Planning for a Networked Produce Storage and Aggregation System for the Piedmont Triad Region

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The purpose of this document is to describe the current conditions of the aggregation and storage networks for local foods in the Piedmont Triad region of North Carolina, and to provide a methodology, propose design guidelines, and suggest actionable items for one potential way forward in the development of those networks. The twelve-county Piedmont Triad region includes a broad consortium of sectors that exist across various scales. This document presents issues and opportunities specific to storage and aggregation of local produce, addressing the growing local food movement and responding to the chronic economic stress experienced by many micro- and small-scale producers, businesses, and entrepreneurs in the region.

A scenario is described in which food storage and aggregation are re-integrated into the fabric of the Piedmont Triad region, contributing positively to economic and community development. It is not solely focused on producers; attention is paid to businesses and entrepreneurs with a current or potential role in aggregating, storing, and distributing local food. A principal tenet of this work is that the storage and aggregation needs of the local food system can best be addressed by a variety of sectors and businesses, many of which do not currently identify as participants in the local food movement. Rural convenience stores, for example, have unused existing cold storage space or are able to add additional units at minimal cost. These businesses are convenient to small rural farmers as well as aggregators and buyers. This change would benefit small farmers in need of a regulatory-compliant place to store farm products while providing an additional revenue stream for the small businesses providing the service.

It should be noted that this project does not address consumer markets, vending, or sales of any sort. Many other current local-foods projects address these important aspects of the system development including the Center for Environmental Farming Systems, the Carolina Farm Stewardship Association, and the Community Transformation Grant's Healthy Eating Project. Instead, this project addresses an existing gap in food system development work: the potential economic impact on households, communities, and across the region by an increase in infrastructure capacity geared toward the aggregation and storage of produce grown by micro- and small-farmers for sale and distribution to small and mid-sized institutional and wholesale retail markets and distributors.
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The Piedmont Region of North Carolina is largely rural. Urbanized areas are shown in brown.\(^1\)

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\(^1\) Image source: Piedmont Triad Regional Council.
Economic Impact

For many small farmers in the Piedmont Triad region, farm income is a supplemental, yet crucial, part of their household economy. According to the North Carolina Department of Commerce State of the North Carolina Workforce report, rural areas are continuing to lose employment opportunities and “middle jobs” that supplied a family-sustaining wage for workers with little formal education are disappearing rapidly.¹ For many of these families, small farm operations can provide much needed household income to supplement low-wage job earnings. Small farming operations also present opportunities for partially or fully retired growers, as well as opportunities for producers who are on their way to building larger, full-time farm businesses. Generally, growers that fall into these categories do not have the physical infrastructure or marketing capacity to sell to institutions or buyers that can pay a good wholesale price for their products. While some farmers that fit this classification have sold produce at roadside stands and farmers markets, some growers lack an interest in, or capacity for, selling to such markets. There is a tremendous untapped opportunity for selling locally grown produce to institutional buyers, particularly for small growers that cannot market their produce directly to consumers because of other job or family responsibilities. Developing this aspect of the local food system would result in larger quantities of fresh, local food reaching the plates of North Carolinians while providing much-needed income for rural farming households in the Piedmont Triad region and additional revenue streams for small businesses that act as aggregation sites.

Throughout the Piedmont Together project, the theme of chronic economic stress recurs. As both an issue to be addressed and a guiding principle for a specific development direction, chronic economic stress produces a variety of social, psychological, and physical effects.² The recovery from the Great Recession that began in 2007 has been much slower than recoveries from previous recessions, as population growth has compounding the problem for unemployed or underemployed North Carolinians. According to a recent report from the North Carolina Justice Center, many of the jobs that have been created since the end of the recession have been lower-wage service jobs; furthermore, rural areas of North Carolina continue to lose jobs, while metropolitan areas have slowly begun adding new jobs.³

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The same report also highlights growing wage and employment disparities for racial minorities and women who are affected by low wages and unemployment at higher rates than their white and male counterparts.

This chronic economic hardship has been studied within a number of disciplines in an effort to understand and respond to the crisis that more effectively addresses the complexity of regional economic decline. In a 2006 article in *Economic Development Quarterly*, Laura Reese suggests that critical responses to natural disasters could be effectively applied to chronic (and slow) economic decay of communities and regions. Specifically, Reese cites the following elements of disaster response as offering positive outcomes:

- Media attention
- Sense of urgency coupled with long-range vision
- Coordinated federal, state, and foundation assistance
- Emphasis on community hope
- Focus on the public sector, public investment, public infrastructure, and public pride

Reese provides a valuable perspective to the issue at hand—chronic economic stress and economic and community decline are similar to a major natural disaster and its aftermath. However, a natural disaster is often described as an “act of God”—a situation attributed to outside and unavoidable circumstances. Although some amount of blame is ascribed (“they didn’t leave quick enough,” “they shouldn’t have been living in low-lying areas”), economic stress and decline elicits much more blame and political posturing. In those situations, debates over who is to blame, who should shoulder the responsibility for recovery, and who should benefit first from recovery efforts often overshadow any attempts to mitigate damage or move toward recuperation. This takes a heavy toll on community hope and public pride, infrastructure, and investment.

