

Sustainable Business Opportunities for Floyd County, Virginia

A Preliminary Feasibility Study for SustainFloyd

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December
2009

Foreword

The Economic Development Studio @ Virginia Tech is a resource for communities throughout the Commonwealth of Virginia. We conduct research on economic development issues to empower community decision-making with technically sound recommendations for economic development strategy and action.

The Studio is a collaborative effort between Virginia Tech's Urban Affairs and Planning Program and Virginia Tech's Office of Economic Development. Graduate students work under faculty supervision on behalf of real-life clients and deliver actionable applied research projects. The students design and shape the implementation of the project, which typically provides a final sheltered work experience before they embark on their careers.

This year's Studio team includes students from Virginia Tech's programs in Urban Affairs and Planning, Public Administration, and Forestry. I am proud to have worked with this fine group of skilled pre-professionals. I commend to you both their work that follows and their potential to make future contributions to the future of communities across the Commonwealth, the nation and the world.

On behalf of the team I would like to express my sincere thanks to this year's clients SustainFloyd. They have been excellent partners to the Studio, opening their organization to the students and taking the time to engage in a sincere and open discussion about ideas. We have been helped by many members of the organization, but I would especially like to highlight the initiative of Jack Wall in taking the time to explore the idea of bringing the Studio to Floyd and working with us to scope out the nature of the project you see here. Our thanks also go to many members of the community who provided insight and guidance to the students during their visits to Floyd.

We could not have undertaken this project without the support and guidance of SustainFloyd and members of the Floyd community. However, it should be noted that any errors or omissions in this report are the sole responsibility of the authors.

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Executive Summary

SustainFloyd, a nonprofit community development group, commissioned the Economic Development Studio@ Virginia Tech to conduct a preliminary feasibility study to identify several sustainable business opportunities for Floyd County. In order to match business opportunities with SustainFloyd's mission, the studio team interpreted SustainFloyd's priorities in the context of this project. Those values were articulated in four key criteria: 1) keeping people employed in Floyd County, 2) maximizing linkages within Floyd County, 3) enhancing Floyd's independent economy, and 4) "meeting the needs of the present without compromising the ability of future generations to meet their needs."¹ The team used an asset-based approach to community economic development, evaluating market and industry research from a starting point of community-fit rather than generic assumptions about the market. From this approach the team identified four candidate businesses opportunities: a wood pellet manufacturer; a micro dairy; a flooring and countertops manufacturer; and a "sustainable living" training and education center.

Climate change and alternative energy is one of SustainFloyd's top priorities, so wood pellet production is a particularly relevant sustainable business opportunity. Wood pellets can be produced and consumed on a local level, aligning with SustainFloyd's desire to localize the area's economy. A micro dairy would allow the county's existing agricultural and dairy base to enter a thriving, value-added niche market. Manufacturing flooring and countertop materials would leverage the county's existing manufacturing skill base, creating opportunities for the area's artisans and craftsmen, while expanding sustainable living options for consumers. A "sustainable living" training and education center could retrain displaced manufacturing workers, empower prospective farmers to enter the agriculture business, and provide additional income streams for professionals in the area.

The paper discusses the compatibility of each business with SustainFloyd's priorities and Floyd's assets, as well as presents appropriate case studies to describe estimated start-up costs and practical scale for each business. The four business opportunities are highly scalable, in that equipment and entry-costs do not preclude a business model that starts small and grows to meet market demand. Other considerations discussed in the paper include indicators of consumer demand, waste products of production, consumer market area, and input sources. Some questions remain for further detailed study, for example in areas of energy costs, capital access. These and other points should be taken up in detail in business plans that would be a logical next step if SustainFloyd opts to move forward with this project. For now, we believe that we have provided a strong basis for community discussion of sustainable business opportunities that will support Floyd's independent economy and help the county to develop its unique brand.

¹ United Nations Bruntland Commission 1987

Introduction

Project Scope

SustainFloyd, a local nonprofit founded about a year ago, commissioned this project to identify business opportunities that could provide much needed jobs in Floyd County without adversely affecting the community or planet's environmental health. SustainFloyd's mission is to "create the idea of sustainable development in Floyd County." The organization is heavily involved in the 350 Climate Change Initiative, a global grassroots campaign to stop global warming,² as well as a variety of local projects intended to develop a groundswell of support for sustainable development. The Virginia Tech team met with SustainFloyd board member Jack Wall and reviewed the organization's mission to understand the organization's goals and values. In the context of this project, the team identified four key criteria:

- Keeping people employed in Floyd
- Maximizing linkages within Floyd
- Enhancing Floyd's independent economy
- "Meeting the needs of the present without compromising the ability of future generations to meet their needs."³

Keeping those priorities as a touchstone throughout the process, this study provides a preliminary assessment of the feasibility of sustainable business opportunities and offers an initial outline of the requirements necessary to make the proposed business opportunities a reality. After conducting a rigorous evaluation process which, included the mapping of Floyd's assets, an analysis of green business sectors, and individual industry research, several opportunities were identified for further exploration. The opportunities selected are scalable, sustainable, potentially profitable, and could add to the unique mix of progressivism and rural charm that makes Floyd such a unique place.

Floyd County served as the unit of analysis for the asset mapping and cluster development elements of the research process. However, we expanded the potential market base scope to include the greater region for the market analysis to address concerns about business growth. The market possibilities we identified would be feasible at a relatively small-scale level of operation and would primarily draw from internal resources and expertise, important considerations based on the criteria set forth by SustainFloyd. However, it is not certain that these operations would remain viable by serving an exclusively local market.

² 350 www.350.org

³ United Nations Bruntland Commission 1987

Process

One of the team's first tasks was to develop a definition of green/sustainable business to evaluate prospective sectors and industries. The team focused on sustainability instead of "green" business because the client's priorities were focused not only on impact on the natural environment, but economic prosperity and equitable job opportunity in Floyd County. Further, there are inherent problems in assessing the degree of "green" to which a business adheres. An excerpt from the *State of Green Business Report 2009*, issued by Greenbiz.com, a green business news site and media company, reflected the team's criteria and client's priorities, therefore the team adopted that interpretation sustainable business:

"Economic activity by companies and customers in the form of products, services, and business models that promote economic growth, reduced environmental impacts, and improved social wellbeing."⁴

Next, the team simultaneously completed an asset map of the County and a preliminary market analysis of the sustainable business sector. The results of this research provided information to identify supply and service gaps and concentrations present in Floyd and develop a list of sectors and industries that could possibly fill these gaps and take advantage of the clusters present in the area. The team evaluated those sectors based on the client's criteria codified at the beginning of the semester. After that evaluation, a shorter list of industries remained. Next, the team used feasibility analysis, a process examining the inputs (including both labor and capital) necessary for each business type and the availability of those inputs to Floyd County, to arrive at our final list of business opportunities. Throughout the process we regularly consulted economic development literature and best practice case studies to calibrate our work. Members of the studio also conducted interviews to with community members, industry experts, and other key informants to develop a more nuanced picture of Floyd's current business climate.

⁴ *State of Green Business Report 2009* Greenbiz.com

Paper Outline

The Theory section of this paper reviews the theory of asset-based community economic development which provided a foundational philosophy for this project. The next section, Data Analysis Method, presents the team's asset mapping and star model analysis as the method by which research was conducted, organized and analyzed. Much of the data collected on Floyd's assets and community is presented in this section.

The majority of the paper's length is devoted to the discussion of each business opportunity. Each discussion includes an overview of the business's industry, reasons that such a business would promote the sustainability of Floyd County, market demand indicators, and case studies to describe estimated start-up costs and practical scale for each business. Finally, each discussion includes issues that should be considered as the feasibility of each opportunity is studied further.

Theory

Asset-based Community Economic Development

Traditionally economic developers have compared communities against a general perception of the type of firms that they want to see in a community, and what they think those firms are looking for. Such cookie-cutter approaches miss unique qualities that give character and appeal to any community. If all economic developers follow the same playbook they risk overlooking the unique strengths in their own communities that make them stand out. In response, we have employed a different approach that focuses first and foremost on existing assets as the basis for economic development planning.

Further, any plan for economic development will only be as effective as its cultural relevance to the community it addresses. Since traditional economic development theories and strategies of recruiting large employers and manufacturers would run counter to SustainFloyd's priorities and vision for the future, we centered our strategy for evaluating the strengths and opportunities for Floyd on holistic theories of community economic development that incorporates social, economic, and environmental outcomes.⁵

Implicit in this decision to build on the theory of community economic development is an emphasis on development over growth. In community economic development, "development" is defined as a "...planned effort to build assets that increase the capacity of residents to improve their quality of life."⁶

⁵ Schafer, Ron; Steve Deller and Dave Marcouiller. 2006. "Rethinking Community Economic Development" *Economic Development Quarterly* 20,1, February.

⁶ Green, Gary Paul and Anna Haines. 2007. *Asset Building & Community Based Development*. Sage Publications: Thousand Oaks. 8.

Data Analysis Method

Developing a plan for economic development in a given community requires an accounting of assets the region possesses and an understanding of that community's goals and vision. In this study, SustainFloyd's goals for and visions of a more sustainable and resilient community and local economy provided an overarching framework for our research methodology and selection criteria. This section will describe the study's research process, the methods employed to complete each step of the process, and an overview of the results yielded at each step. The full process is illustrated in Figure 1. We hope that this detailed account of our process will allow SustainFloyd to reflect thoroughly on the resources available in Floyd County and the conditions of the market to which SustainFloyd plans to contribute. Additionally, we hope that the process itself can be an asset to SustainFloyd. Our process can be repeated to re-analyze the resources of Floyd County in the future. Further, our process could guide similar studies of different geographical areas or with different priorities.

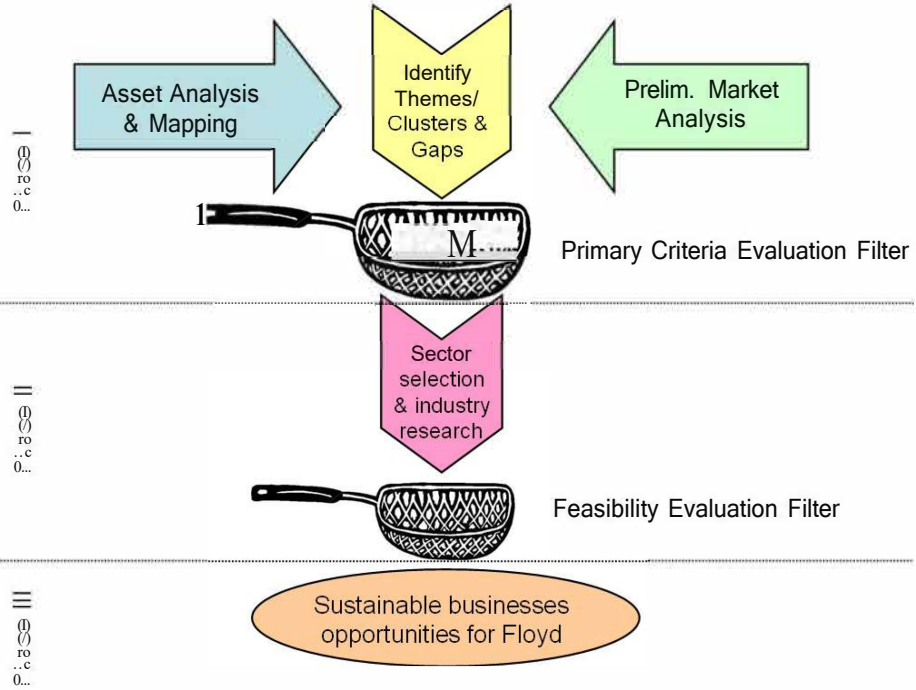


Figure 1. Sustainable economic development research, analysis, and feasibility evaluation process.

PHASE I - Initial Community Data Collection & Assessment

Asset Mapping & Star Model Analysis Framework

The first step of the initial phase of research was to develop a comprehensive understanding of the assets present and available in Floyd County. For this research, assets were defined as any resource of value to the community, tangible or intangible in accordance with community economic development theory which expands the realm of assets beyond physical, human and financial, capital to include cultural, social, natural and environmental capital, as well as political and institutional cultures and networks, and the nature of given place.⁷ This expanded analysis of assets is appropriate to capture the unique character and opportunities of Floyd County. Based on these asset categories, we developed an asset mapping template to serve as both a guide and a repository for information and data collected about Floyd.

The studio team used a mixed-methodology to collect asset-related information and data. Several open-access online resources including census data, land cover and usage trends, resource abundance, employment and labor force data, as well as county services and institutions were used to collect general descriptive information about Floyd. In addition, in-depth interviews were conducted with key informants from Floyd to get a richer and deeper understanding of intangible assets present in the community. Information gleaned from these interviews will be discussed further in the context of identifying themes across Floyd County businesses as well as service and supply gaps. The team also developed a list of existing businesses and organizations established in Floyd that we felt were relevant to our sustainability criteria.⁸

The all-encompassing approach to appraising assets in the community required a particularly flexible evaluation scheme. The star model of community economic development,⁹ illustrated in Figure 2, was selected as an appropriate way to organize and evaluate the assets of Floyd County. An explanation of and findings for each asset categories included in the star model are detailed below.

⁷ Green, Gary Paul and Anna Haines. 2007. *Asset Building & Community Based Development*. Sage Publications: Thousand Oaks. 8.; Schafer, Ron; Steve Deller and Dave Marcouiller. 2006. "Rethinking Community Economic Development" *Economic Development Quarterly* 20,1, February.

⁸ Business information was collected from an array of sources including the local Chamber of Commerce website, online lists of tax exempt organizations in Floyd (<www.taxexemptworld.com>), a small business online database (<www.manta.com>), through interviews.

⁹ Schafer, Ron; Steve Deller and Dave Marcouiller. 2006. "Rethinking Community Economic Development" *Economic Development Quarterly* 20,1, February.

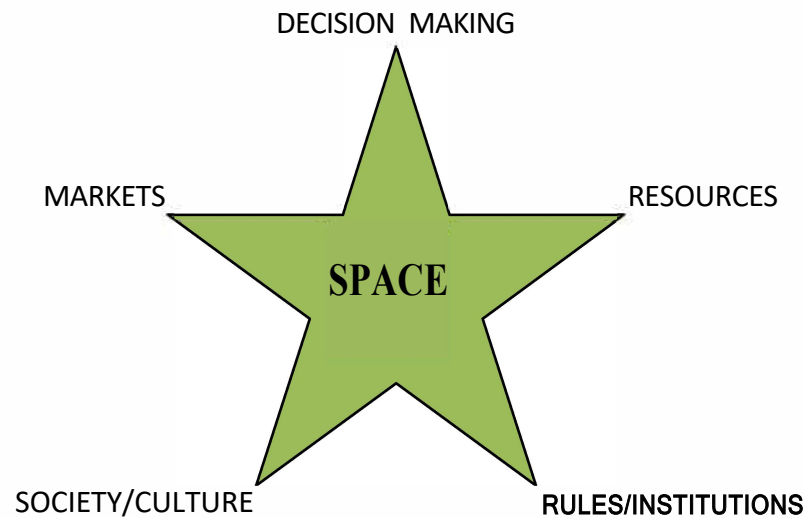


Figure 2 - Community economic development asset evaluation star model (Schaffer et al. 2006).

Space

Space in this context refers to both the characteristics and location of place, as well as geographic proximity and connections to other places in a region. The studio team looked beyond the political boundaries of Floyd to the broader region as a viable, and still relatively sustainable, consumer and supplier footprint. Even with Floyd's potential wealth of assets, the studio team considered this space to be practical for this project. Characteristics and assets the team identified within Floyd relating to the concept of space included:

- A vibrant downtown network
- Community linkages mainly through the arts and "sustainable" networks
- Rural area with abundant natural resources & recreational amenities
- Identity within the Region
- Relative proximity to other "sustainable" networks, including Appalachian Sustainable Development (Abingdon, VA) & Appalachian Sustainable Agriculture Project in western North Carolina

The unique features of the space Floyd occupies leave an imprint on other aspects of the star framework identified in the sections that follow.

Resources

Resources, as defined in the Schaffer model, represent the asset categories typically included in an asset mapping exercise: land, natural resources, labor and human capital, and physical infrastructure. As the team evaluated the full array of assets in Floyd, a number of strengths and potential limitations, which were important to consider as we moved forward in the process, became evident. Other parameters emerged that helped us define the appropriate scales of operation, potential inputs, markets, and productive partnerships related to potential business proposals.

Land is available in Floyd, although it is generally highly valued. There is a significant proportion of undeveloped space, which is largely employed as pasture or forestland. The geology and topography of this land is important to keep in mind in identifying potential business opportunities. Much of the landscape undulates atop schist bedrock, which presents groundwater challenges.¹⁰ Additionally, the geographic location of Floyd at the head of two major watershed systems means that the water that falls on Floyd tends to run downstream out of the county. As a result, water use, conservation, and disposal considerations became a significant part of our selection criteria. Another resource of limited availability in Floyd is natural gas¹¹, which may limit business development that requires that resource for processing or energy.

Forests in Floyd County are abundant and a potentially valuable resource. Close to 100 percent of these forests are privately owned.¹² Currently, forests contribute to the local economy mainly through traditional timber harvests, a small but strong wholesale nursery industry, and Christmas tree growers. Additionally, we identified two locally-operated private forest management companies which attend the increasing numbers of forest landowners interested in managing their land for aesthetics and ecological purposes. Forest management will become an increasingly important task and potentially a highly valued industry as the ecological benefits of trees becomes more widely recognized and valued. With this possibility in mind, we prioritized forests and wood as a valuable asset and potential industrial input for Floyd County.

