of people.

Holley realized that this approach to organization not only addressed some of the practical design considerations for a shared-use kitchen facility, but it also served what she termed a "network weaving" function. Each of those design sessions encouraged connections between people in the community. She noticed that farmers would start talking to grocers or food service managers during breaks and started to form new market connections for their products.

Holley summed up the work of ACENet as building upon opportunities identified by existing farmers or entrepreneurs who wanted to do more for their livelihoods, learning from other communities in the United States that came up with a unique solution to that challenge, and engaging people in "self-organizing" design teams where they were able to reveal individual assets and explore common projects. While she did not recognize it at the time, Holley had stumbled upon some of the core aspects of building robust and healthy networks: open communication and information sharing, diverse community stakeholders working together to identify common assets, and finding ways to value-add to existing businesses or farmers seeking more stability for their own operations and families.

In the late 1990's, ACENet built their Food Ventures center which enabled hundreds of individuals, many of whom were low-wealth residents from surrounding communities, to utilize ACENet's kitchen and micro-enterprise training program to start a whole range of manufactured food products. Many have outgrown the ACENet kitchen space to form their own manufacturing facilities. Building on its early successes, ACENet always utilized a network weaving approach, seeing its staff less as managers or trainers than as facilitators of connections between people and the resources that they need to be successful.

This network culture pervaded much of the entire region, leading to a number of other successful local food ventures. For example, Casa Nueva formed in 1985 as a worker-owned business. Suddenly facing unemployment, the former workers of a restaurant that went out of business formed a small group to take over the restaurant space as a worker-owned cooperative. They pooled together their own small resources along with capital from friends or former clientele that wanted to see a restaurant continue in that space. Because Casa Nueva was a worker-owned business, all of the worker-owners had to make informed decisions about the restaurant's operations. They had to learn how to read financial statements, and took turns operating or managing different aspects of the business. Today, Casa Nueva is a successful business that generates more than $2.5 million in annual revenues, supporting a restaurant, canteena, and a range of manufactured products. Additionally, about 3 dozen former worker-owners went on to start businesses of their own, many of which, like Casa, rely heavily on local farmers and businesses for their products. Thus Casa not only became a successful business, but a successful incubator of other local businesses.

Casa Nueva also produces and sells a number of value-added products, including salsas and barbecue sauces that are featured in its restaurant. They utilize the shared kitchen facilities at ACENet to acquire, store, and process locally grown foods into products that appear on the shelves of grocers across southern Ohio. Holley likes to describe ACENet as a facility that turns "farmers into food processors" and "restaurants into food manufacturers".

Holley emphasizes that, more important than the brick-and-mortar supporting the kitchen incubator facility was the cultivation of networks of farmers, businesses, and consumers that together built the local food system that defines the Athens area today. In that sense, the kitchen facility emerged out of that network process, meeting the needs and opportunities identified by the users themselves. A number of kitchen incubators in other communities have failed due to too much emphasis on raising capital to build facilities and too little investment in forming robust local networks that are essential to the successful functioning of a facility like this. The old adage "build it and they will come" certainly does not work here.

The ACENet kitchens provided a "network hub", bringing together a variety of stakeholders in the community who were able to mingle, form new collaborations, and create or grow a variety of new projects.

The Athens Farmers' Market, with more than 100 weekly vendors, has grown to be the largest and most financially successful farmers' market in Ohio. In addition to an incredible mix of produce, meats, roasted coffees, value-added items, cheeses, and other products, the farmers' market was one of the first in Ohio to actively attract low-income residents through its honoring of SNAP benefits. They also have a Community Food Initiative table where farmers can donate surplus produce at the end of the market, market-shoppers can purchase and donate produce, or they can give money to the volunteers to purchase food themselves. This food gets donated to local food pantries to improve local food security.