Chronic economic stress in rural areas of the United States presents particular difficulties. Rural economic stress is predicated upon a greater variety of continual stressors than in urban areas, resulting in long-term poverty that is more persistent than in cities. While this study is not an attempt to specifically address issues of poverty in the Piedmont Triad region, it is important to understand the precursors and causes of chronic economic stress specific to rural areas because the production, distribution, and sale of food and farm products holds such an enormous possibility for addressing some of these issues.

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This study examines the development of produce aggregation within the Piedmont food system through the lens of chronic economic stress as expressed by these central questions:

What opportunities exist to grow both the supply and demand for local produce while engaging and involving rural and urban, low-resource and high-capital, and diverse communities in ways that generate individual and community wealth? More specifically, what sectors not currently engaged in local food system efforts hold potential for growing their businesses while contributing to a more robust local food system?

To answer these questions, it is necessary to understand economic development as more than job creation, and the food system as more than farmers and farmers’ markets. The goal of this project is to present one way in which the aggregation and storage of local food products can increase supplemental income along with community, business, and household capital through creative and sustainable means.

Because of specific attention to food and farming sectors either not currently engaged in the food system or excluded from current efforts to build the food system, this project specifically explores the potential for the development of micro-, small-, and medium-scale aggregators through decentralized infrastructure throughout the Piedmont Triad. As the graphic below illustrates, these smaller aggregators would also integrate with larger-scale food system efforts, creating a more robust, resilient, and networked storage and aggregation system for local food.
Conceptual model of the food aggregation system.
In addition to integrating with and building the aggregation potential of local foods, this project also fits into the larger food system, where aggregation and storage are just one part of the local food system cycle. As illustrated in the graphic below, the flow of farm products (the large ring) through value-added efforts such as processing and wholesale retail aggregation and distribution includes consumer retailing and the recycling and composting of food waste. The inner ring models a direct-to-consumer relationship. While this smaller model is favored by local food system activists who place a priority on “knowing one’s farmer,” it can exclude opportunities for generating community wealth through the multiplier effect: increasing the number of times a dollar cycles through a community increases the economic impact of each dollar on the local economy. Both approaches are needed to create a resilient and robust local food system. This project focuses heavily on the potential of aggregation and storage to expand the circle of economic impact.

Diagrammatic model of a food system.
Values

In 2012-2013, a consortium of partners and work group members developed these basic principles of the Piedmont Together plan:

- Create a better quality of life for the Piedmont’s residents
- Build a resilient economy
- Promote equity
- Preserve and better the environment
- Engage community voices in regional decision-making

While visions specific to the food system of the Piedmont region remain diverse, many existing values for the future of the regional food system closely relate to the principles of the Piedmont Together plan:

- Preserve and enhance the visual and recreational aspects of the rural Piedmont landscape
- Strengthen local and regional economies by supporting food system efforts
- Engender greater food access among all Piedmont communities, while ensuring fair pay for farmers and other food producers
- Build resilient cross-sector community networks to foster an inclusive and creative food system

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6 http://piedmonttogether.org/

7 These values were compiled by the author from previously conducted reports and assessments in addition to stakeholder interviews.
The Piedmont Triad region, like much of the United States, is experiencing an extended period of low employment and underemployment. At the same time, there is a renewed interest in local foods to foster healthier lifestyles and protect and preserve the rural landscape. The region offers a great potential for the production, aggregation, processing, and sale of local foods to further public health and land preservation goals while promoting sustained economic recovery and fostering resilient local economies.

According to the Center for Environmental Farming Systems, North Carolinians spend about $35 billion per year on food. If 10% of that were spent on locally produced food, then $3.5 billion would be available to local economies. A study by Ken Meter at the Crossroads Resource Center concluded that buying local food has a multiplier effect throughout the wider local economy within the range of 1.4-2.6, depending on such variables as the commodities purchased and the scale of the community economy.

As the local food system develops, chronic economic stress in rural and urbanized Piedmont areas presents specific issues and opportunities. Currently, many projects, programs, and initiatives exist to assist small- and mid-scale farmers who wish to enter mainstream markets such as grocery stores and schools. However, many Piedmont farmers—especially those addressing chronic economic stress within their household through supplemental income earned via small- or micro-scale farming—have production and marketing capacities well below what is necessary to utilize these programs. The time involved in research, marketing, and developing the relationships necessary for participation is often too much for a low-resource farmer to take on, especially if farming is undertaken in addition to a full-time job.

Many of these farmers currently sell produce at informal roadside stands, directly from their trucks parked at strategic locations, or through another informal market. While it is not necessary that they replace these activities with another type or form of farm produce marketing, these farmers could potentially grow their farm income with minimal additional inputs through selling some farm products to currently inaccessible aggregators and distributors. These small- and micro-farmers, many of whom are low-resource, can benefit greatly through the addition of wholesale sales of some of their produce. Likewise, the regional food economy would benefit from the increased supply of local foods supplied by these farmers.

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8 http://www.cefs.ncsu.edu/whatwedo/foodsystems/10percent.html
9 Meter, K. (2008.). Local Food as Economic Development. Crossroads Resource Center, Minneapolis, MN.
10 The Center for Environmental Farming System’s NC Growing Together project is a good example of an organization working within the state to make these connections. In September 2013, the project partnered with NC State’s Poole College of Management to offer the country’s first local foods-focused business school supply chain fellowships. http://www.cefs.ncsu.edu/newsevents/news/2013/septe-news/scrc-fellows.html
To achieve the goal of increasing locally sourced food supplies, however, three main issues and opportunities need to be defined and addressed. These three ideas are presented not as issues to be overcome, but challenges that, once addressed, open the region’s local food system to greater resiliency, sustainability, and integration within the overall community and economy.

