FARMING FUELS:
SEARCHING FOR RURAL REVITALIZATION IN
AN AGRICULTURAL BIOECONOMY

A Dissertation in
Rural Sociology

by
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Energy supply issues have become increasingly salient in the current political, economic, and environmental climate. At the same time, the decline of rural America, evidenced by aging farmers, rural outmigration, and weakened local economies, remains a concern. Production of perennial agricultural feedstocks (such as switchgrass) for bioenergy has been framed as a way to achieve needed energy supplies, with possible contributions to rural revitalization and environmental protection. However, most national policy and programmatic discourse focuses more on where biomass crops might be grown than on who will produce them or their concerns about such development. Guided by ethical framings of agriculture and its relationship to the public good, this dissertation draws on documentary evidence and qualitative field research to examine social understandings of the potential impacts of agricultural bioenergy development in rural America. Research questions address 1) the concerns and interests of actual local agricultural bioenergy project participants; 2) the links between local legacy and project participants’ expectations and experiences of bioeconomy development; 3) the correspondences and divergences between project participants’ views about bioeconomy development and more macro-scale visions and recommendations of policymakers and other less local bioeconomy actors. An analysis of recent international, national, and state-specific policies and trends provides context for the field-based interviews with participants (local farmers and facilitators) of two current switchgrass-for-bioenergy projects – one in southern Iowa and the other in northeastern Kentucky. Situating the field research within this contextual narrative highlights how agrarian and industrial models of bioeconomy development are seen to create different tradeoffs across discrete scales. It also illuminates how more macro-scale plans and policies largely neglect the concerns and interests of rural stakeholders. Project participants’ understandings of the process and implications of agricultural bioeconomy development are shaped by local legacies derived from the biophysical characteristics of their regions, the socio-economic circumstances facing their communities, and the inherited social history associated with being a rural resident in that region. While legacy effects help to interpret some differences in participants’ perceptions across the Iowa and Kentucky cases, project participants in both regions generally express desire for a model of bioenergy production that supports rural revitalization and is locally-initiated, -integrated, and -controlled. Contributions of this research include its detailed accounting of how actors socially construct the trade-offs associated with agricultural resource development. Given the premise that democratic deliberation is an essential component of the public good, the actor-centered approach in this research suggests that rural stakeholders should have a greater voice in bioeconomy planning and development. Based on the findings of this research, macro-scale policy discourses on the bioeconomy should prioritize rural revitalization as much as energy security. Policy discourses should also recognize and incorporate micro-scale concerns of farmers and other rural stakeholders, which offer valuable insights for sustainable bioeconomy development in specific places.
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Chapter One: INTRODUCTION

The initial optimism of stakeholders in and observers of bioeconomy development has recently taken on a more critical, qualified tone. Concerns about the environmental impacts of land-use change, about the social costs related to increased demand for corn, and about the distribution of economic risks and benefits have become more widespread. The term “bioeconomy” is used by various global actors, from the United Nations to the transnational energy company BP, and by many academic institutions. It refers to an economy revolving around the production of materials, chemicals, and energy (for heat, electricity, and transportation fuels) from biomass (such as various crops and trees) made possible by innovations in the biosciences (Brown 2003). The greatest potential is seen, not in the corn grain ethanol of today, but in the multiple products which may be extracted from the grass- and woody biomass-based cellulose of tomorrow. At present, the main components of the bioeconomy are biodiesel (usually from soy), methane sequestration, co-firing biomass (wood, paper, and agricultural waste) for electric generation, and ethanol production (usually from corn grain). In the U.S., ethanol derived from corn grain has been the dominant focus in the biofuels economy, and is generally characterized by significant economies of scale (Milder et al. 2008).

Researchers, investors and observers, however, articulate growing consensus that the high inputs required for conventional corn production and the relatively low energy conversion efficiency of corn ethanol necessitates an eventual transition to lignocellulosic ethanol (Schubert 2006). The negative environmental impacts of increased corn ethanol production also provide impetus for a transition to lignocellulosic feedstocks for biofuels. According to a report published by the World Resources Institute (Marshall and
Greenhalgh 2006, 5.), “given current grain-based ethanol technology and in the absence of policy intervention [reduced emissions and other benefits] will come at a cost to our nation’s water and soil health (5).”

Lignocellulosic ethanol (often called the “next-generation” biofuel) can be produced from any cellulosic feedstock, such as corn stover, other crop residues, fast-growing trees, and a variety of grasses are potential inputs for the process. Switchgrass (*Panicum virgatum*), a widely adapted perennial grass often grown on marginal lands, is one promising biomass feedstock that is being intensively researched nationwide and beyond for use in producing lignocellulosic ethanol (Duffy and Nanhou 2003). The term “bioeconomy” is often used with this tacit connotation – it refers most accurately to the potential future of a high-tech, large-scale energy economy in which cellulosic ethanol plays a dominant role.

This dissertation is based on empirical fieldwork conducted with the participants of two switchgrass projects oriented to this emerging bioeconomy – one in southern Iowa and the other in northeastern Kentucky. The switchgrass harvested under these projects is at present co-fired with coal in regional electric power plants, but long-term visions see it as feedstock in cellulosic ethanol biorefineries expected to come on line in the future. For this dissertation, I employ the term “bioenergy” as an umbrella label which encompasses all biomass-based energy projects – including electricity (biopower), heat (such as pelletizing feedstocks for woodstoves), and transportation fuels. This term includes multiple evolving visions of bioeconomy development, both simpler and based on longstanding technologies, as well as highly advanced, new technologies. The actor-centered focus of the research, however, prioritizes agricultural and locally-achievable
ways of adding value to biomass. The participants of these switchgrass projects include mostly farmers, but also project coordinators and facilitators. These rural stakeholders harbor hopes and concerns about the potential impacts of the burgeoning bioenergy industry on their communities.

One reason for hope is based on the framing of arguments for a bioeconomy, which include economic development (often specified as agricultural or rural), energy independence, and environmental improvement. For example, the United States’ Department of Energy Research Roadmap (2006) states: “Fuels derived from cellulosic biomass… can dramatically impact national economic growth, national energy security, and environmental goals.” David Morris (2006a), consultant or adviser to the Department of Energy for Presidents Ford, Carter, Clinton, and George W. Bush, prioritizes the benefits of bioenergy for agriculture and rural economic development over that of energy independence. For example, he explains “any initiative to aggressively increase the production of biochemicals and biofuels should be viewed as an agricultural strategy with energy-security implications. This is the opposite of the way policy makers currently approach the biomass issue. To them, expanding bioenergy is an energy-security strategy with agricultural implications” (Morris 2006b).

The claims of bioenergy’s potential economic, environmental, and geopolitical contributions, however, can seem empty when contextualized by the increasing availability of empirical information about American corn ethanol’s looming economic problems due to the rising price of corn (Krauss 2007), environmental constraints (Jordon and Powell 2006), and social/humanitarian concerns (Altieri and Bravo 2007; Song
In large part, these obstacles were anticipated as the growing pains of corn grain ethanol, and most biofuels proponents look to the potential for a cellulose-based bioeconomy (using biomass from grasses and trees) as a way to move beyond them. In addition, the use of biomass for a diversified bioeconomy with a slate of end uses (including co-firing for electricity generation and pelletizing or making briquettes for home heat, in addition to biofuels and biochemical production) is seen as having promise for rural economic development (Milder et al. 2008). The potential for the creation of nonexcludable public goods like rural revitalization strengthens the incentive to aggressively develop an agricultural bioenergy industry. But there is a lack of evidence for biofuels’ (especially corn grain ethanol’s) current positive contributions to improvements in rural development, energy independence and carbon emissions, which will be further discussed in Chapter Two. Therefore, questions remain about the extent to which a responsibility to the public good (some negotiated ideal combination of public and private goods) can be met through advocacy for bioenergy.

Bioenergy development occurs in human communities that are couched in the natural environment; therefore the impacts on both human and non-human environments must be addressed. This dissertation makes the argument that the role and concerns of actual and potential feedstock suppliers have been largely overlooked. David Morris (2006c) sees bioenergy as a local socio-economic puzzle. He explains that bioenergy is different from other renewable energy sources in that “the wind blows and the sun shines whether we like it or not. That allows us to design policies and focus resources on developing technologies that harness wind and sunshine. Plant matter, on the other hand,
will be available in sufficient quantities only if farmers choose to cultivate and harvest it. Therefore, biomass policies need to focus not only on improving the conversion of crops to fuels but also on persuading farmers to cultivate the crops” (2006c, 2). While this is a welcome insight, I argue that rather than persuasion to participate, the first priority should be involving farmers in the visioning process. This position provides the impetus for this study, which seeks to identify and interpret the ideas and concerns of farmers and rural residents about the appropriate goals and strategies for bioenergy development that contributes to the public good.

This dissertation research delves into the black box which is the “sustainability of human and natural communities [which] should direct the research and policy that design the new bioeconomy” (Herndl et al. 2006) and seeks to answer the following questions: (1) What are the chief concerns and interests about agricultural bioeconomy development articulated by agricultural bioenergy project participants? (2) How do project participants’ expectations, experiences, and concerns about bioeconomy development merge and diverge based on legacy? (3) How do project participants’ expectations, experiences, and concerns about bioeconomy development reflect and contest the visions and recommendations of policymakers and other less local bioeconomy actors? The justification for these questions will be more fully developed in the following chapters, but suffice it to say for now that the overarching goal of this dissertation is to enrich the discourse about bioeconomy benefits and concerns by including the voices of rural stakeholders.

In Chapter Two, I present an analytical narrative of international, national, and state policies, developments, and trends. This context both situates the specific research
topic in the broader milieu of bioeconomy development and serves an analytical role. In sketching out macro-level discourse, it provides both backdrop and counterpoint to fieldwork conducted with rural stakeholders of the bioeconomy. The comparison allows for a more pointed look at variation across scales in terms of preferred models and agents in bioeconomy development, and in how tradeoffs across sector, scale, and time period are assessed.

In Chapter Three, I develop the conceptual framework that guides this dissertation, beginning with the social and ethical framing of the bioeconomy. Agriculture can be represented as a potential producer of a range of public goods. I am interested to see how bioenergy proponents prioritize preferred benefits, and based on that framing, whether they advocate for a certain model as most likely to achieve said benefits. I draw from Thompson’s (1995, 2007) categorization of agricultural models as industrial or agrarian, with each model being more likely to produce a different set of public (and private) goods. I consider both ecological modernization and multifunctional approaches, looking into what benefits, models, and agents are presented, and how tradeoffs are accounted for and assessed in each of these approaches. In the latter part of Chapter Three, I introduce the concept of legacy, which I use to help interpret participants’ regionally-grounded perspectives, and I explain my justification for the term. Here I incorporate theoretical approaches to human-environment interaction, agrarian transition, and farmer roles and perspectives to develop and elaborate a concept of legacy that takes into account both regional specificity and broader contextual influences on rural stakeholder perspectives.
Chapter Four presents my research design and methodology, including procedural details of fieldwork conducted with participants in the Iowa and Kentucky switchgrass research and demonstration projects. I characterize study participants and conclude Chapter Four by presenting a brief overview of both switchgrass projects, as well as socio-economic and biophysical descriptions of the regions in which they are being implemented.

The findings of the empirical fieldwork are presented and analyzed in Chapter Five. Rooting my analysis in the concept of legacy, I examine preferred benefits and goals, models and agents, and tradeoffs, in participants’ feedback on such issues as environmental sustainability, industry organization, and especially rural revitalization. I highlight distinctions and comparability between project participants’ concerns in each region as well as between rural stakeholders’ perspectives and the visions and recommendations in more macro-level discourse about the bio-economy, as presented in Chapter Two.

Finally, in Chapter Six, I discuss conclusions emerging from these findings, and highlight the importance of this study for rural sociological scholarship, for policy, and for civil society’s interest in and engagement with bioenergy development initiatives.
Chapter Two: HISTORICAL AND POLICY BACKGROUND AND CONTEXT

Introduction

This chapter presents an analytical narrative of international, national, and state level discourse, documents, and developments which have accompanied the growth in the bioeconomy. While not necessarily novel\(^2\), biofuels have been promoted on a new scale over the past decade (Duncan 2004); I focus therefore on this recent history, in order to orient the reader to the issues, patterns, and policies in bioeconomy development. This broader background and context situates the fieldwork in Iowa and Kentucky by illuminating which benefits have been prioritized over others and which issues have been promoted and neglected at a policy and programmatic level. It addresses the impacts that have been created by bioeconomy industrialization thus far. It also highlights how certain models and agents create different patterns of tradeoffs. Fuller elaboration of the conceptual themes guiding the research will be provided in Chapter Three.

I begin by describing the initial drivers, investments, and developments of bioenergy production on international, national, and state levels over roughly the last decade. Next I put forward an analysis of several key documents which have promoted bioeconomy development. I then present some empirical data on the impacts of this growth in terms of logistics, economics, energy independence, and environmental consequences. The final quarter of this chapter explores the reactions and critiques of the bioeconomy which have recently become both stronger and more widespread. A key component of this critical reevaluation by policymakers and other interested parties is the

\(^2\) The U.S. bioenergy industry has a long experience of successes and challenges, including significant political and economic investment in chemurgy in the 1930s, which was initiated to deal with many of the same concerns motivating bioeconomy development today (Finlay 2003).
compilation of several documents and initiatives which address the goal of creating a more sustainable bioenergy industry on an international, national, and state-level basis.

Bioeconomy Development: Policy and Investment

The basic driver for bioeconomy development on a global basis is demand, which has increased in the past decade due to expectations that biofuels and other types of bioenergy can contribute to decreases in greenhouse gas emissions, increase in energy supply, local air quality benefits, enhanced rural economic development and, under the right circumstances, protection of ecosystem services and soil (IEA 2004). Geopolitical drivers for bioeconomy development include the desire for energy security and lower reliance on foreign oil, and post-Kyoto international agreements on decreasing greenhouse gas emissions (Slingerland and van Geuns 2005). These circumstances have motivated the establishment of renewable fuels standards (RFS), which then stimulate productive activity. For example, a recent press release from the European Commission states: “with the significant rise in oil prices and the growing concern about stable, secure and environmentally friendly energy supplies, the promotion of biofuels’ use in transport is a priority on the European political agenda. Today, biofuels are the only way to significantly reduce oil dependence in the transport sector. As part of its Energy Policy for Europe, the Commission is committed to encouraging the production and use of biofuels by proposing to set a binding minimum target for biofuels of 10 percent of vehicle fuel by 2020” (Europa 2007). These types of policies structure demand, which provides stimulus for the industry to increase production.

Economic drivers include research and development of “next-generation” or cellulosic technologies which could make biofuels more cost efficient, and the
relationship between oil and biofuels prices. The relationship of oil to biofuels prices at this stage across the world relies heavily on policy interventions. Tax incentives, tariffs on imported biofuels, and other forms of state-initiated inducements for the promotion of bioenergy help make biofuels more competitive with oil or petroleum prices in the early stages (Slingerland and van Geuns 2005).

These geopolitical and economic drivers have also influenced the growth of the bioeconomy in the United States. A particularly American factor is the California-initiated phase-out of water–polluting MTBE (methyl tertiary-butyl ether) as a fuel additive in 2000 (Renewable Fuels Association 2004). The best replacement for the use of MTBE as an oxygenate and octane-booster is ethanol (Stephens 2000). To support this demand and the domestic growth of agricultural biofuels, incentives, goals, and renewable fuel standards (RFS) are being established at both state and federal levels. The 2002 Farm Bill included the first energy title in Farm Bill history, which established “new programs and grants for procurement of biobased products to support development of biorefineries, to educate the public about benefits of biodiesel fuel use; and to assist eligible farmers, ranchers, and rural small businesses in purchasing renewable energy systems” (USDA 2002 Farm Bill). The 2005 Energy Policy Act increased the amount of biofuel (usually ethanol) that must be mixed with gasoline sold in the United States to triple the current requirement (7.5 billion gallons by 2012) (Solomon, Barnes and Halvorsen 2007). The Energy Independence and Security Act of 2007, signed into law on December 19, 2007, increased that amount to 36 billion gallons by 2022 (Broder 2007). The overall push for biofuels production has increasingly included an emphasis on next-generation bioeconomy development. Switchgrass (Panicum virgatum) enjoyed
a cameo in President Bush’s 2006 and 2007 State of the Union addresses. For example, in 2006, shortly after saying “we have a serious problem: America is addicted to oil,” President Bush referred to “cutting-edge methods of producing ethanol, not just from corn, but from wood chips and stalks or switchgrass.” Such high profile comments, even in passing, signal a new level of national attention.

The policy initiatives discussed thus far have been parallel by and to some extent have stimulated growing private and corporate investment in bioeconomy development. Vinod Khosla, an influential Silicon Valley investor and a co-founder of Sun Microsystems, and Bill Gates of Microsoft fame, both made significant investments in corn grain and cellulosic ethanol companies (Khosla 2008; Olsen 2005). These types of investments have put ethanol production growth on the fast track over the past decade,
going from 1300 million gallons in 2007 to an estimated 6500 million gallons in 2007 (see Figure 1), but it is important to note that most of this dramatic growth has been in corn grain ethanol, while cellulosic biofuels generally still remain at the stage of research, development, and demonstration.

The distribution of the recent ethanol boom across U.S. states varies. Much of this growth has occurred in the American Midwest, where corn and soybeans dominate the agricultural landscape. Because Iowa has been a key region for first generation bioeconomy development (see, for example, the distribution of U.S. ethanol biorefineries as shown in Map 1.), one of the study sites for this research is in Iowa. At the time of writing, Iowa had 40 operating ethanol plants, with a total capacity of 2109 million gallons (RFA 2008a). Many policies have speeded the growth of the bioenergy industry in the region. The Iowa Renewable Fuels Standards stands out as ambitious, with 25
percent of gasoline sales to be replaced with ethanol or biodiesel by 2019 (HF2754, Iowa legislation). Aside from annual targets, the bill also includes the extension of income tax credits until 2008, and an ethanol promotion tax credit (with even greater financial incentives for retailers coming close to the annual targets) which will take its place in 2009. In addition, programs include a cost share for the installation of E85 (gasoline blended with 85 percent ethanol) infrastructure at service stations, a loan program for industrial and commercial development of energy-related processes which add value to agricultural products, and the Rural Economic Value-added Mentoring Program, which provides consultants for innovative agricultural bioenergy start-up or expansion efforts (Iowa DNR). As for electricity generation, however, Iowa only produces .1 percent of its electricity from biomass; wind is the dominant renewable energy, contributing 5.1 percent of state electricity generation.

Providing the other study site for this research, the state of Kentucky is geographically near, but economically peripheral to the heartland of ethanol production. In contrast to the many ethanol plants now dotting the Iowa landscape, Kentucky has only two operating (and three proposed) ethanol plants (Bush 2008) with a total capacity of 35.4 million gallons (Renewable Fuels Association 2008a). The major pieces of legislation supporting the development of biofuels in Kentucky have been passed only in the past two years. The Alternative Fuel and Renewable Energy Fund Program was created by the state’s General Assembly under House Bill 1 during the 2007 Extraordinary Session. The bill provides tax incentives available for up to 25 years, up to 50 percent of capital investment for projects including biomass electricity generation and biofuels commercialization, tax and wage incentives, and a competitive grants program
for biofuels and renewable energy enterprises (Kentucky legislation KRS 154.27, House Bill 1, 2007). In addition, as a member-state of the Appalachian Regional Commission, Kentucky is eligible for the ARC competitive grant program which provides relatively small amounts of funding ($75,000 each) for community-based renewable energy projects (ARC 2008). As for electricity generation, Kentucky produces only a tiny fraction (less than .05 percent) of its electricity from biomass; conventional hydropower is the dominant renewable energy, contributing 2.6 percent of state electricity generation.

Kentucky and Iowa, the field study regions for this research, arguably represent the periphery and the core of bioeconomy development. However, attributions of “periphery” and “core” apply not so much in the sense of capitalist development (per Wallerstein’s [1974] World Systems categorization), but rather in the sense of being at the center of existing sectoral activity (Iowa) or on its fringes (Kentucky). In this framework, peripheral places can also be identified within predominantly core regions. Iowa’s Corn Belt overall may be at the core of bioeconomy development, but the specific location of the Chariton Valley, the field study region in Iowa, is arguably marginal relative to the rest of the state. The hilly terrain and lower soil fertility of southern Iowa preclude the high levels of corn production conducive to currently dominant grain ethanol refineries. Therefore, while inundated by media accounts of new biorefineries, southern Iowa has yet to be enveloped into the commercial development of bioenergy.

In the rest of the country, bioenergy initiatives of various sorts are now occurring in most states, usually depending on the natural resources of the state. For example, Minnesota has seen a trajectory heavily-reliant on corn and similar to Iowa’s (Oregon Environmental Council 2005), while Tennessee, an early bioeconomy player, has focused
more on research and development of cellulosic crops like woody biomass and switchgrass which are more conducive to its soils and topography (University of Tennessee Biofuels Initiative 2008). Institutional investment in various states also plays an important role. The Minnesota Corn Growers Association (http://www.mncorn.org/) has had a large role in promoting ethanol development in that state through lobbying for corn ethanol-favorable policies, while Oak Ridge National Laboratory in Tennessee (http://www.ornl.gov/) has invested in significant research dealing with cellulosic bioenergy.

Analysis of Key Bioeconomy Documents: Goals, Strategies, and Agents

Alongside these policy and industry developments has been the release of several important documents which present bioeconomy visions, “roadmaps,” and reports. These documents are important to this study because they serve as representations of institutional perspectives about the potential benefits and predicaments of bioenergy development. The six documents I present here were chosen to represent national and state-level (Iowa and Kentucky) bioeconomy recommendations and projects. These reports are prominent examples of the first wave of recent advocacy for bioenergy. While the NRDC document may seem an outlier in a sample of mostly governmental reports, in actuality all six are authored by an array of scientists, industry and commodity representatives, nonprofit researchers and advocates, and Extension Service professionals. The research fieldwork (presented in Chapter Five) is strengthened by an understanding of how macro-level visions, as expressed in these documents (and a second set, presented towards the end of this chapter), present preferred models and
agents for bioeconomy development, and how these models and agents prioritize preferred benefits and assess tradeoffs.

The Vision for Bioenergy and Biobased Products (VBBP) in the United States (October 2002) introduces the subject matter with three goals: national security, environmental protection, and rural economic growth. This document was published by the Biomass Technical Advisory Council, established in 2000 by the Biomass Research and Development Act of 2001, and is made up of bioenergy industry, academic, nonprofit, agricultural producer and forestry industry representatives. The introduction discusses opportunities to “revitalize rural economies,” such as “new concepts in integrated biorefineries that produce a wide variety of fuels, power, and value-added chemicals and materials” (VBBP, 1). The focus here is heavily on processing and technology, and is continued throughout the rest of the document. The authors assess the current status of biomass technologies and prioritize the modernization of efficiencies and infrastructure in future development of the “industrial biorefinery” (VBBP, 2).