One of the most successful events in southeastern Ohio is the annual pawpaw festival. The pawpaw festival was spawned by Chris Chmiel a food entrepreneur who started to harvest pawpaw fruits through access agreements with landowners that had forested properties. Pawpaws are a fruit native to Ohio that produce a green fleshy fruit that tastes like a cross between a banana and a mango. The pawpaw festival annually brings together people from across the mid-west that cultivate or grow these fruits. The event has utilized an annual contest to reward the best and most creative recipes for use of pawpaws. These contests have led to the introduction of a variety of new products produced by Chmiel or other pawpaw producers, including pawpaw chutney, pawpaw ice cream, and a pawpaw micro-brew. The festival also helps to boost the local economy of Albany, Ohio, a struggling village outside of Athens. The festival both celebrates and engages people with the unique food culture surrounding this part of Appalachia. At the same time, it has helped to incubate new businesses and product lines, demonstrating the festival as another network hub in Athen's local food scene.

Presently, ACENet is working with the Athens County Tourism Board to develop the "30 Mile Meal" brand. This is used as a brand to market Athens unique local food culture as both an engagement tool for residents to support local farms and food businesses and as a draw for tourists seeking a variety of locally-based culinary adventures in the midst of beautiful natural surroundings.

Matt Ripinni, former food entrepreneur and current manager of Ohio University's dining system, describes the importance of collaboration to the vibrant local food systems when he recalled, "I worked for a German chef years ago. He was in a location that had a beautiful, very successful restaurant. He was always going to other restaurants, his competitors, and encouraged those restaurants to locate shops near his restaurant. So he ended up with all of these restaurants around him that were his direct competitors. He said it was a win-win situation for all of the businesses. It concentrates businesses and gets everybody together. From that experience, I realized ACENet promotes the same idea. We're all vying for the same dollars in some fashion, but everyone's found their unique niche, so that while people are in competition with each other, they are also in collaboration with each other. When you travel places, people have heard of Athens food culture. It is because if everybody looked at it as a purely competitive thing and there wasn't this collaboration, there wouldn't be the overall success locally. So collaboration is a big plus for creating that strong food culture that draws people."

Leslie Shaller, worker-owner for Casa Nueva and Food Ventures director for ACENet also notes the importance of collaborative network culture, "Having folks who get that culture of deep reciprocity who understand the relationship based step. It's not like we all love each other and aren't sometimes competitors, but there's a real interesting collaborative, cooperative spirit that has come out of the work over the past 20 years, whether it's the Athens Farmers Market or the Food Ventures Center, people have learned the win-win of strong relationships."

The impacts of 20 years of relationship building and network cultivation have had a noticeable impact on one of the most chronically impoverished regions of the United States. Today, the work of ACENet and the hundreds of farmers and entrepreneurs have woven together a local economic tapestry that includes:

- Over $3 million in annual sales at the Athen's Farmers Market;
- The start-up of seven additional farmers markets in Trimble, Nelsonville, McConnelsville, Chesterhill, Shawnee, Somerset, and New Lexington;
- Over 200 unique farm and local food businesses utilizing the ACENet shared-use kitchen facility each year;
- Tenants and clients of the ACENet kitchen had an aggregate of over $28 million in annual sales in 2011, supporting over 220 self-employment, full-time, and part-time jobs; and
- Their 30 Mile Meal brand has over 130 collaborating partners working to leverage their local food work to make Athens a destination for tourists and improve quality of life for residents.

Return to Table of Contents

PROJECT REFERENCES AND ACKNOWLEDGMENTS

ARTICLES/PUBLICATIONS/REPORTS:

AgClips, Buckeye Edition, July 11, 2012.

Arsova, Ljupka. "Anaerobic Digestion of Food Waste: Current Status, Problems, and an Alternative Product". Columbia University Master's Thesis published in May of 2010.

Barham, James, Debra Tropp, Kathleen Enterline, Jeff Farbman, John Fisk, and Stacia Kiraly. "Regional Food Hub Resource Guide"- U.S. Department of Agriculture", Agricultural Marketing Service, Washington D.C. April 2012.

Baring Gold, Laura and Elshoff, Kehm, Rae, and Schneider. "Where Our Food Comes from: The Oberlin College Food System", Report to the Environmental Studies Program at Oberlin College, September 1988.