**Issues and Opportunities in the Piedmont Triad Local Food System**

- Lack of distribution infrastructure for small or micro producers and processors
- The supply chain is top heavy, even within local foods efforts
- Unequal access to markets, institutions, and entrepreneurial opportunities

*Issues and opportunities in the local food economy of the Piedmont Triad region.*
1. Lack of distribution infrastructure for small- or micro-producers and processors.

The cost of an 8x10’ cold storage unit, installed, is typically between $4,000-$10,000. For many farmers that entered the farming profession after retirement, or who have substantial off-farm income or access to capital, this is not an overwhelming cost, and they choose to build their own on-farm cold storage units.\footnote{11} However, this capital is not accessible for many low-resource farmers. Additionally, as a farmer tests the possibility of expanding into aggregated sales, it is often not prudent to make these large investments until their market share is established. Furthermore, on-farm cold storage is not generally conducive for multi-farm aggregation. While most farmers see some benefit in aggregating a week’s worth of harvest into one delivery (made possible by cold storage), much greater benefits are obtained by aggregating produce from multiple farms into delivery sizes that are comparable to larger distribution chains. Having climate-controlled cold storage space that is well maintained, available for a reasonable lease, and located in a central and convenient location to both farmer and distributor would fill a current gap in food system infrastructure available to small- and micro-scale farmers.

Some distribution facilities currently exist in the Piedmont region. Pilot Mountain Pride in Surry County is one such center. This ‘food hub’\footnote{12} is a 6,000-square-foot facility providing “necessary food safety training, marketing and distribution systems to allow [farmers] to effectively sell their produce.”\footnote{13} It is a privately owned company that received start-up capital through financial assistance from a variety of governmental and foundation sources. They purchase locally grown products from farms in the greater Winston-Salem area, and sell to Appalachian State University, Surry Community College, their own retail storefront in downtown Mt. Airy, and a variety of grocery stores and restaurants. They are open to purchasing produce from any farmer who has received GAP training. Selling produce through Pilot Mountain Pride is a great way for small- or mid-scale farmers to diversify their markets and their (GAP training, marketing assistance) are highly valued. However, small farmers outside a reasonable driving distance cannot make regular deliveries of small amounts of produce. It is more reasonable to drive products to Pilot Mountain Pride only when a refrigerated truck is full. Therefore smaller, intermediary cold storage and aggregation facilities are needed to ensure the participation of small- and micro-scale farmers, particularly those outside a reasonable driving distance of the Surry County packing house. Additionally, there is market capacity for additional, competitive aggregation businesses, especially those that serve markets and locations that Pilot Mountain Pride and other aggregators and distributors do not.

\footnote{11} As a much cheaper alternative to standard cold storage units, some small farmers are using CoolBots—small devices that cost around $300 (www.storeitcold.com)—which work by interfacing with a window AC unit installed in a well-insulated room. CoolBots are inexpensive to run and work well for florists or farmers who need only temporary storage. They do not recover temperature well when the door is opened, do not cool to below 36°F, do not work well in the wintertime, and are not able to control for humidity.

\footnote{12} The USDA defines “food hubs” as “businesses or organizations that connect producers with buyers by offering a suite of production, distribution, and marketing services.” However, the term is often used more liberally to refer to any facility where food aggregation takes place.

\footnote{13} http://pilotmountainpride.com/
2. The supply chain is top heavy, even among local foods efforts.

Similar to the issue outlined above, much of the resources and focus for the promotion of local foods development over the past decade has gone to supporting mid- and larger-scale farms within North Carolina. Large foundations and universities have been focused on helping farmers who were affected by the tobacco buyout program transition to other viable crops, as well as the renewed public health focus on obesity, diabetes, and stroke prevention. This led to much public support for getting fresh, local foods into a variety of markets and food access programs. Working with larger farmers and distributors could make a more quantifiable difference in the prevalence of local foods relative to the number of farmers in a given program. However, as the food system has matured, there is more room—and more need—for further differentiation within growers and aggregators in the Piedmont region to engender greater resiliency to both the regional economy and the food system at large. Resiliency is a function of a system's ability to return rapidly to a sustainable state of being following distress or disturbance. A food system that is predicated upon supporting and cultivating farmers of all scales, who utilize various production methods and have a variety of market outlets, will inevitably be stronger, more resilient, and more adaptable to change than a system that only responds to one scale or type of farmer or one type of market distribution method.

3. Unequal access to markets, institutions, and entrepreneurial opportunities.

The diversity of Piedmont food system businesses, individuals, farmers, and other entrepreneurs presents an opportunity for development. Historically, minorities and low-resource communities have been underserved by state and federal agricultural agencies. Black land loss in the rural South and institutional discrimination within the USDA has been well studied and documented. Furthermore, minority farmers have historically been small-scale farmers at a rate much higher than their white counterparts. In 1914, the Cooperative Extension at North Carolina A&T University was established with a specific mission to “deliver educational programs and technology to enrich the lives, the land and the economy of North Carolina's limited-resource individuals, families and communities.” There are a variety of programs and initiatives at NC A&T that are


17 http://www.ncat.edu/academics/schools-colleges1/saes/cooperative-extension/
helpful to small and low-resource farmers. The Agriculture and Natural Resources program, for example, has as its primary audience “those farmers who are just beginning, those who are underserved, and those with small-scale acreage.”