Floyd is one of the faster growing counties in southwestern Virginia. Population increased more than 20 percent between 1990 and 2008, with the majority a result of immigration.¹³ Currently, more than 50 percent of Floyd County labor force is employed outside of the county, with the majority of people commuting to Roanoke or Blacksburg for work.¹⁴ Floyd also possesses a notable creative and entrepreneurial spirit, with 10.5 percent of the Floyd

¹⁰ White, Bradley, "Investigation of Groundwater Recharge Processes in the Blue Ridge Physiographic Province" (paper presented at the 2004 Denver Annual Meeting for the Geological Society of America, November 7-10, 2004.

¹¹ New River Valley Economic Development Alliance, Floyd County Community Profile 2009.
http://www.mvalliance.org/data_center/area_info/index.html#logis

¹² Virginia Dept. of Forestry, Virginia Forest Land Ownership based on 2004 FIA Data,
<http://www.dof.virginia.gov/resinfo/forest-ownership.shtml>

¹³ Weldon Cooper Center for Public Service - UVA, "Demographics and Workforce Data"
<http://www.coopercenter.org/demographics/population-estimates>

¹⁴ New River Valley Economic Development Alliance, Floyd County Community Profile 2009.
http://www.mvalliance.org/data_center/area_info/index.html#logis

population being self-employed¹⁵. Official unemployment rates in the county are relatively low for the area at 6.9 percent as of October 2009.¹⁶ The underemployment figure for the county more fully indicates the available quantity of labor in the county. The Virginia Economic Development Partnership estimates that 822 individuals in Floyd County were underemployed in the second quarter of 2009.¹⁷ In 2008, 321 people, approximately 4.4% of the labor force in the county, were unemployed and 715 people, approximately 9.8% of the labor force, were underemployed.¹⁸ There is a wide range of skills available within the county including a strong representation of artisan, agricultural production, and manufacturing skills. With relatively close proximity to Virginia Tech and Radford University, there is also a strong representation of academics and highly-educated professionals. Further, Floyd is close to a number of community colleges including New River Valley Community College and Virginia Western Community College that provided opportunities for individual human capital investments. For example, Floyd County High School already offers dual enrollment program with New River Community college for welding credit.¹⁹

Floyd's physical infrastructure helped distinguish what businesses are feasible and what businesses would be difficult to implement in the area. Roads and transportation present limitations with regards to scale of operation and distribution. The closest interstate highways are Interstate 81, about 20 miles north and Interstate 77, about 30 miles west from the center of the Town of Floyd, via two-lane roads. These roads can accommodate small-scale transport but may pose issues for high volume shipping.

Water and wastewater systems, as mentioned above, present some challenges for business development, as water availability for Floyd County has not been determined. Uncertainty of water availability and a history of drought are reasons for a heightened emphasis on water conservation and wastewater processing. There is a public water and wastewater system that services the Town of Floyd that is currently reported to have an excess capacity of 100,000 gallons/ day.²⁰ The majority of the surrounding county is on septic and well water systems.

Through a cooperatively owned service, there is a robust system of telecommunications available for relative low cost in Floyd. Citizens Co-Op offers broadband, telephone, and television service to the county. The county's state of the art fiber optic network is a clear asset.

¹⁵ U.S. Census 2000 Summary File. OP-3 Profile of Selected Economic Characteristics for Floyd County Virginia. <http://factfinder.census.gov/servlet/QTTable?_bm=y&-qr_name=DEC_2000_SF3_U_DP3&-ds_name=DEC_2000_SF3_U&-lang=en&-sse=on&-geo_id=05000US1063>

¹⁶ Bureau of Labor Statistics, Local Area Unemployment Statistics 2010. <http://data.bls.gov:8080IPDQ/servlet/SurveyOutputServlet;jsessionid=62305fec983379715f56>

¹⁷ Virginia Economic Development Partnership. "Community Profile: Floyd County" 2009 <http://virginiascan.yesvirginia.org/communityprofiles>

¹⁸ Virginia Economic Development Partnership. "Community Profile: Floyd County" 2009 <http://virginiascan.yesvirginia.org/communityprofiles>

¹⁹ Martin, Lydeana. Community and Economic Development Director, Floyd County. Interview by Mel Jones and Will Drake. Unstructured interview. Floyd, VA. 25 September 2009.

²⁰ Lydeana Martin, Community and Economic Development Director for Floyd County, email message to author, 11/26/2009

Floyd County's broadband network is an open network which is a part of the Mid-Atlantic Broadband Network and has redundant fiber optics with eight outside connections.²¹

With regards to physical industrial space, there are a few available fully-connected spaces available in the county for small to medium scale operations. The Floyd Regional Commerce Center has a series of 2-50 acre parcels available for development, already equipped with high-power electricity, broadband connectivity, water, and septic.²² There is also a newly renovated business office in the downtown area with office space available, which also offers business incubation services.

Rules/Institutions

Rules and institutions in the context of community economic development refers to the imposed rules, limitations, and social structures that can help or constrain economic development efforts. Evaluating the nature of a community's rules and institutions is largely an inductive process, pieced together from different observations, sources, and interactions with people in the community.

There are subdivision ordinances in Floyd County, but they place little limitation on physical development considerations. There are no zoning restrictions in Floyd County, allowing development flexibility, potentially posing a threat to the rural nature of the region. The high percentage of independently-owned businesses in Floyd (10.5 percent of county businesses v. 5.5 percent for state) along with the workshops and financing programs offered by the town and county for entrepreneurs, indicate that small business entrepreneurship is encouraged and supported by local institutions. A number of social networks and civic organizations support entrepreneurs and sustainable development efforts in Floyd including, but not limited to, the Chamber of Commerce, SustainFloyd, the Floyd Artisan Network, and 16 Hands. The Jacksonville Arts Center, the Floyd Country Store, a variety of local galleries and shops, and the newly constructed farmer's market are all local establishments serving as gathering places for the community and its local producers.

The public school system in Floyd, consisting of five schools and around 2,000 students (K-12) in any given year, tends to perform on par or slightly higher than school systems throughout the state, as reflected by test scores. The schools boast a low student to teacher ratio and a graduation rate exceeding the state average²³. Close to 20 percent of students in Floyd High School take advantage of the New River Community College dual enrollment program.

Society/Culture

Society and culture in this context refers to the character of the community, as well as the residents' attitudes towards change, experimentation, and entrepreneurship. Even more than

²¹ *ibid*

²² Floyd County Virginia government website, "Sites & Spaces for Business Development", http://www.floydcova.org/business/sites_spaces.shtml

²³ Virginia Dept. of Education, "Floyd County Public Schools Report Card 2009" <https://p1pe.doe.virginia.gov/reportcard/>

rules and institutions category, evaluating assets in this category is highly intuitive. Floyd is widely-recognized in the region as a community that boasts a concentration of independent and creative people who bring with them a unique set of skills and philosophies. The Chamber of Commerce website's tagline, "Floyd is as much a state of mind as a place of great scenic beauty," exemplifies this perception. Though it is difficult to characterize the culture of a place, Floyd's uniquely independent and creative culture can certainly serve as a valuable asset in the form of cultural identity- akin to a brand identity.

The amenities offered by Floyd and the region are a major driver for in-migration and tourism in the region. The rural mountain landscape and culture of the area draw visitors and new residents from throughout the region and nation. In addition, the Blue Ridge Parkway, the most visited park in the country, runs through the county attracting close to 18 million visitors annually.²⁴ The Crooked Road Music Trail, a regional music heritage trail that begins in the Town of Floyd, drew about 264,000 visitors to venues along the trail in 2008.²⁵ A local arts organization that hosts regional music festivals also operates out of Floyd, with their festivals drawing large crowds several times per year. The largest festival, FloydFest, drew a record crowd of close to 13,000 people in 2009.²⁶

A number of artists and artist networks, galleries, and studios around the county, attract both artistic talent and art enthusiasts. One institution in particular, the Jacksonville Center for the Arts, offers a variety of art-related services including work space, gallery space, and immersion training, serving both the local and regional arts communities. The town center in Floyd has been experiencing revitalization over the last few years. Local restaurants, coffee shops, music venues, a new farmers' marketplace as well as the Station building apartments and shops are all home to bustling activity, mainly on the weekends.

While the creative elements of Floyd are often more widely recognized, it is important to recognize the wide diversity of Floyd County's residents and find means of bridging skills and assets. There is a significant portion of Floyd County residents who are part of a traditional rural culture with deep connections to the land and who bring agricultural and more manual skills to bear. There are also residents with background and training in manual or manufacturing skills which are underutilized in the region. In pursuing the goals and imperatives presented to us by SustainFloyd, it is critical that all backgrounds and talents are recognized and respected.

²⁴ National Park Service statistical division, "Blue Ridge Parkway Annual Visitation Data"
<http://www.nature.nps.gov/stats/park.cfm?parkid=466>

²⁵ Bowman, R. "Crooked Road Drives Visits." *Richmond Times Dispatch*, 12/10/08.
http://www2.timesdispatch.com/rtd/news/state_regional/article/CRUK101_20081209-233447/147433/

²⁶ Combs, W. "FloydFest draws all-time attendance" *Southwest Virginia Today*, 7/30/09
http://www.swvatoday.com/news/article/tloydfest_draws_all-time_attendance/5702

Markets

Beyond the more basic supply and demand dynamics of markets, community economic development focuses on local and regional market networks, including the linkages and gaps between different businesses. Expanding the scope of markets as an asset was particularly important for this project because of SustainFloyd's interest in strengthening the independence of Floyd County's economy. In order to develop an understanding of the businesses, networks, linkages, as well as begin to locate some of the gaps and opportunities, the team identified and categorized, by sector, the businesses in Floyd and surrounding region that we felt could contribute to sustainable business development (the full list is included as Appendix 1). This categorization included businesses and operations related to agriculture, building and construction, tourism, arts and culture, natural resource management, energy systems and fuels, food, manufacturing and craftsmanship, retail, and environmental services. The details of this analysis will be discussed in the Sector Identification section of Phase One.

Decision-making

Finally, the inclusion of decision-making in this star model is a means of evaluating the underlying motivations and processes for assessing economic development problems, needs, and opportunities for a given community. Ideally, a community should address foundational problems rather than their symptoms. The very nature of this project addresses foundational concerns since its commission represents SustainFloyd efforts to address underlying problems for development in Floyd.

Preliminary Market Analysis

In order to develop a generalized sense of feasibility from a market demand perspective, the market analysis group consulted various trade and specialized media in order to generate a prospective list of viable green industry options. Using this list, an initial series of candidates was developed in an attempt to include as wide an array of possibilities as possible. These initial candidates did not include any consideration of Floyd assets in favor of broad applicability. Next, the team assessed these candidates' compatibility with Floyd's assets. The compatibility assessment included three primary considerations:

- Inputs - where applicable materials and inputs would be procured from
- Demand-where such products could be sold either locally or nationally, or both
- Waste and Production Considerations - waste material considerations or other consequences of production that may pose a problem for the business or the environment

The goal of this stage was to develop the general industry possibilities into specific businesses opportunities that would seem to fit with Floyd's available assets and capabilities. Further, each proposed business opportunity presented in this paper attempts to include specific information regarding each of these features.

Additionally, to keep the possibility of selling on the national market alive while preserving characteristics and abilities of Floyd, we looked at examples of Floyd businesses which have sought to reach the national market (e.g. Green Label and Seven Springs Farm) as models. These businesses focus on sales of relatively simple products through the Internet. This model could be applied to a wide range of business possibilities. Further, we explored Floyd's well established tourism industry as an asset to leverage by pairing potential products and services to complement that industry.

Potential to foster relationships with ventures already underway in Floyd was a useful central theme as we pursued our final product. Asset based development introduces the new without damaging what is already established. In fact, both new and existing businesses should benefit from asset based development. This idea of asset based development speaks to the core of SustainFloyd's mission since SustainFloyd seeks to encourage economic growth without upsetting the character of Floyd as a rural community and to improve Floyd's independence while maintaining or improving the lot of Floyd county residents.

Using the all of this consideration outlined in this section, the market analysis produced the following sector list for further research:

- Alternative energy production and/or installation
- Sustainable Agricultural Products
- Sustainable Tourism/Education
- Sustainable Building/Retrofitting

Each sector is experiencing growth as identified in our research. Each contained characteristics coinciding with a realistic appraisal of Floyd's capabilities. Further, we researched business networks and the size of the market in Floyd to identify existing clusters on which to build.

Market Overview

The green economy is still in its nascent stages, presenting challenges for research into markets for green products. The specialized nature of some of our product choices complicates the process further. This mixture of difficulties has resulted in an emphasis on qualitative considerations over raw data.

Most sources cite the introduction of sustainable products by common retail outlets, such as Wal-Mart, as an indicator of a promising future for sustainably produced goods²⁷. True, major retailers are seeking to include products and services with lower environmental impact in their offerings, but this does not necessarily imply a burgeoning demand for sustainable products. Consider, for example, a recent study of 6000 shoppers across 11 major urban centers. Only 22 percent of those surveyed purchased a sustainable product within the last six months. Other surveys indicate increased consumer preference for sustainable products and the longevity of consumer preferences for sustainable products in spite of the down economy.²⁸ Reconciling the two faces of consumer preference is a difficult proposition and beyond the scope of this report.

More important to the purpose here is the potential for sustainable products as a viable alternative. The potential products included here all rely upon consumer preference to a varying degree. Wood pellets are sensitive to the comparable cost between heating oil and retrofitting the home with a wood pellet burning stove. Micro dairy products face the difficulty of entering into the dairy commodity market. Furnishings are subject to consumer aesthetic preferences and trends. Training in sustainable living depends on the willingness of consumers to travel to Floyd to make use of classes presented by local experts. In each case, one might say that sustainability is not critical to the products' existence. However, general market findings feature the promise of green or sustainable features as a means of improving the value proposition involved in marketing a product for sale. Success no longer depends upon market demand directly. Instead, it depends on providing a reason for the consumer to spend his or her money on the product in question.

Floyd has significant local assets that fit this qualification. As a result, each business opportunity leverages sustainable practices as a means of putting local assets to use. At the same time, they provide a means of improving the community, by providing a means for local dairy

²⁷ Wal-Mart. <http://instoresnow.walmart.com/Sustainability.aspx>

²⁸ Cone Inc. "Consumer Interest in Environmental Purchasing not Eclipsed by Poor Economy." 2009 Cone Consumer Environmental Survey.

farmers to continue operations, for example; or the environment, by providing an outlet for waste wood or glass, for instance. Sustainability becomes another feature of the product itself. One might consider that Floyd's unique talents and assets become the critical component of the finished product, whether it is training or milk. Through successfully leveraging Floyd's assets in a quality product, sustainable living practices and environmentalism are promoted regardless of general market demand for countertops or classes in rain barrel making. Further, products included here can be sold both locally and nationally, bridging the two marketplaces by means of the value-added components of each product. In closing, considering SustainFloyd's mission, this approach to the general market may lack hard numbers, but it does include a viable approach in light of what numbers are available for consideration.

Identifying and Mapping Sector Themes, Linkages, and Gaps

Having assembled a reasonably comprehensive understanding of Floyd's assets and current businesses, as well as having explored a broad range of sustainable industry trends and ideas, the next step in the studio team's process was to bring these two sets of information together in order to begin to identify business opportunities that would be compatible with Floyd's existing economic and cultural landscape. This process step was based loosely on Porter's theory of industrial clustering in which there is a "geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities".²⁹ The objective of this step was to inventory businesses and industries in Floyd which could contribute to sustainable development, identify linkages among them, and seek out gaps in service or offerings. These gaps indicated opportunities for new businesses.

²⁹ Porter, Michael E. "Research and Practice: Location, Competition, and Economic Development: Local Clusters in a Global Economy." *Economic Development Quarterly* 2000

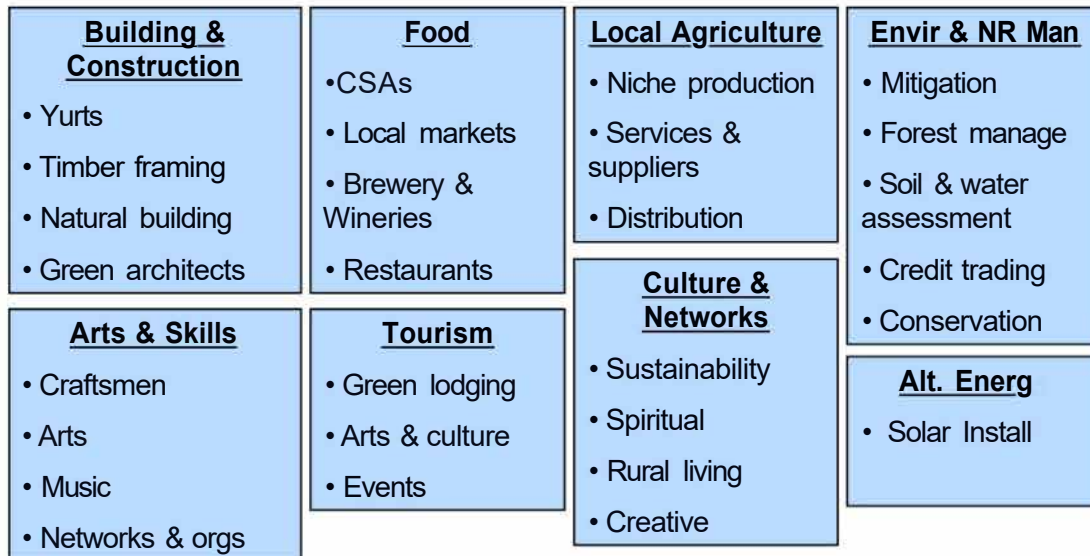


Figure 3. Existing sectors and industries that may comprise the seeds of a sustainable living cluster in Floyd.