An interesting counterpoint is the Roadmap for Biomass Technologies (RBT) in the United States, published by the same council two months later in December 2002. This document refutes the growth of biofuels as a tool for rural revitalization, explaining “expanding the use of biomass for non-food and feed purposes will benefit farmers and rural areas only indirectly and modestly. A more significant development would occur if farmers were able to produce the biofuels or bioproducts themselves, either on the farm or as owners in a local production plant” (RBT, 13). The document then goes on to recommend that federal procurements should favor farmer-owned production facilities. The only other mention of farmers is the recommendation that the government “create
incentives to encourage farmers to grow crops used for biobased fuels and products” (RBT, 29).

The purpose of the US Department of Energy and US Department of Agriculture’s “Billion Ton Report” (BTR) (Perlack et al. 2005) is to determine “whether the land resources of the United States are capable of producing a sustainable supply of biomass sufficient to displace 30 percent or more of the country’s present petroleum consumption” and it finds that there is indeed sufficient feedstock supply at modest conversion rates. The potential and potential problems wrapped up in this landmark conclusion sparked a good deal of research and commentary (Krause 2006). Because it presented extensive evidence claiming that the natural resource base for a significant industry is available, this report has been invoked to justify both economic and policy investment. However, the report’s neglect of certain issues, notably farmer participation, leaves questions about social impacts and public involvement unanswered. Towards the end of the report, some potential concerns and impacts are addressed. Farmers are mentioned only in relation to logistical issues; for example, in the discussion about genetically improved feedstocks, the report suggests that it cannot be predicted whether farmers will adopt these new varieties, “but clearly the technology will be available” (BTR, 26.) The roles and concerns of rural stakeholders are largely absent in these documents. Such glossing of rural interests and concerns provides impetus for this dissertation.

The environmental organization Natural Resources Defense Council (NRDC) published a major report on bioenergy entitled Growing Energy: How Biofuels Can Help End America’s Oil Dependence (GE) (Greene 2004). This document expresses strong
advocacy for “an aggressive push on biofuels” (GE, 1), citing energy security, environmental, and rural economic development as primary motivations. The NRDC document differs from the policy reports described above because it focuses almost exclusively on cellulosic feedstocks, especially switchgrass. Its attention to farmers tends to focus on the profitability and diversification opportunities of cellulosic biomass crops like switchgrass, but these agricultural interests are placed on a par with environmental interests as priorities in the development of the sector. In just the four years since this report was published, dramatic changes in the industry have taken place – the authors of the document (mostly scientists at an array of institutions) assert that “even under an aggressive growth scenario for the biofuels industry, land does not become a constraint until the mid-21st century” (GE, vi). This assertion has been challenged in the past year, as will be elaborated towards the end of this chapter.

Turning to state-level documents on agricultural bioeconomy development, the Biobased Products and Bioenergy Vision and Roadmap for Iowa (BPBVRI), released in 2002, is generally industry-based, technology-oriented and sanguine in view. Farm profitability and economic growth are stated as givens, yet farmers are not even mentioned in a list of “bioeconomy stakeholders.” Recommendations regarding feedstock supply include research on “conventional crop breeding, genetic modification of crops, improved agronomic practices, and the efficient and environmentally conscious use of chemical and natural inputs” (BPBVRI, 5). The other two recommendations in this section are that the USDA should explore measures to “streamline access to wood waste on both private and public lands, provided appropriate environmental safeguards are retained” (BPBVRI, 5) and to consider impacts on the food sector and the
environment. Market development and corporate investment were the priorities in this document, as suggested by the fact that a section on “Directional Targets for Successful Progress of the Bioeconomy in Iowa” (BPBVRI, 8) includes only targets addressing productivity except for one which identifies carbon sequestration as a goal. Towards the end of the document the authors address the need for standards and incentives including: “environmental quality of feedstocks and conversion technologies” (BPBVRI, 15). This statement suggests some tempering of the market investment rush with previously less evident caution about environmental considerations. In some ways, this stance foreshadows more recent debates about ecological impacts of biofuels development. However, even in its limited treatment of sustainability, this document focuses mostly biophysical and environmental quality (and associated implications for markets), while neglecting social impacts and farmer participation.

Turning to the other state treated in this research, Kentucky’s relatively recent involvement with bioeconomy development may, in part, help explain why this state lacks a comprehensive report or vision document to parallel the Iowa or national-level reports. The most comparable document is a mere two-page “roadmap” composed by the Kentucky Rural Energy Consortium, a partnership of the University of Louisville, the University of Kentucky, and the Governor’s Office of Energy Policy, which sponsors research and development in renewable energy industries. The roadmap, titled Kentucky’s Initiative for Renewable Energy and Energy Efficiency (KIREEE), supports a target of 25 percent of energy consumption from bioenergy by 2025.³ It concludes with

³ This Kentucky effort is associated with the national level 25 x 25 Initiative. “25 x 25” has provided an organizing vehicle for agriculture and forest sector interests to promote development of renewable energy. It is supported by the Energy Futures Coalition, which receives funding from a variety of private foundations.
the statements: “Potential Economic Impact for Kentucky = $17.8 BILLION!, Increase Net Farm Income = $1.9 BILLION!, Potential Additional Jobs Created = 162,000!” (available at www.25x25.org). The economic impacts of bioeconomy development are clearly the concern in this short document, but environmental sustainability and energy security are also cited as goals. While rural stakeholders are again unmentioned, the rural development potential of a bioenergy industry is highlighted.

With the exception of the Kentucky report, these documents average about 40 pages each, and yet only a few sentences in each one are dedicated to the role of the feedstock producer. This would be unremarkable except that every document (save the Billion Ton Report) celebrates the potential contributions of bioenergy development for farmers and rural stakeholders. While environmental sustainability and community economic impacts are clear concerns, and the attention which is paid to them is prioritized nearly on the same level as industrial development, the in-depth analysis in the documents tends to focus on research and technology, and market and feedstock availability. The Kentucky document can be seen as a short example of a report promoting the initial development of bioenergy. Its focus is predominantly on commercial investment. Market development tends to be promoted as the first priority, while ecological and socio-economic sustainability are relegated to secondary concerns.

To summarize, the vision statements articulated in these six documents describe a near future with a highly productive bioenergy sector in the specified region, whether that is on a state or national basis. These envisioned futures should, according to the documents, achieve a set of benefits which can be classified into three main goals. The first of these can be labeled economic growth, but stated goals fall into two main
categories. Industrial economic growth includes ambitions to strengthen, diversify, and provide new opportunities for more competitive biomass providers, biofuels producers, and industry. Community economic growth goals refer to benefits that are more locally-distributed, such as cutting energy costs, creating new industries that offer more good-paying jobs, and stimulating rural development. The second main goal is **energy supply**, and includes such preferred benefits as: a more diverse energy portfolio, energy security, energy independence, and the reduction of fossil fuel import dependence. The third set of preferred benefits is **environmental improvement** which takes into account reduced carbon emissions, conservation, better air quality, and broader sustainability concerns.

As will become obvious when compared to switchgrass farmers’ and rural residents’ perspectives (presented in Chapter Five), the majority of these goals assume a macro-scale focus, with benefits accruing primarily on a national or even global level. This does not necessarily indicate that local communities are neglected – rural Kentucky could benefit from decreased carbon emissions as much as Washington D.C. – but the focus in these documents privileges widely distributed public goods that do not necessarily take into account specific regional variations. For example, in these documents, a decrease in greenhouse gas emissions is a more prominently presented environmental benefit than soil conservation. Industry development tends to be prioritized over rural revitalization, and energy security is more frequently cited than lowering gas prices.

This gap between macro-scale recommendations and local communities is also evident in assessing the strategies and agents cited in the documents as likely in models.

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4 These are the terms used in the documents.
for bioeconomy development. Strategies and agents for promoting the development of a bioenergy industry which achieves these benefits tend to have a great deal of overlap. The role of government is to establish and develop policies, regulations, incentives, funding, education and outreach which will make it easier for industry to transition into the bio-energy based sector. The role of science lies in research and development to provide technologies for every step in the commodity chain, including biomass production (plant sciences, farm machinery, transportation and storage), biofuels production (conversion technology, biophysics, mechanical processing), and end-use development (byproducts implementation, transportation and logistics). The role of the market is stressed across these policy documents, with an emphasis on investment. These three sectors – state, science, and market – are what Busch (2000) calls the three Leviathans. According to Busch, they tend to undermine democratic, civil society participation through their overemphasis on technology. In this model, the public good is assumed to be produced through the cooperation of the benevolent state, the expert scientist, and the invisible hand of the market. As will be discussed below, the distribution of public and private goods which make up the public good is an ethical-political concern which should involve democratic deliberation. But again, in these policy documents the primary goal tends to be commercialization, which is initially and foremost a private good. Industrial development will be aided and facilitated by state policies and scientific research and development, but it is industry itself, and the market within which it acts, which determines whether biofuels will get off the ground.

Overall the focus of these documents on bioeconomy development remains high-level and broad. Indeed, it is impractical to expect a national or even state-level
representative to strategize a role for a specific rural community. From such an elevated perspective, it is more feasible to endorse a likely direction for market investment and industrial development, rather than for rural revitalization. This gap between macro-scale recommendations and on-the-ground developments, however, can veil important concerns. In the next section, I describe recent empirical research on the impacts of bioeconomy development. The research findings are sorted to mirror the preferred goals articulated in the governmental and nongovernmental documents presented above. I first report on the qualities which make bioenergy exceptional relative to more traditional agricultural production processes, next discuss the economic impacts of bioeconomy development, then address energy independence, and finally present some of the findings about environmental impacts of bioenergy industrialization.

Impacts of Bioeconomy Development

The introduction of new technologies and new economic arrangements is bound to challenge and transform social relations (Busch 2000). Bioenergy development shows increasing signs of being disruptive of existing social and environmental arrangements. The stakeholders experiencing this transformation will undoubtedly differ in their preference for or resistance to new ways of organizing economic and community patterns. It is therefore important to imagine the potential future(s) that a bioeconomy might point to, and assess the potential gains and losses of such development to better understand the implications for society and environment. The boom in corn ethanol production and the concomitant growth in bioenergy-related studies have resulted in a growing body of knowledge about the economic, environmental, and supply-related impacts of biofuels. This section reports on such research in order to provide further
context for this study, as well as to highlight prominent issues in the development of a bioenergy industry.

*Exceptionalism*

Certain characteristics of a bioenergy industry make it different from conventional agriculture as broadly practiced in the industrialized world. First, the framing of the industry is unique. Rather than simply a supply-demand model, bioenergy is purported to create a range of public goods including environmental benefits like decreasing carbon emissions and social benefits such as rural revitalization. This framing inherently involves a new range of stakeholders, including rural residents, environmental advocates, and the civil sphere in general.

Second, a bioenergy industry specifically based on a perennial crop (such as switchgrass), which is the focus of this study, has unique characteristics relative to the annual crops more common in conventional production agriculture. Perennial crops must be established often well in advance of a market. This requires significant investment and risk by potential farmers, who must plant their crop a year or two (or three, depending on management) before the first significant commercial harvest. This characteristic speaks to the importance of engaging farmers’ participation, whether that happen through economic incentives or through their buy-in to the socio-economic and ecological benefits projected to accrue from a thriving bioenergy industry.

Third, biomass crops are neither food nor feed, and thus elicit a different type of public concern. Yielding products not directly ingested by humans or animals, they may be less subject to public concerns about safety, contamination, and genetic modification (Paula and Birrer 2006). Traditional agricultural products are closely linked to supply-
demand curves (though influenced as well by state subsidies and programs), but the new role of agricultural residues or dedicated crops for bioenergy purposes gives it greater freedom from market mechanisms.

Fourth, the role of government incentives and policies to spur demand are especially key to bioeconomy development. Farm payments and related subsidies bolster conventional production agriculture in the United States, but the bioenergy industry receives these investments at the production, processing, and distribution levels. In addition, advocacy for the bioeconomy is being used as a political tool to show a candidate’s or an administration’s commitment to both rural sustainability and energy independence. This role gives the bioenergy industry a unique responsibility and position.

Finally (and this will be elaborated further in the following chapter), the bioeconomy may be high-tech or low-tech, large scale or small-to-mid scale, nationally or locally-oriented. Agriculture in the United States has to a large degree become structured as a system of large scale commodity crops, on the one hand, and smaller scale niche or direct marketing, on the other (Lobao and Meyer 2001) The documents described above tend to predict a large scale, high-tech, commodity system, such as manifested now in the corn ethanol industry, but it is important to note that within agriculture more broadly other models co-exist with that large scale, technology intensive system.

**Economics**

Of particular interest to this research is the impact of rising corn prices on food costs and on the ethanol industry itself. The problem of trade-offs between food and fuel
has recently received attention. Corn prices were up from around $2/bushel in 2006 to almost $6/bushel as of April 2008 (Jacobs 2008). Despite rising production costs and decreased government payments, U.S. farm incomes have seen growth due to the high prices of corn, as well as of other commodities such as soybeans, wheat, and rice (Westcott 2007). This dramatic price shift, however, has sparked fears about spiking food costs (Goodell 2007). The doubling of the price of corn tortillas in Mexico, and resulting protests in Mexico City are attributed to the competition for corn from biofuels production (Sauser 2007). Food insecurity due to bioenergy production in the developing world has become a growing concern as land is taken out of food production and put into biomass production (Meade, Rosen and Shapouri 2007; Milmo 2008). On the other hand, some economists insist that for many food products, corn derivatives make up only a very small proportion of total costs, and so rising prices are having little impact on grocery store prices (Riggins and Meyer 2007). Other factors including oil prices (which directly tie to the price of many agricultural inputs like fertilizers) and government farm and ethanol policies (Mulshine 2008) have also been blamed for the recent rise in food prices.

A related concern is the impact of rising corn prices on the ethanol industry itself. The narrow profit margin for fermenting corn and producing liquid fuel, made viable by federal incentives, is disappearing. These struggling biorefineries have been celebrated as mechanisms for promoting rural development, but recent economic difficulties including the effect of recent Midwest flooding on corn prices, are undermining that potential (Mouawad 2008).

The degree to which economic benefits stay in rural areas varies based on plant ownership. Estimated jobs multiplier impacts for the ethanol industry (not including
construction) range from 3 to 40 in studies on both state and federal levels conducted over the past ten years (Euken 2006). Higher proportions of local ownership result in higher economic returns to the local region. With no local ownership, a 50-million gallon/year ethanol plant would either create directly or otherwise stimulate a total of 133 jobs in the regional economy. For every 25 percent increase in local ownership of the plant, 29 more jobs would be created (Swenson and Eathington 2006). Local investment, then, results in local economic returns, but it means that the risk is carried locally as well (Swenson and Eathington 2006). If the recent boom continues to diminish, local investors will bear the brunt of the negative impacts. The exuberant projections of ethanol’s positive contributions to rural communities must be tempered with acknowledgement of the economic complexity that brings potential risks as well.

*Energy Independence*

The capacity of ethanol to reduce US dependence on foreign oil is often cited as one of its most important benefits. As of 2001, the US used over 113 billion gallons per year of oil for transportation fuel – the majority of which comes from volatile foreign supplies (EIA 2005). The main advantage of biomass is that it can be transformed into liquid transportation fuel unlike many other renewable energy sources (like solar, wind, hydro, etc.) and so can displace some of that 200 billion gallons of petroleum, but as of 2004 only 3 percent of US energy consumption came from biomass (Perlack et al. 2005).

A full investment in biofuels could bring that proportion significantly higher – US biofuels production is projected to grow to over 16 billion gallons per year by 2015, with ethanol (from corn and cellulosic feedstocks) making up almost 20 percent of total gasoline consumption and biodiesel compiling approximately 4 percent of total estimated
diesel consumption (Soyatech 2006). But biodiesel, grain ethanol, and cellulosic ethanol combined may, at most, be able to produce roughly 30 percent of projected U.S. demand for transportation fuels (Bantz 2007). Conservation and efficiency, therefore, must be prominent plans and not just afterthoughts for attaining energy independence. Improving fuel efficiency standards and implementing innovative ways of reducing miles driven represent policies that have the greatest potential at the least cost (Bantz 2007).

Ultimately, these numbers suggest that diverse approaches are important for achieving energy independence. Biodiesel, grain ethanol, and cellulosic ethanol based on agricultural, forest-based, and industrial feedstocks, efficiency, and conservation are all important and necessary pieces for solving the energy puzzle (Pacala and Socolow 2004).

Achieving energy independence is not a cure-all to global energy use however. At the 2007 G8 meetings, OPEC representatives made a point of expressing their concerns about the rush to biofuels. The oil cartel warned that the growth in biofuels will eliminate their incentive to invest in new crude oil supply (BBC 6 June 2007). The relationship between oil price and biofuels production cannot be ignored. The two industries can influence each other in both positive and negative ways, and while certain corporations (e.g. BP) are deeply invested in both oil and biofuels, conflicts of economic interest abound. In addition, while US energy use currently outpaces the rest of the world, China’s energy (and especially transportation fuels) consumption is growing dramatically (Adams and Shachmurove 2007). If an important goal of energy independence is to decrease conflicts over energy demand and use, supply issues must be addressed, not just domestically, but also globally.

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5 These figures vary depending on the research, however. For example, Hill et al. (2006) find that even dedicating all U.S. corn and soybean production to biofuels would meet only 12 percent of gasoline demand and 6 percent of diesel demand.
**Environmental Impacts**

A third set of concerns about bioeconomy development focuses on biophysical and ecological impacts. First, minimizing corn ethanol’s environmental impacts will require significant investment. The recent increase in the price of corn became a concern for its potential to induce crop farmers to forego standard the corn and soybean rotation in favor of producing more (and continuous) corn for ethanol production. Disease and pest problems can increase in the absence of crop rotation. In South Dakota, for example, research is being conducted on pesticides and biological control for corn rootworm, which are thriving in fields planted to corn year after year (Chandler et al. 2003). A domino effect of ecological challenges begins with the possibility of increased pesticide and fungicide use for combating these kinds of pests, and increased fertilizer use for addressing nutrient deficiencies. These agro-ecological impacts must be acknowledged and mitigated if corn ethanol is to be more than a very brief transition feedstock for the bioeconomy.

Another criticism of corn ethanol concerns its energy balance. Depending on the researcher, studies find that it can take more energy to produce ethanol than is available in its output. According to David Pimental, about 29 percent more energy is used to produce a gallon of ethanol in a coal-fired biorefinery than the energy in a gallon of ethanol (Pimental 2003). On the technical processing end, the production of ethanol from corn grain is a mature technology that is not likely to see significant reductions in production costs (DiPardo 2002). At the same time, the technology for producing ethanol (and other value-added and secondary products) from cellulosic feedstocks is developing quickly. Cellulosic ethanol can achieve a net energy yield that is close to carbon-neutral
Worldwatch Institute 2007) and also has a more positive energy balance than grain ethanol (Solomon et al. 2007). For these reasons, cellulosic ethanol is now receiving considerable attention and investment, and field residues (corn stover and/or wheat straw, primarily) are being piloted as feedstocks in first-generation cellulosic biorefineries. The research community has yet to come to an agreement about the likelihood of increased soil erosion and chemical runoff and the decrease in soil organic matter due to the removal of so much organic material from the land, however. The consensus at the time of writing indicates that it is possible to produce ethanol from corn stover in an environmentally-benign manner, applying best management practices of no-till production and strict restrictions on the proportion of residue removed (Kadam and McMillan 2003, Sheehan et al. 2003), but perennial crops have fewer possible negative impacts and equally positive energy balances (McLaughlin and Walsh 1998).

Producing ethanol from perennial feedstocks like switchgrass and forest residues could provide decreased emissions, positive energy balances, and fewer environmental impacts (Farrell et al. 2006, Graham et al. 1992, Hall 1997, Hill et al. 2006, Lynd 1996), but even these seemingly benign options provoke concerns (McLaughlin and Walsh 1998). One concern is that monoculture plantings of switchgrass, for example, would eliminate or minimize its use as wildlife habitat (Harper and Keyser 2008). Another concern is that putting marginal or unused land back into production, even for grasses, could have impacts on soil erosion (Kort et al. 1997). As for forest products, the addition of a market for small diameter cuttings to the existing market for large diameter logging could promote clear-cutting and negatively impact biodiversity and soil and water quality.

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6 According to Pimental and Patzek (2005), however, all potential biofuels feedstocks have negative energy balances.
(Skog et al. 1997). More recently, researchers have found that land-use change associated with production of biofuels in one location leads to increased net carbon emissions, as it stimulates land clearing for food production in other locations (Fargione et al. 2008; Searchinger et al. 2008). This shifting of impacts challenges the assertion that biofuels production will help to mitigate climate change.

The issues associated with corn ethanol production are highly relevant to bioeconomy development that focuses on research and investment in cellulosic biomass crops. The economic multipliers for ethanol refineries and boom-bust concerns about corn prices, for example, reveal that while local ownership promotes rural economic development, it also places risk on already vulnerable communities. This context is important for understanding the likely trajectories of cellulosic (or next-generation) biofuels, and points to some of the likely tradeoffs which will have to be assessed.

**Bioeconomy Reactions and Critique**

Growing identification of negative trade-offs possibly accompanying bioeconomy development have begun to evoke strong opinions in the international community (Mol 2007). With particular vehemence and outrage, Jean Ziegler, a United Nations special rapporteur on the right to food, recently called the growing production of agricultural crops for bioenergy a “crime against humanity” (Ferrett 2007). He emphasized that competition between food and fuel can create shortages in food staples, and increase global hunger. In a report on biofuels from the OECD Round Table on Sustainable Development, Doornbosch and Steenblik (2007) ask if promoting bioenergy as a “cure” (to global climate change, energy supply limitations, and stagnating farm economics) may be worse than the “disease,” due to biodiversity loss, deforestation, the dependence
on subsidies, and added pressure on land, food, and water supplies. A recent report by Oxfam claims that biofuels are pushing 30 million people worldwide into poverty (Harrison 2008). According to the UK’s *The Guardian* newspaper, a “secret report” commissioned by the World Bank has found that biofuels have pushed global food prices up 75 percent (Chakrabortty 2008).