However, much remains to be done to encourage and support not only farmers, but also business owners and entrepreneurs from minority and low-resource communities who are interested in various aspects of local food system development. In the same way that a diversity of scale and market-type will strengthen the ecosystem of the local food system in the Piedmont Triad region, greater involvement from a diversity of stakeholders throughout the system will engender more dynamism and resiliency.

The Piedmont Together project names “Equity” as a guiding principle related to each of the plan's five main focus areas (Housing, Transportation, Jobs, Health, and Places & Spaces), and cites the region’s changing demographics as a motivator for increased attention to equity. Specific to the food movement, equity often is used to mean equal access to fresh, local food. However, too narrow a focus on food access misses opportunities for job creation, entrepreneurship, and increased on-farm income. Nationally, the local food movement can be quite hegemonic in its (lack of) inclusion of racial, class, or gender minority participants. If individuals, businesses, and communities not currently participating in the local food movement pay greater attention to these barriers for participation, then there will be greater equity of access, economic opportunity, and public and environmental health.

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18  [link](http://www.ncat.edu/academics/schools-colleges1/saes/cooperative-extension/Programs/ANR/index.html)

19  [link](http://piedmonttogether.org/content/equity)

The Importance of Stakeholder Engagement

It is imperative to identify the necessary stakeholders in creating a local foods aggregation and storage network that is well integrated into the economic and community fabric of the Piedmont Triad region. A combination of public sector, private industry, and nonprofit/community initiatives is necessary to create a sustained system that is integrated into the fabric of the community. The following list provides a thorough (though not exhaustive) list of the types of stakeholders that would be beneficial to this project. Where available, contact information is given.

Public Sector

Regional Development Agencies
To communicate with existing and potential business owners and entrepreneurs, inform the business community of potential opportunities and partnerships.
Piedmont Together: http://piedmonttogether.org/
Piedmont Triad Regional Council: http://www.ptrc.org/
Piedmont Triad Partnership: http://www.piedmonttriadnc.com/

City, County, and Regional Economic Development and Planning Offices
Metropolitan planning offices (MPOs), regional planning offices (RPOs), transit authorities, and town, city, and county agencies—including planning offices and economic development efforts—are all important stakeholders that should be engaged with efforts to link food system business opportunities to a wide array of the public. These offices exist at different scales and levels of staffing throughout the Piedmont Triad Region.

NC Department of Commerce
http://www.thrivenc.com/

State and County Cooperative Extension Offices
NC State Extension (offices in every Piedmont County): http://www.ces.ncsu.edu/local-county-center/
NC A&T Cooperative Extension (every county does not have an agent, but many programs are available state-wide): http://www.ncat.edu/academics/schools-colleges1/saes/cooperative-extension/index.html
NC Fresh Produce Safety: http://ncfreshproduc safet y.ncsu.edu/
Plants for Human Health Institute (A project of NC State Extension): http://plantsforhumanhealth.ncsu.edu/
NC 10% Campaign: http://www.ncsu.edu/project/nc10percent
FoodCorps
Service sites throughout North Carolina: https://foodcorps.org/where-we-work/north-carolina

Local School Districts
For institutional purchasing, as well as the potential of sharing cold storage and aggregating space.

Soil and Water Conservation Districts (SWCD)
Often, SWCD specialists serve multiple roles in their counties and regions. Their roles include administering cost-share programs and partnering with other local agencies and initiatives to apply for foundation and governmental grants.
http://www.ncagr.gov/SWC/

Public Health Agencies
US Health and Human Services (HHS) Community Transformation Grant (CTG) Program. NC Division of Public Health is a 2011 grant recipient, working to “support public health efforts in local communities to reduce chronic diseases, promote healthier lifestyles, reduce health disparities, and control health care spending.” Specific to local foods, this multi-year grant program works to expand access to and affordability of local foods, especially in low-income areas. The project ends in 2014, but will spawn a number of sustained efforts to increase local food access.
CTG Region 3 and 5 includes the Piedmont Triad region counties:
http://www.nwtransformationproject.org/about-ctg-project/

County Health Departments
Many county health departments have programs and resources available to answer regulatory questions about food storage and handling, as well as contacts for initiatives that are working to increase food access in the county.
http://www.ncalhd.org/county.htm

Farm Service Agency
The USDA established the Farm Service Agency (FSA) in 1994, incorporating the activities and responsibilities of several predecessor agencies. The main task of the FSA is to implement farm conservation and regulation laws around the country. They offer a broad range of services, information, and cost-share programs. USDA Service Centers are located in each county, where farm businesses can access the services provided by the Farm Service Agency, Natural Resources Conservation Service, and the Rural Development agencies.
http://offices.sc.egov.usda.gov/locator/app?state=nc&agency=fsa
Community Colleges
Many community colleges have agriculture or other food-business courses and resources and serve as a wonderful asset for the community. The Sustainable Agriculture program at Central Carolina Community College is a leader in teaching and resources for innovative farmers, and is located in nearby Chatham County. http://www.cccc.edu/sustainableag/