Boehnlein, Paul, Western Reserve Land Conervancy. GIS Analysis of Vacant Lands Inventory within the City of Oberlin. 2012.

Cleveland Urban Design Collaborative, "Re-Imagining Cleveland- Vacant Land-Use Pattern Book". Published by Kent State University in collaboration with Neighborhood Progress, Inc. April 2009.

Colasanti, Kathryn and Michael Hamm. "Assessing the Local Food Supply Capacity of Detroit, Michigan". *Journal of Agriculture, Food Systems, and Community Development*. Volume 1, Issue 2, Fall of 2010.

Conservation Agriculture Carbon Offset Consultation, "Mitigating Climate Change- Conservation Agriculture Stores Carbon", West Lafayette, Indiana. 2008

Eisenhauer, Lucian. "Waste Matters- Context and Development of Oberlin Compost Initiative" Honors Thesis for Environmental Studies Program at Oberlin College, 2003.

Environmental Studies Program at Oberlin College. "Oberlin Student Cooperative Association Local Foods Study in 1988."

Grewal, Parwinder. "Can Cities Become Self-Reliant in Food?", *Journal of Cities*, 2011.
H.S. Shin et al. "Performance of UASB Reactor Treating Leachate from Acidogenic Fermenter in the Two-Phase Anaerobic Digestion of Food Waste". Pergamon Publishers. (c) 2001

Horst, Megan and Rignstrom, Tymann, Ward, Werner, and Born. "Toward a More Expansive Understanding of Food Hubs" appearing in the *Journal of Agriculture, Food Systems, and Community Development*. Volume 2, Issue 1, Fall 2011.

Jones, Christine, PhD. "A Carbon Friendly Beef Enterprise- Is it Possible", Angus Australia National Conference. 2010Jones, Christine, PhD. Adapting Farming to Climate Variability" Amazing Carbon. 2010.

Jones, Christine, PhD. "Australian Soil Carbon Accreditation Scheme", at the Managing the Carbon Cycle Katanning Workshop, 2007.

Jones, Christine, PhD. "Carbon and Catchments- Inspiring Real Change in Natural Resource Management", Managing the Carbon Cycle National Forum, 2006.

Jones, Christine, PhD. "Soil Carbon- Can it Save Agriculture's Bacon?" Agriculture and Greenhouse Gas Emissions Conference, 2010.

MacRae, Rod and Gallant, Patel, Michalak, Bunch, and Schaffner. "Could Toronto Provide 10% of its Fresh Vegetable Requirements from Within Its Own Boundaries- Matching Consumption Requirements with Growing Spaces", *Journal of Agriculture, Food Systems, and Community Development*. Volume 1, Issue 2. Fall 2010.

Masi, Brad. "Full-Circle Learning- Case for Distributed Compost System in Oberlin, Ohio". Report to the Ohio Environmental Education Fund of the Ohio EPA following grant support for pilot of distributed composting system. 2006.

Masi, Brad. "Regional Food System Assessment for Northeast Ohio- Recommendations to the Northeast Ohio Foodshed Alliance", Graduate Thesis at the Urban Affairs College of Cleveland State University, 2002.

Masi, Brad. "The Northeast Ohio Foodshed Network- Building a Sustainable Regional Food System for Northeast Ohio". Report of the first annual Northeast Ohio Food Congress at Cleveland State University, 2003.
Meadows, Donella. "Leverage Points: Places to Intervene in a System". Published by the Sustainability Institute, Hartland, VT. 1999.

New Agrarian Center, "Feasibility Analysis for Oberlin Kitchen Incubator" prepared by Brad Masi and Leslie Schaller with the Appalachian Center for Economic Networks, 2009.

Oberlin Research Group, "Oberlin Culinary Enterprise- Feasibility Study for a Kitchen Incubator in Oberlin, OH". Report for the City of Oberlin Open Space Commission. April 2007.

Ohio Agriculture Research and Development Center (OARDC), localfoodsystems.org supply network analysis, 2011.