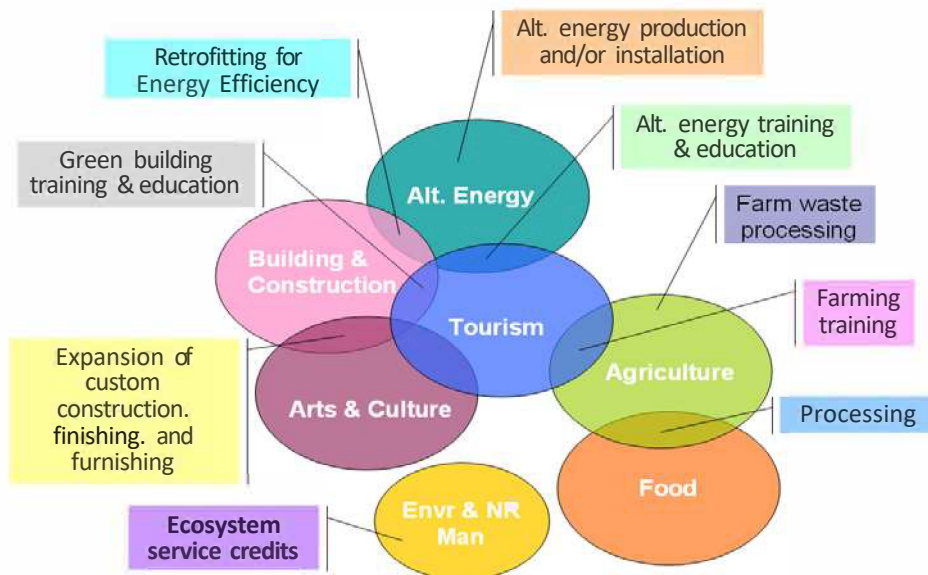


Figure 4. Initial clustering and linkages of sectors and industries in Floyd identified in Phase I with linkages with gaps and areas of opportunity labeled.

The first step, categorizing the businesses and enterprises identified through our asset mapping process into the sectors described in the market asset section, was expanded to include organizations and institutions which might provide linkages or shared assets between businesses and sectors. We grouped these businesses and organizations by industry within sectors to simplify our analysis and diversify our results. The full list of sorted and categorized industries can be found in Figure 3 [blue boxes] and the complete list of businesses identified in Floyd can be found in Appendix 2.

The next step in our process, as outlined above, was to identify linkages and overlaps in necessary skills and customer base, as well as possible gaps in services and opportunities to strengthen what we thought could be the start of a "sustainable living" cluster. The information collected during the preliminary market analysis was brought into the process at this point to provide potential industry or business options within each sector. The overlaps and linkages are represented in Figure 4. Overlapping sections of the sector circles represent gaps as well as potential areas of opportunities labeled in the call-out boxes.

Each gap was expanded to include a list of potential industries and business opportunities identified through the preliminary market analysis, with input from the asset map, as shown in Table 1. The various training and education opportunities were not expanded upon at this point because they were already narrowly defined.

Primary Selection Criteria Evaluation

The final step in the first phase of this project was to evaluate the initial list of potential business development ideas and possibilities (Table 1) against the primary selection criteria. These criteria were a combination of the priorities SustainFloyd had established at the outset, as well as limiting factors discovered through the asset mapping process.

The criteria set by SustainFloyd, as described earlier, included: 1) keeping people employed in Floyd, interpreted as leveraging the existing skills and talents within the community; 2) maximizing linkages within Floyd, interpreted to mean building on the existing businesses illustrated in the cluster map; 3) enhancing Floyd's independent economy, which meant keeping production and distribution of goods and services as local as possible, and; 4) meeting current needs without compromising future generations ability to meet their own, the commonly referenced definition of sustainable development which we interpreted as causing minimal negative environmental impacts, ideally with net positive impacts.

Selection criteria which surfaced as limitations from the asset mapping process included minimal need for high volumes of water inputs or discharge, and minimal need for heavy, frequent, or distant transport. We also included subjective criteria for cultural compatibility and an ability to offer employment opportunities to a range of skills and backgrounds. Each of these criteria was included in an evaluation matrix, which we used to structure the assessment of each potential industry. The goal was to narrow the range of possibilities by eliminating blatantly incompatible industry options and identifying the stronger sectors for further research in Phase II. As a range of methods had been used to gather information about the assortment of industries, many of which are limited in the amount of data available, we could not adapt the matrix to evaluate and compare options quantitatively. Rather, a framework was developed to structure the group discussion and evaluation of each industry. A copy of the primary selection criteria evaluation matrix is included in Appendix 1.

Through this evaluation process, two industry possibilities were eliminated entirely - farm waste processing and ecosystem services. Given size and spread of farms in Floyd County, we did not feel there would be a critical mass of waste to maintain a constant stream of inputs. Further, we also learned of a commercial composting facility in Riner which may already be satisfying this niche. The ecosystem service market is not well enough defined that we could identify any stand-out opportunities at this point in time. We also narrowed the remaining industry opportunities considerably. In the building, finishing, and furnishings sector, construction and green building was already fairly established in the area, and would be better served by focusing on the complementary industry of interior finishings. The agricultural processing sector was narrowed by removing the option of a slaughter facility, which we learned is already under consideration in a community closer to an interstate highway.

The remaining options were reorganized into a more consolidated arrangement. The retrofitting industry was divided, with services moving into the alternative energy production and

installation sector, and workforce training moving into the education and training sector. We also decided that the tourism sector was already well developed in Floyd and may not be the most strategic place to focus our energy. However, recognizing that much of the tourism industry revolves around events in the region, creating peaks and lulls for the industry, the existing tourism industry was kept as an asset for other industry possibilities. As illustrated in Figure 5, we narrowed our selection to four sectors to research further in Phase II - alternative energy production and service, sustainable interior finishings and furnishings, education and training, and agricultural processing. The narrowed list of industry and business options we felt were viable options are included in Table 2.

Custom Building, Finishing & Furnishing	Agricultural Processing	Alternative Energy Production and/or Installation	Retrofitting Services and Training	Ecosystem Services Credit Markets	Farm Waste Processing	Education & Training	Tourism
Green construction	Slaughter facility	Solar panel kits	Workforce training	Carbon credit trading	Cellulosic waste processing	Agricultural training	Eco-tourism
Custom furniture	Fruit/vegetable processing	Wind turbine installation	Residential retrofitting services	Mitigation banking	Manure processing	Green building education	Rural heritage tourism
Custom fixtures	Micro dairy facility	Wood pellet production	Wood stove retrofitting		Methane digesters	Energy efficiency training	
Interior finishing		Wood stove conversion kit production					
Kitchen & Bathroom tiles and counters		Methane digesters					
Composting toilets							

Table 1. Initial list of potential business opportunities identified through industry/ sector linkages and gap analysis.

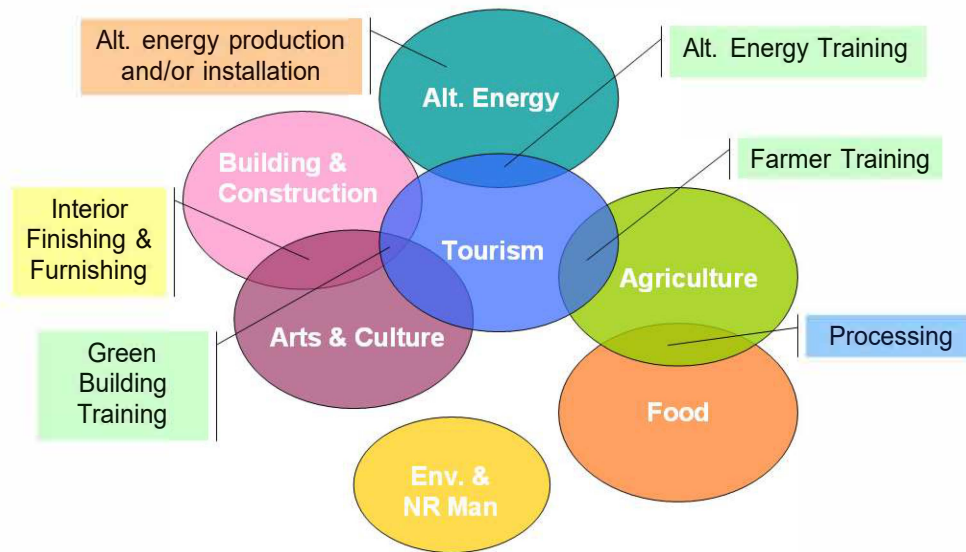


Figure 5. Narrowed sector selection following primary selection criteria evaluation, which were the basis for Phase I of the process.

Custom Building, Finishing & Furnishing	Agricultural Processing	Alternative Energy Production and/or Installation	Education & Training
Green construction	Fruit/ vegetable processing	Solar panel kits	Agricultural training
Custom furniture	Micro dairy facility	Wind turbine installation	Green building education
Custom fixtures		Wood pellet production	Energy efficiency training
Interior finishing		Wood stove conversion kit production	Workforce training
Kitchen & Bathroom tiles and counters		Methane digesters	
Composting toilets		Residential retrofitting services	

Table 2. Narrowed and consolidated sector and industry list for further research in Phase II.

PHASE II - Sector & Industry Research & Evaluation

Sector & Industry Research

Having narrowed scope of industry possibilities to four main sectors and a more strategic selection of industries within each sector, Phase II of the research process was dedicated to more detailed research on the selected industries (see Table 2, previous page) including, specific information about start-up costs and investments, necessary inputs, market demand and potential distribution footprints, and any waste disposal considerations. Two significant challenges arose during this phase of the research- locating market data for largely emerging industries and determining an appropriate scale at which to conceptualize and assess each industry. Particularly with regards to the sustainability criteria for viable business opportunities, the availability of market data for some types of "green" industries and processes is minimal. This required us to make some inferences based on conventional processes. Determining the appropriate scale of operation and distribution to use as a hypothetical in Floyd was also a challenge, both for determining start-up requirements, sustainability impacts, and a distribution footprint. In general we tended towards assessing industries at a smaller start-up scale, which, if desired could grow over time.

The studio team researched a number of industries, specifically focusing on:

- o Inputs - type & source of resources and labor skills
- o Start-up costs
- o Employment possibilities
- o Consumer footprint
- o Demand drivers
- o Compatibility with assets of Floyd
- o Issues for future research

Feasibility Evaluation

As discussed above, not all of the information sought about the range of industry options identified was readily available. Consequently, rather than a quantitative evaluation of our options, we evaluated the options through a deliberation process, in which each industry was presented to the greatest detail possible, and that industries strengths and weaknesses were discussed. This process began with a broader discussion of the strengths and weaknesses of each sector, in order to review the decision-making process to date, and to re-evaluate the selections and eliminations made up to that point.

As a group, the team then went through the research for each industry, some of which overlapped and were presented as part of a larger discussion (i.e. wood pellet production, wood

stove inserts, and wood stove conversion). After the team completed this deliberation process, we discussed which industries we felt were stronger candidates than others based on its potential value to strengthening the existing business clusters in Floyd, their compatibility with Floyd's assets and selection criteria, and a preliminary understanding of market feasibility.

Through this feasibility and compatibility evaluation process, we narrowed our selection of industries to four specific business possibilities: wood pellet production; small scale value-added dairy processing; green interior finishing--specifically flooring and countertop materials; and a sustainable living education and training program (Figure 6).

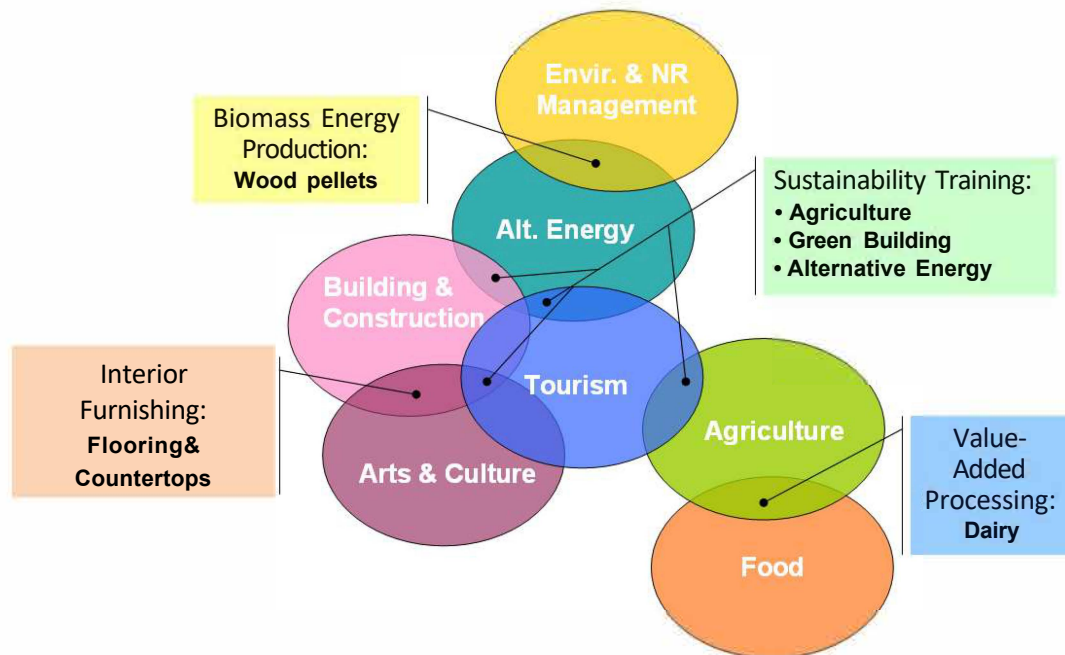


Figure 6. Final selection of business opportunities for Floyd, for which preliminary feasibility studies were completed in Phase III.

Within the alternative energy sector, we elected to focus on wood pellet production because of the abundance of woody biomass available in the region and existing natural resource management enterprises that could facilitate positive-impact forest management in the area. These links would have positive environmental impacts and provide a step towards energy independence which is another major objective of SustainFloyd. The startup costs were relatively low for a small-scale operation and the use of wood pellets requires a low-tech conversion kit from current wood-burning stoves.

The decision to focus on flooring and countertop materials within the building and interior sector, came out the range of highly scalable production which could be initiated with minimal investment, and from the desire to integrate the artistic talent found in Floyd into other industries. With a particular focus on tile and countertops, there are a number of products and processes that use recycled materials and could contribute to the green building industry already taking root in Floyd.

With value-added and niche agricultural production and distribution already relatively well established in Floyd, we knew that processing facilities were a gap in the value-chain. Fruit and vegetable processing was an obvious opportunity, but its high water demand raised questions and concerns for its compatibility for Floyd. It seemed that dairy farmers in Floyd are also struggling to find local markets for value-added processing. We elected to focus specifically on a dynamic micro dairy production facility which could accommodate a range of production lines (e.g. yogurt, cheese, butter) because it could respond with flexibility to a range of demand and input variables with minimal disruption.

We grouped the different training and education opportunities into a single concept of "sustainable living" education and training, which could be offered as part of a program or be expanded to the establishment of a physical learning center. This option aligned well with the current tourism industry, as it would be able to tap into the existing infrastructure able to provide an additional stream of visitors for these businesses. Additionally, it would provide additional employment opportunities for locals with sustainability-centered skills and talents to instruct courses or workshops through the program. Depending on the implementation route, it could also provide opportunities for workforce development or sustainable business development for the region.

Phase III - Preliminary Feasibility Studies for Identified Business Opportunities

The final stage of this research process was to describe what each of the selected business opportunities could look like in the context of Floyd County. The team produced a set of standardized information pieces detailing the information gathered about the particular business opportunities, as well as case studies to illustrate successful models at a scale comparable to Floyd. Each piece is presented in the following section.

Wood Pellet Production

A wood pellet production facility is one of the proposed business opportunities for Floyd. Wood pellets are a fuel source for pellet stoves used for residential heating. There are two main types of pellet stoves: stand-alone units and inserts for preexisting chimneys. Insert models are less expensive and easier to install, while stand-alone models are more expensive and require more extensive installation. The prices and features of pellet stoves vary a great deal, but the price generally runs from about \$1,700-\$3,000.³⁰

Pellet stoves are more advanced than simple wood-burning stoves. Whereas wood stoves radiate heat, wood pellet stoves use convection to heat a room. Pellet stoves draw in cold air from below. The cold air is used to fuel a continuous fire fed by wood pellets. Heat energy given off during the combustion process is transferred to a separate source of clean air via a heat exchanger. The clean air is circulated through the room by a fan. The smoke and chemicals produced during combustion are vented to the outside. Pellet stoves are controlled by electronic components, increasing their efficiency. An electronic thermostat and automatic hopper allow the stoves to function largely independently. Depending on hopper capacity, the time between adding pellets will range from every few hours to several days. Additionally, units feature an ashtray requiring periodic cleaning.