Private Industry

Restaurant Associations
NC Restaurant And Lodging Association: http://ncrla.org/
Boone Independent Restaurants: http://booneindependentrestaurants.org/
Asheville Independent Restaurants: http://airasheville.org/
Asheville Certified Green Restaurants: http://ashevillegreen.org/

Industry Associations
Global Cold Chain Alliance: http://www.gcca.org/
NC Petroleum and Convenience Marketers: http://www.ncpcm.org/
NC Specialty Foods Association: http://www.ncagr.gov/markets/specfoods/about.html

Farmers Markets and other Retail Outlets
The Piedmont Grown website has a directory of groceries, restaurants, multi-farm CSAs, and other food buyers in the Piedmont Region: http://www.piedmontgrown.org/directory.php

NC Local Food Infrastructure Inventory
This web-based map includes location and contact information for wholesalers, distributors, cold storage facilities, commercial kitchens, multi-farm CSAs, and food hubs: http://www.cef.ncsu.edu/statewide-infrastructure-map.html
Nonprofits and Community Initiatives

Advocacy, Research, and Resource Organizations
Carolina Farm Stewardship Association: http://www.carolinafarmstewards.org/
Appalachian Sustainable Agriculture Project: http://asapconnections.org/
Center for Environmental Farming Systems: http://www.cefs.ncsu.edu/
Piedmont Conservation Council: http://www.piedmontconservation.org/
Slow Food Piedmont-Triad-Greensboro: (no current website)
Piedmont Grown: http://www.piedmontgrown.org/
Center for Creative Economy: http://www.centerforcreativeeconomy.com/
Center for Design Innovation: http://www.centerfordesigninnovation.org/
The Center for New North Carolinians: http://cnnc.uncg.edu/
Forsyth Futures: http://www.forsythfutures.org/

Food Banks and Food Access Agencies
Food banks and pantries often make great partners for local food systems. Many pantries are located in dispersed areas across the region because they need to be within easy reach of households experiencing food insecurity. While most pantries have limited existing cold storage capacity, more and more are expressing the desire to distribute fresh produce along with the non-perishable items they typically distribute. They typically have the space and building facilities to support this but could benefit from community partners who could share the cost and management of cold storage facilities. Triad Community Kitchen (culinary training and catering): http://www.hungernwnc.org/how-we-work/tck.html
A directory of food pantries in NC, searchable by city: http://www.foodpantries.org/st/north_carolina

Community Foundations
North Carolina Community Foundation: http://www.nccommunityfoundation.org/
The Winston Salem Foundation: https://www.wsfoundation.org/
Z. Smith Reynolds Foundation: http://zsr.org/
The Golden Leaf Foundation: http://www.goldenleaf.org/
Mary Reynolds Babcock Foundation: http://mrbf.org/
The Southwest Renewal Foundation: http://highpointsouthwest.org/
The Winston Salem Sustainable Resource Center: http://www.wssrc.org/
Case Studies and Relevant Reports

Assessing the Economic Impacts of Regional Food Hubs: The Case of Regional Access 21

This 2013 report presents, with great detail, a methodology for conducting an economic impact assessment and analysis of the impact of local food hubs on local economies and participating farms using IMPLAN software.22 The study found that, for every additional dollar of final demand for food hub products, an additional $0.82 is generated in related industrial sectors. However, taking into account the opportunity costs—not generally included in economic assessments of local food initiatives—the suggested net output multiplier is 1.63. In addition, the study found that the food hub under investigation positively affected farm business expansion, specifically through availability of freight and storage services and access to new customers. Lower minimum order sizes and increased frequency of deliveries presented opportunities for expansion. Note that the case study used for this research was a true regional food hub—an entity that undertakes activities such as marketing and logistics. However, significant portions of the research and methodology are relevant to smaller, decentralized aggregation and storage facilities.

Food as a Catalyst for Change: Local enterprises aim to rebuild the food system in Birmingham, Alabama 23

This is a case study of efforts underway in the Birmingham area that specifically address methods of food system development among communities with high political fragmentation and government distrust. The study presents food system issues as social justice issues. The authors provide concrete examples of how rebuilding regional networks help to bring jobs and economic prosperity into underserved communities as well as fresh, local, healthy food into neighborhoods that otherwise lack access. This study presents a detailed assessment of REV Birmingham, an economic and business development agency that saw the economic and employment potential in the food and farming sector, and made the effort to understand the significant challenges faced by farmers in trying to tap into local distribution networks. This case study presents a great model for working within communities to affect positive, sustained, and integrated change, and includes lessons learned and a comprehensive list of resources.

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22 IMPLAN (Impact Analysis For Planning) software is widely used in economic development and planning fields to generate highly accurate models of the impact a given change will have on the local or regional economy. https://implan.com/

Local Food Systems as Regional Economic Drivers In Southern Minnesota

This report presents a thorough investigation of local food system development, based upon entrepreneur interviews and surveys of economic development professionals, in addition to food sector mapping. The author concludes that the local food sector is still experiencing robust growth in southern Minnesota, but that growth could be further facilitated by providing affordable, effective technical assistance and access to financing for new and existing businesses. Additionally, the report found that embracing change and new business models and sectors are important factors for a community’s success in developing the local food system.