Following so much early exuberance and enthusiasm about the potential of agricultural bioenergy to address a host of social, economic, and ecological problems (FAO 2007, UN-Energy/FAO 2007), this subsequent, more apprehensive wave of reaction seems only to be growing. The abatement of carbon emissions was an important early motivation for biofuels production, especially in the European Union, but this has been shaken by more recent evidence suggesting that land clearing for biomass production may result in net increased greenhouse gas emissions (Fargione 2008, Searchinger 2008). While considerable industrial investment has aimed to produce liquid fuels for transportation in developed nations (Refuel 2006), the encouragement of lower-technology bioenergy (e.g., fuel wood, charcoal) for the global poor has also been seen as a goal (UN-Energy/FAO 2007). However, more recent concerns about global hunger and poverty are undermining those ambitious environmental and social goals. As for supply, the actual potential of biofuels to contribute to global supply ranges dramatically (Berndes et al. 2003), with even the most optimistic predictions seeing biofuels as unable to displace petroleum in any major proportion. More tellingly, production targets set just one year ago are now being framed as a mistake in France (Phillips 2008), because of concern about the unintended social and environmental impacts mentioned above.
The initial promise of the bioeconomy to create benefits, however, maintains its influence. Rather than completely rejecting biofuels and, more broadly, bioenergy, recent initiatives have sought to develop and incorporate sustainability standards, certification, and guiding principles. The Roundtable on Sustainable Biofuels, for example, is an international multi-stakeholder effort to draft biofuels sustainability standards which address greenhouse gas emissions, environmental impacts, social impacts, and implementation (for further information, see the Roundtable on Sustainable Biofuels http://cgse.epfl.ch/). The United Nations-Energy and the Food and Agriculture Organization (FAO) jointly released a document titled “Sustainable Bioenergy: A Framework for Decision Makers” (UN-Energy/FAO 2007), which purports to: “raise key questions and explain the principal [sic] trade-offs involved in bioenergy development, and to contribute to both the international discourse on these issues and the informed decision-making of policy makers.” This report is quite wide-ranging, and is one of the very few documents at any scale which addresses feedstock producers’ and rural stakeholders’ concerns. The authors acknowledge the significance of tradeoffs and the importance of local circumstances to regional bioenergy development impacts.

Many now claim that a push for “green” fuels in the West risks creating hunger and deforestation in the global South. These conclusions are shared by the author of a report by the Community Food Security Coalition International Links Committee (Steward 2007). This report links hunger and ecological damage specifically, especially in the developing world, to what the author calls “agrofuels, [which] are liquid fuels from biomass grown on a large industrial agriculture scale” (Steward 2007, 5). While the problems associated with the globalization of economic industrialization is not the
primary focus of this study, the importance of scale and tradeoffs is. This report finds that biofuels are especially harmful on that industrial scale. Incentives and corporate investment promoting biofuels development within the United States and the European Union reflect little comprehensive understanding of the potential social, environmental, and economic tradeoffs, nor of their geographic distribution.

In the United States, a similar trajectory from eagerness to caution about biofuels can be seen. As a whole, initial exuberance has become tempered by concerns about supply and land availability, impacts on food costs, and the risks associated with relying on an agricultural commodity (subject to climactic and weather anomalies) for energy supply. Bill Gates, an early and much noted ethanol investor, has recently sold most of his stakes in the ethanol industry at a loss (Kasler 2008) and some United States legislators are discussing cutting the federal mandate for ethanol targets (Crable 2008). The shift to increased caution is probably productive; the initial intense investment in corn ethanol has created a range of externalities which must now be addressed. The many “roadmaps” and recommendations for developing the agricultural bioeconomy glossed over the need for engaged feedstock producers, and failed to anticipate and address the consequences of biofuels competition with food and feed sectors for both land and crops. Macro-scale policies and investments thus far have also neglected most place-based concerns (such as the likelihood of soil erosion and water quality deterioration as more land shifts into corn production, or the preferred processing model for distribution of economic benefits). Ultimately, despite increasing awareness of the fundamental importance of feedstock production to an agricultural bioeconomy, national-
level discourse still tends to focus on *where* biomass crops might be grown as opposed to *who* will produce them.

Nonetheless, while still promoting aggressive industrial development of biofuels production, recent policy and developments have clearly taken a more conscientious and nuanced approach to facilitating bioenergy production. The 2008 Farm Bill (H.R.2419, the Food, Conservation, and Energy Act of 2008) allots more than one billion dollars to biofuels-related incentives and projects. These include an extension of the tariff on fuel ethanol, biorefinery loan guarantees, a new tax credit for cellulosic biofuels producers (processors, not farmers), a bioenergy program for advanced biofuels, research and development funds, repowering assistance for existing biorefineries to install biomass energy systems for plant operations, a biofuels infrastructure study, and a biomass crop assistance program (BCAP). This last item is focused at potential feedstock producers. Agricultural producers in BCAP project areas may contract with the Department of Agriculture to receive biomass crop establishment payments up to 75 percent of costs, plus annual payments to help compensate for lost opportunity costs until crops are established. The program also provides for cost-share payments for the harvest, storage, and transport of biomass crops to user facilities at a rate to match the biomass sale price, up to $45 per dry ton. The bill provides such mandatory funds as are necessary to carry out the program (Green Car Congress 2008).

This new program is the first specifically targeted to biomass farmers, and is a welcome move of funding down the chain to rural stakeholders. The other incentives in the Farm Bill indicate strong legislative interest in continued growth in agricultural biofuels, but also reveal some recognition of need for more sustainable organizational
models. The push for a transfer to second-generation or cellulosic biofuels speaks to concerns about food costs, and the funding for biomass energy systems at existing plants suggests a desire for more environmentally-benign models. Social, environmental, and economic concerns about biofuels development are now reaching the policymakers (Jordan et al 2007). While they may not fulfill every hope, these policies and funding appear a step closer to a sustainable future for the bioeconomy.

A recent report targeted at Iowa, and produced by the Sierra Club and the Worldwatch Institute, Destination Iowa: Getting to a Sustainable Biofuels Future (Widenoja 2007) also brings farmer interests and concerns to the fore. The report starts with a current update on the biofuels industry in Iowa, then addresses the social and economic impacts of first- and second-generation (i.e., corn grain and cellulosic respectively) biofuels. The report then presents “sustainable choices” (p. 14) and concludes with a vision and recommendations. The criticism of current biofuels practices is astute and wide-ranging, yet the report ultimately sustains a view of biofuels’ original promise to bring environmental benefits with economic growth and rural revitalization.

It is telling that while composed by national and international nongovernmental organizations which are both based in Washington DC, the report’s focus is region-specific. The attention to geographic particularity in this report underscores the value of local or regionally focused analyses of bioeconomy development. A sufficiently targeted perspective allows for a more precise, detailed reading of actual impacts on specific environments and people. I develop this assertion more fully in the next chapter, but suffice it to say that the national-level documents discussed earlier in this chapter seem
are ultimately too widely and generally focused to take important regional variation into account.

As established above, the state of Kentucky is a latecomer to bioeconomy development and so lacks the more in-depth reports and analyses available for Iowa. One obvious reason for the peripheral nature of the bioenergy industry in Kentucky is that in the absence of a large supply of corn, the agricultural landscape was simply not very suitable for first-generation biofuels. The waning of the tobacco industry in Kentucky, however, has incited a search for farm diversification schemes, and so some bioenergy advocates are now investigating the role that second-generation biofuel feedstocks might play in the state’s agriculture and land use. A recent development is the construction of a “rural community integrated biorefinery” near the dissertation study region in Washington County, Kentucky. I include this investment in this section because, while not a policy or document, the model of the plant suggests preferred benefits, strategies, and agents. Co-funded with state and federal monies, the Alltech-owned facility will use corncobs initially, but has plans to utilize switchgrass in the near future, and to implement full-system integrated technologies. For example, nearby livestock operations may provide methane to power the refinery, and the dried distillers grains which are a result of the process will be used as feed for the cattle. These developments suggest a more involved future for bioenergy in Kentucky, and also speak to the ways in which more recent investments and perspectives seem to be searching for more sustainable models from the outset. Because Kentucky is a latecomer to bioeconomy development, it can take advantage of the lessons that have been learned in other regions about negative environmental impacts, and fewer-than-expected rural economic benefits.
Again, this trajectory from initially celebratory and market-oriented to more critical and tentatively moderated seems to have occurred at every scale, as externalities and tradeoffs have become more apparent. These lessons have relevance for the switchgrass projects which are the focus of the fieldwork in this dissertation. Benefits to rural stakeholders must be prioritized – they will not transpire on their own. Market development cannot be equated with equitable distribution of benefits. Regional variation in socio-economic and environmental conditions is a key component of developing sustainable models.

Conclusion

None of the major reports by governmental and nongovernmental organizations reviewed in this chapter and addressing bioenergy in the United States deal in any depth with implications for feedstock producers, save for the Sierra Club/Worldwatch Institute report on Sustainable Biofuels in Iowa. This suggests the need for research on bioenergy feedstock producers themselves, and also highlights policy gaps. In addition, the fact that this one report focuses on one state, rather than on the nation as a whole underscores the importance and the traction in place-specific analysis and investigation. The need for public input in this burgeoning industry also becomes clear in the way the documents and policies are framed as more than simply a new agricultural sector. These theoretical concerns – the importance of scale, of democratic deliberation regarding the distribution of the public goods resulting from a successful bioenergy industry, and the role of feedstock producers – are elaborated in greater detail in Chapter Three, where I develop the concepts of the public good, the agrarian-industrial spectrum, and the idea of legacy.
Chapter Three: CONCEPTUAL FRAMEWORK

Introduction

Having presented a brief account of recent bioeconomy policy and developments, I turn in this chapter to the conceptual framework guiding this study. I introduce and elaborate the main theories and concepts which animate this research. The chapter first considers broad social and ethical framings of agriculture generally and of an agricultural bioeconomy more specifically. It then funnels down to examine specific models and strategies which are purported to achieve preferred benefits. It continues by addressing the ways in which various models consider (or not) tradeoffs, and then attends to the role of various agents in these models. The second half of the chapter focuses on constructing the concept of legacy, beginning by reviewing relevant literatures concerned with place. It considers scholarship on human–environment interaction, agrarian transition, and farmer roles, preferences, and knowledge, in developing an account of the composition of legacy as inclusive of these many interacting influences.

Social and Ethical Framings of the Bioeconomy

This dissertation is grounded in the argument that it is an ethical priority to elicit feedback from on-the-ground feedstock producers about preferred goals, strategies, and agents for bioenergy development. The public good is encompassed by some negotiated combination of public and private goods. The public good is a moral goal, made political by the potentially differing perspectives of decision-makers about priorities and tradeoffs amongst those private and public goods. The analytical narrative presented in Chapter Two revealed some of the complex social, economic, and environmental tradeoffs that have been created by the development of bioenergy industry and are now coming to light.
The choices about how to deal with tradeoffs across sectors and across scales have yet to be adequately addressed. Assessing these tradeoffs is a complex task, and it is deeply affected by the perspectives of those doing the assessing. The complexity and challenge of tradeoffs is certainly partly due to the central role of human perception and its propensity to vary by position and interests. Policymakers, for example, will likely have different priorities than do rural residents because they have a different set of concerns (e.g., representing their broad constituencies, facilitating industry and economic development, ensuring their own re-election). In this section I address the ways in which these priorities are tied to larger ideas about preferred models and agents, and how tradeoffs are accounted for differently in different development models. The basis for these models is how agriculture is framed, and whether it is perceived as solely an economic enterprise, or as contributing to a wider array of benefits for the public good.

Boody (2002) puts forward the assertion that agriculture should be viewed as a national public good, as a producer of multiple benefits to society. He explains that “public goods are those benefits society deems it needs but does not directly pay for by the exchange of goods and money through the marketplace” (Boody 2002, 263). In the phrase “public good,” he includes aesthetics, carbon capture, community jobs, and wildlife habitat. A Jeffersonian vision of agriculture adds to this list the production of a citizenry: the “hard-working, independently minded, and independently supported citizens who would more easily avoid the vices, civic and personal, of an urban laboring class” (Dundon 2003, 427). In framing agriculture as a public good, Boody (2002) also includes the ability to remove “the public ‘bads’ currently created by industrialized agriculture: contaminated drinking water, polluted streams, reduced wildlife populations,
and increased lung disease problems produced by working conditions in livestock confinement” (263).

All of these qualities and services are public goods. In a political economic sense, public goods are nonexclusive. They cannot practically be withheld from one individual without withholding them from all, and the marginal cost of an additional person consuming them, once they have been produced, is zero (Johnson 2005). To take aesthetics as an example, the beauty of a regional landscape planted to native grasses cannot be restricted for only certain consumers. Nor is any additional cost incurred in more people enjoying the view as they drive by. In the context of this definition, the public part of public goods is as important as the goods themselves.

Private goods, on the other hand, are consumed. A ton of switchgrass consumed in a power plant is unavailable then for use in an ethanol plant – it is excludable. It takes a balance of public and private goods to create the public good. These terms have traditionally been defined and used by economists, who assume that the market is the best way to distribute both public and private goods. Boody’s (2002) framework, however, suggests a more moral component. He explains that agriculturalists who are stewards of the land and of their communities, and not only commodity producers, create the public good through farming. Not just any model of agriculture can be seen as a public good. Instead, an explicitly sustainable, ethical model of agriculture creates the above-mentioned environmental, economic, and social benefits and so contributes to the public good.

The array of benefits produced by agriculture for civil society may seem obvious, but the multiple functions of the farming sector raise complications in terms of policy.
Farming does create private goods – profit for the farmer, food for individual consumers, etc. – as well as public goods. While Boody (2002) neglects to specify the difference between a public good and the public good, he makes it clear that public dialogue is required for the creation of either. He argues that “the public at large must be involved in helping determine national and local goals for agriculture, thus contributing a new vision and a social contract for agriculture” (273). A view of agriculture as the public good demands civic involvement to create policy that supports environmentally-sustainable farms, aesthetically-pleasing farms, and farms that revitalize communities and produce good citizens. In this context agriculture is more than solely an economic enterprise, and so should not be treated by farm policy much as any other business.

The assumption that farms are good for people and for their environment has long been held by society in general, resulting in a high level of public support for agriculture (Duke and Aull-Hyde 2002, Welle 2001). This support can be seen manifested in the United States in high farm payments despite the low number of farmers and, to some degree, this public support provides justification for the use of public funding for the land grant university system and extension service (Lobao and Meyer 2004).

In recent decades, however, especially since the advent of the environmental movement, a co-existing discourse that characterizes agriculture more as a public problem than as a public good has evolved (Buttel 1992, Kirschenmann 2001). Rachel Carson’s landmark book Silent Spring (1962) opened the nation’s eyes to the harmful impacts modern farming can have on natural resources and the environment. This and other research – for example on genetic modification (Israel and Hoban 1992) and farm labor (Friedland et al. 1981) – has sparked increasing debate about the drawbacks of an
industrial model of agriculture. Buttel (2006) labels these adverse impacts “societal costs” and addresses policy and economic mechanisms for internalizing these harms and facilitating an agricultural system that maximizes benefits. The national framing of agricultural bioenergy as an opportunity for rural development, energy security, and environmental improvement is not a new sentiment then, but can be seen as an agricultural renaissance\(^7\) in accentuating the benefits, the public goods produced by American farms, over the drawbacks.

**Models for achieving preferred benefits**

The idea that agriculture can both positively and negatively affect biophysical systems, community well-being, and regional economies suggests that different systems of farming – that prioritize different benefits – result in different consequences. Thompson (1995) proposes that in determining desired outcomes from farming one can think of the philosophy of agriculture in terms of two broad options. These are industrial agriculture and sustainable agriculture or agrarianism (Thompson uses the latter two terms interchangeably).

The industrial model of agriculture is an ideal type, marking one end of a spectrum (the agrarian model is at the other end). In practice, industrial agriculture meets the ideal type to varying degrees. Industrial agriculture can be associated with increasing size and capitalization of farms, with a small number of firms dominating processing in the main commodity sectors (Buttel et al. 1990). The growing control of agricultural processing firms over farm production also characterizes the industrial model (Welsh 1997). According to an article published by the Union of Concerned Scientists (2001),

\(^7\) Agricultural renaissance is also the language used in the FAO (2007) document on bioenergy sustainability, discussed in Chapter Two.
industrial agriculture in practice creates three main benefits: cheap and plentiful food; large, profitable chemical and agricultural industries; and increased export markets. Boody and DeVore (2006, 839) emphasize that “modern industrial agriculture is incredibly good at the mass-production of low-priced commodities.” These benefits are created through a reliance on monoculture plantings of a limited number of crop varieties, chemical inputs, and the separation of plant and animal agriculture. The industrial model tends to rely strongly on “advanced,” often capital-intensive technologies, with hybrid and genetically modified crop varieties, synthetic fertilizers and pesticides, irrigation, and machinery playing important roles.

The industrial model, both as a theoretical construct and also as actual instances in practice, has received much criticism from both public interest groups and the research community. Industrial approaches to agriculture tend be associated with serious drawbacks. The Union of Concerned Scientists (2001) cites environmental and economic (mostly externalized environmental) costs, both of which are extensive and include soil erosion, chemical contamination in ground and surface watersheds, massive fossil fuel and water consumption, and pesticide resistance. The infrastructure to support the industrial model of agriculture is complex, expensive, and resource intensive. The social costs of an agricultural system based predominantly on productivity and growth are ample, as well. Fewer, larger farms have led to rural outmigration, the disintegration of rural communities, and the separation of consumers from their food supply (Lobao and Meyer 2001). The heavy reliance on technology to ensure constant growth is also seen as problematic. “This is the prerequisite of an industrial dynamic of affluence which regards its normal state as one of endless growth, and which succeeds in displacing its
negative effects so that they seem to originate elsewhere… This implies a belief that scientization can eventually perfect the control of nature” (Beck at al. 2003, 5). The marginalization of farmers and and their effort to regain control over their practices and profits are issues I will return to later in this chapter, but suffice it to say here that the industrial model often tends to erode this control (Welsh 1997).

Developed according to an industrial model, large-scale production and processing of agricultural biofuels (especially cellulosic crops) could indeed contribute to transportation fuel supply. Standardization and efficiency in production, processing, and commodity chains, the use of advanced technologies, and synergies with large scale food processors, distributors, and retailers could maximize biofuels production, thus decreasing reliance on foreign oil and contributing to energy security. The 2007 Energy Bill set the goal of displacing 15 percent of domestic gasoline consumption with fuels from renewable or alternative sources by 2017. While the likelihood of meeting this target has been contested, the productivity of industrial models of biomass crop production could increase the chances of reaching ambitious production targets. Other, especially non-economic or community economic benefits, however, might be more likely through an agrarian model.

The agrarian model marks the opposite end of the spectrum from the industrial model. Following Thompson (1995), I use the term agrarian to connote a greater emphasis on the social context and implications of agriculture. Agrarian agriculture rests on the assumption that when designed and practiced appropriately, agriculture can be productive over an infinite time scale, without causing irreversible harm to ecosystem services (Altieri 1995). As an ideal type, agrarian agriculture tends to be small-to-mid
scale, locally-integrated, and guided by a sense of stewardship for the land and the community in which it takes place. In practice, the agrarian model has the capacity to advance environmental values through food consumption, encourage diversified family farms, biophysical health, community well-being, and the promotion of place values through closer connections between producers and consumers (Thompson 2007). These are seen as benefits equally if not more important to the public good as is the large-scale productivity of the industrial model.

The agrarian model is not without its criticisms, however. For some, the term agrarian connotes a romanticized past, which they find unrealistic. On a practical level, the concept is vulnerable to marginalization because of environmental and economic policy and infrastructure that is more conducive to large scale, legislative solutions (Buttel 1993). Similarly, the agricultural extension service and the dissemination of agricultural information by agribusiness have until recently disregarded agrarianism (Warner 2007), giving preference to more technologically-based industrial farm practices. These weaknesses have to some degree undermined the feasibility of a more agrarian model, or at least slowed its adoption and spread.

Well-designed agrarian bioenergy industries could potentially encourage more diversified family farms, promote environmental and ecological health, enhance community well-being, and strengthen place-based values. Vehicle drivers who care about supporting small and mid-scale farmers, and about decreasing fossil fuel dependence, could choose locally grown and sustainably processed biofuels to demonstrate their green transportation consumerism. Farmers and local entrepreneurs could establish regionally integrated and/or cooperatively-owned switchgrass pelletizing
plants or small-scale biorefineries to supplement farm incomes for a low-input crop, create community jobs, and build economic viability in struggling rural places. An agrarian model might face significant obstacles to near-term commercialization and large-scale production, however.

The weaknesses of the agrarian model, set next to the growing awareness of the social and environmental costs of the industrial model, have led to the proposal of solutions that attempt to bridge the two. Two prominent examples which I address here in their conceptual forms (rather than as empirical analyses or projects) are ecological modernization and multifunctional agriculture. The bioeconomy is ecologically modern in the vision of a large-scale, technological solution to resource depletion and climate change. The bioeconomy is multifunctional in the vision of a market-driven agricultural enterprise which also creates environmental and social benefits. Both models create public goods in addition to private ones. But neither includes democratic mechanisms for deliberating about the distribution of these benefits (and costs) for the public good. This framing is discussed in great detail below.

Ecological Modernization is often described in relation or contrast to previously-prominent notions of how to deal with environmental problems and global environmental risks (Mol 2000, Mol and Spaargaren 1993, Seippel 2000). Weale (1992) conceived of the concept as an ideological break with earlier notions of environmental problems as discrete and easily addressed through end-of-pipe policies. Hajer explains that ecological modernization “recognizes the environmental crisis as evidence of a fundamental omission in the workings of the institutions of modern society” (1995, 3). Ecological modernization is new in that it internalizes environmental obstacles and in doing so
promotes innovation that advances economic goals at the same time (Weale 1992). Thus, ecological modernization can inspire ideas about how to overcome the discord between environmental and economic ends (Murphy 2000). It is grounded in the assumption that the social, environmental, and economic costs of industrial practices can be subsumed through the implementation of technological advancements and a new long-term point-of-view toward the desired aim of ecological sustainability paralleled by economic growth (Obach 2007). The crux here is that these transformations can occur within an existing capitalist framework and an emphasis on ever-growing prosperity (Obach 2007). Therefore ecological modernization tends to focus on market-based, large-scale, high-tech solutions.

Incorporating sustainability into market mechanisms is also a way by which multifunctionality attempts to bridge the divide between industrialism and agrarianism. Multifunctionality rests on the assumption that farming can and does produce various specific benefits to society, including environmental improvement and protection as well as socio-economic sustainability, and that these services are not (or are inadequately) accounted for in the marketplace. The term emerged out of neoliberal trade policy contestation, and offers a tactic for states to sidestep claims of economic protectionism in the agricultural sector (McCarthy 2005) by asserting that payments to farms are actually for these types of services. Farm payments for multifunctional (environmental and social) benefits are the policy end of multifunctionality. On a more theoretical level, there tends to be less emphasis on the specific role for state governance and more attention paid to the core idea of agriculture as a creator of multiple benefits, as a contributor to the public good. Multifunctionality also offers a way to operationalize
many of the ideas of sustainable agriculture but with a greater focus on the contributions rather than the problems of agriculture (Noe et al. 2008).