Ohio Agriculture Research and Development Center, Anaerobic Digestion Training Course Manual. Assembled in September of 2012
Porteous, James and Frank Smith. "Farming- A Climage Change Solution", appearing in *ECOS* magazine, Volume 141, Feb-March 2008.

Sherr, Sara and Sajal Sthapit. "Mitigating Climate Change through Food and Land-Use", *WorldWatch Report* 179. The

WorldWatch Institute, Washington D.C. 2009.

United States Census Bureau- Consumer Expenditure Index, 2007.

United States Census Bureau- National Economic Census, 2007.

United States Environmental Protection Agency, "Benefits of Anaerobic Digestion at Wastewater Treatment Facilities" published in 2010.

USDA- National Census of Agriculture, Years 1959, 1969, 1977, 1987, 1997, 2007

Yin, Daphne. "Soil Carbon Lands Market Opportunities through New Offset Methodology". Ecosystemmarketplace.com. 2012.

BOOKS:

Alexander, Christopher et al. *A Pattern Language*. Oxford University Press, New York. 1977.

Dueblein, Dieter and Angelika Steinhauser. *Bio-gas: From Waste and Renewable Resources*. Published by Wiley-VCH Verlag GmbH & Company. Weinheim, Germany. (c) 2008.

Hansen, James. *Storms of My Grandchildren- The Truth about the Coming Climate Catastrophe and Our Last Chance to Save Humanity*. Bloomsbury Press, New York. 2009.

Hewitt, Ben. *The Town that Food Saved*- How One Community Found Vitality in Local Food. Rodale Press, New York, NY. 2009

Holley, June. Network Weavers Handbook- A Guide to Transformational Networks. Network Weaver, Athens, Ohio. 2012.

Lappe, Anna. *Diet for a Hot Planet- The Climate Crisis at the End of Your Fork and What You Can Do About It*. Bloomsbury Press, New York. 2010.

McKibben, Bill., *Eaarth*- Making a Life on a Tough New Planet. Times Books, Henry Holt & Company, New York. 2010.

RIccuitto, Jack and George Nemeth. Instructions from the Cook- Recipes for New Conversations, Pubished by jackzen, 2008.
Schuman, Michael and Leslie Schaller and Brad Masi. *The 25% Shift- The Benefits of Food Localization for Northeast Ohio and How to Realize Them*. Published by the Cleveland Foundation, Cleveland, OH. 2010.

Sears, Paul. *Deserts on the March*- Fourth Edititon. University of Oklahoma Press, Norman, OK. 1935.

Shepard, Mark. Restoration Agriculture- Real World Permaculture for Farmers. Acre USA Publishing, Austin, Texas. 2013.

Shuman, Michael. *Local Dollars, Local Sense*. Chelsea Green Publishing, White River Vermont. 2012.

Tumber, Catherine. *Small, Gritty, and Green- The Promise of America's Smaller Industrial Cities in a Low Carbon World*. The MIT Press, Cambrdige, Mass. 2012.

Van Buren, Ariane. *A Chinese Bio-gas Manual- Popularizing Technology in the Countryside*. Published by Intermediate Technology Publications, Ltd. (c) 1979.

INTERVIEWS:

Ajamian, Michelle. Co-Founder of Shagbark Seed and Mill. May 25, 2012 and February 19, 2013

Allen, Erika. Executive Director of Growing Power in Chicago, Illinois

Baumann Family (Jeff, Milo, and Una), at their urban farmstead in Oberlin, October 5, 2011

Baumann. Jeff. Director of Public Works, City of Oberlin in Oberlin, Ohio

Beil, Ruby. Sustainable Agriculture Certification Director at LCCC, July 23, 2011

Benzing, David. Co-Owner of Vermillion Valley Vineyards, October 7, 2011

Blissman, Beth, Director of the Bonner Center for Service and Learning at Oberlin College, October 12, 2011

Bosserman, Steve. AgBio Regional Food Project, OARDC, August 19, 2011

Brastaviceanu, Tiberius. President of Sensorica Open Source Sensor Company, August 19, 2011

Brylowski, Laura Rose. Local Foods Coordinator for Oberlin Student Cooperative Association, July 23, 2011