West Virginia Food System: Opportunities and constraints in local food supply chains

This 2012 report details how an increasing number of interested buyers have inspired the need for more highly developed local food supply chains that capture a fair portion of each consumer dollar for farmers. The authors underscore the limitations of overreliance on direct marketing as the sole source of farm income. The report also addresses the types of supply chain infrastructures needed to accommodate processing, aggregation, and distribution, providing case studies for several businesses engaged in these sectors. Additionally, the report describes the importance of new business connections and collaborations across the region and the state in building a resilient and higher functioning food system. Specific to the topic of decentralized aggregation and storage facilities, the authors found that cultivating small food hubs distributed throughout rural areas could increase small farmers’ access to distribution outlets and create economies of scale. Among other things, they suggest identifying underutilized buildings in production centers that can be used as food aggregation centers in order to facilitate the movement of crops to mainstream markets.


Guidelines for a Decentralized Network

These guidelines are intended as a resource for people interested in starting or adding to some aspect of the decentralized aggregation and cold storage local food network. This includes: farmers wishing to expand into new or different markets; existing business owners who recognize an opportunity to make additional profit; new entrepreneurs interested in addressing a gap in their local food system; existing aggregators looking to reach new, small, or specialty farmers; food access agencies interested in creating more sustainable supply chains for their programs; and economic developers and advocacy organizations concerned with promoting a resilient food system that responds to chronic economic stress and the growing potential of the Piedmont Triad region.

The goal of these guidelines is to incorporate the values defined earlier in this report into economic and community development strategies surrounding the expansion of food and farm sector activities. That goal can be summarized as:

The development of a decentralized network for the aggregation and storage of local foods in the Piedmont Triad region that will address the current chronic economic stress and promote economic and community resilience through equitable participation.

These guidelines do not address production techniques or farm planning practices, nor do they delve into marketing strategies or opportunities. The focus remains on the aggregation and storage of local food; specifically, how this particular segment of the local food system can effectively increase profitability of farm businesses as well as open new economic opportunities for related support enterprises.

This is not a “how to” manual for starting a food hub. Instead, it is a set of design guidelines and key considerations that should be taken into account when planning for the development of a decentralized local food aggregation and storage system. Some specific information is given, although it is always recommended to conduct a thorough market analysis and seek out current information on any given topic before embarking on a new business or initiative.
Guideline #1: Promote Networks and Nodes

As in any ecosystem, systems with greater complexity (more connections, nodes, diversity of scales and types) are more vital and resilient than those with less complexity. In a regional food system, this takes the form of a diversity of interrelated and interconnected producers, aggregators, processors, and markets. Rural and urban areas must share in the economic risks and benefits of participating in the food economy, and create networks between areas of production and areas of consumption.

However, the desire for complexity and differentiation must be balanced with nodes—clusters of economic and social activity that support and trade with one another. These nodes create economic impact zones where local firms cycle more money through the local economy than is possible where geographic proximity does not exist.26

A. Look for opportunities to situate aggregation and storage facilities throughout the region, while encouraging strong interconnectedness throughout.

B. Cluster small aggregation and storage facilities near one another, forming “nodes” of the local food supply chain.

C. Identify and strengthen shared values, goals, and visions among businesses and initiatives participating in all aspects of the local food supply chain.

Intent: Develop a Piedmont Triad regional food system that utilizes complexity (a system of networks and nodes) as a mechanism for achieving greater economic and food system resiliency.

Guideline #2: Engender Equity and Inclusivity

Informal community reciprocity within specific social groups is a culturally ingrained system prevalent in all aspects of our economic lives, including our food systems. Small enterprises seek out commerce with other businesses owners that they know or with whom they share some commonality. Similarly, farmers in the same social groups often share knowledge, tools, equipment, and other resources. However positive this informal reciprocity is, the individuals and businesses that are left out often represent untapped potential, new market shares, and an increased distribution of goods. While degrees of social inclusion will always remain a part of doing business, every effort should be made to reach across boundaries. This is another way in which the complexity of the food system is built in a manner that engenders greater resiliency.

A. Understand the political geography of your community. While doing business in a new area may present challenges, new business opportunities, collaborators, and markets also await.

B. Build new lines of community rapport across racial, economic, class, and language boundaries.

C. Work to promote access to financing and entrepreneurial assistance for diverse communities that are specific to current trends in food system development.

Intent: Build on the strengths of the Piedmont Triad region by integrating cross-barrier collaborations into the aggregation or cold storage business initiative.
Guideline #3: Plan for Appropriate Transportation Options

Produce should be cooled immediately upon harvest,\(^\text{27}\) and transported to a storage or aggregation facility while maintaining the cold chain. Local produce has the potential to be highly competitive with foods from national distributors because of the drastic reduction in transport miles. However, improper handling, especially in relation to removing the field heat and maintaining the cold chain while the produce is stored, aggregated, and distributed, can degrade the nutritional and aesthetic quality to a noticeable degree.\(^\text{28}\) For some farmers and businesses, the transportation of the produce will be outsourced, while others will transport their own products. Either way, proper handling practices must be understood and utilized by all.