Arguably, multifunctionality can be characterized as an agricultural version of very similar principles expressed in ecological modernization theory (McCarthy 2005). Theoretical writings on both approaches (Evans et al. 2002, Marsden 2004, Wilson 2001) deal with very similar sets of concerns, notably internalizing environmental externalities and redefining development as sustainability rather than simply economic growth. Ecological modernization and multifunctionality both entail the fundamental ingredients of: an important role for government policy, increased efficiencies, internalizing externalities, the consideration of future generations, and “a high degree of reflexivity among rural actors” (McCarthy 2005, 779). They both also rely heavily on market mechanisms and state institutions to commoditize the desired benefits (Castree 2003, Frouws and Mol 1999, McCarthy and Prudham 2004). Yet another and related shared characteristic of ecological modernization and multifunctionality is the degree to which tradeoffs are seen as surmountable.

Tradeoffs: Prioritizing Preferred Benefits

Ecological modernization proposes win-win situations (Anderson and Massa 2000), setting forth proposals that create environmental and economic benefits simultaneously. Weale (1992) found this a fundamental novelty about the concept – that ecological modernization “challenged the widespread belief that there was a zero-sum trade-off between economic profit and environmental concerns, and argued instead that a sound environment is a precondition for economic activity and, vice versa, that the environment could mean profitable business. Thus, while economic and ecological
concerns were previously seen as contrary, they are, in time, taken to be mutually 
reinforcing factors” (Sieppel 2000, 288). In this way, ecological modernization 
theoretically eliminates the need for tradeoffs between economic and environmental (at 
least) benefits. If, however, the expectation that tradeoffs can be transcended is only 
theoretically but not practically possible, this suggests possible losses to important 
components of a project that are effectively overlooked. If, for example, the current 
(Bush) administration’s Energy Bill goals are prioritized, then biofuel supply gains may 
come at the expense of rural revitalization.

Some multifunctional projects nod to the need to trade some productive capacity, 
for example, for ecosystem services (FAO 1999, Groot et al. 2007). But it seems that 
these are the exception rather than the rule. Multifunctionality inherently addresses 
social and ecological issues through an economic model; ecosystem services, for 
example, are generally seen as a bonus, not as a benefit to be traded for more marketable 
goods. And if, as Noe et al. (2008) propose, multifunctionality differs from sustainability 
in focusing predominantly on the benefits as opposed to the costs of agriculture, it could 
be inferred that there is no room for tradeoffs in that conceptual framework.

Tradeoffs must be investigated as more than the economic notion of cost-benefit 
analysis to ensure that the broadest possible array of contingencies is taken into account. 
In practice, ecological modernization is invoked more often to characterize efforts in 
industry and manufacturing. Technological solutions in manufacturing tend to deal with 
fewer variables and closed networks, so ecologically modern solutions that “raise all 
boats” may be appropriate and even possible. In rural landscapes, however, systems-
based thinking may be more complex-- necessarily including biological, social, technical,
economic, environmental, and policy considerations on multiple time and place scales. Gibson’s (2005) analysis of tradeoffs in the context of sustainability assessment argues that decision criteria for tradeoffs must address both generic or global concerns and concerns grounded in the particulars of the place or case. These considerations are particularly relevant to this study of rural stakeholders’ perspectives about agricultural bioeconomy development. Sustainable and ethical bioenergy initiatives must be able to address tradeoffs across scales (as per Gibson) as well as across areas of concern (for example, exchanging a lower ton per acre of switchgrass biomass production for increased wild bird habitat), and throughout time scales (for example, increasing ethanol production in the near term, but creating greater water contamination in the longer term). Investigating bioenergy trends thus far and likely trajectories into the future makes it clear that tradeoffs are inevitable and evident if one’s perspective is sufficiently broad.

The authors of the UN-Energy/FAO document introduced in Chapter Two take the necessity of tradeoffs as a given, stating their hope that “appropriate tradeoffs can be made and both the energy needs of people met and the local and global environment adequately protected” (2007, 1). A sociological analysis of bioenergy development can provide an important understanding of tradeoffs by paying attention to the distribution of power amongst decision-makers and stakeholders, and addressing the ways in which priorities are set. Understanding how to assess and balance global and local needs and vulnerabilities requires a wide and deeply-integrated perspective. Lowe et al. (2008, 226) make the argument that these types of “integrated perspectives are particularly called for to improve understanding of the mutual interaction between technological change and the economic, social and environmental contexts in which it occurs. The promise is held out
for holistic solutions combining adaptations in socio-technical systems, rather than single-minded technological responses.” This argument is insightful, and appropriate to a discussion of trade-offs. Integrated perspectives – that include natural and social scientists, practitioners, and laypeople – allow for a greater awareness of potential tradeoffs across sectors, scales, and time periods, and facilitate more systemic strategies for minimizing costs and maximizing benefits. Models which allow for this type of interaction, however, are complex, and at present, the array of agents involved with bioeconomy development is not necessarily integrated adequately to create holistic solutions.

**Agents for Achieving Preferred Benefits**

For the purposes of this dissertation, agents are entities who do or who could have a role in developing the bioeconomy. Agents may be individual farmers or policymakers, commodity groups or corporations. I classify agents into several groupings – state, science, market, and civil society. Objectives for bioeconomy development are proposed by a wide variety of agents. Politicians – within the federal administration or perhaps state governors – propose that biofuels can contribute to national security or boost the regional economy. Bureaucrats – in the Departments of Agriculture or Energy – suggest that biofuels can contribute to domestic energy supply or decrease carbon emissions. Interest groups – environmental advocates and rural development proponents – accentuate the potential of biofuels to improve the biophysical environment and also quality of life. I propose that a distinguishing feature of industrial and agrarian models is the particular agent(s) involved in developing and implementing a particular manifestation of the model in question.
Agrarian agriculture is carried out predominantly in civil society (Thompson 2007, Warner 2007). According to the London School of Economics Centre for Civil Society, “civil society refers to the arena of uncoerced collective action around shared interests, purposes and values” (2004). State policy may establish incentives for certain systems, science may research and develop certain practices, industry may design and market certain tools, but an agrarian model is ideally realized through the cooperation of farmers and communities invested in the benefits and ethics of sustainable agriculture and rural viability.

In contrast, industrial agriculture in the U.S. can be broadly characterized as a neoliberal, capitalist project, carried out by state, science, and market. Neoliberal capitalism involves the facilitation of the market by the state. It is guided ultimately by science – including natural science, the science of government, and the science of economics – what Busch (2000) calls the three Leviathans. These three institutionalized agents share an uncritical faith in technology (Birch 2006). The problems of relying on the institutions of science, state, and market, and their dominant strategy – technological solutions – are numerous. Habermas (1970) writes about technology as a “social project,” carried out by a society’s ruling interests. This framing also ties back into the notion of the public good - the distribution of public and private goods (and public “bads”) is a moral question that cannot be left to a benign state, a “self-regulating” market, or an expert scientist (Glenna 2008). In industrial agriculture, the emphasis on technological solutions could be interpreted as a social project which promoted a certain type of corporate development, export market growth, and cheap food for the masses – thus prioritizing private goods. The hegemony of the three Leviathans also undermines
local or indigenous or civil society knowledge. Busch (2000) proposes that rather than rely on any one Leviathan, morality and knowledge should be built on networks of democracy in civil society that allow space for multiple truths. Ultimately he sees the public good as a moral goal which requires democratic deliberation in the civil sphere.

An agricultural bioeconomy for the public good, then, must not rely predominantly on the three Leviathans. Rather it should involve some measure of public reflection. The goal of this research to learn what biomass producers think about the potential impacts of a bioenergy economy is important precisely because those farmers and their community members are under-recognized, though no less significant stakeholders in this process. The principles of democratic deliberation require that all stakeholders in matters of considerable socio-technical change (such as bioeconomy development) be consulted (Glenna 2008). This stance builds the ground for an agrarian bioenergy economy – small-to-mid scale, locally-integrated, and guided by civil society with a sense of stewardship for the land and the community in which it takes place.

These qualities are often lacking in practical manifestations of both ecologically modern and multifunctional approaches. Both ecological modernization and multifunctional agriculture tend to fall toward the industrial end of the industrial-agrarian continuum because of their reliance on these three Leviathans, and on neoliberal capitalist principles. Both approaches consist of sets of practices and systems for reorganizing (or even simply re-labeling) existing systems of policy initiatives (State), scientific foci (Science), and industry directions (Market). More recent attempts to integrate local and indigenous participation into multifunctionality practice, through policies, tend to be the exception rather than the rule, and generally to occur in the end
stages of projects rather than in visioning and planning (Pinto-Correia et al. 2006).

Multifunctionality can be characterized as the commodification of nature for trade in a
global market governed by neoliberal agents (state, market, science) (Castree 2003,
McCarthy and Prudham 2004). Ecological modernization, similarly, is the
institutionalization of ecology in market mechanisms of production and consumption
(Frouws and Mol 1999). This institutionalization by established agents of neoliberal
capitalism – state, market, science – accounts for much of the criticism of both models’
potential for creating sustainable agricultural systems. Many theorists, environmentalists,
and advocates for social justice distrust that the same institutions that caused
environmental problems have the motivation or capacity to solve them in a useful and
sustainable manner (Beck 1999). David Harvey (1996) explains that even if corporations
were to self-regulate and choose to develop ecologically sustainable productive
technologies, issues of gross social injustice are inherent in the capitalist system because
of the prioritization of profitability over other concerns.

Plans for developing the bioeconomy sound inherently like ecological
modernization and multifunctional projects. To the extent that the bioeconomy is
conceived as a large-scale, high-tech solution to resource depletion and climate change, it
will be driven by partnerships between the three Leviathans of market, state, and science.
The bioeconomy is theoretically capable of producing public as well as private goods.
But this is where the definitions of terms must be re-clarified. I use the term bioeconomy
because it does technically incorporate simple heat and electricity projects as well as the
complex plans for turning switchgrass into a variety of plastics, chemicals, and fuels.
The focus in the media and in many of the documents and policy initiatives covered in
Chapter Two is on the latter. Industrial agriculture and its ecologically modern and multifunctional manifestations also favor the latter. But these trajectories overlook the distribution of public and private goods which may be produced by a small-scale, low-tech model which takes rural revitalization or other local benefits as a primary motive. They dismiss the importance of tradeoffs and the moral imperative of democratic deliberation in the civil sphere.

The ultimate failure of ecological modernization and multifunctionality to provide a strong bridge between the industrial and agrarian models reveals important conceptual notes. First, engaging civil society is important to the development of place-appropriate strategies and stakeholder investment. Second, an awareness of tradeoffs requires a broad, integrated perspective which can make for more systems-based models, ultimately minimizing costs. Third, an overemphasis on state, science, and market has a tendency to lead to technological solutions that may create additional externalities, undermine democratic input, and treat both nature and local people simply as market-based inputs. The priorities of the industrial model neglect key components to long-term sustainability. The agrarian model, however, is important to creating a slate of benefits focused at rural communities and civil society in general. In this next section I address the way decentralization fits into an agrarian model, and speak to the way it may contribute to rural revitalization.

The Rural Revitalization Benefits of Decentralization

In the academy, many scholars have paid attention to the effects of agricultural transformation and its effects on communities (Lobao and Meyer 2001). Much of the resulting literature has argued that concentration in the agricultural sector, and the growth
in scale of farms and agribusiness, has had detrimental consequences on economic
growth (MacCannell and Dolber-Smith 1986, Whiteley 2000), social capital (De Mello
2004, Inglehart and Baker 2000) and economic inequality (Hassebrook 2001, Lobao and
examined two California agricultural towns and found more positive social conditions (a
larger middle class, higher family incomes, better public services, and greater civic
participation) in the family farming community which was less dominated by large farms.
These associations between a more populist, Jeffersonian style of farm distribution and
better socio-economic outcomes are quite germane for efforts at creating rural
development through new industry and policy initiatives, such as bioenergy development.

In practice, industrial bioeconomy models to date tend to follow the established
corn ethanol example with large-scale input-intensive production, biorefineries that
maximize efficiencies of scale, and distribution at mainstream gasoline stations with no
place-of-origin labels (Milder et al. 2008). More agrarian models (as envisioned by
David Morris, 2006b) involve sustainable production practices by actual farmers (not
large-scale managers or absentee landowners), refineries and processing facilities owned
by farmers and rural residents, and local distribution networks. This focus on local
distribution and decentralization addresses some of the lessons taught by the limitations
of ecological modernization and multifunctionality. A more local perspective allows for
greater civic engagement by local people, makes place-based trade-offs more visible, and
provides opportunities for lower-tech alternative solutions (for example, pelletizing
switchgrass for burning instead of processing it into liquid fuels). The authors of an in-
depth analysis of the rural development potential of an agricultural bioeconomy find that
“in general small-scale systems offer greater opportunities to improve environmental and social outcomes and lower risks than large-scale systems” (Milder et al. 2000, 110). The following section builds a framework for how to conceive of the role of local places and local people in agricultural bioeconomy development.

**The Importance of Local Legacies**

Following from the conceptual framework thus far, local places and local people are important to bioeconomy development for three reasons. First, the local civil society is the key agent for developing an agrarian bioeconomy model. Second, rural residents are (at least an important component of) the public, on whom an agrarian bioeconomy for the public good should be focused. Finally, local places are the level at which an agrarian bioeconomy will develop if it is accepted that decentralization is an essential component of an agrarian bioeconomy for the public good. I now look more closely at the factors which influence these local places and people. I start with place studies, sketching out the broad discipline which I then draw from in developing the concept of legacy.

Sense of place is a broad area of theoretical analysis which refers to the socially-constructed nature of and meanings given to specific locales (Berger and Luckman 1967, Casey 1996, Greider and Garkovich 1994). That is, a place is not a simple function of its social, economic, environmental, historical and geographical characteristics; rather sense of place emerges in people’s perception of the interplay of all these factors in a given location. This phenomenological approach can be pictorially represented as a formula: \( \text{place} = \text{space} + \text{meaning} \) (Tuan 1977). The point here is that “places don’t just exist – they are always and continually being socially constructed” (Cresswell 2004, 57).
A related construct is the concept of place identity. Place identity refers to the way in which a person’s environment affects his or her sense of self (Proshansky 1983, Stedman et al. 2004). Place identity is grounded in the assertion that “through personal attachment to geographically locatable places, a person acquires a sense of belonging and purpose which give meaning to his or her life” (Proshansky 1983, 60). Furthermore, place identity has important interactional overtones. Places are spaces which are endowed with a sense of socially constructed and often shared meaning.

Critical theorists writing about space take a more explicitly political approach (see, for example Harvey 2002, Lefebvre 1991, Massey 1994). They highlight the relationship between the local and the global in the context of globalization and power, investigating ways in which places (often equated with the local) are marginalized, co-opted, or erased by space (associated with global). For example, place consciousness (Dirlik 2001) is very similar to the notion of place identity, but it is more politicized, and correlated with the political economic notion of class consciousness. Harvey (1989) explicitly draws on Marxist connections between space and global capital, and between place and labor. Multinational corporations have free movement and little oversight, while labor is more constrained to specific places, and is subordinated by many layers of state and economic power. Local labor, in the case of the present study, refers to agricultural biomass producers, and accentuates the need to address the importance of place to rural communities.

Dirlik’s (2001) approach takes account of these geopolitical socio-economic factors, but also grounds the concept of place in the topography and biophysical specificity of actual geographical places. He further suggests that “it may be best to
conceive of places and place-based consciousness not just as a legacy of history or geography … but as a project that is devoted to the creation and construction of new contexts for thinking about politics and production of knowledge” (Dirlik, 2001, 16). He argues that an overemphasis on the ways in which local places are marginalized by global spaces, while insightful, further disempowers the idea of place. This is dangerous because place is essential for regaining local power and revaluing local knowledge. The power of place ties directly back in to his conception of place consciousness as a correlate of class consciousness. A person’s physical location helps shape his or her role as a worker, as a political being, or as a citizen.

These conceptions of place – sense of place, place identity, and the politics of place – bring to the concept of legacy an acknowledgement of the social construction of place and the importance of that conception to identity and consciousness. They accentuate the political implications of local places, both as marginalized in the global market and as a locale for recapturing power. These three streams of thought are central to an investigation of agricultural bioeconomy development, but can be further informed by the concept of legacy. I differentiate legacy from these other established approaches to place because legacy connotes an inherited quality, and a corresponding responsibility to use that endowment properly. In this case, legacy offers further resources for understanding perceptions about future development plans based on place, identity, politics, and the social construction of these.

Legacy takes into account the social construction of place, place identity, and the politics of place, but is also deeply grounded in the materiality of historical, socio-economic, and bio-physical circumstances of a particular place; it is the physical memory
of a system with regard to past events (Little et al. 1997, Vogt et al. 1997). The term legacy has been used in many related fields. In hydro-ecology, for example, legacy sediments refer to the massive soil deposits (often contaminated with phosphorus from agricultural and forest-based enterprises) left by the impact of early settlers’ hundreds of small mills and dams which slowed water flow on rivers (Blankenship 2007). This context for legacy provides a useful parallel for how I use it. The socio-economic history of dam and mill construction for early American commerce interacts with the past and present impacts of water flow and soil dynamics, and the recent attempts by various stakeholders to diagnose the problem, educate private landowners, and clean up stream backs that are creating a problem. Every place is influenced by the interaction of human activities, human responses, and biophysical processes, or put more clearly by Gragson and Bolstad (2006, 178), “the temporal rhythms and spatial arrangements of human activities and their institutions shape and influence their surrounding ecological systems, and are in turn shaped and influenced themselves by the ecological systems in which they are embedded.” These interactions are what I am calling legacy; however (save Gragson and Bolstad 2006, who use the same term), few authors tend to label them.

For example, the pressure on southern Iowan farmers to plant corn is comprised of the farmers’ geographical location in a state dominated by corn, the influence of previous generations of corn growers, soil that is highly conducive to corn production, extension professionals who share knowledge predominantly about large-scale, row-crop farming, and a historical moment in which corn is bringing farmers very high prices. These factors interact with southern Iowa’s relatively less-fertile soil and steeper slopes, extension professionals who share information about soil erosion problems and
government-funded conservation programs, concerns about food supply, and about the possibility for an economic bust on corn prices, and the desire for healthy wildlife populations for hunting and recreation. In turn, these dynamics are shaped by other biophysical, socio-economic and cultural factors. The desire to hunt wild turkey may be influenced by a family history passed down by a grandfather, the close proximity to terrain and wild food sources that attract turkey, and the potential for food budget savings by producing one’s own meat supply.

Three broad bodies of literature inform the specific framing of legacy I use to contextualize my fieldwork. First I look to research in human-environment interactions for insights about the relationship of biophysical circumstances to societal activity in the landscape. Then I outline some of the key trends in work in agrarian transitions in an effort to understand how some of these structural changes over time affect rural viability. Third, I take a more micro-level approach in looking at farmer roles, preferences, and knowledge, especially with a focus on biomass feedstock producers.

**Human-Environment Interaction**

Biophysical processes, including topography, climate, water and air quality, and soil fertility, both influence and are influenced by human activities. These multi-directional influences are important to a concept of legacy, as described in the Iowa example about turkey hunting above. Certain soil types and climates are more conducive to the production of energy crops than others. But the interaction between humans and the natural environment is an even more important factor to managed landscape change; a farmer’s understanding of and reactions to soil types and climate matters. Human-environment interactions are used to differentiate between stages of societal
development. “The essential difference between modern and traditional society, most theorists of modernization contend, lies in the greater control which modern man has over his natural and social environment. This control, in turn, is based on the expansion of scientific and technological knowledge” (Huntington 2000, 146). “… [T]o be modern is to believe that the masterful transformation of the world is possible, indeed that it is likely” (Alexander 1995, 66). These notions of control through science and technology, of the ability of people to control the natural world and, in doing so, to remove themselves from the threats of severe weather, hunger, predation, and disease, are based on a specific concept of nature, founded on its exploitation. In this context, nature is normatively understood as being limitless and useful. “This is the prerequisite of an industrial dynamic of affluence which regards its normal state as one of endless growth, and which succeeds in displacing its negative effects so that they seem to originate elsewhere… This implies a belief that scientization can eventually perfect the control of nature” (Beck at al. 2003, 5). As Habermas puts it, “we know how to bring the relevant conditions of life under control, that is, we know how to adapt the environment to our needs culturally rather than adapting ourselves to external nature” (1970, 115).

These notions about the relationship between biophysical processes and human technology were touched on above in the discussion about models, strategies, and agents for an agricultural bioeconomy, and they are important in a more micro-analytical sense, too. Rural stakeholders’ relationship to nature has great bearing on their willingness to participate, their preferences for one model over another, and their hope or skepticism about the distribution of benefits. Agricultural producers who feel their role to be as stewards of the land will likely have concerns about the biophysical impacts of new
production systems. They may prioritize the health of the soil and water resources on their farm near to that of economic profitability of the enterprise. These attitudes will in turn impact the types of production practices which resonate with different farmers. The relationship of human-environment interaction to legacy is multidirectional. The specific history of, for example, coal mining in Kentucky, has to some degree engendered the assumption that the environment’s best use is resource extraction, but at the same time it provokes protective feelings, since the potential to degrade and destroy important services (like water quality) has been seen firsthand. As for bioenergy, growing crops for biofuels can be seen as use of science and technology to control nature and to transcend limits to growth. High-tech solutions are not necessarily the only objective of an agricultural bioeconomy, (particularly an agrarian agricultural bioeconomy). Pelletizing switchgrass for use in wood stoves can represent a lower-tech, approach for sustaining rural communities and making a low-input, perennial crop (with ecosystem services like wildlife habitat and water quality benefits) profitable.

Agrarian Transition

Broad changes over time in the structure and experience of agriculture also have a bearing on legacy. These changes, as articulated below, remain somewhat macro-level, but certainly affect the evolution of individual communities. First, the broader analysis has relevance for the global, national, and regional context within with more specific changes (in say, the number of farmers relative to the size of farms) take place. Second, when agrarian transition is investigated at a more material, meso-scale level, it becomes a description of many of the socio-economic components of legacy. A community which has experienced the shift from many medium-sized farms to fewer large-scale farms may
also be subject to increased rates of outmigration, especially of young people, underemployment, an aging population, and an increase in poverty.

Agrarian transition refers to the socio-economic and cultural transitions accompanying the shift from a large number of small- and mid-sized “family” farms to a smaller quantity of larger-scale agricultural operations (Lobao and Meyer 2001). This shift is associated with the growing role of agribusiness in farm inputs, processing, distribution, and even in commodity production (Welsh and Lyson 2005). Following the Goldschmidt hypothesis laid out above in the section on decentralization, this corporate influence contributes to loss of welfare (poverty, employment, farm profits) in rural communities (Welsh and Lyson 2005). The tendency toward fewer, larger farms is accompanied especially in western Europe and the United States by a growth in smaller-scale, organic, local, niche, and value-added farm enterprises. This leaves a marginalized “agriculture of the middle” (Kirschenmann et al. 2004) with mid-sized farmers finding it difficult to fit into commodity chains more oriented towards large scale, standardized producers. In terms of labor, “one of the most profound changes in the United States in the past century is the national abandonment of farming as a livelihood strategy” (Lobao and Meyer 2001, 103.), and those still farming tend to rely more on off-farm income.