Pellet stoves are most commonly associated with wood pellets, but it is possible to produce and burn a pellet composed of any combination of biomass. This could include corn and grass-type biomass. The ability to burn different pellet fuels depends on individual stoves. Not all stoves are designed to burn a range of biomass pellets, many are limited to wood pellets and within this group of stoves, most can only burn high-quality wood pellets. Low-quality pellets contain higher amounts of ash and less energy, reducing their burn efficiencies. Wood pellets typically have higher energy content than grass pellets. Wood pellets average 8,000 BTU/lb. Grass pellets create approximately four percent less energy because they have a higher ash content, making them less desirable in stove burning applications.³¹ Pellets averaged \$18.37/Million BTU's in 2008, equivalent to paying 6.5 cents per kilowatt-hour of electricity.³²

³⁰ "A Consumer Guide to Pellet Stoves", Nov 1, 2009. <<http://www.woodpelletstoves.net/>>

³¹ Susan Lang *Grass Pellets as an Economical, Efficient, Environmentally Friendly Biofuel*. Cornell Chronicle. Apr 7 2005. <http://www.news.comell.edu/chronicle/05/4.7.05/grass_biofuel.html>

³² <http://www.woodpelletinfo.com/calculator/>

**Table 3. Hearth Industry Unit Shipments
1998-2008
U.S. Shipments**

Pellet Appliances	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Freestanding Stoves and Inserts	34,000	18,360	30,970	53,473	33,978	48,669	67,467	118,746	133,105	54,032	141,211
% Change	-	-46%	69%	73%	-36%	43%	39%	76%	12%	-59%	161%

(Hearth, Patio, and Barbeque Association, 2009)³³

³³ Hearth, Patio, and Barbeque Association. <<http://www.hpba.org/statistics>>

The Hearth, Patio, and Barbecue Association, which produced the Table 3 above, provides shipment data on pellet stoves shipped in the U.S. From 1998 to 2008, annual shipments of pellet stoves increased from 34,000 units to 141,211 units. Throughout this period, year-to-year shipment totals are marked by dramatic ups and downs. This fluctuation is likely a result of fluctuations in the price of oil. However, the overall trend shows large industry gains.

Wood pellets are not limited to use in small-scale wood pellet stoves. Pellet burning boilers are used for heating large-scale buildings, anywhere from 10,000-50,000 square feet.³⁴ Pellets can also be co-fired with coal for electrical generation in power plants. This use of wood pellets is quickly growing in Europe. Policy mandates have dramatically increased the demand for wood pellets in Europe. In March of 2007, at the European Council in Brussels, EU members agreed to a binding resolution that 20 percent of energy used would come from renewable sources by 2020.³⁵

Currently, the Federal government is offering a tax credit on pellet stoves. Until December 31, 2010, consumers of professionally installed qualifying pellet stoves are eligible for a tax credit on 30 percent of the cost, not to exceed \$1,500. Stoves must have an efficiency rating of at least 75 percent to qualify. EPA certification is not required for pellet stoves, but some manufacturers procure a voluntary certification.³⁶ Pellet stoves are as important as the pellets themselves. A high quality pellet burned in a stove that is inefficient or improperly installed, is not efficient and does not promote sustainability.

A Match to Sustainability

A wood pellet production facility promotes SustainFloyd's priorities, as they are understood by the Economic Development Studio@ Virginia Tech. That is, wood pellet production will retain employment within Floyd County, create new business linkages within the county, enhance the independent Floyd economy and promote the sustainability of Floyd. This section discusses the ways wood pellet production meets these criteria.

People with skill sets required for producing wood pellets are living in Floyd. Total employment numbers are not very large for pellet production, but the positions created from this enterprise could all be filled by Floyd residents. Wood pellet production is a relatively low-tech, straightforward process.

The second criterion, to maximize existing linkages, thereby strengthening connections between Floyd's assets is met because wood pellet production would create and strengthen the demand for pellet stove retail sales, service, and installation. It would also potentially create

³⁴ Wood Pellet Heating Guidebook. Massachusetts Div. Energy Resources.
<http://www.mass.gov/Eoeea/docs/doer/publications/doer_pellet_guidebook.pdf>

³⁵ "EU Sets Target of 20% Renewable by 2020", Mar 17, 2007. Renewable Energy Access.
<<http://www.renewableenergyworld.com/rea/news/article/2007/03/eu-sets-target-of-20-from-renewables-by-2020-47722>>

³⁶ <http://www.epa.gov/burnwise/appliances.html>

opportunities for sustainable forestry management practices and biomass cultivation. The primary concern for pellet production is access to cheap biomass. Wood pellet production would be an ideal incentive to harvest trees as part of a sustainable forestry management program. From this standpoint, wood pellet production is the middle link between responsible natural asset management and a retail end-product which promotes sustainable living. All three components: responsible forest management, wood pellet production, as well as pellet stove production and retail could develop in Floyd, enhancing the vertical integration of Floyd's economy.

The third sustainability priority, to transform Floyd from a dependent to independent economy, highlights the concept of resiliency iterated in SustainFloyd's vision. Energy independence, or rather, a lack thereof, has had broad implications for social, economic, and environmental policy, both domestically and abroad. Wood pellets represent an opportunity for Floyd to expand its self-reliance since wood pellets are a renewable fuel source which can be locally produced.

The fourth priority is the common definition of sustainability. Although difficult to empirically demonstrate, wood pellet production has several other "green" merits that contribute to the overall sustainability of the endeavor. Besides being renewable, biomass is considered a carbon-neutral fuel source. Carbon is released into the atmosphere as a result of combustion, but this is carbon that was in the atmosphere a short while ago and is therefore, part of the short-term carbon cycle. Vegetation continually cycles carbon from the atmosphere, into its biomass, and back into the atmosphere during decomposition. Averaged out, the amount of carbon in the atmosphere is held constant. This impact is extremely different from burning coal and other fossil fuels. During these combustion activities, carbon buried for millions of years within the Earth is reintroduced into the atmosphere, resulting in a negative impact on the balance of carbon in the atmosphere on a geologic time scale.

Inputs

Wood pellet production typically involves sawdust, wood shavings, or wood chips, although other forms of pelletized biomass can be produced and burned. Soft and hardwoods, including the bark can be used to produce pellets. In production, raw semi-processed waste is dried to a certain moisture level and ground to a small size. The order of these first two steps can be reversed. The dried and ground wood is then forced through an extruder and cut. Extruding under high pressure increases the temperature of the wood. This causes the natural resins and lignin present in the wood to melt. These resins and lignin serve as a natural bonding agent. Hardwoods contain less of these natural bonding agents and therefore may require bonding additives if a high enough proportion of hardwood material present.

The primary resource used in wood pellet production is wood waste. It is therefore critical for a wood pellet manufacturer to have a guaranteed source of wood waste. Wood is not the only potential pellet ingredient, and most types of dried ground biomass can be included into a pellet, but their incorporation complicates the process from a marketing perspective. Wood

pellet stoves are carefully calibrated convective heaters. Only certain stoves are built to burn multi-mix pellets and thus there is a smaller market for such pellets.

Energy inputs must also be considered. A cost analysis by the Department of Forestry Sciences at Colorado State University estimated an annual electrical usage of 166,000 kWh, based on a 340 HP system with an output of 1 ton/hr and an annual pellet output of 2,000 tons.³⁷ That is, one ton of pellets require 83 kWh of electricity to produce. Natural gas is often used to power commercial drum driers. Although Floyd has no natural gas, pellet producers are beginning to use wood waste to run driers, a practice that is becoming more common as the price of natural gas rises.

The production process and technology are straightforward. Most of the process takes place within components that are generally self-operating. Regarding labor skills, experience with maintenance and/or mechanical engineering would be needed to keep the equipment in working order. Depending on the shipping needs, a driver with a commercial driver's license may be required. The majority of labor would be manually moving materials around. Many of the skills required would be learned on the job, through experience. Although the production process is relatively low-tech, an International Energy Agency (IEA) report indicates most plants take 12-18 months to optimize their production. Parameters are well established for each production phase, but feedstock composition is unique to each plant and requires time to fully optimize each phase of production³⁸.

Compatibility with Floyd Assets

Having access to a sufficient, local wood source is most important pre-requisite for the profitability of a wood pellet plant. The raw materials become too expensive if they must be shipped over a certain distance because of their low bulk density. Wood waste is locally available since there are two wood flooring plants located in Patrick County. Approximately 35 percent of the wood used in these flooring plants becomes waste. This waste can be sold for approximately \$35-\$50 per ton based on the market price. Between the two plants approximately 10-12 trailers of waste are produced each day. A trailer holds approximately 18 tons of wood waste. Currently, some of this waste is being sold to Trek, a particleboard company, and Pennington Seed, a wood pellet facility located approximately 3 ½ hours from the plants in Patrick County.

Wood pellets are usually dried using drum driers. Natural gas is the standard fuel source for these driers. Floyd has limited access to natural gas. Depending on the scale of operations, this could be a limiting factor. However, the rising cost of natural gas has caused plants to switch

³⁷ Nikki Williams and Dr. Dennis Lynch, Wood Pellet Manufacturing Production Equipment and Cost Study for Walden Colorado. Colorado State University. 10-12
<http://csfs.colostate.edu/cowood/library/06_Wood_Pellets_Walden.pdf>

³⁸ "Global Wood Pellets Market and Industry," IEA Bioenergy. Nov 2007. pg 9.

over to wood waste as the energy source for these drum driers.³⁹ The ability of a plant in Floyd to use an alternative energy source for the drying process will be important to consider as the feasibility of a wood pellet production facility in Floyd continues to be assessed.

Start-Up Costs

Start-up costs include the purchase or lease of a drier, grinder, extruder, cutter, packing equipment, and the shipping vehicles. Advantageously, the size of the production equipment can be tailored to wood stock supply. Depending on the intended production capabilities, pelletizing machines can be purchased in a variety of sizes. It is important to note that the IEA Bioenergy report on wood pellets states that plants on average take 12-18 months to reach a desirable production rate.⁴⁰

Pelletizing equipment is available in a wide range of output capabilities. There are several small-scale suppliers easily accessible through the Internet. Pellet Pros is one such supplier. Pellet Pros offers small to medium scale pelletizing machines for personal and commercial scale uses. Their machines range in production capability starting from 65-600 pounds per hour. Their two largest extruders cost \$9,000 and \$12,000 and produce 1,000-12,000 pounds of pellets per hour. Grinders cost \$3,000- \$5,000, driers cost \$10,000-\$20,000 and the bagger costs \$19,000. Total equipment costs would be in the \$41,000-\$51,000 range.⁴¹ Driers are generally the most expensive component. The moisture content of the wood will dictate the needed drying capacity. This is the most important consideration when pricing a production facility.⁴²

Case Study

Carolina Wood Pellets, LLC is a newly operating wood pellet plant. It is a good example of how a successful facility in Floyd might operate. The family-owned plant is located in Macon County, North Carolina, near Franklin. Construction began in September of 2008 and the plant became operational in early 2009. Steve Smith, owner of Carolina Wood Pellets, decided to begin producing pellets in order to combine the wood waste stream from his log home enterprise with several other local wood waste streams to create the wood pellets. Between his log home business and several flooring and mill operations, the wood for the pellets comes from within a 50-mile radius. The total project costs for the plant were \$2.8 million. The Natural Capital Investment Fund provided \$250,000. Given its set-up, the plant will produce 68,000 tons of pellets annually. At full capacity, 32 full and part-time jobs will be created.⁴³

³⁹ IEA Bioenergy, 10

⁴⁰ IEA Bioenergy, 9.

⁴¹ Pellet Pros, LLC. <<http://www.pelletpros.com/>>

⁴² Nikki Williams and Dr. Dennis Lynch, 17.

⁴³ Carolina Wood Pellets, LLC. Natural Capital Investment Fund. <<http://www.ncifund.org/node/321>>

The plant can produce 10-12 tons of pellets per hour. For purposes of comparison, western North Carolina matches well with southwest Virginia, so this plant provides a good approximation of how a plant of similar size could operate in Floyd. Steve Smith, the owner, plans to primarily market the pellets within a 30-40 mile radius. At its current production rate, the plant produces enough pellets for 30,000 families to consume during an average North Carolina winter, based on a household using about 2-3 tons of pellets during the year. Stoves can be bought at a few local retail locations, including Smith's other business. He has recruited local contractors to install the wood pellet stoves.⁴⁴

The potential for a pellet business in Floyd to sell locally and/or nationally is likely to depend upon several factors, including operational scale and the local market for pellet stoves. Turman Lumber Group, located in Galax, Virginia, is a local producer of wood pellets. Turman produces approximately 17,000 tons of pellets year, selling across the east coast.⁴⁵ Turman's pellet production uses only the Group's own production wastes and is generally sold by November.⁴⁶ In Christiansburg, Blue Ridge Heating & Air sells pellet stoves and carriers Turman Pellets. The ability of Carolina Pellets to produce four times as many pellets as Turman, and sell them locally indicates the potential for further pellet capacity in the area.

Further Considerations

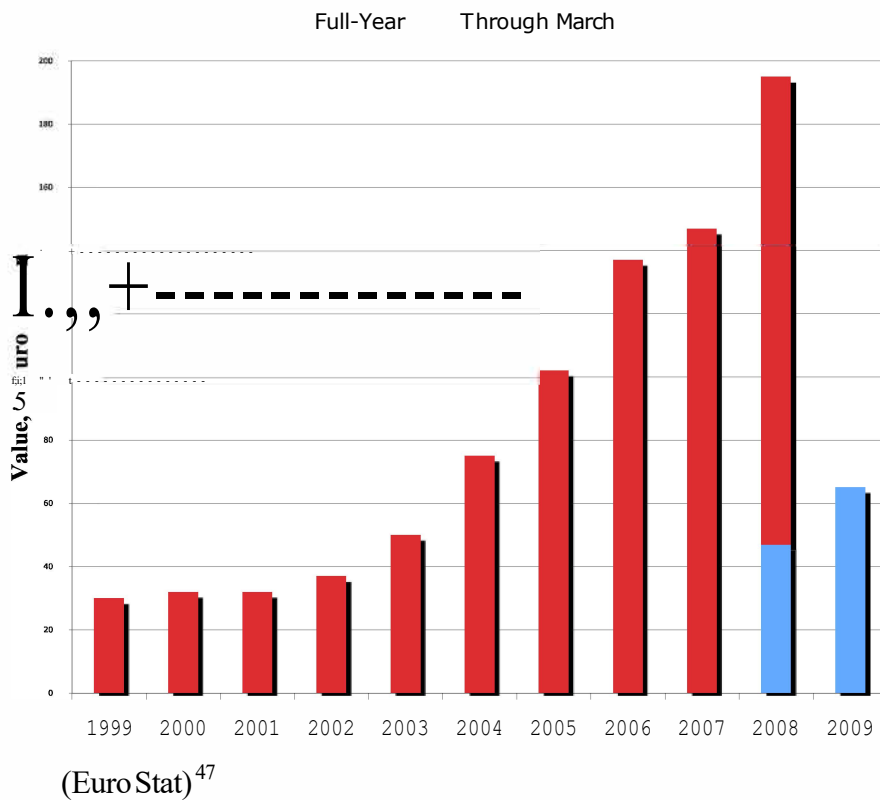
The wood-pellet industry has experienced rapid growth. A large portion of the increased demand is coming from the EU where legislative mandates require 20 percent of member nation's energy to come from renewable resources. The southeastern U.S. is expanding production capability and exporting wood pellets to the EU to meet this growing demand. It is not clear whether a smaller operation could compete with the major producers in the international export market on price. However, as was noted earlier, the scalability of this process could be tailored to meet wood pellet demand for Floyd County, the New River Valley, Southwest VA, the Mid-Atlantic or the Southeastern U.S.

⁴⁴ McRae, Barbara. "NC-Wood Pellet Plant Begins Construction". The Franklin Press. News. Sep 15 2009. <<http://www.thefranklinpress.com/articles/2009/09/15/news/12news.txt>>

⁴⁵ Turman, Ryan. The Turman Group. Interview by Mel Jones. Unstructured Interview. Blacksburg, VA. 27 October 2009.