Coleman-Mumford, Blythe. Oberlin High School Student and Chair of Food Awareness Club, September 8, 2011

Comings, Bruce. Co-Founder of George Jones Farm and Nature Preserve, October 1, 2011

Cox, Victoria. Oberlin College student and Jones Farm apprentice. July 15, 2011

Edel, John. Executive Director of Chicago Plants and CEO of Bubbly Dynamics and the Plant in Chicago, Illinois

Eisenhauer, Lucian. Vice President of Operations for RecycOil and Oberlin College Alumni, July 21, 2011

Fox, Valerie. Former Jones Farm Manager and Athens-Area farmer. May 27, 2012

Gentry, Viviana. Oberlin College student and Jones Farm apprentice. July 15, 2011

Gwin, Brian. Program Associate with LocalFoodSystems.org at the Ohio Agriculture Research and Development Center in Wooster, Ohio

Hayes, Sean. Facilities Manager for the Lewis Center for Environmental Studies at Oberlin College in Oberlin, OH.

Himmelright, Roger. Farmer Liaison and Logistics Coordiantor for City Fresh, September 8, 2011

Holiday, Dean. Executive Chef for Bon Appetit Management Company at Oberlin College, August 15, 2011

Holley, June. Founder of Appalachian Center for Economic Networks, May 26, 2012

Hopkins, David. Urban Gardener at the Village Garden in Oberlin, October 12, 2011

Jaeger, Brandon. Co-Founder of Shagbark Seed and Mill, May 25, 2012

James, Randall. City Fresh Shareholder, August 6, 2011

Johnson, Alan. Quasar Energy Associates in Cleveland, Ohio.

Kelly, Tucker. High School student and Jones Farm apprentice. July 15, 2011

Kennedy, Emily. Local Food Coordinator for Oberlin Student Cooperative Association, July 23, 2011

Kish-Jordan, Sandy. Executive Director of the New Agrarian Center. August 15, 2011

Liew, Lo Niee. Ohio Agriculture Research and Development Center Bio-gas testing laboratory in Wooster, Ohio.

Locke, Kim. Carbon Harvest Energy in Burlington, Vermont

Martin, Jay. Associate Professor of Ecological Engineering, School of Agriculture, Ohio State University, in Columbus, OH.

Masi, Brad, Curator for NEOFoodWeb.org, July 21, 2011

Nichols, Peter. CEO of Foresight Design in Chicago, IL.

Nigra, Anne. City Fresh Volunteer and Oberlin College student, July 10, 2011.

Panfil, Rick. General Manager for Bon Appetit Management Company at Oberlin College in Oberlin, OH.

Petersen, John. Chair of the Environmental Studies Program at Oberlin College, July 26, 2011

Pilacky, Kate. Field Manager for Western Reserve Land Conservancy, October 12, 2011

Schaler, Leslie. Food Ventures Director for the Appalachian Center for Economic Networks. May 26, 2012

Shuman, Micahel. Post-Carbon Institute and Author of Local Dollars, Local Sense, April 12, 2012

Small, Maurice, Co-Founder of City Fresh and Urban Farmer, October 1, 2011

Sokoll, David. Head Chef for the Oberlin Early Childhood Center, September 28, 2011

Turner, Abbe, Owner of Lucky Penny Farms and Creamery, August 25, 2011

Walzter, Joseph, Owner of the Black River Café and Agave Café, July 22, 2011

Wycoff, Danielle. Visitng Professor of Art at Ohio University, May 27, 2012.

ACKNOWLEDGEMENTS:
I would like to thank the staff of the Oberlin Project for their support, inspiration, and assistance throughout the process of this study, including Heather Adleman, Kristin Braziunas, Sharon Pearson, and Bryan Stubbs. I would also like to thank David Orr for his vision and tenacity in getting the Oberlin Project started. Finally, I would like to thank the community partners that provided the funding support for this project: the George Gund Foundation, Oberlin College, the New Agrarian Center, and NEOFoodWeb.org

Return to Table of Contents