Various theoretical developments have addressed these changes in rural society and agriculture. “Agrarian questions” centered on the politics, production, and accumulation of wealth from agricultural products in a capitalist society (Byres 2002, Newby 1983) are broadly shaped by a political economic concern with social stratification and power inequities. Much of this research tends to be more macro-scale, and focuses on the global agri-food system (Bonanno et al. 1994), but these changes
affect communities and individuals as well (Berardi 1986). In a similar vein, researchers have begun to theorize about post-productivist approaches to farming (Bell 2004, Wilson 2001), where the value in what a farm can produce comes from ecological stewardship, aesthetics, and recreation, for example, rather than solely production units per acre.

These empirical changes and the research which attempts to explain them have a bearing on the legacy of specific regions. The shift to fewer, larger farm enterprises can affect socio-economic well-being and environmental quality in rural communities. Max Pfeffer (1983) examined the ways in which regional variation in farm structure is explainable by economic, social, and political factors, but neglected any integration of ecological factors save the impact of the seasonality of farming on labor supply and the role of risk due to weather conditions. The disappearing agriculture of the middle, the growing scale of farms, and the viability of niche agriculture manifest differently based on political and economic history, but also based on geographical location and biophysical attributes. The potential for an agricultural bioenergy industry to be woven into specific places and benefit them also differs based on these interrelated circumstances.

The past few decades have seen protectionism and trade liberalism gain and lose influence in various parts of the world. In the United States, free market mechanisms are often celebrated by the same administrations which enact farm payments and regulate trade. In general, and on a global scale, the end of the 20th and beginning of the 21st century is characterized by economic deregulation of agriculture, export-oriented neoliberal development strategies, and globalization in the agri-food sector (Goodman and Watts 1997). These have been accompanied by technological advances in crop
productivity, agrichemicals, irrigation, and genetic modification (often taken together as industrial agriculture). Lacy and Glenna (2005/2006, 37) suggest that “scientific and technological innovations are analogous to legislative acts or major policy decisions, establishing a framework for public order that may endure over many generations.”

Again, the importance of technology to legacy cannot be minimized, especially as past uses of technology may help to normalize new technological solutions as future paths.

Energy crops represent a significantly different approach to agriculture because of their end use and the way that determines the commodity chain, as well as because of the values tied up with them. Switchgrass production could be seen as inherently post-productivist because of the environmental benefits of a perennial crop, and the fact that it might contribute to energy security. It could also simply speed trends toward even fewer, larger, more industrial, globalized farms because of its low labor requirements and because established oil companies are investing in the technology to make conversion to biofuels possible. The effects of the agrarian transition on potential sites for the production of agricultural bioenergy will in turn shape the way bioenergy development affects ongoing and future agrarian transitions.

*Rural Stakeholders’ Knowledge and Organization*

Ultimately, agrarian transitions are most directly and deeply experienced by rural residents. While the farm population has seen significant decline, farming maintains economic importance as an export market and ideological-cultural importance as the arena of such attention-garnering issues as genetic modification, greenspace preservation, food safety, environmental conservation, and global debates over free trade in such arenas as the World Trade Organization (Lobao and Meyer 2001). It follows that both
input and feedback from agricultural producers and rural residents about these and related issues are important for more democratic national deliberation. Agricultural bioeconomy development is doubtless another such issue in the agricultural arena, but rather than presenting producer perspectives and preferences as just one more set of public interests, I suggest that a consideration of legacy is essential for investigating the context of those perspectives and preferences.

Legacy and place-based specificity are important because both theory (conceptual approaches to multifunctionality and ecological modernization) and the practice of bioeconomy development are largely conceived of on a macro-scale. Returning to the perspective of individual agricultural producers in specific places is important in order to assess whether these macro-scale models mesh with on-the-ground priorities. In a survey of farmers in the United Kingdom and based on evidence from other studies of farmers in the West, Burton and Wilson (2006) address the gap they see between what they label the ‘productivist/post-productivist/multifunctionality (P/PP/MF) model’ and the grassroots ‘agency’ perspective. They find that farmers’ self-concepts are still largely dominated by production-oriented identities.

Very little research or analysis has been conducted which focuses on potential biomass feedstock producers. One of the few exceptions is Hipple and Duffy’s (2002) social research on potential feedstock producers in southern Iowa in the early 2000s, in which the authors began to examine farmer motivations surrounding adoption of switchgrass production for energy use8. Not surprisingly, and like Burton and Wilson (2006), they find that profitability most guided farmers’ decisions about whether to

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8 Hipple and Duffy’s qualitative study provides an important platform for the present research. This dissertation engages with findings from fieldwork conducted in the same region, and in some cases with the same producers, as their study.
produce a “new” crop like switchgrass. However, Hipple and Duffy (2002) determine that farmers’ judgments about profitability were also leavened by a yeasty mix of other considerations, including values, beliefs, aesthetics, and extended benefits for family and community. Many of these same motivations were cited by the farmers in the fieldwork for this study (presented in Chapter Five). An analysis of how rural stakeholders actually prioritize motivations and preferred benefits can enrich a characterization of farmers as simply or largely productivist. These non-economic aims which accompany concerns about economic viability are useful and relevant to understanding producer preferences and concerns.

Jensen et al. (2007), in a study in Tennessee, found that specific farm characteristics, especially farm size, influenced landowners’ willingness to convert acreages to switchgrass. Here the larger the farm, the less likely the farmer was to express willingness to produce additional acres of switchgrass. Farmer characteristics, too, such as age, educational attainment, off-farm incomes, and views about issues such as market development, use of contracts, or potential harvest limitations under the CRP influenced the amount of land Tennessee farmers were willing to convert to switchgrass. The emphasis of these studies on the perceptions of potential producers is an important and neglected one in terms of research on agricultural bioeconomy development. Without a significant base of invested farmers, there will be no ability to address other of the purported benefits of bioenergy production.

One reason for the gap that Burton and Wilson find between post-productivist theory and productivist farmer self-images (2006) may be the distribution of knowledge and expertise. Institutions that disseminate agricultural information to producers, for
example the U.S. agriculture extension service, tend still to emphasize productivity and practices more conducive to large-scale farms (Warner 2007). For example, approaches which emphasize the adoption and diffusion of various agricultural technologies and practices “illustrate a research orientation that assumes the superiority of scientific research” (Raedeke and Rikoon 1997, 146). This approach parallels the industrial model, which assumes the superiority of corporate organization and integration (Welsh 1997).

This marginalization of producer knowledge and control means that profits tend to be distributed elsewhere than on the farm or rural community (Milder at al. 2008, Welsh 1997). “As rising prices for biofuels create financial incentives for large scale production, smaller actors may be marginalized” (Milder et al. 2008, 109). Farmers have a few options for attempting to maintain local economic benefits in the midst of the dominance of industrial agriculture. “Forming bargaining units, lobbying for state intervention, and constructing cooperatively run producer networks are all coping mechanisms in dealing with an industrializing structure. They are strategies of control retention and/or profit redistribution within a coordinated structure” (Welsh 1997, 503).

The construction of cooperatives is another important issue for this study in that the current corn ethanol model relies to some degree on cooperatively-owned biorefineries, and this model is part of the reason corn ethanol was initially heralded as a contributor to rural economic growth. In addition, as will be further discussed in Chapter Five, participants in this study express an expectation or preference for cooperative organization. The pathway to this type of collective association, however, is fraught with obstacles. Downing et al. (2005) find that the greatest challenge to developing agricultural cooperatives is “the minor role that cooperatives have traditionally played in
the determination of agricultural policy… Realistically, the interests of cooperative members would be most effectively reflected in the policy process if cooperatives themselves became more directly involved in farm policy-making” (433.) This suggestion speaks to the role of farmers in cooperatives. For farmers to participate fully in a cooperative involves one type of scaling-up (Mooney 2004); to participate in a cooperative which influences policymaking requires another level of participation by farmers.

More specifically, Altman and Johnson (2008) find the relationship between feedstock producers and processors to be contingent on the organizational model chosen. Depending on the assets owned or controlled by the producer, he or she will prefer a different model. For example, if a farmer must invest in expensive machinery, he or she will most likely prefer a long-term, contractual model. If the farmer has all necessary technology, he or she would be more likely to prefer a more flexible arrangement, in order to take advantage of spot markets, when and where prices are highest. These types of specific findings are few and far between, but they are the type of information which is key to engaging rural stakeholders in agricultural bioeconomy development. Understanding the specific considerations which potential producers must weigh will aid in recruiting efforts by facilitating models and technologies appropriate to the farmers in question.

**Conclusion & Research Questions**

Despite rapid developments, a mature agricultural bioeconomy remains difficult to envision. Current trajectories reveal that attempts to achieve certain benefits (economic growth, biomass production, energy independence, environmental benefits)
are already evoking a range of concerns from the distribution of economic benefits and risks to the engagement of potential feedstock producers. Certain preferred benefits may be more attainable if one specific model is implemented rather than another. The two main models presented here – industrial and agrarian – are each more conducive to a certain set of benefits. The industrial model, a project of state, science, and market, could likely create greater productivity levels and economic benefits for corporate facilitators, but may create a range of social and environmental externalities, and exacerbate the problems of rural communities. Because this study is grounded in the potential of an agricultural bioeconomy to create rural revitalization, I present the argument for an agrarian model, in which the focus is on keeping economic benefits circulating locally, creating environmental sustainability, and preserving the socio-cultural assets of rural communities. The engagement of civil society and the focus on decentralization in an agrarian model allow for an understanding of tradeoffs that is grounded in place.

Place is important, because (as was discussed in Chapter 2) current macro-scale initiatives tend to neglect both regional differentiation and the role of rural stakeholders and potential feedstock producers. The concept of legacy, as an interaction of human-environment connections and agrarian change, grounded in the material characteristics of a place, provides an analytical tool for sifting through interview data. I will use this tool, and consider the themes raised in this conceptual frame, in answering my research questions: (1) What are the chief concerns and interests about agricultural bioeconomy development articulated by agricultural bioenergy project participants? I want to give voice to switchgrass project participants in the interests of contributing to more integrated perspectives (per Lowe et al. 2008) for more holistic assessments of the tradeoffs
required in bioeconomy development. (2) How do project participants’ expectations, experiences, and concerns about bioeconomy development merge and diverge based on legacy? Conceiving of legacy as the physical memory of a system with regard to past events, the regional variation in rural stakeholders’ perspectives has relevance for current participation in bioenergy development and for the construction of regionally-appropriate models. (3) How do project participants’ expectations, experiences, and concerns about bioeconomy development reflect and contest the visions and recommendations of policymakers and other less local bioeconomy actors? I argue that perspective plays an important role in the prioritization of preferred benefits and the assessment of tradeoffs. Comparing and contrasting rural stakeholders’ perspectives to those expressed in the documents and policy presented in Chapter Two allows for a wider understanding of how preferences differ based on perspective (scale and scope). Before turning to my empirical findings in Chapter Five, which answer these questions, I next present further information about my research design and methodology in Chapter Four.
Chapter Four: RESEARCH METHODS AND STUDY REGIONS

Introduction

With the context and conceptual framework for the study now established, this chapter presents the methodological approach, research design, and descriptions of the study regions. The overall dissertation examines (1) the ways in which rural stakeholder and institutional perspectives about biofuels differ in terms of preferred benefits, broader societal goals, and agricultural model (industrial or agrarian), and (2) the links between socio-economic and ecological legacies and stakeholder perspectives about biofuels.

I use a comparative approach to address these associations, first situating producer perspectives within the broader discourses presented in Chapter Two, and then comparing the perspectives of rural stakeholders (farmers and project facilitators) in two different geographic settings. I use qualitative methods (in-depth personal interviews and document analysis) to develop a contextualized and deeply textured understanding of how rural stakeholders perceive the potential impacts of bioeconomy development. The research has proceeded inductively, building from field-generated data to identify and assemble themes, hypotheses, and then generate new questions.

Methodological Approach

Qualitative research is an interpretative approach concerned with understanding the meanings which people attach to actions, decisions, beliefs and values, and addressing the social construction that study participants use to interpret the world around them (Ritchie and Lewis 2003). A qualitative approach is most conducive to my goals of eliciting and interpreting the perspectives of rural stakeholders about the potential impacts of bioeconomy development. As the adage says, what people perceive to be real
is real in its consequences. In this case, stakeholder perceptions of the implications of bioenergy development and commercialization impact the degree to which they participate in or challenge these developments. While not a pure or orthodox grounded theory study (cf. Glaser and Strauss 1967), this study draws on many of the techniques associated with that approach. The research has been conducted iteratively. It began with the raising of generative questions (designed to spark ideas about connections between themes), which helped guide the research, but were not fixed or static. In gathering data, I began to notice linkages between interviews, between interviews and macro-scale policy and development, and between interviews in different regions. For example, I became aware of ways in which participants’ responses mirrored and contested recommendations from policy reports. By exploring these linkages, I identified and developed central concepts guiding this study, including the role of legacy and the importance of tradeoffs. These research strategies facilitate a study which is not wholly dictated by the researcher, but rather is grounded in the perspectives of research participants (Creswell 1998).

Openness in presenting the research context, conceptual framework, research design, analysis and findings is essential to high-quality qualitative methods (Trochim 2005). In this case, openness means making my approach assessable to research participants, collaborators, and other readers. Openness is important to high-quality methods because it facilitates the peer review process, and holds the researcher accountable to the objections and ideas of readers. In the spirit of transparency, I present a good deal of the raw data in the findings section. The longer quotes allow the reader to take part in the analytical process, and see the credibility of the analysis and conclusions.
It is important to note that the focus of my study is on the project participants’  
*perceptions* of potential impacts – it is neither my goal nor my role to address actual  
biophysical or economic effects on bioeconomy development. In no way do I propose  
that these perceptions or the themes obtained from compiling and analyzing them are  
generalizable, but the research design does allow for transferability. I describe the broad  
context, the study regions, and the research assumptions in detail so that a similar  
investigation could be carried out. These descriptions also make it clear that the research  
was conducted at a very particular time in two specific regions. The same research  
design carried out today would likely uncover different themes and priorities, in large  
part because of the rapidly-changing nature of bioeconomy development but also because  
of the natural evolution of human subjectivity.

Finally, the reflexivity of the researcher is important to a rigorous qualitative  
study (Creswell 1998). My own assumptions, voice, and analysis are necessarily part of  
this research. I have made every attempt to minimize and account for my biases, errors,  
and misjudgments through the procedures described above. Even still, recognizing my  
influence on the study during data collection, analysis, and in this narrative report  
reminds me to be conscious of some risks in qualitative research. I have therefore  
actively worked against inserting my views into those I present on behalf of my  
participants. I cultivated reflexivity about my researcher role and responsibilities through  
frequent memo-ing, both during the fieldwork and throughout the analysis process. I  
sought to question my assumptions and challenge my conclusions. I made frequent  
forays back into the raw data to double check my analysis with participants’ actual  
words. I want it to be clear in this dissertation that the findings did not report themselves
objectively. Rather that I, with systematic, rigorous, and careful research methods, produced them.

While being aware of my positionality as researcher, however, I also purposely allow the voices of the research participants to retain prominence. The interview guide was sufficiently structured to elicit ideas relevant to the research questions, but it was also flexible enough that project participants’ voices and concerns could guide the conversation. Through this qualitative research approach, project participants raised subjects and concerns (for example, concerns about corporate influence and cooperative organization) which I did not foresee, but which became prominent themes in the overall dissertation.

Research Design

The research design facilitates addressing the research questions. By engaging directly with current producers for and facilitators of switchgrass projects, I can elicit and interpret the concerns and interests of rural stakeholders in the emerging agricultural bioenergy industry. By conducting fieldwork with two geographically dispersed projects, I can explore the significance of legacy and regional variation. The context and policy description presented in Chapter Two allows me to examine difference and similarity between institutional and rural stakeholder perspectives.

The research design centers on fieldwork carried out in two study regions – southern Iowa and northeastern Kentucky. These two regions were chosen to fulfill several criteria. As discussed in Chapter Two, Iowa and Kentucky can be understood to represent the center and the periphery (respectively) of current bioeconomy development
in the U.S. Iowa sits at the center of biofuels industrialization. As such, it provides a reference for how rural stakeholders in that state are constructing perspectives about these changes from within the midst of bioeconomy development. At present, Kentucky is still comparatively peripheral to bioenergy commercialization, so farmers and rural residents there are articulating their perceptions about the bioeconomy from positions in the “wings.” Incorporating this contrast is a strength of my research design. The two state/project foci allow comparison of how project participants think differently about bioeconomy development relative to their region’s overall level of material, financial, resource and human investment in the bioenergy sector.

However, despite their divergent state contexts, the Iowa and Kentucky switchgrass projects are similarly organized, with small switchgrass plots on multiple farms, shared management responsibilities, and financially-compensated farmers. Both projects aim to address logistical and socio-economic issues. Most importantly for the research design, these projects represent two of the very few fully-operational situations where switchgrass is being produced by independent farmers for bioenergy production. Thus, they approximate as much as currently possible an actual as opposed to merely a projected switchgrass-based biofuels sector. The similarities and differences between the two research sites permit an analysis of the two as one cohesive and yet more representative set of producer perspectives, which will be useful when emphasizing common themes as potentially valuable for policy and project application. In addition, the commonalities and differences of these two sites work well for my investigation of how legacy may influence farmers’ and facilitators’ opinions and expectations of bioenergy production and its community impacts. More detail about project and site
descriptions, as context for the investigation into the role of legacy, are included towards
the end of this chapter.

All together, I interviewed 33 farmers and 15 facilitators associated with these
two projects, including 31 total interviews with participants in the Iowa project and 17
total interviews with participants in the Kentucky project (See Table1).

<table>
<thead>
<tr>
<th></th>
<th>Farmers</th>
<th>Facilitators</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td>Iowa</td>
<td>20</td>
<td>11</td>
<td>31</td>
</tr>
<tr>
<td>Kentucky</td>
<td>13</td>
<td>4</td>
<td>17</td>
</tr>
</tbody>
</table>

While there is an apparent distinction in the sample between those who actually
grow and supply switchgrass to the project and those who do not, but somehow support
that effort, there are many commonalities between the two groups. Fundamentally, the
line between farmer and facilitator was often blurred; several of the “farmers” were
professionals (e.g. bankers and businessmen) with 2000 acres, most of which were rented
to other managers, while a few of the “facilitators” were first and foremost mid-sized
farmers relying on an off-farm job to make ends meet. The Iowa fieldwork was
conducted over the summer of 2006; the Kentucky fieldwork over the winter of 2008.

I gained initial access to the research participants in both Iowa and Kentucky
through the project organizers. In Iowa, I began with a list provided by project
organizers, and then asked the farmers and facilitators on the list to suggest others (i.e.,
snowball sampling). I spoke to twenty current switchgrass producers and eleven
facilitators (e.g., past and present project coordinators, regional Resource Conservation and Development [RC&D] professionals, and bioeconomy researchers at Iowa State University, associated with the project). In Kentucky, I spoke to seven current switchgrass producers, six growers who were to be drilling in their switchgrass seeds in the spring of 2008, and four facilitators (e.g., county agents and project coordinators). Both Iowa and Kentucky samples include approximately four-fifths of all individuals associated with the switchgrass project at the time. I received consent to digitally-record the interviews with every participant except one.

The interviews were in-depth, ranging in length from 40 minutes to more than two hours. Study participants were predominantly men, although seven were women. They were mostly native to their areas, with small-to-mid scale farms, and having an average of 14 years of education. The only notable difference between the Iowa and Kentucky participants was their age – the average age of Kentucky participants was 50 years (for both facilitators and farmers), while the average age of Iowa participants was 62 years (average age of farmer subgroup in Iowa was 68 years). This difference may be explained by the fact that the Iowa project specifically recruited farmers with acres enrolled in the Conservation Reserve Program. Because of its low-management requirements, the Conservation Reserve Program has tended to attract participants seeking to supplement retirement income. Most Iowa farmers in this study were retired, compared to less than a third of Kentucky farmers. Of those who were not retired with both projects, most had off-farm jobs. At least half of both samples served in leadership positions (e.g., on soil and water conservation commission) in their county. Interview topics included experiences growing switchgrass for energy production, subsidies,
conservation programs, and environmental perspectives and concerns. I also asked about farmers’ and facilitators’ views on the potential and constraints for energy crops, and their hopes and concerns about the development of a bioeconomy in their state and nationally.

The interviews were transcribed through the winters of 2007-2008, and were then hand-coded, sorted, and analyzed. I listened to every interview with the transcription in hand to correct any transcription errors and sometimes insert a note if a respondent’s tone of voice seemed to suggest particularly strong emotions about a certain topic. I then printed hard copies of every interview and hand coded them. I used colored pencils to differentiate the major themes suggested by the research design at the outset, as well as those that emerged from fieldnotes and initial interview analysis. These themes include: aesthetics, rural economics, environment, energy security, industry involvement, state involvement, bioeconomy organization and logistics, regional exceptionalism, scale, and technology/knowledge. Next, I used these themes to sort out (1) specific quotes, and (2) general ideas in a word processing program. I also coded the interviews according to participants’ answers to certain specific interview questions (i.e. What do you think are the most important potential benefits of a bioeconomy?). I first made a list of every answer, and then compiled answers that expressed what I judged to be similar sentiments. The end product was a list of all significantly distinct answers with notations about the prevalence of certain responses. This approach served as a guide to whether specific ideas were echoed by several project participants or whether they were unique, though not necessarily less relevant, opinions. While I made no attempt to produce generalizable findings, it was a priority to capture general trends across and between project
participants. Because of the time that had elapsed between the Iowa and Kentucky interviews, I returned to the original text of the Iowa interviews during the winter of 2008, to review and amend earlier coding of these transcripts, in light of new themes produced by the Kentucky analysis.

The research design was established foremost to allow for cross-site (Kentucky-Iowa) evaluation. A primary comparison investigated whether participants at both sites expressed similar ideas and concerns about the potential problems and contributions of bioeconomy development, and about the way their specific region is situated to be involved in the bioenergy industry. The spectrum of responses, whether participants at each site tended to share similar perspectives or whether opinions were widely divergent, was of particular interest for exploring the role of context. I paid special attention to perspectives that seemed place-based (i.e. in Kentucky, concerns about replacing tobacco or, in Iowa, concerns about corn grain ethanol biorefinery ownership). For the thematic analysis, I evaluated which themes were raised, how they were addressed, and how prevalent the topic was. Throughout the analysis I took note of assumptions that might be implicit (i.e. government programs lack local input), as well as the way a participant’s personal life experience and the history of his or her region might shape responses.