⁴⁶ Ibid

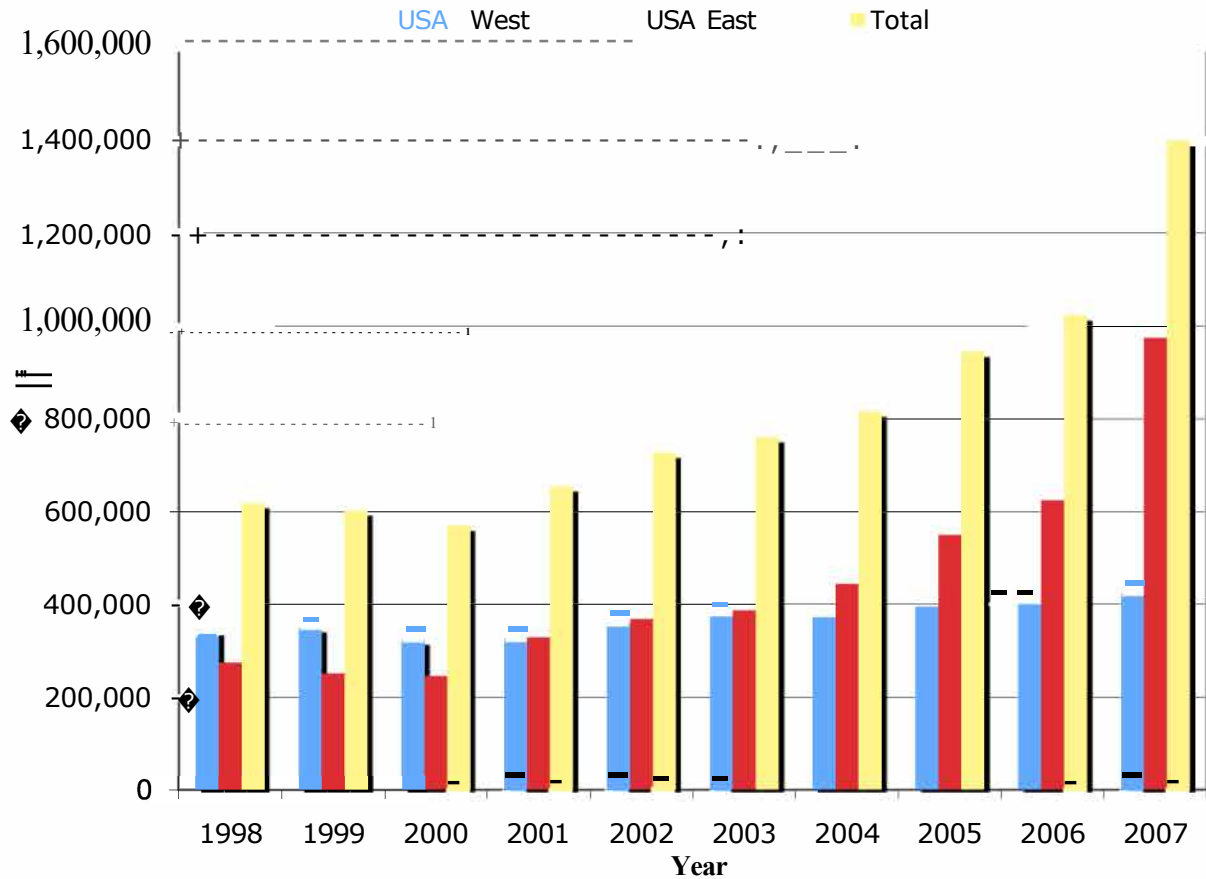
Figure 7. Rising EU Pellet Imports



The graph, Figure 7 above, tracks the value of wood-pellets imports into the EU. For the first three months of 2009, wood pellet imports are up 62 percent from the first three months in 2008. If a similar renewable energy mandate were passed in the U.S., a similar demand boom would likely occur.

⁴⁷ Russell Gold, "Wood Pellets Catch Fire." Wall Street Journal. July 17, 2009
<http://online.wsj.com/article/SB124691728110402383.html>

Figure 8. USA Pellet Production



(Wood Pellet Association of Canada, 2006)

This graph, Figure 8 above, shows pellet sales broken down into USA West and USA East. While overall growth has occurred, it is clear much of this growth has occurred in the eastern half of the U.S. From the period 1998-2007, USA-West pellet production rose from 344,000 tons to 425,000. This was an increase of 81,000 tons. The eastern U.S. grew production from 274,000 tons to 975,000 tons. This was an increase of 700,000 tons. Growth is occurring predominately in the east largely as a result of location advantage for exporting to the EU, as well as a response to rising carbon-based energy sources and the growing availability of pellet stoves described at the beginning of this section.

Several large-scale plants have recently begun operations or will begin in the near future. Green Circle Bio Energy Inc opened a 500,000-ton facility in Florida in May 2008. Dixie Pellet opened a 500,000-ton facility in Alabama in 2008. Phoenix Renewable Energy LLC is constructing a 250,000-ton plant in Arkansas. The Arkansas plant will cost \$110 million and employ roughly 45 plant workers and 30 truck drivers.⁴⁸ These three plants alone will more than double the historical annual output of domestic wood pellet production. This should give some

⁴⁸ Phoenix Wood Pellet Plant <<http://phoenixrenewableenergy.com/what.html>>

indication to the current and anticipated tremendous increase in wood pellet demand. Currently, there are 80 pellet mills producing 1.1 million tons of pellets per year.⁴⁹

Even with these extremely large plants, employment opportunities are relatively low. The \$110 million plant in Arkansas is designed to produce 500,000 tons of pellets annually and will employ 40 plant workers and 30 drivers. The equipment from the online retailer Pellet Pros could be operated by less than five people, with a couple of drivers, both bringing in the semi-processed wood waste and delivering the packaged wood pellet. Carolina Pellets employs approximately 20-30 people.

Wood pellet manufacturing is a growing sector. Demand has boomed in Europe because of legislative mandates on renewable energy. Rising fuel costs in the U.S. have caused demand for wood pellets to rise as well. A cap-and-trade bill, carbon tax, or bill requiring a renewable energy threshold, would likely cause demand for wood pellets to increase domestically in a similar fashion currently seen in Europe.

⁴⁹ Pellet Fuels Institute <<http://www.pelletheat.org>>

Interior Furnishings: Flooring and Countertops

The production of flooring and countertop materials, as part of the interior furnishings sector, is another business opportunity proposed for Floyd County. Furnishings are defined here as any item used in decorating or accessorizing the home. While appliances, fixtures, and furniture can also fit in this category, this discussion is limited to flooring and countertop materials produced using sustainable practices. It will illustrate how flooring and countertop materials can have a positive immediate environmental impact, without requiring significant investment in untried technologies or markets. These products are simple to manufacture, easy to market, and allow for opportunities to use post-consumer materials, local talents, and pre-existing labor assets.

The following discussion is a mixture of considerations for both large and small scale enterprises. Compatibility of Floyd's assets and a generic business producing home furnishing materials are considered, as is compatibility with the proposed sector and sustainable manufacturing principles. The case study presented here focuses on a specific element of the interior furnishings sector - the production and sale of countertop and flooring materials, using post-consumer inputs. This narrow category allows for an illustration of a business model that incorporates sustainable practices and business potential to make a product that is a compelling choice for consumers in spite of a difficult business climate. Finally, the example presented in the case study is meant to present a realistic business idea as well as an example of practices and processes that can be tailored to other uses in the greater interior furnishing sector and other manufacturing possibilities.

A Match to Sustainability

The furniture industry in particular, has received some "much needed cushion" from sustainable furniture, in spite of a gloomy retail environment.⁵⁰ Consumers are willing to pay higher prices for "sustainably" developed furnishings as a means of preserving their future welfare. The interior furnishings sector has also seen the development of a comprehensive certification program for potential products.⁵¹ The certification program indicates an established market developing norms for inclusion and a standard to measure quality. Furthermore, manufacturers can design sustainable furnishings with both haut couture and every day applications in mind, allowing them to market to a variety of consumers. Whereas the production of furnishing materials is typically associated with dirty factories and waste, sustainable production diverts waste.

⁵⁰ Gottfried, Miriam. "The Crowded World of Green Furniture." *Smart Money Magazine*. 2009
<<http://www.smartmoney.com/Spending/For-the-Home/New-Furniture-Made-With-Old-Parts/?hpadref=1>>

⁵¹ The Institute for Market Transformation to Sustainability. "Frequently Asked Questions."
<<http://mts.sustainableproducts.com/FAQS.html>>

Developing and marketing furnishings according to a sustainable philosophy is feasible on a small scale. Home furnishings provide ample opportunity to employ the innovation and creativity of Floyd's local artists. Crenshaw Lighting is a local company that demonstrates the opportunity for a furnishing business in Floyd County. The company specializes in high value handmade lighting fixtures and installations. Crenshaw Lighting has grown in spite of limitations posed by Floyd's distance from major traffic routes. Further, it has developed into a highly successful company while continuing to provide "hand-made-to-order" lighting fixtures.⁵²

A survey of Floyd's artisan network shows that potters, engravers, and furniture makers are already producing products in the area.⁵³ Many of them emphasize sustainability as a key element of their work. Their skills could be an asset to large scale furnishings productions according to the Crenshaw Lighting model, thereby connecting local tradition with environmental concerns in a viable business.

Inputs

Inputs required for the production of flooring and countertop materials include labor, raw materials, and machinery. Typical manufacturing processes in the home furnishing sector involve adding embellishment materials to substrate materials. In instances such as stone countertops, where the product is one single block, the production process is even simpler.

Our emphasis on sustainability adds another category to the mix: post-consumer materials. A potential business centered upon producing countertop and flooring materials puts simple manufacturing principles to use in a new way. As will be shown, the ability to produce countertops and flooring products using sustainable post-consumer materials can lead to a significant positive impact on the local environment. Combined with heavy use of local assets, and what could be considered a viable local market, products following the pattern presented here indicate a strong fit with SustainFloyd's sensibilities and purpose.

Compatibility with Floyd Assets

The production of these products is a good fit for Floyd County provided that the county has easy access to the components needed to produce these products. The modest manufacturing and shipping requirements, at least at smaller firm sizes of these products, could help to stimulate Floyd's local economy. While using environmentally friendly building materials may require going outside the county for raw materials, such a business proposition could jumpstart a local recycling effort in order to generate raw materials. Additionally, the local school system has put considerable effort in vocational programs geared towards building construction, architecture,

⁵² Crenshaw: Makers of Fine Lighting. "Our History." <<http://www.crenshawlighting.com/about/history.php>>

⁵³ Floyd's Post-Industrial Park: Artisans and Craftspeople of Floyd County, Virginia. "Floyd Artisan Listing" <<http://www.floydart.com/artisans/>>

design and other skills compatible with home furnishing manufacturing. Employing the graduates from these programs would provide employment opportunities that may help to counteract the "brain drain" seen in the county, leading to a more resilient Floyd as local youth stay in the community.⁵⁴

Floyd is also home to a strong artistic community that can serve as the foundation for developing home furnishing businesses. A necessary part of a successful business centered on artistic applications of materials is a natural and effective means of connecting the business and artistic worlds. For example, the Floyd area is home to the Jacksonville Center for the Arts, which bills itself as an artistic incubator for the area, offering support services for local and visiting artists. One could imagine an expansion on this theme to ultimately include networking and sales services for local artisans. Through connecting business and artistic interests, we strengthen linkages within the community, while providing opportunities for new interactions amongst Floyd's diverse population..

Floyd is currently home to several companies involved in the home furnishing sector. For example, Serenity House Cabinets designs, builds and installs custom cabinetry for "retailers, designers, space planners, and architects." Serenity House handles design, fabrication, and installation of the finished product.⁵⁵ Following the lead of such companies, part of, if not all of the way from idea to finished product, would be desirable for Floyd County because the production facility could be relatively small due to the scale possibilities for the operation. The type of work should be highly acceptable because it could draw on pre-existing skills within the county in order to provide opportunities to local residents who are currently under employed.

Combining Sustainability and Economic Viability

Countertop and flooring businesses typically start small, but if successful, can lead to substantial employment opportunities as a result of their growth. One can find examples of sustainable housing materials production that have experienced large scale growth, illustrating the potential for providing employment opportunities while remaining true to sustainable principles.. IceStone, located in Brooklyn, New York, produces counter slabs out of a variety of recycled materials including buttons, glass, mirrors, and concrete.⁵⁶ Employing 60 full-time employees in a 55,000 square foot production facility, IceStone has grown in what one might consider to be a sustainable manner. IceStone not only uses recycled raw materials, but also recycles water used in production, reclaiming and reusing 90 percent of water used. IceStone has gone to considerable efforts to reduce energy consumption - its manufacturing floor is day lit, while the production process itself is designed to minimize waste heat, reducing energy

⁵⁴ Floyd County Virginia. "Business and Commerce" <http://www.tloydcova.org/business/workforce.shtml>

⁵⁵ Serenity House Cabinets. "Our History." <<http://serenityhousecabinets.com/history.html>>

⁵⁶ Fletcher, Derek. "In Brooklyn, Following Broken Glass To Sustainable Profit." *Apollo New Service*. 2009. <<http://apolloalliance.org/made-in-america/signature-stories-made-in-america/in-brooklyn-following-broken-glass-to-sustainable-profit/>>

consumption. IceStone could also be considered "sustainable" in its hiring practices as well. Known for hiring immigrants and refugees, IceStone makes a living wage and full health care benefits a priority. In addition, IceStone attempts to provide advancement and education opportunities for employees as a benefit of employment at the company. ESL (English as a second language) classes are offered free of charge, while employees are encouraged to volunteer in the community through paid "volunteer days." In addition, IceStone is investigating practices that will allow employee input in the production process in order to increase design and manufacturing innovation.⁵⁷ As a result of these efforts, IceStone strengthens its linkages with its employees and the community at the same time.

Through its growth, IceStone is encouraging sustainable practices and recycling efforts in the New York City area. The area lacks glass recycling capacity, which in turn forces IceStone to purchase glass from outside sources, increasing energy consumption as a side effect. Due to its growing demand for glass and other post-consumer products, IceStone has partnered with the Brooklyn Naval Yard to site a potential glass recycling facility for the New York City area. IceStone's business growth has led to an opportunity to fill a gap in existing recycling efforts in a manner that reduces its own operating costs and environmental impact.

IceStone's success did not happen overnight. Steadily growing over a six year period, its combination of sustainable manufacturing and employment practices provide a worthy example to follow. IceStone's growth can be attributed to several factors. First and perhaps most obviously, the company has developed a quality product which customers are willing to pay for. In fact, while their countertop materials cost more than traditionally produced competitors, demand has grown steadily in spite of the recent economic downturn. Part of this resiliency in the face of adverse conditions can be attributed to resiliency in consumer demand for "green" products. But, it would seem that a mixture of conscientious business practices and savvy play a part as well.⁵⁸

Start-Up Costs

Initial start-up costs vary with the ambition of the entrepreneur. Smaller scale operations require less; larger scale operations require more. Considering the preliminary nature of the report, we will focus our attention on small scale enterprises and related costs. We presume that the business will start in a small workshop where handmade end products are produced. Binders such as epoxy resin can be found at local suppliers with a retail costs ranging from \$29.99 per

⁵⁷ Appelbaum, Alec. "Is Sustainability Scalable? A Visit to the IceStone Headquarters" *Fast Company*. 2009. <<http://www.fastcompany.com/blog/alec-appelbaum/what-does-green-mean/green-manufacturer-inspires-chilly-thoughts-O>>

⁵⁸ Fletcher, Derek. "In Brooklyn, Following Broken Glass To Sustainable Profit." *Apollo New Service*. 2009. <<http://apolloalliance.org/made-in-america/signature-stories-made-in-america/in-brooklyn-following-broken-glass-to-sustainable-profit/>>

quart to wholesale prices of \$2890 for a 52 gallon drum⁵⁹. Recycled glass can be purchased from a variety of sources. Online resellers provide quotes ranging from \$2.25 per ton to \$36.00 per ton depending on quality desired.⁶⁰ This figure does not include shipping costs, which can vary with the distance, product, and shipping facilities involved. While deriving an estimate for freight or transport costs lies outside the scope of this preliminary study, a preliminary estimate for the amount of inputs required for production can be derived. Manufacturing processes typically involve an 85-15 split- 85 percent recycled materials to 15 percent binder.⁶¹ IceStone advertises an approximate weight of 16.3 lbs per square foot for its mainstay recycled glass slab⁶². Applying the 85-15 split to this figure gives 13.86 lbs of recycled glass to 2.45 lbs of resin binder. So, one could theoretically produce 144.40 square feet of countertop material. This final figure would naturally fluctuate depending on application. Flooring, for example, would not be as thick as countertop material, reducing overall weight and consequently the amount of glass required per square foot. The nature of the post-consumer material would also change these values. As a contrasting example, Paperstone, available for flooring and counter applications, is made from recycled office paper⁶³. Produced by layering and laminating paper sheets, Paperstone is denser than glass based examples, but may in fact allow for more finished product per ton, due to the layered manufacturing process involved in its production. As a result, the cost per square foot of paper based products may in fact be cheaper than glass products.

Importing glass from outside of Floyd need not be the only means of procuring glass for production. Small glass crushers are available which are compatible with the scale presented here. For example, C.S. Bell produces several glass crushers that operate on 110v electricity and are small enough to fit in a standard workshop. With outputs ranging from 3 to 13 tons per hour, one could replace importing a source of glass with recycled area glass, increasing the operation's positive impact on the environment. Prices range from \$2600 for an entry level model to just under \$6000 for a crusher capable of producing three tons of glass per hour.⁶⁴ While purchasing a glass crusher may significantly increase start-up costs, the potential for encouraging recycling as a way of life may outweigh the increased costs involved. In addition, purchasing a glass crusher directly would allow the prospective entrepreneur to source their glass scrap from local glass manufacturers and cutters, which could decrease freight costs and provide an alternative to the dumpster for locally produced waste glass.

Whether purchased or crushed directly, glass based products generate little waste themselves. Any remnants or tailings could in fact be processed post production for application

⁵⁹Jamestown Distributors Epoxy Resin prices.