A. Ensure that there is access to a refrigerated truck or trailer to keep the cold chain intact.\(^\text{29}\)

B. Know the acceptable upper and lower temperature and humidity limits of the produce being aggregated.

C. Keep all appropriate records regarding the place of origin, place of sale, and storage notes for all produce that moves through the aggregation facility.

Intent: Ensure that the cold chain of all produce is maintained from farm to fork and handling is appropriately documented. Each segment of the supply chain should work in tandem with other segments.

\(^\text{27}\) Removing the field heat from horticultural crops immediately upon harvest is imperative, and will go along way to ensuring food safety and the longest shelf life possible. For more information, see \url{http://www.ces.ncsu.edu/hil/hil-801.html}


\(^\text{29}\) The Plants for Human Health Institute has developed construction plans and cost estimates for a DIY refrigerated trailer, the “Pack n Cool,” using the CoolBot refrigeration system. Plans are available here: \url{http://plantsforhumanhealth.ncsu.edu/2012/08/17/%E2%80%9Cpack-%E2%80%98n-cool%E2%80%9D-provides-farmers-with-mobile-refrigeration-solution/}
Guideline #4: Design an Effective Management Plan

Aggregation and cold storage systems are dynamic activities that involve constant monitoring and management. Even relatively simple, storage-only enterprises require monitoring to maintain consistent temperature and humidity and cleanliness of the units. A small amount of spoiled produce can contaminate the entire unit, and something as simple as a door left ajar will cause disruption to the cold chain, potentially rendering produce unsalable. In addition, like any business, an aggregation or cold storage enterprise will require consistent and effective marketing and promotion. New client relationships should be developed on both the producer and the buyer ends.

A. Choose a management structure that fits with your business. A simple cold storage unit leased to several farmers who are marketing their own produce to aggregators will still require facility management, rent collection, and marketing to new farmers.

B. Ensure that your facility is compliant with all regulatory requirements, including appropriate recordkeeping. Track and document temperature and humidity through the duration of the entire supply chain.

C. Advertise effectively to ensure that your facility is operating at full, or nearly full, capacity at all times. The NC Local Foods Infrastructure Inventory, in addition to other local food directories such as Piedmont Grown, is a great way to inform potential clients of your new business.

D. Develop procedures that allow access to storage space by clients when needed, and ensure that everyone who enters keeps appropriate logs for food safety requirements.

Intent: Design a management structure and plan that addresses the goals and limitations of your aggregation or cold storage business, while adhering to all regulatory requirements.

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30 Cold storage temperature and humidity monitoring devices are relatively inexpensive, and many are wi-fi enabled, allowing for a notification email or text to be sent to the manager in the event of a climate malfunction. Additionally, many devices track temperature and humidity conditions in conjunction with time stamps, enabling reports to be printed that show buyers that the cold chain has remained intact. The Onset HOBO Data Logger is an example of a system that is affordable and useful for smaller-scale enterprises: http://www.onsetcomp.com/products/data-loggers/u10-003

31 http://www.cefs.ncsu.edu/statewide-infrastructure-map.html

32 http://www.piedmontgrown.org/
Guideline #5: Build Appropriately-Sized Cold Storage Facilities

One of the biggest mistakes that new aggregation or cold storage businesses can make is not building enough cold storage. Without enough space, it is not worth the time of a farmer or buyer to engage in any business activity. Cold storage panels are relatively inexpensive, especially previously used units. The majority of the cost is in the compressor and evaporator. Additionally, outfitting a facility with the appropriate electrical current (single-phase or triple-phase) for the amount and type of cold storage can be a large, one-time expenditure. Know your intended market and the rate at which you will grow your business.

A. Estimate how much cold storage space you need based on the amount of produce your suppliers will need to store at a given time. In general, one cubic foot of open storage area accommodates approximately 28 pounds of solid food.\(^{33}\)

B. Approximate energy costs ahead of time and investigate alternative energy as a way to lower your utility bill.\(^{34}\)

C. Know what the optimal temperature and humidity settings are for each produce type you will store and aggregate.\(^{35}\)

D. Determine what storage system you will use within the cold storage units based on the farmers and buyers you are working with. Some smaller growers who are storing their own produce to sell at a local farmers market may prefer industrial shelves where they can store produce boxes, while larger growers may prefer palettes and use palette jacks to move their product around.

Intent: \textit{Invest in infrastructure wisely. Cold storage units can be re-configured, and their temperature and humidity changed with relative ease. However, there is an economy of scale, even when working exclusively with small-scale farmers and buyers. Develop a business plan that helps to determine what and when your enterprise should build.}


\(^{35}\) NC State Cooperative Extension has a handy guide detailing the cooling and storage requirements for many North Carolina fruit and vegetable crops: http://www.ces.ncsu.edu/hil/hil-801.html
Regional Action Plan

While it may seem like a paradox to implement and promote a decentralized network for produce storage and aggregation through a concerted regional effort, there are a number of actions that will promote the development of this much-needed aspect of the Piedmont Triad’s local food systems. Below, three objectives are presented with proposed actionable items.

**Goal**

To promote a regional, decentralized network of cold storage and aggregation enterprises geared toward assisting small-scale producers in engaging with new markets and wholesale buyers and increasing the profitability of a diversity of food and farm businesses.