This latter concern is a primary focus of this analysis, as I sought to examine the extent to which socio-economic and ecological legacy links to perspectives about the potential for community benefits to accrue from a bioenergy industry. To this end, the comparison across the Iowa and Kentucky cases required investigation into the socio-economic, cultural, and ecological history and context of each study region. This context is described below in the site descriptions, and is supported by information about state
policy, investment, and developments presented in Chapter 2. Three questions guided the investigations of Iowa and Kentucky context. First, what is the nature and extent of past and present human land use? Second, what is the nature and extent of past and present economic activity and livelihoods? These two questions are key, as according to Gragson and Bolstad (2006), the “past helps define the present and constrains the future, so that the spatially and temporally explicit reconstruction of past land use [and economic activity] is the prequel to understanding the local and regional consequences of land-use change [and economic change] in the present and into the future” (176, text in brackets added). For this study to contribute to policy and community sustainability, then, consideration of land use and economic activity patterns, past and present, is necessary. Finally, and logically following on the first two questions, what forces have guided these changes, and what is the anticipated trajectory of change? By addressing this question, public policy can have more success in supporting appropriate development in regional settings.

The relationship between public policy initiatives and the perspectives of project participants makes the approach of this study relevant for applied efforts to create a socially sustainable agricultural bioeconomy. To analyze this relationship, I relied on the analysis of international, national and state policies presented in Chapter Two to provide both backdrop and counterpoint to the fieldwork. Treating the interviews as one cohesive set of findings, I highlighted the ways in which project participants’ perspectives reflected and contested policy recommendations and developments. I noted interview questions which seemed to get at the themes used to sort and analyze the governmental and nongovernment documents (concerning their goals and objectives, strategies, and
agents). For example, I could compare participants’ answers to “What do you think are the most important potential benefits of a bioeconomy?” to the goals articulated in documents. Agents enrolled in bioenergy development policy and plans could be compared to interview questions about the role of corporations, the role of government, the role of research, and the role for farmers and rural residents. In addition, I emphasized how broader themes evident in the documents echoed those found in the interviews (for example, the prioritization of small-scale farmer interests). This analysis was more flexible since in the interviews I could ask a wide range of questions and participants could raise a variety of concerns, while the boundaries of the documents were pre-determined. Still, this comparison helped shed light on what was not covered in the documents, but which is of interest to the project participants or to rural development researchers. For example, the size and degree of local-integration of the bioenergy industry was an important theme in the interviews, but was rarely mentioned in the documents.

The conceptual framework guiding this analysis was based on the understanding that bioenergy is often alluded to as a potential provider of various benefits beyond energy production. I was especially interested to see if and how the documents propose a certain model by which to create these benefits (whether they be rural revitalization, economic growth, or energy security). I then examined how the interview participants’ ideas merged or diverged with these plans and goals. The concept of legacy was also relevant to the relationship between more macro-scale developments and project participants’ perspectives. Place-based influences (biophysical descriptions, socio-economic history, community concerns, etc.) can be seen as having a greater bearing on
place-based interests (i.e. rural stakeholders) than on policymakers and interest groups in their professional roles with a wider lens of concern. In the following pages I present a description of the Iowa and Kentucky switchgrass projects, and of the socio-economic and biophysical attributes which characterize each study region. This context informs both the comparison of responses across place and the assessment of links and contrasts between international, national, and state-based bioenergy policy and developments.

Iowa switchgrass project and study region

The Chariton Valley Biomass Project (CVBP) is one of the first organized instances of U.S. farmers growing a perennial feedstock dedicated to energy production. This demonstration pilot project was initiated in southern Iowa in 1996, through a public-private collaboration that included the Chariton Valley Resource Conservation and Development (RC&D) Inc., Alliant Energy, Prairie Lands Biomass LLC, and the U.S. Department of Energy (DOE). Organizers envisioned the project as an effort to build the production and initial processing end of a switchgrass-based economy. The energy application thus far has been co-firing the switchgrass with coal, of which there have been several test burns.

In its official literature, the project has emphasized the link of biomass energy to rural development, noting the following objectives: demonstration of integrated biomass supply system with power conversion technologies; introduction of alternative energy crops as a means to offset federal agricultural subsidy payments; economic revitalization of rural America and job creation; reduction of greenhouse gas emissions; improvements in biodiversity and ecological health; and creation of a U.S. industry with significant
The project recruited area farmers who already had switchgrass plantings enrolled in the Conservation Reserve Program (CRP), obtained a waiver to harvest these acres, managed and harvested the feedstock, processed the dried switchgrass to powder, and supplied it to a nearby Alliant power plant to be co-fired with coal at a 2.5 percent rate for electricity generation. The longer term goal has been the creation of a cellulosic ethanol plant which would process the switchgrass for higher value-added materials, chemicals, and transportation fuels, but this has yet to be realized. The shorter term need has been research and development centered on switchgrass planting, management, harvesting, handling, transport and processing, which the project has addressed.

These logistical issues are the major contribution of the CVBP to larger cellulosic bioenergy development plans thus far. Switchgrass has many benefits, as mentioned above, including the fact that it is perennial, sequesters carbon, is native to much of the country, and is thus adapted to local weather and soil conditions. Management practices can maximize these benefits. For example, the CVBP eventually decided to harvest the majority of the feedstock in late fall or winter, after many of the nutrients from the plant have leached back into the soil. This tactic decreases the removal of nutrients (especially nitrogen) from the land, minimizing the need for fertilizer application, and results in a drier feedstock for use in energy applications.

Other characteristics, however, make switchgrass a challenge to handle, store, and process. Establishing dense switchgrass stands was difficult at first. Indeed, during the fieldwork, farmers and land managers reported being divided on their preference for
drilling (using a tractor combine to mechanically plant seeds) or frost seeding (relying on the freeze-thaw cycles in winter to plant seeds). Switchgrass is bulky, and so storage and transportation constraints abound. Even the small 2.5 percent co-firing rate at the Alliant power plant requires both frequent deliveries and massive on-site storage. Supply must be constantly available and of consistent quality in order for the power plant to maintain emissions standards. Complex machinery and equipment were specially developed to handle the large square bales of switchgrass, which were eventually identified as the best configuration for processing. Large warehouses were built both at the plant and on participating farmers’ land to store and keep the dry feedstock in between harvest and processing. Developing approaches to surmount the logistical challenges of producing and processing switchgrass is an important contribution of this project to bioenergy development.

While the CVBP is arguably a distinctive and deliberate demonstration project, it merits empirical attention for two main reasons. First, even though the CVBP is not directing switchgrass yet to ethanol production, it is one of the longest established and most closely observed cases of switchgrass production and handling directed towards an energy use. In this respect, it approximates as much as currently possible an actual as opposed to merely a projected switchgrass-based biofuels sector. Second, it has been organized in a socio-environmental setting-- one of comparatively marginal agriculture (at least within Iowa) – that is fairly representative of rural regions that could produce the cellulosic feedstocks for a biofuels sector.

The Iowa fieldwork takes place with participants located in four counties (Monroe, Wayne, Lucas, and Appanoose Counties) in southeast Iowa (circled in Map 2.).
This region differs from the rest of the state in geology, topography, soil fertility, and land-use. While much of the state produces much of the nation’s corn and soybeans, this region, due to its erosive hills and forest cover, is more characterized by pasture and hay.

The marginal place of agriculture in southern Iowa in relation to the rest of the state is important to understanding the development of the bioeconomy there. Influenced by rapid industrialization of corn grain ethanol in the north, project initiators were interested to see what role southern Iowa could play in the rapidly developing bioenergy industry. Because of southern Iowa’s more perennialized landscape, cellulosic crops seemed an obvious feedstock for the sector. As well, the Conservation Reserve Program (CRP) offered an important tool to help facilitate the production of switchgrass for the CVBP. The USDA’s CRP encourages farmers to take land (especially marginal land) out of row crop production, and plant it with a more environmentally-benign land cover. Originally monoculture switchgrass was a common option, but more recently native grass mixtures with legumes and wildflowers are favored for wildlife benefits. The CRP then
pays farmers a stipend for “reserving” this land, which cannot generally be harvested. As mentioned above, the CVBP received a temporary waiver which allowed harvest of switchgrass from CRP land for the purposes of using it in test burns at the power plant. CRP payments are important to farmers in southern Iowa, especially those who are largely retired from crop production and those who have land too environmentally-sensitive to farm.

This part of southern Iowa has seen the same declining socio-economic trends as found in many parts of rural America and other parts of the Midwest: a domino effect of dwindling towns, outmigration, and poverty. In the four-county area served by the Chariton Valley Biomass Project, the net population from 2000-2007 decreased by 2 percent, as opposed to statewide (very modest) population growth of 1 percent. Poverty remains greater in southern Iowa as well, with almost 13.8 percent of persons (range from 9 percent to 14.5 percent) in the four-country area being below poverty in 2000 as compared to a state rate of 9.1 percent (US Census Bureau, 2000 Census Data). In 2000, the median age of residents of the four-county region was 40.8 years; the state median age was 36.6 years. These small differences in statistics show vividly upon a visit to southern Iowa. County seat town squares present many empty storefronts and the farmers gathered in the dining area of a BP gas station are, for the most part, elderly. The study region, then, can be seen as an economically peripheral area in Iowa, and as such, is in need of precisely the revitalization that proponents suggest a growing agricultural bioeconomy can provide.
Kentucky switchgrass project and study region

In what used to be the tobacco fields of northeast Kentucky, another switchgrass project is being carried out (see Map 3). In continued efforts to find alternative crops for ex-tobacco farmers, promote hay and grass production on erosive hills, and initiate rural economic development, researchers at the University of Kentucky have networked with extension professionals and regional farmers to organize the production of five-acre switchgrass plots on a sample of twenty local farms within an appropriate transportation zone to East KY Power in Maysville, Kentucky. Workshops, field days, and farm visits for sharing and collecting information as well as working with growers to facilitate advanced management skills are key components of the project. Project coordinators express their intention to “work with representatives from state government who are trying to attract a company to establish a cellulosic ethanol plant in the region.” (Smith 2006)
The project began in the growing season of 2007 with seven producers. Most of the participating farmers were recruited by their county’s extension agent. Because of that year’s drought, and because switchgrass establishment can take up to three years, yields were low, and no harvest was conducted. Next year’s harvested grass may be pelletized, co-fired with coal, or used as a feedstock for ethanol production in research projects at UK. The plots are cooperatively managed by the farmer and the project – all planting is done by a local seed company with native grass no-till drills, but pre-establishment herbicides are applied by the landowner. Participating growers were compensated for their land and time – funds for the project come from the state’s Agricultural Development Funds, which is tobacco settlement money.

The switchgrass project in Kentucky is one of many initiatives that have been financed by tobacco settlement funds. These initiatives are united as attempts to create agricultural diversification and sustain the predominantly small farms which relied so heavily on the profitability of the burley industry. The legacy and economic importance of tobacco in northeast Kentucky are longstanding, as can be seen by the historical evidence of tobacco production in Map 3. In many ways, tobacco provided a longtime boon for Kentucky agriculture. Because of the unique climate of the northeast region of the state, light burley tobacco (one important variety) grew well, and could be air-cured in cavernous barns. The crop required considerable labor, originally supplied by family and community members, often high school students, and more recently supplied by migrant workers. The tobacco quotas ensured that supply matched demand (as anticipated for the following year by cigarette companies) and maintained a high price for the commodity (Zhang and Huston 1998). Although the quotas kept plots quite small, a

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9 Others include aquaculture, small ruminant, and direct-marketing projects.
family could fund a college education for a child on only several acres. The profitability
of tobacco, and the caps on acreage, also kept farms small (Wright 1999, 2005).

But in the late 1990s, it became clear that the heyday of tobacco was past. The
Master Settlement Agreement was a court settlement between the major cigarette
manufacturers and 46 state attorneys general to compensate state governments for the
expenses incurred in the treatment of tobacco-related illness. In order to finance this
settlement, the major cigarette manufacturers have implemented steep price increases.
These increases have lowered demand for their products and demand for American-
grown tobacco (Snell 2003). In an effort to lessen the economic impact of the Master
Settlement Agreement on tobacco quota owners and growers, Phillip Morris, Inc., Brown
and Williamson Tobacco Corporation, Lorillard Tobacco Company and RJ Reynolds
Tobacco Company agreed to establish the National Tobacco Growers Settlement Trust
(GOAP 2008).

This $5.15 billion trust fund was negotiated by the four cigarette companies and the
political leadership of tobacco growing states… The participating companies will
make annual payments to the Trust beginning in 1999 and concluding in 2010. The
Trust is divided among tobacco producers in 14 states. Each state’s share is
determined by its relative share of the total 1998 basic quota for flue-cured and
burley tobacco. Other cigarette tobacco producers in Maryland and Pennsylvania
are included in the Trust according to their 1998 tobacco sales. Kentucky is the
second-largest tobacco producing state, and the second largest recipient of Trust
proceeds. (GOAP 2008)

The National Tobacco Growers Settlement Trust in Kentucky is divided into two parts:
one part goes directly to ex-tobacco farmers. The other part is distributed for education,
outreach, and research for rural revitalization and farm diversification, facilitated by the
Agricultural Development Board (GOAP 2008). This is the money that funds the
Kentucky switchgrass project which is a focus of this dissertation study.
Five of the eight counties which host farmers currently signed up to produce switchgrass for this project are included in a list of 15 counties “most vulnerable” to the phasing out of the burley tobacco quota (Childress 2000). This vulnerability helps to explain why the project was initiated at all, and particularly in the northeast region of Kentucky. Investigating viable alternatives to tobacco and promoting economic development in the area have become urgent concerns. In addition, tobacco production has been an intensive draw on the fertility of the land; perennial native grasses and hays would help restore the quality of the soil.

Source: Dept. of Community and Leadership Development, University of Kentucky.

It is these types of socio-economic and ecological legacies that have importance for the Kentucky-Iowa comparison. Tobacco has also left cultural impacts including an
appreciation of quotas and cooperatives (the model used for burley tobacco markets), and
the frustration of the post-tobacco buyout period, which has caused an increase in the
frequency of part-time farming, commuting to off-farm (often factory) jobs in urban
areas, and outmigration causing slow population growth (see Map 4 [circle designates
study region]).

In the eight counties (Bracken, Elliot, Fleming, Grant, Harrison, Lewis, Mason,
and Robertson) with growers enrolled in the switchgrass project, the net population from
2000-2007 increased by 2.25 percent, as opposed to statewide population growth of 2.1
percent. This growth, slightly higher in the study region than in the state, is likely due
largely to “suburbanization” – a trend mentioned often in the interviews – rather than to
rural immigration. Poverty in the eight counties varies, ranging from 10.9 percent to 28.5
percent, averaging 18.2 percent of persons in the eight-country area being below poverty
in 2000 as compared to a state rate of 15.8 percent (US Census Bureau 2000 Census
Data). The median age of residents of the eight-county region is 36.7 years; state median
age is 35.9 years. In sum, the study region is slightly older than the state and has a higher
poverty rate, but is nonetheless maintaining population growth.

To recap, in comparison to the Iowa study region, the Kentucky study region is
younger and is seeing population growth rather than decline, but has a much higher
poverty rate. Southern Iowa’s gentle hills, on the other hand, are nevertheless dramatic
compared to the glacial flatness of much of that state, and its agricultural land is viewed
as rather marginal relative to the fertility of the corn belt somewhat farther north. That
expansive corn production has been central to the establishment and recent growth of
ethanol production in the U.S. Iowans are well-aware of the potential of the bioeconomy
given its prominence now in state pronouncements and politics, and the attention it receives in state and regional media. The major socio-economic issue in the Kentucky region is the phasing-out of tobacco quotas, and bioeconomy development is new to the state. These characteristics have relevance for how project participants speak to the potential impacts of bioenergy, and how their perspectives are grounded and constructed. In the next chapter, I delve into the study findings, highlighting these types of regional variation in the fieldwork, and exploring relationships and links between the larger policy context and the perspectives of rural stakeholders.
Chapter Five: FINDINGS

Introduction

This dissertation provides an actor-centered comparative case study of two rural projects responding to the call of the new agricultural bioeconomy. In Chapter Two, I presented the historical and policy context of current agricultural bioeconomy development, highlighting preferred benefits, models, and agents. Policy and investment tend to prioritize industrial models of commercialization, with less attention paid to feedstock producers and rural stakeholders. In Chapter Three, I suggested how regional histories and present circumstances condition actors’ perception of and response to agricultural bioeconomy development. I highlighted the ways in which legacy and various conceptions of scale have the potential to inform project participants’ opinions.

Having described the methodology, research design, and study regions in Chapter Four, in this chapter I analyze switchgrass project participants’ perceptions, opinions, and responses. I compare the findings from the Iowa and Kentucky fieldwork in search of variations based on legacy and regional variation, and then address the relationship of the micro-level findings to more macro-scale development, paying attention to scale, tradeoffs, and preferred benefits. My interpretative analysis highlights the unevenness and obstacles facing “large scale development” in the bioenergy sector. Throughout this chapter, I use various adjectives to signal noteworthy characteristics of the research participants. For example, the typical farmer in my sample is older (between 65 and 83), native (multiple generations on the same farm or in the same county), semi-retired (no or only part-time off-farm job, low-intensity farm operations such as CRP acreage or hay), and small-to-mid scale (100-500 acres). But other research participants are businessmen
with high-profile off-farm jobs (bankers, lawyers, entrepreneurs), and/or large-scale farmers (1000-2500 acres), and a few are from other states/regions (five individuals out of the total forty-eight are originally from out of state; less than one-fourth are originally from outside of the county of residence). These categorizing adjectives enable possible connections to be drawn between participants’ backgrounds and their comments. Nearly every interview participant is quoted verbatim in the remainder of the chapter, and no single individual is relied on for more than a few quoted passages.

The Iowa Switchgrass Project: Hope and Skepticism

Interviews with switchgrass project participants in Iowa yielded a variety of themes related to environmental impacts, energy independence, corporatization, and rural revitalization. Overall, project participants expressed both hope for potential economic and environmental benefits and skepticism that such desired goals are achievable given current economic tendencies. The Iowa project participants tend to envision the future of the bioeconomy as large-scale, but are skeptical that the involvement of large-scale entities, such as an agribusiness corporations like ADM, will be conducive to rural revitalization. Participants of the Chariton Valley Biomass Project in southern Iowa are generally well-informed about the state of the bioeconomy in Iowa. Based on their own evaluations, the majority of respondents are fairly well-informed, well-informed, or very well-informed. Project participants express excitement about the growth in agricultural biofuels, and pride in eventually being part of this emerging bioenergy industry. “I like the idea of growing grasses on these hills versus row crops just from a quality standpoint, so I would like to see that happen. Now whether it’s going to be financially viable I don’t know. I don’t have a very good feel for that,” muses one long-time, large-scale
native Iowa farmer, expressing a typical mix of hope and skepticism. All participants agreed, though, that the benefits of the bioeconomy lay in value-added end products, especially cellulosic ethanol, rather than in co-firing energy crops with coal for electricity, as is currently done with this project’s switchgrass.

I would think it’s eventually going to transform to more of the cellulose base. If the predictions of technology are true, which I assume they are, if you go back and use the example of refined petroleum the least valuable material that comes out of a petroleum refinery is gasoline. It’s transportation fuels. Higher value materials go towards plastics and chemicals and industrial uses. So it’s an extraction process and that’s where I talk about perennials moving into that same scenario where they provide that same linkage, chains they are pulling off and they have that higher value and they have the transportation fuel off the bottom. Right now we’re trying to plug directly into the transportation and I think it is very much contrived. The energy balance is questionable, but I think you would probably find folks that would argue on both sides of that. But I think the greatest potential is when we get the chemistry down and we understand a little bit better and take a perennial, and hopefully it’s a native perennial that you can grown sustainably, harvest it, run it through a process that basically provides petroleum substitutes.

This extended comment by a native Iowa Resource Conservation and Development Coordinator displays the depth and breadth of knowledge of many Iowa project participants, and it also touches on the complexity of the logistics and economics of bioeconomy development. Sustainability, technological and logistical issues, and economics are all seen as intricately interrelated, and project participants did struggle with tradeoffs across these concerns (as will be evident in discussions about community economic development, below). That said, most CVBP participants say they are optimistic or hopeful about developments in the agricultural biofuels sector. Another native farmer working 500 acres and holding a full time job explains, “I guess I’m relatively optimistic that there will be a larger share of our ethanol and other products produced from [switchgrass] in the future… I hope that it grows faster than I think it will.” This man’s ambivalence creeps in, however, and it tempers his optimism.
Recognition of the complexity of an agricultural bioeconomy and the likely tradeoffs across preferred benefits produce a hope tempered by skepticism.

When asked more detailed questions about how they see this new potential crop of switchgrass and the energy economy affecting themselves, their neighbors and children, that skepticism becomes more apparent. “The biggest goal,” explains a female farmer and Natural Resource and Conservation Service coordinator, “is trying to get a decent return back to the landowner so they don’t have to just take the pennies. You know milk or beef prices or whatever it is, it’s always going up at the store, but when you see the bottom dollar that goes to the farmer, it’s the middle person in between that gets that increase. How do you keep that honest and fair so the person actually doing the work gets some of the profit?”

It is such insights, where participants’ personal experience and history inform their expectations about the potential benefits and complications of agricultural bioenergy, which are the center of this dissertation. They speak to my construction of legacy, and the ways in which place and regional variation condition reception of new economic arrangements. This part-time farmer has witnessed a long pattern in which the producer seems to get the smallest proportion of the return on a product. This leads her to expect a similar tendency in the biofuels market10. Unless things are done differently, she and many others suspect that switchgrass farmers will see little-to-no economic benefit from producing energy crops. When asked whether they think the development of this sector would be good or bad for farmers and landowners like themselves, less than

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10 It is important to remember that this research was conducted in southern Iowa, which is on the periphery of the Corn Belt. Therefore, the economic impacts of the corn ethanol boom are less present in this area. Further, both the economic and environmental impacts may have changed in the two years since this data was collected, based on the extent to which farmers in the region may have taken their land out of CRP and started growing corn.
half of the respondents see likely, partial, or potential benefits. The remainder predicts that benefits will accrue predominantly to large-scale or absentee landowners due to existing economic patterns and the specific logistics of switchgrass production. They are somewhat optimistic that dedicated energy crops will be good for Iowa’s economy, possibly through multiplier effects, but don’t see it being a boon for farmers like themselves.