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⁶⁰Scrap Metal Prices and Scrap Metal Auctions <<http://scrapmetalpricesandauctions.com>>

⁶¹ Vertrazzo <<http://www.vetrazzo.com/>>

⁶²IceStone: Durable Surfaces Made of Recycled Glass and Concrete

<http://www.icestone.biz/index.php?option=com_content&task=view&id=33&Itemid=272>

⁶³ Paper Stone "Technical Specifications." <http://www.paperstoneproducts.net/ps_tech_specs.php>

⁶⁴ Alibaba.com Product listings: Glass crusher <http://www.alibaba.com/product-free/254061856/Model_HMG_16P_Glass_Crusher.html>

as a landscaping material. EnviroGLAS, for example, sells remnant glass and porcelain for use as a cover in landscaping installations with a variety of materials available. As a result, the direct waste generated from production can be considered zero. Any secondary waste, such as excess heat from the curing process, or water used in washing the final product, can be addressed through water collection or utilizing low heat curing processes, reducing the impact of production on the environment even further.

Demand Drivers

In general, demand for our proposed home furnishings follows demand for traditional furnishings. Both are subject to the affects of changes in the economy at large and the housing market in particular. Clearly, recent events have created a rocky business climate for large scale entry into the home furnishing market. Traditional brands such as Corian by DuPont have continued to see slumping sales.⁶⁵ The sector as a whole continues to face the problems of an uncertain housing market.⁶⁶ In addition, much like any other consumer good, home furnishing products are sensitive to changes in disposable income. Obviously with high unemployment continuing to haunt the job market, disposable income comes at a premium.

Taking these macro-level considerations into account, one might wonder why we are proposing home furnishings in the first place. In answer to the difficulties faced in the home furnishing sector, we wish to highlight two important points that counteract the grim economic environment at hand.

First, green construction and surface materials have enjoyed considerable resiliency, and in some cases have grown in despite today's troubled economic environment.⁶⁷ This vigor represents an opportunity, as consumers continue to demand sustainable furnishing products, even though such options come at a premium in comparison to their traditional counterparts. Combined with their comparably low production costs, the possibility of leveraging sustainable production as a value-added aspect in order to command a higher price is a lucrative business opportunity. The flexibility gained by the simple production technologies involved and ready availability of capable employees could allow for a quick rollout with low start-up costs, offsetting some of the difficulties seen in the economy as a whole.

Second, the model presented here can function equally well in local and national markets without significant investment in terms of a physical plant or logistics. Many sustainable product manufacturers sell their product online, cutting the costs seen in marketing their product

⁶⁵BENZING "DuPont Delays Product Launch - Analyst Blog"

<http://news.google.com/news/url?sa=t&ct2=us%2F0_0_s_1_0_t&usq=AFQjCNHMTJS3U9oFH9z8GwP9Stydpfrdow&cid=1484958782&ei=zsgH9DiDoXNIQeAgK7QAw&rt=SEARCH&vm=STANDARD&url=http%3A%2F%2Fwww.benzinga.com%2F54516%2Fdupont-delays-product-launch-analyst-blog>

⁶⁶Winters, Timothy and Ian Thomas. "Advance Monthly Sales for Retail Trade and Food Services" *US Census Bureau News*. December 2009. <http://www.census.gov/retail/marts/www/marts_current.html>

⁶⁷Bonda Penny. "Green Outlook 2009" *Interior Design Magazine*. January 2009. <<http://www.interiordesign.net/blog/1860000586/post/160038616.html>>

substantially. Shipping is handled according to the size of the order itself, with many orders including installation. Costs here totally depend on the consumer, leading to considerable savings for the supplier. Hence, the retailer is not required to carry significant stock, nor is the producer required to maintain the assets necessary to produce a constant stream of product for sale. Marketing involves word of mouth, important for local sales, and engaging bloggers, activists, and other environmentally conscious assets, reducing advertising costs significantly. As a result, the entire production and sale process could be developed as to depend entirely upon demand, offsetting any negative impact seen from economic downturns.

Case Study

Located in Plano, Texas, EnviroGLAS has produced a number of home furnishing products out of locally sourced recycled glass for seven years. Employing 11 full-time employees, EnviroGLAS' 2008 sales amounted to \$3 million⁶⁸. The company sells its products through its north Texas showroom and the internet at www.enviroglasproducts.com, with clients ranging from Texas to New Hampshire. EnviroGLAS products are shipped from the company's Garland, Texas production facility, with the company advertising national and international availability through standard shipping companies.

EnviroGLAS specializes in terrazzo style materials for flooring and other home uses. Glass is suspended in an epoxy substrate and then finished with a protective coat. Sold as EnviroTRAZ, their centerpiece product is available in 22 standard resin colors and can be tailored according to customer application. EnviroGLAS highlights the cost efficiency, health benefits, and reduced maintenance cost of using EnviroTRAZ in home and commercial installations. The company also highlights the environmental dimension of the product, including its LEED assessment and a variety of green building resources on its website. EnviroGLAS has recently expanded its product offerings to include EnviroSCAPE, a landscaping product made of recycled glass and porcelain sourced from local landfills and EnviroSAND which consists of finely pulverized recycled glass and mirror for a variety of outdoor uses. EnviroPLANK and EnviroSLAB are designed for counter and tiling applications respectively. Available as finished sections, EnviroSLAB and EnviroPLANK can be routed, sanded, drilled and polished the same as a traditional granite or wood counter material. The company has recently launched EnviroMODE. Comprised of recycled toilets, EnviroMODE is designed to utilize the contract between austere porcelain and bright resin colors for aesthetic effect. Prices vary according to application, with pricing quotes available through contacting the company directly. Installation is similar to the installation of granite materials, requiring no special tools.

EnviroGLAS has been featured in several green oriented television programs and tours, such as Red Hot and Green on the HGTV channel and through the channel's 2008 green tour. EnviroGLAS advertises its development as a successful partnership with Piano's waste

⁶⁸ Selectory.com Company Profile.

management program as a means to combat the overabundance of glass in city landfills, with a total weight of one million tons of glass diverted in 2005. EnviroGLAS advertises its products as contributing to seven of the 69 possible LEED points, positioning their use as part of an ongoing sustainable construction process⁶⁹.

While direct involvement in the community is minimal, the company has donated its products to several sustainably constructed model homes and various museums in Texas, which it uses as an advertising element on its website. One could imagine an expanded community involvement program to include applications in local renovation and home building organizations, such as Habitat for Humanity, as a means of advertising and integration in the surrounding community. While the terrazzo style does not provide significant opportunities for artisans beyond matching color schemes, other styles such as al fresco may allow for mosaic style pieces to be made on a per order basis designed by a local artisan. Sourcing the raw materials for such a product would admittedly be labor intensive, as the glass would need to be sorted for application. While suppliers for colored recycled glass can be contacted through Internet sales, the price for sorted glass leads to cost increases that must be taken into consideration.

Further Considerations

Sustainable countertop and flooring products, as illustrated here, provide a good opportunity to combine Floyd's assets with sustainably produced materials in an economically viable product. However, there are important issues to be considered before setting out to develop a business around the models presented here. Determining the right level of initial investment and scale depends on consumer preference and spending power. Since the Terrazo style discussed above may not be the best use of local artistic assets, a niche for Floyd's local artisan community to become involved should be found through product designs other than what is considered here. Finally, transportation costs of bringing raw materials such as glass into the county and investments in machinery as the business grows must not be overlooked.

⁶⁹ Enviroglas. <www.enviroglasproducts.com>

Micro Dairy

A micro dairy processing facility is another business opportunity for Floyd County. Our team recommends that the facility be able to process yogurt, fluid milk, cheese, butter, and cream. The milk used in the processing of these products would come from one or more of the local farms in Floyd. Getting the milk from the farm to the processing plant must follow strict guidelines. The Pasteurized Milk Ordinance (PMO) provides standardized guidelines to ensure the consumer receives a safe and high quality product. The United States Departments of Health and Human Services and Public Health, along with the Food and Drug Administration are responsible for a document that defines the practices related to milk parlor and processing plant design, milking practices, milk handling, sanitation, and standards for pasteurization of Grade A milk products. While each state regulates its own dairy industry, the state's guidelines normally meet or exceed the standards found in the PMO. Virginia's State Milk Commission licenses all milk processors and distributors and assigns milk allotment to all licensed distributors.⁷⁰ Further, the Virginia State Milk Commission regulates the grade, storage, milk content and processing of milk products. Full information on the regulation of milk processing is provided by the Department of Agriculture and Consumer Services.

Once milk has been obtained from the cow under sanitary conditions, it must then be cooled to 45 degrees Fahrenheit within two hours of milking. A milk handler then comes to pick up the milk and take a sample before it is pumped from the farm's bulk tank into the milk truck. When the milk reaches the processing plant it must first be tested for antibiotic residues before it can be unloaded. If the milk tests negative for antibiotics, it can be pumped into the plant's holding tank. If the milk tests positive for antibiotics, it must be discarded and the farm samples must be tested to find the source of the antibiotics. Although having to discard the tainted milk is costly, it is rare that positive antibiotic tests occur.

Once at the plant, the milk is stored below 45 degrees Fahrenheit and is usually processed within 24 hours; however, it can be held up to 72 hours before it is processed. If held any longer, the milk has a high chance of spoilage organisms developing.

Because of the short holding period of milk, it is recommended that the dairy plant be able to process a variety of milk products. Cheese and butter have a longer shelf life and can be produced when there is excess milk due to a decrease in demand for fluid milk. Flexibility and versatility of production is key for a small dairy processing facility since dairies must make a commitment to farmers to buy a certain amount of milk despite the price of milk (through these commitments farmers are able to make production targets, matching the flow of milk to market demand) and that the profitability of the dairy depends on its ability to produce and sell products made from that milk.

⁷⁰ Virginia Department of Agriculture and Consumer Services. "State Milk Commission."
<<http://www.vdacs.virginia.gov/smc/>>

A Match to Sustainability

A dairy processing facility would match the goals of sustainability by keeping people employed in Floyd. The skill sets needed for most of the positions in a dai_{ry} processing plant do not require an education beyond a high school degree and a few would require a college degree. While a small plant would probably not employ more than 15 people, it will still create more jobs for the people of Floyd County.

Another benefit of a dai_{ry} processing plant would be providing an additional market for dai_{ry} farmers to sell their milk to. Currently, the dai_{ry} farmers in Floyd are selling much of their milk to large scale milk processing companies such as Pet. It would be more sustainable for these farmers to have their locally produced milk go to a local producer of value-added agriculture products. Because the milk would go towards producing value-added agriculture products, the price paid to the farmers would be a premium because the products could be sold for premium prices. Note that dairy farmers are paid based on the percentage of their milk going into a particular product.⁷¹ The highest price is paid for fluid milk.⁷² This creates more profitability for the farmer. Also keep in mind that a micro dairy would very likely increase efficiency if it was co-located with a dairy farm. The PMO allows on farm processing as an alternative to selling milk to commodity markets.⁷³ An interview with Bob Turner, a sales manager for Pladot Mini Dairy (an equipment supplier), explains, "[o]ne possible way for small- to mid-sized dai_{ry} operators to improve their situation involves processing their own milk into byproducts, a move offering an efficient way of adding value."⁷⁴

Compatibility with Floyd's Assets

Floyd County has a considerable agricultural base including five dairy farms. Curtis R. Sowers and Mark A. Sowers own Huckleberry Dai_{ry} which milks 180 head of cows. The herd's average milk production is 23,000 pounds a year. Sterling Bridge Dairy Farm, Conner Dairy Farms, Duncan Farm and the farm of Peggy M. Lester are also located in the county.⁷⁵ A milk processing facility would provide an additional market for the aforementioned dairy farmers, contributing to farm profitability. The facility would thereby help to maintain the character of Floyd County. Further, the processing facility would further add to the developing cluster of

⁷¹ *ibid*

⁷² *ibid*

⁷³ Johnson, Kristin. June 2000 "Big Rewards In Small-Scale Dairy Processing." *DairyBiz Archive* http://www.moomilk.com/archive/tech_44.htm

⁷⁴ *ibid*

⁷⁵ Floyd County Virginia LCF Group < <http://www.floydcountyvirginia.org/industry.html>>; Lefever, Dave. "Brothers and Conservationists." *Lancaster Farming*. June 2009 < <http://lancasterfarming.com/node/2064>>

Virginia Department of Agriculture and Consumer Services. "Virginia's Finest Directory, Non-food Items, Milk for Processing" <<http://www.vdacs.virginia.gov/virginiafinest/rawmilk.shtml>>

value-added agricultural enterprises in Floyd. Some of these value-added agricultural enterprises in Floyd include: Chateau Morisette, Harvest Moon, Black Snake Meadery, Sweet Providence Farm, and Faith Mountain Farm.

Inputs

A dairy processing facility producing yogurt would require an initial investment in a processing facility, a number of regular inputs as well as trained labor. The facility will likely consist of a pasteurizer, tanks for storage and stirring, a filling machine, and incubation room and a refrigeration room⁷⁶. These components of a yogurt production facility are slightly more complex than a simple fluid milk processing facility which would require only a pasteurizer, storage tank, filling machine and refrigeration room. The diagram in Appendix 3 provides the equipment needed and the process by which a number of dairy products are made. Other facility requirements for receiving milk, office, aisles, well, septic and expansion should be considered.

A dairy processing facility producing cheese or cream would require much of the same equipment a yogurt facility would require. Therefore, multiple machines for each product would not necessarily need to be purchased. The facility could alternate which product to produce based on the supply of milk and other factors.

Regular inputs would include product ingredients, maintenance, labor, electricity, water, and waste water disposal.⁷⁷ The primary ingredient of all of these products is milk. The type of milk (full fat, low fat, or non-fat) corresponds to the type of yogurt produced. Stabilizers such as alginates, gelatins, gums, pectin and/or starch may also be used to modify the body and texture of yogurt. Sweeteners, flavors and fruits are other possible ingredients.⁷⁸

Labor to manage and supervise the facility will be required along with people to operate and tend the processing machines and facility. The Bureau of Labor Statistics Occupational Outlook Handbook, 2008-2009 Edition explains that on-the-job training, usually from about one month to a year, is common among food machine operators or tenders and that "[a] degree in an appropriate area-dairy processing for those working in dairy product operations, for example-is helpful for advancement to a lead worker or a supervisory role."⁷⁹

⁷⁶ See Appendix 3 PLADOT Mini Dairy flow diagram

⁷⁷ Becker, K.M., R.L Parsons, J. Kolodlnsky, G.N. Matlrut. "A Cost and Returns Evaluation of Alternative Dairy Products to Determine Capital Investment and Operational Feasibility of a Small-Scale Dairy Processing Facility" *Journal of Dairy Science* 90(5) 2007: 2509

⁷⁸ See "Ingredients" under "Milk Processing" at the Cornell University Milk Quality Improvement Program website: <http://www.milkfacts.info/>

⁷⁹ Find this and more information in the Occupational Outlook Handbook, 2008-09 Edition, Food Processing Occupations <http://www.bis.gov/oco/ocos219.htm>

Costs

Facility construction costs were reported by K.M. Becker, et al in 2007 as approximately \$58.75 per square foot. They estimate that the construction costs for a plant with the capacity to process the milk from one farm is \$450,000 (\$950,000 for a facility that could process milk from five farms). They estimate that total investment costs including land, facility and equipment in Vermont is \$1,280,000 for a facility to process milk from one farm and \$1,780,000 for a facility to process milk from five farms. With a \$1.5 million investment, Leon and Ida Heatwole, owners of a 200 acre dairy farm in Timberville, Virginia established a 15,000 square foot milk processing facility made to handle 30 to 300 cows. The facility includes a pasteurizer, a cream separator, a cheese-curdling tank and retail space.⁸⁰ This expansion of the Heatwole's farm required employment of 15 additional people. Descriptions and costs of individual equipment pieces can be obtained from dairy processing systems retailers such as Pladot Mini Dairy⁸¹ and Intrade A/S.⁸²

The Bureau of Labor Statistics Occupational Employment Statistics reports that mean annual earnings of food batch makers in the dairy product manufacturing industry in May 2008 was \$31,790 (median hourly wage is reported as \$15.31). First-line supervisors and managers of production are reported as earning a mean of \$53,070 annually (median hourly wage is reported as \$24.62).⁸³ Becker reports estimated that labor represents 58 percent of total cost of production of fluid milk. The same study estimates that annual pay rates will be as follows: Janitor/cargo agent, \$17,000; Secretary/bookkeeper, \$22,500; Packaging/filling machine operators \$20,000; Food batch maker (setup and operate mixing/blending equipment), \$24,000; Cheese maker/yogurt maker, \$50,000; Truck drivers/delivery services, \$25,000; and Management (including production marketing and business), \$60,000.⁸⁴

Case Study

Seven Stars Farm is an organic yogurt producer that was established in 1987. David and Edie Griffiths are the owners of the 350 acre farm located in Phoenixville, PA, which is west of Philadelphia. They have an 80 head cow herd and process about 1.25 million pounds of milk per year. In addition to processing the milk from their farm, they also purchase 100 percent of

⁸⁰ "Area dai_ry farm adds creamery and garden market" *The Delmarva Farmer*
http://www.pladotminidairy.com/page_sub.asp?topic_id=17&topic2_id=29

⁸¹ <http://www.pladotminidai_ry.com/>

⁸² <http://www.intrade.dk/default.aspx?pageid=48>

⁸³ Additional BLS Occupational Employment Statistics for Dai_ry Product Manufacturing can be found at http://www.bls.gov/oes/2008/may/naics4_311500.htm Also note, the Becker article has much lower employment cost estimates.