**Objective #1**

Integrate small-scale, independent local food aggregation and cold storage business support and development into the Piedmont Triad region economic and community development efforts.

*Action Item:* Provide and maintain an up-to-date online hub for resources related to technical support, foundation or other grant support, and access to financing that is specific to local foods aggregation and cold storage.

*Action Item:* Ensure that the information provided is relevant to and accessible by all farmers, small business owners, and entrepreneurs. Consider Spanish-language translations of some materials, and use language that is clear and not reliant on industry jargon.

*Action Item:* Disseminate the location of this information through a diversity of media channels, specifically reaching out to underserved communities and sectors not yet considered to be part of the “local food movement.”
Objective #2
Facilitate private sector efforts to locate existing and potential sites and facilities for the aggregation and cold storage of local foods. Promote the “clustering” of food and farm businesses, while also recognizing the economic development potential that small-scale aggregation and storage holds for rural regions of the Piedmont Triad.

Action Item: Encourage the use of the NC Growing Together Local Food Infrastructure Inventory through promotion in regional development online and print materials. 

(http://www.cefs.ncsu.edu/statewide-infrastructure-map.html)

Action Item: Facilitate the coordination between growers, buyers, and producers through promoting the use of existing directories such as Piedmont Grown (http://www.piedmontgrown.org/) and Local Harvest (http://www.localharvest.org/).

Action Item: Work in tandem with local economic development offices and agencies (especially those in rural areas) to ensure that they have access to these resources.

Objective #3
Build connections between Piedmont Triad local food system efforts and university, cooperative extension, and other partners that can provide ongoing technical assistance and regulatory expertise to food and farm businesses.

Action Item: Inform appropriate university and cooperative extension partners of the regional commitment to developing aggregation and cold storage capabilities for food and farm businesses (specifically, those addressing the needs of small-scale producers) so that potential partnerships can be identified and pursued.

Action Item: Include information about conferences, workshops, and seminars throughout the state that pertain to aggregation and cold storage of local foods on Piedmont Triad websites. Examples include the National Good Food Network (NGFN) Food Hub Conference in Raleigh (March, 2014) and various seminars conducted by NC State’s Fresh Produce Safety department (http://ncfreshproduc safety.ncsu.edu/).
Sources for Data Collection and Mapping

Many resources are available to ascertain current data regarding economic conditions, market share, land use, food system infrastructure, and growth potential. The following sources were used in creating this document, but the list is by no means exhaustive.

Land Cover Analysis Tool (LCAT)
Online mapping of land cover data, as well as display of the 1992-2001 Change Analysis.
http://lcat.usgs.gov/

National Atlas of the United States
Hard copy maps, GIS data sets, geostatistical data sets, and web-based mapping capability including agricultural census, environmental, political, and economic data.
http://nationalatlas.gov/

NC Local Food Infrastructure Inventory
This inventory was compiled through the North Carolina Growing Together project (ncgrowingtogether.org), in collaboration with the North Carolina Cooperative Extension Service Local Foods Flagship Program, with the intention of cataloging businesses that serve as intermediary steps in local food supply chains. The inventory contains user-generated content pertaining to the storage, aggregation, and processing of local foods, including meat, seafood, produce, and dairy. Food hubs, commercial kitchens, processing centers, cold storage, incubator farms, and multi-farm CSAs are also represented.
http://www.cefs.ncsu.edu/statewide-infrastructure-map.html

NC Office of State Budget and Management
Data sources listed by type, both state and federal sources.
http://data.osbm.state.nc.us/pls/pbis/dyn_osbmweb_libdatalinks.show?p_arg_names=context&p_arg_values=facts

NC OneMap Geospatial Portal
A catalog of NC geospatial data—census, public infrastructure, etc. The site allows one to download datasets, as well as utilize web mapping services.

36 This inventory does not include end-retailers such as groceries, restaurants, and farmers’ markets.
North American Environment Atlas
This data set contains a variety of layers for both download and online mapping.
http://www.cec.org/Page.asp?PageID=924&SiteNodeID=495

North Carolina County GIS Data
List of county-level data websites, maintained by NC State University.
https://www.lib.ncsu.edu/gis/counties.html

North Carolina Department of Agriculture and Consumer Services
Agricultural Statistics Division, contains agricultural census data, along with pertinent economic, climatic, land use, statistical, and production data.
http://www.ncagr.gov/stats/index.htm

Population Estimates and Projections, NC OSBM
Includes population estimates for as much as 20 years into the future.
http://www.osbm.state.nc.us/nosbm/facts_and_figures/socioeconomic_data/population_estimates.shtm

Southeast GAP Analysis Project
Downloadable data and online mapping of native land cover types.
http://www.basic.ncsu.edu/segap/

US Census Data
The main site for all US Census data, including historical data and 50-year projections.
http://www.census.gov/population/projections/

USDA Food Environment Atlas
Produced by the Economic Research Service, this atlas provides county-level data “to assemble statistics on food environment indicators to stimulate research on the determinants of food choices and diet quality, and to provide a spatial overview of a community's ability to access healthy food and its success in doing so.”

USDA Natural Resources Conservation Services, Natural Resource Inventory
A statistical survey of land use and natural resource conditions and trends on U.S. non-Federal lands.
Bibliography


Additional References