*Environmental Conservation Gains Expected*

Project participants are much more optimistic and hopeful about the potential environmental impacts of switchgrass production in southern Iowa than they are about the likelihood of significant economic benefits. Nearly every respondent considers him-or herself to be an environmentalist to some degree, although only a few were content with the term “environmentalist.” The others qualified the label, identifying themselves as “conservationists,” “no-tillers,” “environmentally aware,” “tempered environmentalists,” “practical conservationists,” “practical environmentalists,” and “an environmentalist who has to look after his own interests first.” According to one mid-sized southern Iowa farmer, a transplant from a western state:

> I think any time you are in agriculture, you have to be an environmentalist. Now I don’t stand on a soapbox and point down at my neighbors and stuff because of what they do. I would say there are some policies that I do that probably are a little unkind to the environment, but overall I like to keep a balance. We have to or we’re going to lose it all.

This position was typical of the farmers involved in the project. They tended to be quite immersed in on-farm conservation practices, and to express the opinion that farmers should be stewards of the land. The farmer’s final statement about losing “it all” refers to the biophysical ability of the land to be productive, and so includes both
environmental sustainability and the capability of making a living through agriculture. Whether this environmentalist position is representative of Iowa farmers is debatable; these project participants were all enrolled in the Conservation Reserve Program, and bioenergy in general is often framed as an environmental initiative. Thus environmentalists are possibly overrepresented in this study. However, two points are important. First, conservation-minded farmers may be more likely to participate in developing an agricultural bioenergy economy, and second, these energy crop farmers are not solely motivated by economic considerations.

Environmental considerations were important to project participants. When asked to compare and contrast a bioeconomy based on annuals (especially corn) to one based on perennials, Iowa project participants most often mentioned the soil conservation benefits of crops like switchgrass. As a retired, small-scale, native farmer explains, “we’re not losing our soil is the biggest thing. It’s not washing down to the creek. That’s one of the biggest things right there. Some of the guys just farm from fence row to fence row and try to get the last haul of corn they can, but I like to get up in the morning and just look at this [switchgrass] out here.” Another 2000-acre farmer with a full-time job agrees, also mentioning his pleasure with the aesthetics of switchgrass.

It’s kind of nice because it’s kind of back like our country was years ago. I don’t know if that’s any big deal. But I like the idea of it because it protects our land, it makes good habitat for wildlife. But the main thing is it doesn’t blow away with wind or wash away with rain. It protects your soil, yet it has the potential to make us a little income.

The emphasis on the soil conservation and wildlife benefits of switchgrass in the responses suggests that environmentalism may be more of a motivation for producers of perennial grasses than for corn grain ethanol feedstock providers. While of course this
study does not specifically address that comparison, the environmental advantages of
even monoculture stands of perennial grasses tend to be evident. As was touched on in
Chapter Two, criticism about industrial models of corn production, however, include
concerns about soil erosion and water quality degradation. Fully-integrated best practices
for corn grain ethanol production may contribute to decreases in greenhouse gas
emissions, and thus contribute to lessening climate change concerns, but as will be more
fully developed later in this chapter, project participants tend to be more motivated by
what they perceive as local benefits rather than such somewhat-removed (and recently
controversial, see Fargione et al. 2008 and Searchinger et al. 2008) advantages.

A common stereotype of the southern Iowa farmer is that he or she sees beauty in
the order of straight furrows and clean fence lines, which is something a couple of no-till
producers mention having to overcome. The legacy of conventional agricultural
practices, as historically promoted by the agricultural extension service and by
agricultural input corporations, has left the impression that good farmers eliminate every
weed and cultivate every square foot. Despite the unconventional aesthetics of
switchgrass, however, respondents are proud of its beauty and of its capacity to provide
wildlife habitat. This small-scale farmer and advocate for native grasses elaborates on
the aesthetics of switchgrass:

I don’t know whether you have seen many pictures, but I’ve taken some really
gorgeous pictures over the years of switchgrass fields. They are fabulous. Different
times of the year they are gorgeous. They are just some of the most beautiful pastels
you ever saw. I’m not even talking about the winter scenes with the frost and all that
good stuff. It’s a beautiful, beautiful thing. Here in just a few weeks when the wind
is blowing and that stuff is six feet tall, it’s just waves. It’s just like a green ocean.
It’s beautiful and there is all sorts of wildlife out there living in it.
Along the same lines, respondents feel that corn is not environmentally (or economically) sustainable, and that perennial grasses are more ecologically appropriate for the landscape and topography (and economy) of southern Iowa.

… down here where the ground is rougher ground, it’s cheaper ground and it don’t cost as much. It’s $1,000 to $1,500 an acre, where up there it’s $3,000 or $4,000 an acre. I wouldn’t expect them to raise switchgrass on that. You would do more with corn and beans on that. But this helps to kind of build up your soil and keeps it from washing away and that’s one of the things I’m interested in doing.

This 2000-acre farmer, businessman, and innovator describes how the economics of land prices relates to his understanding of soil conservation. This is an important point, and emphasizes again the notion of tradeoffs. The Iowa switchgrass producers constantly weigh the benefits and costs to their farms, both financially and in terms of land management, of transferring acreage to switchgrass. Those informal tradeoff “equations” vary greatly depending on the type of farm – the topography, soil fertility, farmer assumptions, and regional land rents. Thus the comparison between land prices farther north (in the Corn Belt) to those somewhat south in the Chariton Valley underscore the importance of place. The Chariton Valley project participants use different inputs for their cost-benefit equations than would farmers in another region. For example, this 80-year-old, fourth-generation, small-scale farmer explains that the soil and topography of the southern part of Iowa lend themselves to a switchgrass-based bioenergy industry, which will then complement the farm belt’s investment in corn ethanol:

I think [switchgrass will predominate over corn] in the rolling hills. Yes, where they can’t really continue as corn and beans you know. You take up north there, they are just corn and beans year after year after year you know and we can’t do that down here. We’ve got to rotate, so I think if they go to this switchgrass program that it will even out.
On-farm environmental improvement is seen as a major advantage of participation in a cellulosic-based agricultural bioeconomy (again, corn grain production is less likely to create these types of benefits). One reason for this may be that these benefits (such as soil conservation and water quality improvements from growing perennial crops that need few inputs) accrue to the farm and to the public sector, and cannot be funneled to private industry. Project participants here can rely on these types of benefits, while other forms of capital (such as the profit from producing biofuels or the climate change effects of a decrease in carbon emissions) are more mobile, and thus less reliable for local stakeholders.

*Energy Independence Possibilities and Pride*

Energy independence can also be seen as a public good. Project participants are proud about the potential to contribute to energy independence and related energy security. The 80-year-old, fourth-generation, small-scale farmer cited above makes this clear, “That’s the reason I switched over to biomass because I think maybe we need the fuel here instead of buying that foreign oil.” These benefits can be seen to accrue on a national basis in that energy independence can create greater economic and political security, and can also have even global benefits, in contributing to a decrease in geopolitical conflict over limited fossil fuel supply. They conveyed a subtle, but clear sense of patriotism tied to the opportunity to “fuel the world,” while at the same time they observed and criticized ties between energy availability and international conflict. A female RC&D coordinator and farmer explains:

My kind of philosophy is that oil and gas cost us so much, not just the price of that, but also I connect it to the war because there are lots of places where there is social unrest and we aren’t involved. But we are in the Middle East because they have oil, so I see the larger picture and connect those dots. So to me the oil and gas is costing
us billions of dollars. So if we can be as energy self-sufficient as we can possibly be, I think that’s a good thing.

Energy independence, which participants often equated with energy security, is frequently cited as an important benefit of growing a domestic biomass crop. Participants express a sense of pride in their ability to contribute to energy independence. “Someday we might be the oil company of the west. These other companies, maybe the Middle East will run out of oil some time and they will be looking at us and they will want oil,” muses one small-scale, multiple-generation, pasture and cattle farmer. But in many cases this pride is paralleled by a current of political criticism of present international policies. One middle-aged lawyer, deeply tied to his 800-acre southern Iowa farm and to his family farm background explains:

I don’t care what political flavor you are – if we’re living more and more on ethanol and less and less on oil, we don’t need to be in the Middle East as much as we are, you know. There are a whole lot of worldwide political considerations.

The large-scale farmer, businessman, and innovator cited above agrees:

We can use this switchgrass for ethanol. And that’s one of the things that got me interested in it. I think we ought to do something to make ourselves more independent from the Arab oil fuel.

Overall, Iowa project participants’ comments about the potential contributions of agriculture to energy independence reflect a sense of dissatisfaction with current policy and economic approaches to transportation fuel supply, as well as interest in providing an alternative supply. Observations were critical, but constructive, and they expressed a multi-scalar perspective; farmers were proud to be able to grow energy on a local scale for the good of the state on a national scale to address global geopolitical concerns on an international scale. This ability to assess needs and benefits on many scales speaks to the
ways in which project participants see their role in an agricultural bioeconomy as part of a much larger and interrelated system. However, project participants also wonder if this system will create benefits at the local scale, where project participants live.

Resignation about Rural Community Viability

The importance of scale can also be seen in how project participants discuss the potential contributions of an agricultural bioeconomy to the viability of rural communities. Respondents are well-aware of the social and economic trends affecting much of rural America, and southern Iowa particularly. Many participants nodded affirmatively as I listed some of these developments including: increasing hardship for mid-sized farmers, deteriorating small towns and county seats, the rising average age of farmers, barriers to entry for new and young farmers, and the potential for significant land transfer in the near future.

Some respondents specifically point to market trends and state policies as reasons for rural and agricultural problems. For example, one middle-aged environmentalist and farmer, recently returned to Iowa after 30 years in a northern state, explains, “farmers especially around Iowa have gotten so trapped both because of the government programs and because of the markets by this corn-soybean business.” This man and his wife farm only native grasses in an effort to restore the over-taxed land and maximize the wildlife and environmental benefits. They receive carbon payments from the Farm Bureau Carbon Sequestration Program in addition to selling hay and growing switchgrass for the CVBP. This unique situation is made possible by the couple’s off-farm employment as well as their connections with various agricultural Boards and Commissions, which keep
them informed about likely possibilities for more sustainable and geographically-
sensitive alternatives to the conventional corn-soybean rotation.

The predominance of corn-soybean rotations has been facilitated by crop payment
programs, the development of agricultural inputs, and the expansion of markets
specifically for these two crops (e.g., high fructose corn syrup in food manufacturing).
These patterns narrow the spectrum of choices for Iowa farmers, creating more
constraints to the implementation of alternative production models. Regarding farm
income, many farmers explain how the profit margin is now extremely narrow, and that
many producers are kept in business only by government programs and expansion\textsuperscript{11}.
Another semi-retired, full-time older farmer speaks to the ways in which efficiency, as
expressed through mechanization and economies of scale, has failed to realize
profitability for many producers:

There are larger farms, fewer producers, and that trend is probably going to continue.
It seems like we have to do more with larger equipment to make it. I can think back
to the 70’s and 80’s the extension people kept telling us, “To be profitable you have
to be more efficient. You have to be more efficient.” And back then I thought we’ve
rode this efficiency horse to the limit, but we’re still doing things to be more
efficient.

Project participants’ reactions to the plight of rural communities in America
reveal a kind of resignation, with about half expressing hope (but only one with
expectations) that these trends will be reversed. This stoic skepticism can be linked to a
shared social history of watching these trends progress. While I did not ask consistently
about generational turnover, very few of the participants’ children are farming or

\textsuperscript{11} The economics of corn have changed dramatically however, since this fieldwork was conducted in 2006.
At the time of these interviews, corn prices were stagnant at about $2 per bushel. As of June 17, 2008,
prices spiked to almost $8 per bushel, but then dropped as high prices prompted demand worries. Soybeans
are seeing a similar pattern of price elevation and decline. This speaks to the dramatic impact biofuels
could have on farm profitability, and also to the variability of impacts.
planning to farm. One middle-aged, full-time, native farmer with 2500 acres compares current US trends in agriculture to agricultural production systems in Russia in the Soviet era:

I think what’s happening, we are going more and more toward corporate farming and I don’t think that’s good for the country. I think they tried it in Russia and communist countries and it didn’t work. We are headed down the same path right now. Eventually over a period of years I think it will prove that it will be more efficient with smaller farms and not getting the land and income into the hands of one group.

This comment can be linked to the discussion of decentralization presented in Chapter Three. This farmer believes in the value of dispersed farms, which are better suited to distribute benefits, and does not approve of the corporate restructuring which characterizes dominant trends in agrarian transition. His comments are all the more interesting given his own large farm. When I told him he was farming more acres than any of the other project participants with whom I had spoken, he seemed almost embarrassed and said, “Well, that’s not good.” He suggests pride in farming full-time, but also voices some criticism that this industrial model – over two thousand acres, row crops on unsuitable land, and a wife working full-time – is necessary to support it. From a place of entanglement with that industrial model, he therefore supports a more locally-based decentralized system of bioenergy development, and hopes it could support more small-scale, younger farmers.

It is clear that the small-scale, geographically-sensitive farm model is not profitable under current market tendencies. A typical small-scale southern Iowa farmer expresses his bewilderment with the current economics of US agriculture.

I mean the farmer when I started farming, we were getting $5.00 out of beans and they are still $5.00 today and that was 50 years ago. So there is something wrong.
Corn $1.75 - $1.85. Well, we got that 50 years ago. There is something wrong somewhere. I don’t know what it is. Something is badly wrong.

This farmer does not attribute blame for the failings of the agricultural economy, but stresses that commodity costs should not be stagnant over a 50-year period. This comment is especially interesting in that corn price as of this writing (July 2008) has nearly quadrupled, to large degree because of the corn ethanol industry. While I have no direct information on how this farmer’s opinion might have changed in the past two years, the volatility of the market might still concern him. For example, a farmer recently cited in a New York Times article articulates serious fears about how the possible reduction of the ethanol supply mandate would affect the economic viability of his farm (Streitfeld 2008). The high corn prices have caused him to transfer larger acreages to corn production, and the rising costs of agricultural inputs have put him in a situation where he is currently profiting, but also increasingly vulnerable if and when the price of corn falls again.

Many project participants suggest that these rural and agricultural problems may have less to do with farmers, and more to do with factors, decisions, and policies beyond the usual purview of rural stakeholders. Still, a strong minority sees these trends as either neutral and inevitable or positive, efficient, and a natural part of modernization. One older, small-scale, native farmer expresses his perspective about the inefficiency of small towns and small farms.

What we’re doing is mechanizing. Yes, we’re getting bigger, but an old guy like me can run any damn machine there is and I think you’re going to see guys in their late 80’s and early 90’s still actively farming … I’m not opposed to larger farms because they can be quite efficient. Now I know it wrecks the hell out of our small rural towns, but then again, are they still a viable necessity? I don’t think so. You notice I’m not saying that very damn loud either because I would be slaughtered. I would be crucified.
The sentiments in this comment were not expressed by project participants in general, but nor were they unique to this individual. While farmers like this one may adore their air-conditioned, computer-controlled combines, others were proud to show me the 1940s International Harvester which they had refurbished and continue to use. Perhaps a preference for the latest technology is not the best demonstration of it, but there appears to be tension between advocates of modernization and advocates of rural revitalization. This farmer’s fear of being “slaughtered” for his resignation about the demise of “small rural towns” is a clear marker of that friction. And yet if traditional rural livelihoods are no longer viable, it becomes rational to envision alternative (in this case advanced technology-oriented, efficient) futures. A few respondents express personal identification with the rural economy of the past, but feel that it is a romanticized history to which this country will not return. A farmer/switchgrass advocate sketches out his version of the political economy of southern Iowa, focusing less on farming and more on rural economic development.

And you have to understand that in many cases Iowa doesn’t want to be saved because Iowa has crafted a niche for herself, rightly or wrongly, about abusing its citizens. So we have the highest high school graduation rate of any place and one of the lowest rates of people who go into advanced education. Those that do we export to other states. That leaves a relatively well educated, if you call a high school degree well educated, workforce that’s willing to work for not much money. That attracts a certain kind of industry and this state has chosen to exploit that niche. So manufacturers at a certain level are willing to come here because they get well educated people, that definition of well educated, who are willing to work for peanuts because there is nothing else available. The people who run those businesses at one level control economic development in the state don’t want to see that change. So you will see bankers in local communities looking against bringing in business that might upset that status quo. That’s a scary thought.

These comments, taken together, suggest that project participants have come to accept the demise of viable rural communities. Given that these project participants tend
to be older, long-time native residents, they have a long perspective on change in their region. Whether they are sad, resigned, or optimistic about agrarian transition in general, there seems to be agreement that vibrant small towns and farm communities represent an historical moment which cannot be regained.

Therefore, when I asked how participants expect an ideally-organized agricultural bioeconomy (as they defined it) to affect these community trends, few answered with confidence. In the context of the constraints and tendencies mentioned above, respondents tend to be skeptical that even a best-case organization of production and processing networks could significantly change current trends. Most participants expect energy crops to have either no effect on the developments listed above (for example, rural out-migration) or to speed those developments. Others predict that a thriving bioeconomy will slow rural disintegration trends by providing a diversification opportunity for farmers of all sizes, but will not reverse such trends. Only two respondents assert that their ideally organized bioeconomy could “definitely” reverse these trends, providing more opportunities for mid-sized farmers and new or young farmers and reviving the economies of small towns. For example one Iowa project facilitator suggests, “One biomass energy crop is not going to change the culture of an industry, but what it will do is it will change where the revenue stream goes.” He continues by describing how methods of cooperative organization (discussed further below) could help keep profit circulating locally.

Project participants clearly identify with small towns, small-to-mid sized farms, and local economic entities. Farmers and coordinators feel doubtful that benefits from bioenergy will flow to this scale for logistical, political, and economic reasons. It is this
scale of community which is threatened by agrarian transition. The land will endure, many people might even stay, but farm size will increase, farmers will shop with strangers at Wal-Marts or Tractor Supply stores in distant towns, and a sense of identity, of being grounded in a bounded place, will slowly diminish. These qualities of identity and groundedness are what local residents suggest cannot be replenished by a thriving agricultural bioeconomy. The economics of switchgrass ethanol seem just as likely (to both this researcher and to project participants) to favor large-scale networks of farms and logistical operations as smaller-scale ones. Participants’ personal experiences with commodity prices and crop programs, for example, reveal that many economic and political mechanisms for agricultural development are not conducive to smaller-scale, place-bound farms and enterprises.

Several project participants do expect agricultural bioenergy to be “good” for Iowa’s economy in a broader sense, by providing off-farm jobs that bring more capital into the region through multiplier effects, but again, have little hope that a bioeconomy could generate significant rural revitalization. More detailed analysis of this skepticism will be discussed below, including first an examination of the patterns that the market has established between agricultural corporations and their clients.

Corporate Involvement Inevitable

Agribusiness corporations such as Archer Daniels Midland (ADM) or Cargill have a long presence in southern Iowa, as in the rest of the state, and have left mixed impressions. When asked about corporate involvement, Iowa project participants explain that ideally the bioeconomy would be controlled locally with capital put up by private investors and entrepreneurs. As they elaborate, however, they concede this vision is
unrealistic. They believe the political and economic power of these types of large-scale agribusiness corporations is essential to the viable commercialization of bioenergy. Although a nuanced argument, it became clear over the course of the fieldwork that project participants see corporate involvement as one reason large-scale economic development hurts rather than helps rural revitalization.

Participants express ambivalence about corporate involvement, explaining that corporations would turn energy crops into a commodity and send value elsewhere. A libertarian stance was also evident as some farmers voice concern that corporate involvement would limit their power and voice and independence.

Sometimes I feel like these big corporations need to stay clear out if it. Well, it’s just kind of like on your big farms for livestock like a hog producer. I couldn’t live with these big corporations that come in here and put up these great big confinement systems. But a lot of these corporations put it in and they’re not even around here. They just have somebody to run it for them. That’s the way corporations like your biomass project, sometimes they would be telling us what to do. Whether they know what’s going on or not I don’t know. A farmer first-hand has a little more knowledge than some of these big corporations I feel like.

This small-scale, native, retired Iowa farmer is insistent on maintaining his independence, often seen as a characteristic trait of farmers in general. He also, however, is adamant that farmer knowledge not be subsumed by corporate policy, and this is an important point for agricultural bioenergy commercialization. Contract farming, at least to some Iowa switchgrass farmers, takes away the power and role of the farmer, and is not a desired organizational model. Another part-time female farmer and RC&D coordinator speaks to concentration in the agricultural sector as a problem, but maintains that independent farmers are still upholding their autonomy:

I don’t want to see corporate America owning all the land and the farmers just being hard labor. I don’t want to see that. I think that will be very sad. I don’t want to see
the concentration of the livestock that has been happening… I don’t want to see the Cargills and the ConAgras and the Monsantos and everybody then owning everything and we just working for them. That’s not my picture of the future of the United States. I think innovation and entrepreneurship would be dead if that was the case and I don’t think we are even close to dying.

A few Iowa project participants see corporate control as the biggest potential pitfall in the development of a bioeconomy, and assert the need to bypass corporate involvement at all costs. This native, 2500-acre, male farmer with a full-time job explains:

I would like to see groups of farmers kept locally. My biggest fear is that the big petroleum companies and corn companies will get into this business and as soon as they have controlling interest in this whole thing we’re going to just be right back where we are right now dependent on the big oil companies and they will drive the price and control the price.

These comments echo earlier hints about preference for smaller-scale industry, in which local stakeholders can have a voice in decision-making. Perhaps even more clearly they express distrust of “big business,” which is seen as undermining local control, local knowledge and entrepreneurship. Again, without saying so explicitly, these statements place project participants in some opposition to large-scale or outsider-driven economic development. However, despite voicing suspicion that corporate involvement will not just minimize economic benefits to local farmers, but also undermine their own influence and innovation, project participants like this middle-aged, non-farming coordinator tend to agree that corporate involvement in the developing agricultural bioeconomy is inevitable.

They do have the capital and they are the system, so it’s just a recognized part that they are there. To the extent that you can minimize the control of an industry at least until it gets up and going I think is good. The tragedy is that just like many of the ethanol facilities that even didn’t start early with farm-based cooperatives they are selling out to large entities. So that’s kind of a strange dynamic too in that even
though you do have something that does incorporate or create local opportunities and bring local growers together and local producers the natural progression is if they get it successful it’s worth a lot of money, so a Cargill or ADM is buying it anyway.

One facilitator-farmer rejects this inevitability, but explains that in order to bypass corporate dominance, advocates must move quickly.

So you can intervene from the standpoint of trying to get involved and trying to shape perceptions and trying to shape the direction of the project to at least interject these concepts or you can stand back and in a few more years I think the larger energy producers, Archer Daniels Midland will come in or Cargill. Anybody that’s going to develop a biomass facility and they will have the technology perfected to convert and they will just come and open up and say, “We’ll pay you X number of dollars and you deliver it.” So I think we have a very narrow window of opportunity.