⁸⁴ Becker, K.M., R.L Parsons, J. Kolodlnsky, G.N. Matlrut. "A Cost and Returns Evaluation of Alternative Dai_ry Products to Determine Capital Investment and Operational Feasibility of a Small-Scale Dai_ry Processing Facility" *Journal of Dairy Science* 90(5) 2007: 2509

another farm's milk and as much milk as the need from several other farms in the area.⁸⁵ Seven Stars Farm makes between 175-200 quarts of yogurt per day, six days per week. The business has eight full-time employees and 4-6 part-time employees. At first, Seven Stars Farm processed about 200cwt of milk per day, it now processes approximately 1000cwt a day.⁸⁶ Five different flavors of yogurt are produced and sold in 32 oz. containers to most of the eastern United States. The farm also serves as a living laboratory for children who want to visit the farm and learn more about the yogurt making process.

Demand Drivers

To be sure, local farmers supply food to local residents and sell their product at regional markets. However, the rise in prominence of sustainable living practices, as seen in the press and popular culture, may signal the possibility that Floyd could turn their local efforts into something of a wider scope. Economists studying the effects of product differentiation in the U.S. fluid-milk market explain that due to health considerations, "... the number of fluid-milk product choices in U.S. supermarkets have expanded considerably in the last decade."⁸⁷ Varieties of milk range in fat content and specialty brands producing organic and lactose-free products have emerged. Further, as people become aware of the health and environmental benefits of consuming locally produced foods a "locally produced" niche is emerging.

It is important to understand that people with higher incomes and fewer mouths to feed are more likely to buy specialty milk products no matter the price changes. Further economists note that "... across the board increases in prices induce greater volume losses in higher priced milk types, such as organic and lactose-free specialty milks."⁸⁸ Low-income consumers and those with children tend to choose a milk product based on price.⁸⁹

Further Considerations

A dairy processing facility would take advantage of Floyd's current assets of cow grazing farmland and provide an alternate buyer of milk for the farmers in the county. It is a sustainable business option because the locally produced milk would be used to make a local value-added agriculture product. Nonetheless, there are some important considerations to be explored should an entrepreneur like to move forward, establishing a micro dairy. Although dairy processing does

⁸⁵ Brett, Terry. Marketing Specialist for Seven Stars Farm. Interview by Mel Jones. Unstructured Interview. Blacksburg, VA. 18 November 2009.

⁸⁶ *ibid*

⁸⁷ Lopez, Elena and Rigoberto A. Lopez. "Demand for Differentiated Milk Products: Implications for Price Competition." *Agribusiness*. 25, 4, 453-465.

⁸⁸ *ibid*

⁸⁹ *ibid*

not use an inordinate amount of water,⁹⁰ disposal or re-use of waste water and they are important to consider. Creative waste management should be investigated.

There would certainly be some product competition from local and national brands for a dairy processing facility producing value-added products. Although very little competition in the production of yogurt. Other small creameries and dairies in the area include Sterling Bridge Dairy in Willis, Meadow Creek Dairy in Galax, and Homestead Creamery in Wirtz. Only Homestead creamery produces a variety of dairy products that would compete with a processing facility in Floyd. Sterling Bridge Dairy produces only cheeses, beef and pork,⁹¹ Meadow Creek Dairy produces only cheese,⁹² while Homestead Creamery produces three core products: milk, butter and ice cream.⁹³ Also note that, in order to continually grow, a micro dairy will need to expand marketing ability beyond the local region. The milk from 70 cows is much more than can be sold locally⁹⁴. Selling beyond the local region will introduce further competition concern. As the distribution footprint of a micro dairy expands, strategic marketing techniques will become more and more important.

The commitment this processing facility would need to make to the farmers it would purchase milk from is another extremely important consideration for the future. Any processor must commit to buying a percentage of a farm's milk production. Generally this commitment is a two to three year contract. Since this contract must be honored, it is imperative that a processor have the production flexibility to respond to seasonal changes in supply. Milk production can increase by two percent in the spring.⁹⁵ If demand for fluid milk or yogurt does not increase at the same time, the processor must put that milk into products with a longer shelf life such as cheese and butter.

⁹⁰ Brett, Terry. Marketing Specialist for Seven Stars Farm. Interview by Mel Jones. Unstructured Interview. Blacksburg, VA. 18 November 2009.

⁹¹ Sterling Bridge Dairy Farm, LLC. "Our Products" <<http://www.sterlingbridgedairy.com/products.html>>

⁹² Meadow Creek Dairy. <http://meadowcreekdairy.com/JML/index.php?option=com_frontpage&Itemid=1>

⁹³ Medley, Kate. "Homestead Creamery." Whole Story, the official Whole Foods Market blog. November 2008. <<http://blog.wholefoodsmarket.com/2008/11/homestead-creamery/>>

⁹⁴ Brett, Terry. Marketing Specialist for Seven Stars Farm. Interview by Mel Jones. Unstructured Interview. Blacksburg, VA. 18 November 2009.

⁹⁵ *ibid*

Sustainable Living Education & Training Program

SustainFloyd could invest in a training center or program to provide a regional customer base with a range of "sustainable living" education and training opportunities, including a combination of agricultural, alternative energy, green building, or homesteading skills. In addition to the center's outreach potential, such a program would provide opportunities for locally-based experts in these fields to diversify their earnings by working as instructors. This idea emerged partially in response to interests and concerns expressed throughout the community.

There has been some discussion in developing training and education programs to encourage and support beginning farmers in the area as well as providing training for the local skilled workforce in green industries and trades. We also heard concerns about the need to diversify revenue streams for both the arts and tourism industries. While such a program may not be a major revenue generator for the community, it would serve to strengthen linkages across the community and reinforce the cultural brand of Floyd as a sustainable community. The actual form such a program or center could take is widely variable, ranging from half-day workshops offered in conjunction with local partners to multi-week immersion courses.

A Match to Sustainability

The concept of a 'sustainable living' education and training program was developed as a means of attending to the interests and concerns raised by members of SustainFloyd and the broader community, with the criteria for sustainability in mind. One of the most valuable assets in Floyd County is the range of skills and talents among its residents which include a vibrant agricultural community, a notable homesteading and "back-to-land" faction, and a collection of skilled trades and craftsmen working in traditional and nontraditional livelihoods. This program would allow these skilled residents to diversify their incomes, working as course or workshop instructors. It would also create additional opportunities for administrative positions, and attract an additional stream of customers to the existing tourism industry. Moreover, if such a program were to emphasize workforce training and 'green collar' skill development, it could, in time, encourage new business development in the growing alternative energy sector.

An education and training program or center that capitalizes on the existing talents and skills within the community would provide a hub to build and strengthen connections between businesses, social institutions, and organizations within the community, as well as to provide a bridge from the community to the broader region. Further, the existence of such a program would serve as a focal point for building the cultural identity of Floyd as a sustainable community, which would also strengthen inter-community linkages.

In our initial interactions with SustainFloyd, two main concerns were raised with regards the resiliency of Floyd County - food security and energy independence. In addition, there were concerns about the out-migration of young people, the declining farmer population, and the lack of opportunity for reinvestment within the community. All of these issues impact the strength of the local economy. A 'sustainable living' training and education program would address each of these issues to varying degrees. Training could be offered for future farmers, and/ or on alternative energy production and energy efficiency adaptations, which would provide the community with tools to address food and energy security, as well as developing innovative opportunities for young people within the community. It could also potentially serve as an informal business incubator, creating opportunities for local investment.

Beyond the employment benefits, such a program could bring to the community, an education and training program that provides people with the skills and knowledge necessary to live more sustainably, directly addressing the sustainability criteria, as well as the mission of SustainFloyd.

Inputs

The inputs for an education or training program would initially be limited to the skills and talents of individuals providing the instruction and training, a facility, and necessary equipment for training. None of these elements would necessarily need to be full-time or permanently owned and operated. Depending on the structure of a program or center, workshops could be hosted by community partners or businesses, using their spaces and facilities

Compatibility with Assets

The Jacksonville Center for the Arts would be a significant asset for a Sustainability education and training program. This program could easily be offered as a complement to the activities and programs hosted through the Jacksonville Center, potentially even supplementing their revenue streams to recompense their substantial operating costs. As mentioned above, the skills and talents found in Floyd would also be a valuable asset for this program. Further, the cultural identity and enthusiasm among different pockets of the community for alternative and sustainable living practices would contribute to the success of such a program.

Case Studies

There are a number of different programs and centers focusing on various aspects of sustainability training and education that might be useful to consider in determining what is appropriate for Floyd. Four different programs are profiled here to demonstrate the range of possibilities and scale of operations that currently operate in the US. It is also useful to consider what could be easily integrated into existing community programs or institutions, such as the Jacksonville Center, or even into the activities of SustainFloyd. All of the programs profiled below maintain a primary programmatic focus, but offer programs and workshops on a range of topics outside of that focal area. The idea here would be to offer a range of programs compatible with the skills and talents found in Floyd.

Angelic Organic Learning Center⁹⁶

Located outside of Chicago, Angelic Organic Learning Center is a multifaceted organization serving both producers and consumers in the region in an effort to build a strong local food system. Operated as a 501(c)(3) organization, there are three main elements to this program: the *On-Farm Initiative* that provides hands-on learning opportunities for individuals, groups, and children at the farm; the *Farmer Training Initiative* which provides training, business assistance, and mentoring for the next generation of sustainable farmers; and an *Urban Initiative* that works with urban communities to establish community gardens and build linkages to surrounding farms and local food sources. The organization also operates a community supported agriculture (CSA) operation from their organic certified farm for the surrounding area.

The programming offered through the On-Farm and Farmer Training Initiatives might be of potential interest to SustainFloyd. The On-Farm programming, in addition to tours and school field trips, mostly entails half-day to full-day workshops on a variety of farming and homesteading skills, targeted at both adults and children. These workshops cover a wide-range of topics, from chicken tending to green building techniques. The tuition charged for these workshops ranges from about \$40-60 for half-day adult workshops, \$10 per person for childrens workshops, and \$100-110 per day for full-day and weekend workshops.

The Farmer Training Initiative is a potential model for farmer training programming. Angelic Organic provides a suite of services to beginning farmers, including coordinating mentorships with experienced farmers around the region through the Collaborative Regional Alliance for Farmer Training (CRAFT) program, facilitating a business planning training series through the Stateline Farm Beginnings® program, as well as working with urban farmers to develop marketable goods through their Growing for Market Project. Serving as a local facilitator for these initiatives, as well as hosting workshops and meetings at their facility,

⁹⁶ Angelic Organics Learning Center <www.learngrowconnect.org>

Angelic Organic is able to provide these services both to aspiring farmers as well as surrounding farms without assuming the full costs of maintaining the farm and training program.

Operating as a nonprofit organization, the majority of Angelic Organic's revenues comes from grants and charitable donations. In 2007, their revenues were \$609K, with operating expenses close to \$612K. According to their 2007 annual report and 2009-2013 strategic plan, the organization is looking to expand their programming to meet demand. The Farmer Training programs have had waiting lists each year for the last three years, suggesting there is demand for those service, at least in the Chicago region. The organization estimates they reach about 4,000 people annually with their programs and services.

Solar Living Institute⁹⁷

The Solar Living Institute was established as a nonprofit spin-off from the Real Goods Trading Company based in Hopland, California to provide a range of educational and training options for sustainable living. The organization's headquarters, the Solar Living Center is a 12-acre renewable energy and sustainable living demonstration site for renewable energy technology and techniques, alternative fuels, green building, permaculture, and other sustainable living technologies. The site offers tours and demonstrations to over 200,000 people annually. While the Institute offers workshops and trainings on a broad range of topics, its main emphasis is on alternative energy technologies, particularly photovoltaic solar energy production. With parallel hands-on and online courses, and working in conjunction with trade associations and workforce training programs in the Bay area, the Solar Living Institute offers a sequence of courses that qualify participants to become certified by the North American Board of Certified Energy Practitioners (NABCEP). The Institute also works with local urban areas to retrain the green collar workforce. In addition to solar technology, the Institute offers programs in green building, energy efficient retrofitting, biofuel production, among others.

Tuition for general workshops is similar to comparable programs, with half-day courses falling in the \$40-60 range. The more technologically intensive solar courses are often multi-day courses, generally 2-5 days, with tuition ranging from \$140-200 per day including materials. Instructors are often hired on contract from around the region and bring to the Institute a rich background and understanding of the technologies.

The Solar Living Institute is operated as a 501(c)(3) organization separate from its parent company the Real Goods Trading Company. There was no response to requests for specific enrollment or financial information from the organization.

⁹⁷ Solar Living Institute. <www.solarliving.org>

Asheville Institute - project of Kleiwerks International⁹⁸

The Asheville Institute is a project of Kleiwerks International, an international organization that promotes ecological regeneration and empowers communities through hands-on natural building and sustainability education programs based in Asheville, NC. The Asheville Institute's urban education center and living laboratory is also located in Asheville, North Carolina and offers a range of programs to the surrounding region. This organization and set of programs appears to be the closest potential competitor to Floyd, though the assortment of program offerings or an emphasis on a particular area would differentiate a program in Floyd significantly. It appears that Kleiwerks is also interested in expanding their network both in the US and abroad, so partnership opportunities may be possible.

The main focus for Kleiwerks International is natural building techniques - timber framing, cob building, earthen plasters and paints, etc. These techniques are taught in multi-day workshops, usually 2-6 days with a flat \$100 per day fee structure including materials. Their US-focused Asheville Institute offers an additional urban homesteading track with 1-2 day workshops in beekeeping, foraging and fermenting, residential retrofitting, and other more backyard-scale skills and techniques. The Asheville Institute also offers a permaculture design certification course that is structured in a six-weekend sequence.

Until 2006, Kleiwerks International, the parent organization that funds the Asheville Institute, was totally volunteer-based, with the costs of workshops supported through tuition and fees. In 2007, the organization reached capacity for what it could support on tuition and fees alone and started seeking external funding. As a 501(c)(3) organization early in its development stages, they are focusing right now on individual giving and local sponsorship, with an annual operating bud.

Center for Essential Education - School of Homesteading⁹⁹

A different model for sustainable living education and training is the Center for Essential Education's School of Homesteading in Elm Mott, Texas. One segment of a much larger set of programs and offerings, the School of Homesteading is part of the Traditional Crafts Village at Brazos de Dios, a 510-acre homesteading community that offers visitors an opportunity to take classes, watch crafting demonstrations, and to purchase food and crafts produced on site. The School of Homesteading offers a wide range of workshops falling into a few broad categories including agricultural skills, fabric and clothing crafts, kitchen skills, and traditional workshop crafts.

⁹⁸ Asheville Institute. <www.asheville.org>

⁹⁹ Center for Essential Education School for Homesteading <<http://www.homesteadheritage-homesteading.com/>>

What sets this model apart is their integrated business model, offering classes and workshops in conjunction with a number of revenue-generating enterprises including a blacksmith shop, pottery shop, woodworking shop, retail gift and craft store, deli, bakery, and gristmill, which I imagine supplements at least partially the cost for workshops. The organization that operates the facility and programming is a religious organization, which created challenges for getting specific financial information.

Input Costs

Though anticipated costs and revenues would clearly depend on the choice of structure or program offerings, it was possible to glean some general figures based on averages from the programs we explored. Revenue from such a program would largely come from the tuition and fees charged to students. Fees are charged to cover material costs, so this figure is completely dependent on the nature of the workshop or training. Tuition rates did vary, but generally fell in the \$25-50 for half-day sessions, \$60-\$100 for full-day sessions, and \$100 per day for multi-day trainings. Immersion courses that lasted several weeks, months, and even a year were less systematic in their tuition rate structure.

Costs would be associated with administration costs, the potential purchase of a facility and its operating expenses, and compensating instructors. One possible arrangement to minimize these first two costs would be to integrate this program with the current operations at the Jacksonville Center for the Arts. This organization is already an established hub for the artisan network in the community, but with 5.5 acres of land and several buildings being renovated, its operating costs exceed its revenues (at least at this point). The center offers a range of artisan-focused workshops and trainings with a residential facility for students. Integrating a sustainable living training program would be a natural complement to the programs already offered through the center, would strengthen the center's connections to the community, and would reduce the barriers to implementation for the new program.

With regards to the costs of compensating instructors, from a general review of other programs that offer the sorts of workshops we are calling 'sustainable living', it seems compensation rates depend on the level of expertise the trainer brings to the program (and hence the level of the course). In general, these rates ranged from \$50-75 per hour, with LEED certified trainers providing the example for the higher end. If a program is offered in conjunction with a university or community college, there may be costs associated with that as well.

Demand Drivers

The demand for such a program will come from several factors. The rising saliency of 'green living' and the need to reduce our ecological footprints will clearly have impacts on the interest in programs providing education and training on technologies, strategies, and best practices to achieve these goals. It is also possible that over time, as the urgency for reducing carbon emissions and improving energy independence increases, tax incentives will emerge for people to enhance these skills. At a workforce training scale, the increased emphasis and funding made available for building the green collar workforce is creating a space for programs that can train and retrain the labor force in the US. Finally, even just the fast growth of membership of SustainFloyd in the year since its establishment suggests there is interest in learning how to live more sustainably. A program such as this could respond to that demand.

Further Considerations

Three main issues emerged in researching and considering the possibility of a sustainable living education and training program in Floyd, which may have significant implications for how such a program would be implemented and what direction it would take. These main issues were the uniqueness of program offerings, the target audience, and the proposed farm center which emerged from the Rocky Knob tourism exploratory project.

The uniqueness of program offerings has to do with the potential competitive advantage of such a program offered in Floyd. There are currently workshops and trainings held in the region that could qualify as training people in 'sustainable living' techniques. For example, there are rain barrel construction workshops offered in Blacksburg, the local cooperative extension office offers a variety of short educational programs, and the Jacksonville Center offers an array of arts trainings opportunities on-site. A successful sustainable living training and education program in Floyd will need to offer a unique set of trainings that distinguishes itself from these other programs, but would ideally complement and not directly compete. The goal would be to possibly appeal to some of the same audience, while broadening the scope of audience.

This leads to the second issue, which is identifying and targeting the appropriate audience for the programming choices. One way of distinguishing audience is through differentiating between vocational training and avocational programming. Vocational in this sense is more aligned with workforce training, while avocational is more geared towards providing opportunities for personal enrichment. Though they would not necessarily need to be mutually exclusive, these two foci could provide very different opportunities and outcomes. An emphasis on vocational training could create opportunities to train a green workforce for Floyd and the broader New River Valley for such industries as alternative energy installation and efficiency retrofitting, sustainable agricultural production, green and natural building, among others. It could potentially also create an opportunity for business expansion and development.

Avocational programming on the other hand would enhance the cultural identity of Floyd and bring additional tourist streams to the community to support the existing tourism-based infrastructure without necessitating community growth.

The final consideration which emerged in researching such a program was the need to be cognizant of the proposals that emerged from the recently released Rocky Knob Sustainable Tourism Project, one of which was the Miller's Way Farm Life Visitor Center and Trail. The proposal for this project would be a facility that would offer workshops and educational programming on agrarian living and skills to tourists from around the region. If Floyd chose to pursue an avocational programming track in agricultural skills, it would be prudent to communicate with the coordinators of this project to ensure they aren't duplicating or competing directly. Likewise, there would be great opportunity to create coordinating or complementary programs.

Conclusion

This report identified four potential business opportunities for Floyd County: a micro dairy, a wood pellet manufacturer, a flooring and countertop manufacturer, and a sustainable living training/education center. The project's primary goal was to identify business opportunities to promote SustainFloyd's priorities and mission. The Virginia Tech team codified four priorities of SustainFloyd: 1) keeping people employed in Floyd County, 2) maximizing linkages within Floyd County, 3) enhancing the county's independent economy, and 4) "Meeting the needs of the present without compromising the ability of future generations to meet their needs"¹⁰⁰. These priorities along with resources available in Floyd County became the criteria by which the team chose the business opportunities reported here. This project interprets Floyd's resources as more than physical, financial and human capital, paying special attention to intangible assets in the county. A unique Floyd "brand" and local entrepreneurs' application of sustainability concepts are particularly important among those assets.

The Floyd brand or flavor is the result of several factors. The influx of "Back-to-the-Landers" beginning several decades ago has combined with Floyd's heritage to produce a community with a unique mix of agriculture, art, music, and the broad, powerful movement of sustainability. Goods produced in Floyd, and events like FloydFest and Floyd Fandango, serve to promote the unofficial Floyd brand even beyond Virginia's borders. Creating and marketing an official Floyd brand should be given substantial consideration in the future. Each of the suggested business opportunities would benefit from and bolster such a branding campaign.

Sustainability is a major component of the Floyd brand. Floyd has organic farmers, composters, alternative energy and home retrofitting, alternative housing options, a farming collaborative, and many other sustainable businesses. These enterprises demonstrate the social acceptance of sustainability in Floyd and also prove that this type of business can be economically viable. The realization of any one of the businesses suggested in this paper would contribute to the county's sustainable living economy.

The scale of the business enterprises was a major factor in determining feasible business opportunities since water restrictions and traffic concerns limit the size of any new business. The county's position atop a high plateau at the eastern continental divide prevents stream flow into the county, constraining water availability. Route 8 is heavily used by citizens, visitors and industry. It extends through the center of the county connecting with Interstate 81 and Highway 58. There are many steep curves and narrow areas along the route. These conditions raise concerns about the capacity of Route 8 to support an increase in trucking and whether an increase in trucking would have an adverse impact on Floyd's environment.

To address these constraints and to promote sustainability, the four businesses suggested as a result of this project are scalable. That is, these businesses can start out small and grow to meet an expanding demand sustainably. Scalability contributes to the sustainability of each

¹⁰⁰ United Nations Bruntland Commission 1987

business opportunity since it allows the business to meet present demand with an appropriate operating scale while leaving the potential to grow or downsize depending on market conditions. Additionally, the studio favored scalable businesses because of the open-ended parameters we were given regarding potential investment. The businesses require relatively small initial investments and given minor investments over time can be have a range of production capacity.

Each of the opportunities presented here needs to be explored further. We have provided an explanation of each opportunity and an initial outline of the requirements for its realization. While some key questions remain for further study, for example related to energy costs and capital access, these and other points should be taken up in detail in business plans that would be a logical next step for SustainFloyd in moving forward with this project.

Appendix 1: Asset Map Template

What is it?			
Industry	Sector	Growing or Declining?	resources

What it needs						
Component Operations	Type of Labor		How many people?	Logistics/Infrastructure		Does Floyd have most/Do most need to be imported?
	Needs	Floyd?		Needs	Floyd?	

Who wants it		
Type of Consumer	Projected Market Size	Where is the market?

Economic Impact			
Jobs	Taxbase	Revenue	Risk

Social Impact		
Job Creation	Talent	Equity

Political Impact			
NIMBY	Risk	Political Agenda	Implementation Resources

Appendix 2: Floyd Businesses grouped in "Sustainable Living" clusters

Sustainable Living Choices in Floyd

How can Floyd leverage the culture it has established for itself to create opportunities for those being marginalized by the transitioning demographics? What opportunities are there for Floyd to increase and strengthen the 'sustainable living' economy and culture that it has already established? To answer these questions we identified Floyd County businesses that are a part of the 'sustainable living' economy and grouped them into industry clusters.

Building & Home Construction

- **Blue Ridge Yurts** - <http://ljwww.blueridgeyurts.com/>
 - o Company founded by local organic Christmas tree farmer (wood supply & skill) and a local leather & fiber crafter who also makes motorcycle bags
 - o Custom crafted
 - o Shipping is responsibility of customer or pick-up available
Crating fee additional
- **Dreaming Creek Timber Frame** - <http://www.dreamingcreek.com/index.htm>
 - o Design & beamery located in Floyd
Beamery is the physical processing of beams
- **Streamline Timberworks** - http://ljwww.streamlinetimberworks.com/the_buzz.html
 - o Design office in Floyd
- **Direct Connect Solar & Electric** - <http://ljwww.directconnectsolar.com/>
 - o Residential & Commercial installation and retrofit of small-scale alternative energy systems
 - o Conducts energy audits
- **Ancient Hills Cottage Builders** -
 - o Private contractors to build green buildings
 - o Consulted on straw bale office at Jacksonville Center
- **Builderscrete** - <http://ljwww.builderscrete.com/>
 - o Low impact construction brick product
- **DesignWorks** - <http://www.designworksconstruction.com/>
 - o Green architecture firm

Interior Design & Products

- **Icove Lighting** - <http://www.icovelighting.com/>
 - o Lamps & fixtures crafted from recycled materials

Natural Resources-based Businesses (beyond agriculture)

- **RidgeRunner Forestry**- <http://www.ridgerunnerforestry.com/>
 - o Private forest management - timber, wildlife, etc
- **Greenwoods Inc** - <http://www.greenwoodsinc.com/>
 - o Private forest management - timber, wildlife, etc

Agriculture

- **Production**
 - **Sweet Providence Farm** - <http://www.sweetprovidencefarm.com/2.html>
 - Diversified production
 - Beef & poultry
 - Value-added production: pies, cider, etc
 - **Five Penny Farm** - <http://fivepennyfarm.com/>
 - Certified organic
 - Also run Shooting Creek Brewery
 - **Brush Creek Buffalo Farm & Store** - <http://www.bcbuffalostore.com/home>
 - Located in Riner - domesticated buffalo herd
 - Organically raised (not certified?)
 - **Faith Mountain Farm** - <http://www.faithmountainfarm.com/>
 - Goat products- meat, dairy, and soaps/lotions
 - **Waterbear Mountain Organic Farm** - <http://www.waterbearfarm.com/csa.htm>
 - Organic vegetables
 - **CSA**
 - Internship program
 - **Atlantic Breeze Alpaca** - <http://www.atlanticbreezealpaca.com/>
 - Alpacas & alpaca fiber products
- **Services & Supplies**
 - **Seven Springs Farm** - <http://www.7springsfarm.com/>
 - organic farm & gardening products; apprenticeship program
 - **Harvest Moon** - retail outlet for local producers
 - **Good Food Good People** - aggregated CSA program and delivery system

Food

- **Blue Ridge chapter of Slow Food** (based out of Floyd)
 - <http://www.slowfoodblueridge.org/>
- **Blue Mountain Organics** - <http://www.bluemountainorganics.com/>
 - Organic processor & wholesaler
 - Direct sales (web-based) &
- **Brush Creek Buffalo Farm & Store** - <http://www.bcbuffalostore.com/home>
 - Store sells processed buffalo cuts & specialty products
- **Harvest Moon** - <http://harvestmoonfoods.com/default.htm>
 - Retail outlet for locally produced foods & wines
- **CSAs** (Community Supported Agriculture - subscription based)
 - **Seven Springs**
 - **Good Food Good People**- (cooperatively run)
 - **Waterbear Mountain Organic Farm** - <http://www.waterbearfarm.com/csa.htm>
- **WINERY & BREWERY**
 - **Blacksnake Meadery** - www.blacksnakemead.com
 - **Chateau Morrisette** - www.chateaumorrisette.com
 - **Villa Appalaccia** - www.villaappalaccia.com
 - **Shooting Creek Farm Brewery** - www.shootingcreekbrewery.com
 - **Foggy Ridge Cider** - www.foggyridgecider.com

- Technically in Carroll County

Lifestyle

- **Homesteading** (deliberate attempt to live off of the land with minimal dependence on external resources)
 - o **Floyd County in View** - <http://www.floydcountyinview.com/mainpage2.htm1>
 - There appears to be a vibrant homesteading community
- **Sustainable Living**
 - o **Dancing Green** (affiliated with Gaia University) <http://www.sustainableagriculture.org/>
 - Commitment & education of permaculture, sustainable agriculture, etc
- **Spiritual**
 - o **Rev. Katherine Chantel** - Life Ceremonies <http://www.lifeceremoniesbykatherine.com/>
 - o **Karen Osborne** - Multi-Faith Minister- <http://www.ceremoniesforall.com/>
 - o **Miracle Farm B&B** - <http://www.miraclefarmbnb.com/>
 - Also serves as animal sanctuary and spiritual retreat center
 - o **Serenity Studio** - <http://www.serenitysymmetry.com/>
 - Yoga & pilates studio
 - o **Living Light** - <http://www.livinglightinfloyd.com/>
 - Center for awareness & relaxation
- **Education**
 - o **Blue Mountain School** – <http://www.bluemountainschool.net/>
 - Non-traditional education for primary grades

Business & Commerce

- **The Village Green** - <http://www.villagegreenoffloyd.com/>
 - o Reclaimed & renovated grocery store - renovated as office space

Tourism

- **LODGING**
 - **Hotel Floyd** - <http://www.hotelfloyd.com/>
 - o LEED certified hotel
 - **Miracle Farm B&B** - <http://www.miraclefarmbnb.com/>
 - Also serves as animal sanctuary and spiritual retreat center
- **ATTRACTIONS**
 - o **The Crooked Road**- musical heritage trail
 - Floyd Country Store
 - o **Jacksonville Center for the Arts** - <http://jacksonvillecenter.org/>
 - Residential arts program
- **EVENTS:**
 - o FloydFest
 - o Wine Down the Trail
 - o Friday Night Jamboree

Retail

- **Green Label Organics** - <http://www.greenlabel.com/>
 - o Organic cotton & environmentally friendly production process
 - o Regional retailers; ship direct orders
- **Harvest Moon** - <http://harvestmoonfoods.com/default.htm>
 - o Retailer of local foods & wines
 - o "Follows the Slow Food vision"
 - o Over the Moon is adjoining gallery for local artists
- **Winter Sun** - <http://www.wintersuninc.net/>
 - o Handcrafted clothes & crafts
 - o Commitment to social corporate responsibility

Arts & Culture

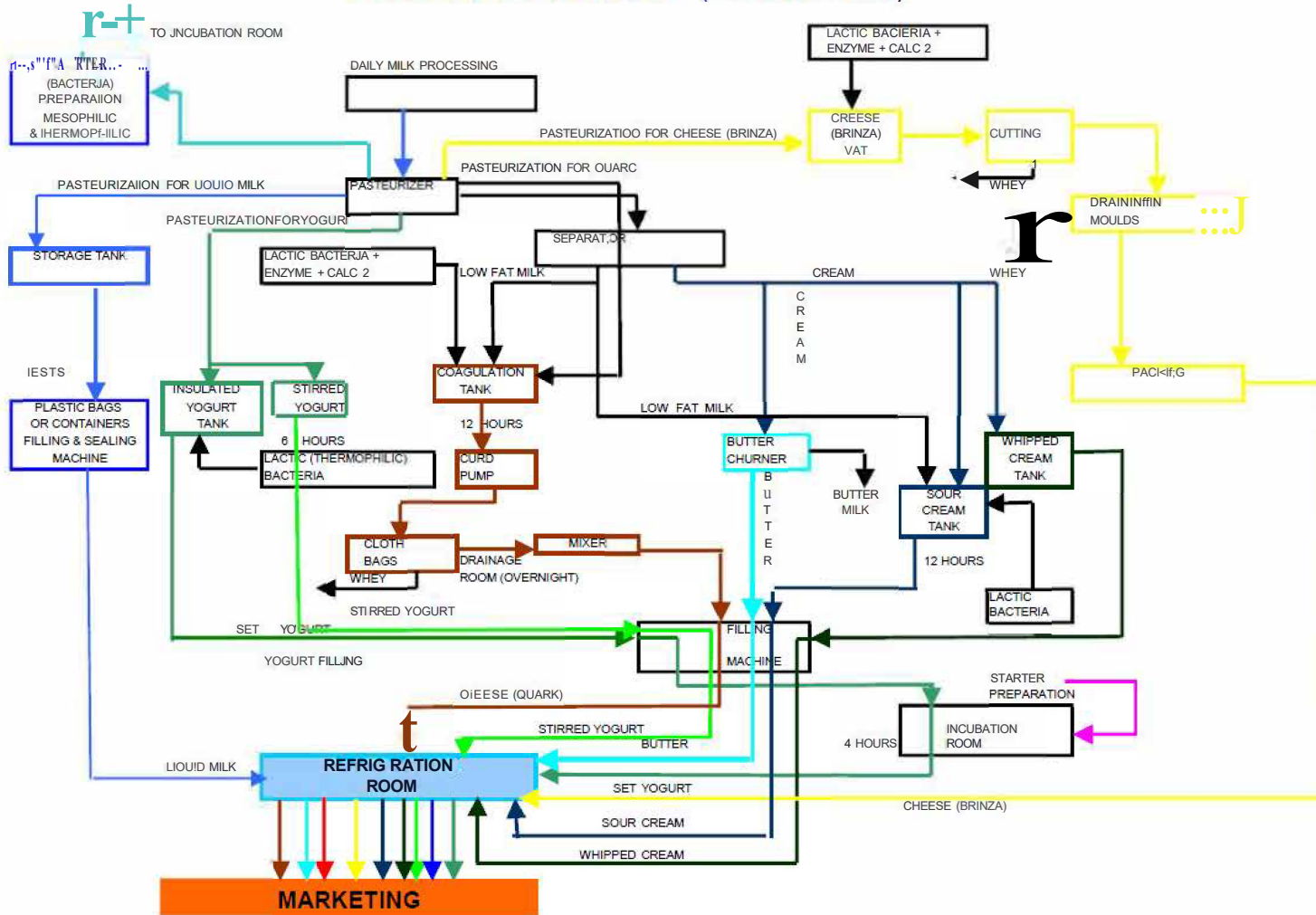
- **Crooked Road**- state musical heritage campaign
 - o *Floyd Country Store*- <http://www.floydcountystore.com/>
 - Campaign economic impact - http://www2.tricitie.com/tri/news/local/article/study_reveals_crooked_road_success/17484/
- **Jacksonville Center for the Arts** - <http://jacksonvillecenter.org/>
 - o Provides space, support, and training for artisans & craftsmen
- **June Bug Center** - <http://www.junebugcenter.org/>
 - o Performance art organization
- **Across the Way Productions** - <http://www.atwproductions.com/>
 - o Event production
 - o Floydfest, Floyd Fandango, etc
- **Sun Music Hall** - <http://www.sunmusichall.com/>
 - o Local dance performance
 - o Music performances
 - o Workshops

Local Craftsmanship

- **Woodwork**
 - o **Phoenix Hardwoods** - <http://www.phoenix-hardwoods.com/>
 - Local woods
 - Custom crafted furniture & railings
 - o **St. Pierre Woodworking**- <http://www.stpierrewoodworking.com/>
 - Crafter of fine furniture
 - Also offers woodworking courses
- **Pottery**
 - o **16-Hands** - <http://www.16hands.com/>
 - Potters alliance & tour

Appendix 3: Micro Dairy Production Process and Equipment

PLADOT MINI DAIRY (FLOW DIAGRAM)



PLADOT