A couple of individuals assert that these types of agribusiness corporations should be required to donate capital and resources to the development of the bioeconomy as reparations for a history of funneling farm profits away from the farmer. This view actually can be seen as a summation of participants’ concerns – agribusiness channels profits away from rural communities, but without corporate investment in research, equipment, and capital, a bioeconomy will not be realized. And again, project participants do want to play a role in an agricultural bioeconomy despite their skepticism that it will be financially good for them, because of on-farm environmental benefits, a desire to contribute to energy security, and as articulated in this comment by a lawyer and native, mid scale, farmer, a sense of competition in wanting Iowa to succeed as a major player in biofuels.

If we turn our back and we chase ADM and Cargill out of the state, they will build a plant somewhere else and they will cozy up with other senators and Iowa I think in the end will suffer. So I don’t see any reason to chase them out. I think we ought to find a way to partnership with them, use their research, use their financial and political clout to keep Iowa ahead of the game.
Only a few participants are enthusiastic about the role of corporate involvement. For example, one retired, small-scale male farmer originally from northern Iowa, asserts that the best researchers and facilitators are in agribusiness.

You’ve got to go with Cargill or Archer Daniels. You’ve got to go with them. I’m not putting universities down, but damn it they don’t encourage these young professors. They make them conform to the square hole and I’ve met some real young nice positive professors that are just not allowed to go very damn far in a university setting. They have got to get outside of the universities, so they join Cargill or Archer Daniels, thank God.

In a related vein, a native, older, large-scale, full-time, farmer explains his preference for a free market system.

We just need a free market system. The corporation that establishes an ethanol business that’s profitable that pays the highest price for the product going in will be the one that would get my switchgrass or my corn or whatever. It’s a situation where free enterprise has to develop so that it’s profitable for all the entities, for the producer, for the people that make the ethanol and the people that use it and buy it have to get it bought to reasonable, not for $3.00 a gallon12.

This latter comment, though trusting the invisible hand of the market to develop a balanced economics of ethanol, points to acceptance of a bioeconomy that has the same (low) profit margin as most other agricultural commodities. However, such a stance runs counter to national and state policy discourse that celebrates the potential of energy crops to revitalize rural areas. It means that there is nothing inherently different about the economics of energy crops, and project participants, be they advocates for or opponents of large-scale corporations, know and accept that. But at the same time they harbor a vague hope that the agricultural bioeconomy components which are different from mainstream agricultural commodities (including public interest and the political and

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12 This comment speaks to the rapidly-changing nature of the bioeconomy. With gas prices pushing past $4/gallon as of July 2008, the economics of ethanol (from corn or new generation feedstocks like switchgrass) is rapidly evolving and undetermined.
environmental implications of energy supply) could push for new directions of
development that would emphasize certain benefits (even the viability of rural
communities) over others, such as corporate bottom-lines.

Reluctance and Advocacy for Cooperatives

Cooperative organization is one strategy for adapting agricultural economies so
that profits are distributed more evenly and circulate locally. Project participants
advocate for cooperative investment at all levels of bioeconomy development as a way of
bypassing corporate dominance. This native, small-scale, farmer and native grassland
advocate explains:

A bunch of little farmers out here, they will pinch us off like a bug. We don’t even
qualify as a bug to be swatted. We are so insignificant, but we have the power if we
can get together regionally as a block. I think we could at least have somebody that
could sit up there at the table, not completely out here in the parking lot screaming
about it. But we might be able to get to the table a little bit.

The CVBP is seen as a likely model for organization, with individual farmers
owning land that is planted, managed, harvested, stored, and transported by managers
hired by the cooperative, in which the farmers are members. Cooperative ownership of
biorefineries, which was initially the common practice with corn grain ethanol in
northern Iowa, is also seen as the best way to keep profits circulating locally and ensure
both a voice and an income for farmer-cooperators.

With these recommendations, however, participants (especially project
facilitators) voice uncertainty that southern Iowan farmers would agree to participation in
a cooperative. In large part, they allude to cultural reasons. According to one older,
native, large-scale, full-time farmer,

…well, it’s kind of been proven that at this point by the ethanol people that you just
about have to have a cooperative or a LLC or some means for a group situation. …if
an individual wanted to deliver switchgrass to a unit that was producing electricity or producing ethanol with switchgrass, he would have kind of a hard time unless he was part of a group. But southern Iowa is notorious for individualism, wanting to be independent. I don’t want to be part of a cooperative.

This comment speaks to how farmer identities and culture have been shaped by past experience. According to another facilitator, native to the area, “it seems like the farther north you get, they pull it together and make it happen... The farther south you go, it’s almost like they wait and let it happen to you, because they are not proactive. Maybe it’s just poor quality ground; you know they have less to start with. It seems to be a different mindset.” If it is real, this mindset could have significant implications for bioeconomy development. The ties this project participant draws between the land, residents’ socio-economic status, and their psychology or mindset borders on geographic determinism, and yet there may be some truth in his assertion. Farmers in the Corn Belt (farther north) are more likely to have larger acreages, more access to capital and credit, and a bit more financial cushion in their farm budgets. These advantages may give them more confidence in investments, like cooperative ownership of a biorefinery for example, than farmers in southern Iowa, who are struggling to make a living on very slim margins.

These points help elaborate theoretical notions of legacy and place. They reveal a strong relationship between project participants’ perceptions about biophysical conditions (like soil quality) and social and economic conditions (like income and psychology). Additional questions emerge, however. Where are the boundaries between “north” and “south” in Iowa? Can they be delineated solely by soil deposits and glacial history or by social psychology? Is the (potentially) anti-cooperative sentiment in southern Iowa fixed and inescapable? Perhaps more usefully, what might the relationship between geography
and soil and independence suggest in terms of the needs and abilities of the residents of southern Iowa?

A local small-scale farmer and facilitator explains his interpretation of the needs and abilities of (especially southern Iowan) farmers:

[Farmers] need a lot of re-education on how to work together. They need to learn what a limited liability corporation can and cannot do. They need to learn how to cooperate. Farmers have always been taught to be independent, strong, silent, and all this good crap, and one farmer can’t do squat in today’s world. One can, very special individuals the innovators, maybe 1-1/2 percent of the population are equipped to be an innovator. You got your early adopters. They might be able to get in on the tail end, but the real wealth reaction is always by the innovator; the guy that’s willing to take the risk to think outside the box. The vast majority of them are going to be so far behind all the power and all the profitability is going to be out of that enterprise. So they’ve got to be able to band together and try, try, try to control one facet of it. All of our business structure has to start looking at partnerships. Now it doesn’t have to be equal, but equitable partnerships or business relationships. We’ve got to get these folks together working together, not as an NGO type organization, but a group of intelligent, motivated citizens that can work together.

Another middle-aged, non-farming, male, facilitator expresses a similar attitude:

And farmers are interesting to work with because I think they have been working within the current system so long it’s hard to get a group to think, “Wow, we should grab a hold of this, move ahead and try to develop our own market and try to figure out our own arrangements and own it ourselves.” They are more interested in “I will produce it when you tell me what you’re going to pay me for it.” I’ve gotten that response.

These comments uncover important considerations for economic development in the region. If cooperative organization is the best way to avoid corporate dominance and promote local benefits, but farmers are not willing to participate in this type of organization, alternatives need to be developed. Some participants are looking to state programs as an alternative to cooperatives.
The Necessity for State Programs

In recognition that southern Iowa is not yet capable of supplying a biorefinery with an adequate mass of feedstocks, participants spoke of the importance of programs like the US Conservation Reserve Program (CRP) in providing incentives for the production of energy crops. Participants see CRP-type funding as essential to building an energy crop supply. Because switchgrass takes up to three years for the establishment of a full stand, some sort of incentive is necessary to cover the lack of income in those three years. This time lag means that supply must be addressed long before a market is functioning, and in order for a market to be established.

Respondents almost unanimously called for some sort of CRP-type program (one suggested the title “Energy Crop Reserve Program”) in order to deal with the time lag and provide farmers some risk insurance. Because the CVBP relied on CRP funding, it is probable that participants saw a similar situation as the most likely option. At the same time, however, farmers like this large-scale, native, full-time producer of row crops and pasture ground, are overtly critical of CRP requirements, and spoke of the need for reform and more local decision-making.

It’s ridiculous. I go up and they say, ‘Well, the only way you can do that is you’ll have to tear that switchgrass up and you’ll have to have row crop for at least two years and then put it back to switchgrass and enroll it in CRP.’ Now that isn’t any kind of management that makes sense at all to me.

The recent incentives for planting mixed stands of grasses, wildflowers, and legumes for the purposes of providing wildlife habitat also received criticism. One small-scale farmer, retired from his off-farm job says, “I’m not happy with that many rules and

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13 A similar program actually was established in the 2008 Farm Bill – this fieldwork was conducted before that Farm Bill was passed.
regulations changing [in the CRP]. To me the erosion problem is worth an awful lot more than the birds,” explaining that he is impressed by the role of CRP land in soil conservation, but upset by the disincentive to plant monoculture switchgrass.

In addition, half of the Iowa participants seem defensive of this call for government funding, insisting that they’d rather rely on free market mechanisms. While only one farmer explicitly refuses to participate in CRP or any other agricultural subsidy-type program for ideological reasons, many express the wish that they did not have to rely on such programs. The single producer who refuses to participate in government programs, a 50-year-old man with 2500 acres and an off-farm job, muses about how biofuels could be free of federal organization and benefit farmers, even on a small scale.

So now if I could buy my own still and just make my own [biofuels] at the farm to put in my vehicle and then feed the byproduct to my cows I think that would work pretty good. But then they want to figure out a way to tax me on fuel because I wouldn’t be paying any tax like I do now… But if I was just doing it for my own use then what does that amount to? I don’t know. It could be beneficial to myself.

In terms of bioeconomy development, respondents generally saw this type of funding as a short-term boost to help establishment. They also pointed out that many other industries, especially those with which agricultural bioenergy would compete, are subsidized in a variety of ways. Those who rejected CRP-type funding for energy crop production, while in the minority, had concrete arguments for doing so. One participant recognized that the CRP (perennials for conservation) would likely be a competitor for switchgrass production (perennials for feedstock supply). Another suggested that CRP increases constraints for young farmers by keeping older-, retired-, and non-farmers on the land. These considerations again reveal project participants’ awareness of the complexity of developing an agricultural bioeconomy that maximizes a wide range
benefits. If environmental conservation and feedstock supply are necessarily competitive goals, tradeoffs will be required. On the other hand, noticing these types of competitive relationships can highlight constraints to a socially- and environmentally-beneficial bioeconomy, and create space for more productive discourse about solutions.

Some respondents also called for government funding at the research and processing levels, but were vaguer about those needs. The government’s role, according to a couple respondents, is to find the big gaps in the technology, where risk is too high and corporations cannot deal with it, and “build those bridges for public benefit.” RC&D employees, like this woman with a 400-acre farm and 30 acres in switchgrass, suggested that their organization is uniquely situated to provide help in building a bioeconomy, especially in getting technology implemented on the ground, and working with farmers and community member to help facilitate cooperative organization.

I think there is a huge disconnect between the research and development putting on the ground and that’s also where one of the roles I guess the RC&D could help with. I’m not saying we could do it, but we could sure help with that because that’s what we are good at, taking things and getting it on the ground.

In sum, the general sentiment about government funding and programs among participants is that it is necessary. Anti-government and free-market libertarianism sentiment was expressed, but despite past experiences with government projects gone wrong (i.e. multiflora rose establishment), participants approved of CRP for help with retirement income as well as for its soil conservation impacts, and were open to the idea of a similar program to help facilitate the development of a bioeconomy for the good of the economy and environment of southern Iowa. Project participants tended to have more neutral feelings about the government in general, especially compared to
corporations, but they did not expect state programs to be able to create an agricultural bioeconomy that could save rural America.

**The Kentucky Switchgrass Project: Preservation and Production**

Having now presented the perspectives of participants in the Iowa switchgrass project, I turn here to the second major component of the fieldwork, which was carried out in northeastern Kentucky. As discussed in Chapter Four, the Kentucky switchgrass project tended to be more focused on on-farm logistics than on farm-to-processor storage, transportation, and processing, which was the logistical focus of the Iowa project. The Kentucky project’s on-farm emphasis has two main reasons. First, forage specialists are coordinating the project and second, the project is so new, it has yet to organize the movement of a switchgrass harvest to the energy production phase, although that is the intention. Despite these facts, most participants (i.e., farmers, county agents serving as facilitators, and University researchers serving as coordinators) in the Kentucky project self-identify as well informed, but several readily admit they are “not really” up to date on developments in the bioenergy arena. They tend to be mixed in terms of their general attitudes toward bioeconomy development. Many individuals are interested or neutral-to-negative when I asked about their general impressions, while others are excited – either about the potential benefits to the environment, the potential for an alternative fuel that could contribute to energy security, or about potential contributions to the rural economy or farm economics. Overall, the basic attitudes of the sample paralleled those of Iowa project participants regarding the potential of bioeconomy development.

A prominent theme emerging from the Kentucky fieldwork was participants’ marked acknowledgement of the region as marginal in the context of American
agriculture. Project participants suggest that the small-scale production capabilities of the region minimize their ability to play a role in many different agricultural sectors, including energy crops. The twin themes of legacy and place are visible throughout participants’ observations, in terms of this casual acknowledgement of the limitations (e.g., ecological, economic, scalar) of their region and its relationship to the national economy, and in references to the biophysical and socio-economic history of the area. In the wake of tobacco dominance, agricultural biofuels look like just one more attempt at building productive diversity and providing avenues to keep farmers farming, even if only part-time. Participants’ resigned outlook characterized their comments about a range of issues, starting with biophysical and environmental concerns.

Land Conservation a Priority

When asked, almost all project participants did identify as environmentalists; though a couple qualified the term, most seemed comfortable with the label. General environmental perspectives include: (1) progressive conservatism, as articulated here by a part-time, mid-scale, farmer with a full-time job: “I track how well the farm does by how much money it makes per acre. If I am looking at new crops I think, ‘how much return per acre can I get out of something?’ So like I said, I try to utilize every acre to the best of what it can be used for without hurting anything,” and (2) land stewardship and conservation, as explained here by a native, but non-farming county agent: “I think anybody that is involved with agriculture is an environmentalist. I don’t think there is a farmer out here that doesn’t consider things… when making decisions that he is going to do the best as he possibly can to protect his soil and his land and things like that. So I
think the farming community are all environmentalists.” By far the more common of these two environmental perspectives is the idea of land stewardship.

Farmland conservation is the component of stewardship that most concerns Kentucky participants. A young, full-time farmer, recently returned from a farm research trip to Brazil (unrelated to biofuels) explained:

[Brazilians] have an appreciation of what the land can produce. That we don’t seem to have here. We always had the next technological leap that has kept our production going up even though the amount of land in production has gone down. Then farmers adopt no-till technology and they are able to crop ground that they were not able to crop before. You know so that kind of brings that up, but when you pave it over and when you build a subdivision on it or if you are a farmer and you sell a dozen lots off the front of your farm or give one to your kid or stuff like that, that is an acre of ground that is not going to be used for farming any more.

This participant’s understanding of what Schnaiberg et al. (1999) call the treadmill of production incorporates an ethic of land conservation that is overlooked when productivity is the primary objective of agriculture. He expresses a value in farming that goes beyond yield maximization, and is quite reminiscent of multifunctionality. His concern with the loss of farmland was shared by many participants. A profitable agricultural bioeconomy, then, may be able to keep more people farming and help stave off urbanization and land development. For the most part, though, energy crops were not expected to address participants’ environmental concerns.

Only one individual saw ecological benefits as the main goal of bioenergy development. This may be in large part because farms in northeast Kentucky tend already to be in hay and forage, with only small plots of row crops, often no-tilled. Transferring from these types of low-input systems to energy crops like switchgrass creates much less of a net environmental benefit than transferring from a corn-soybean
rotation to a perennial system. When I asked why farmers do not seem to want to grow row crops in the region, a county agent says:

They learn. If you are driving around in some of this area and some of these real steep hill sides and how they’re eroded ... That occurred back in the 40s and 50s and that is when a lot of these farmers were growing up. They know what happened then and I think you learn by mistakes. With the cost of fuel and the cost of nutrients to put on this marginal-type land, I do not think you will see that type of thing occur in this part of the state again. This is a grass area now.

This observation – that current farmers’ production practices represent the combined outcome of heritage land (mis)management, the present-day economics of agricultural inputs, and the biophysical characteristics of the land itself – ties directly into the notion of legacy elaborated in Chapter Three. Legacy, then, plays an important role setting the stage for perceptions regarding the feasibility of various bioeconomy models. Large-scale corn grain ethanol is seen as simply inappropriate to the land and producers of northeast Kentucky, for example.

A few participants mention the goal of decreasing global carbon emissions through the production of biofuels, but for the most part, the ecological contributions of an agricultural bioeconomy are seen as less of a priority by the Kentucky farmers and facilitators. Again, the legacy of the region’s social, economic, and biophysical history has created a climate in which farmers have internalized land stewardship to such a degree that they do not even recognize it as such. This legacy has left producers a limited slate of productive choices because they see a certain set of assets and obstacles to take into account. Unless one of the lucky few with rich riverside bottom land, farmers in northeastern Kentucky make do with crops, like switchgrass, which hold soil, require little cultivation and few inputs. Therefore, while a switch to a different species of grass to be used as a feedstock for biofuels may have some management challenges, it is not
seen as likely to appreciably improve farm soil or water quality. In this way, environmental issues are not a high priority in the switchgrass production decisions of project participants in Kentucky.

Renewable Energy a National Necessity

Energy issues, however, are of greater interest. Several project participants cite energy independence as a major benefit which bioenergy development might bring about. Some expectations were characteristically conservative. A young (30 year old), college-educated, full-time farmer (fourth-generation on the same farm) remarks, “I think the benefit of ethanol is it is the stepping stone. It is the bridge that gets us to the next level of technology when we can be free of the fossil fuel albatross around our neck.” The growing criticism of corn grain ethanol in the media has left its mark, but many of the Kentucky project participants maintain that agricultural biofuels are a necessary contribution to moving the American economy away from oil and toward a more renewable energy supply. Other comments, like this one from a native, but non-farming project coordinator, are more fervent:

I think we are called to do it. I think it is our charge that with the current situation with fossil fuels and our energy consumption here in the United States and abroad… None of us know where this path is going to lead us. Our charge is to start answering some questions to start opening some doors as to what our potential is and what our possibilities are. Can we do it? Is it economical? Is it farmer friendly? Is it good for the environment? So it is just such an undertaking, but I think for future generations -- for my children, or at least my grandchildren -- we are going to have to have an energy policy that encompasses green energy and not just fossil fuels. So do we have all of the answers? No. But I think it is crucial that we do it.

Heeding the call to grow energy crops sounds zealous, but this comment also conveys realism in accepting the unknowns of agricultural bioenergy and asking questions about the tradeoffs among capability, profitability, productive and social
concerns, and ecological consideration. Other Kentucky project participants also speak of the potential for reducing American reliance on oil from the Middle East as a way to avoid military entanglements, much like Iowa project participants. But again, energy security was not seen as the primary goal for bioenergy development. Project participants see the potential contribution to rural revitalization as the most important benefit for Kentucky.

_The Elusiveness of Rural Revitalization_

In order to explore the salience of rural revitalization to project efforts, I asked participants how they viewed trends commonly associated with rural restructuring (e.g., farm concentration, the marginalization of small farms and small towns, aging farmers, barriers to entry for new and young farmers). Many bemoan these changes, but see them as inevitable. A handful of participants envision some possible gains in agriculture from rising prices for many commodity crops in recent month, but at the same time insist that full-time farming will never again be a viable way-of-life. This fatalism may stem to some degree from the loss of tobacco as a thriving cash crop opportunity, but it also emerges from concern about various adverse cultural and economic trends.

One part-time farmer with a full-time job and a goal of being a full-time farmer explains, “I would love to see the trends reversed. My father raised our family at a time that he could provide us a decent living farming, you know, on 150-200 acres. That day is in the past, I think.” Project participants mentioned land loss (to residential developments, especially) an irreversible problem that contributes to this prediction. Other influencing factors mentioned by participants include: changes in agricultural economics which favor larger-scale enterprises, the high costs of what are today seen as
necessary capital investments such as machinery and agricultural inputs, the end of the
tobacco quotas, and lifestyle changes such as the desire for more consumer goods, and
saving for children’s college funds.

The dual nature of these factors seemed to influence participants’ opinions about
the value of small-scale farming and the viability of rural communities. Changes in the
economics of farming seem to have come from the outside, from corporatization and
agricultural policy. Full-time (or recently full-time) farmers are especially frustrated by
these developments. On the other hand, consumer preferences seem to have changed
from the inside. Many project participants who farm part-time express satisfaction with
being able to maintain the assets of farm living (e.g., know-how, independence, privacy,
a connection with the land) as a part-time enterprise, or even as a hobby, while funding
these preferences with an off-farm career.

One project participant, recently retired from an off-farm career and now farming
full-time, insists that if a person works hard enough, long enough, he or she can still get
into and make a living farming. Another local businessman and farmer/landowner
maintains that rural revitalization is imperative, “because America is the bread basket of
the world.” He feels that if young people continue to leave the farm and agricultural
livelihoods grow even less desirable, farm production will drop, and hunger will spread.
But based on participant responses, an agricultural bioeconomy is not necessarily seen as
the way to accomplish this. When asked if an ideally-organized bioenergy economy
could help revitalize rural areas and farm sectors, responses were mixed. Many
participants say that if it is made profitable to grow energy crops, and this is an essential
“if,” the bioeconomy might possibly help to some degree. Another full-time farmer with a booming laugh explains:

Your big oil companies are going to spend as little as they have to get [bioenergy feedstocks] and the farmer will produce more than he needs to, and the profit margin will probably fall just like everything else. Real marginal, just enough that the farmer can survive. That is what I see with the history of the farm, whether it be milk or whatever. So unfortunately once it all balances out, the margin will probably be just enough to keep a farmer there growing it and that’ll be it.

(Interviewer): So it would not necessarily be good for farmers?

Well it won’t be no worse. It would just be the norm. (Laughter)

This comment, and others included here, details the reasoning behind the opinions expressed. This farmer explains how he has seen the profit margin fall to “just enough that the farmer can survive” before, and that is why he expects a similar trend with energy crops. This is a shared expectation among most project participants, which is derived from their experience with other crops. This economic experience has resulted in resignation to small profit margins and suspicion of schemes to significantly increase farm profitability. This resignation is accumulated throughout a life and even passed down from previous generations.

The most optimistic of project participants concede that an agricultural bioeconomy will help part-time farmers (because of the minimal labor requirements for switchgrass and other bioenergy crops), but that it will not bring people back to farm full-time. One concern is that it could hurt small farmers if they have to compete with the biofuels industry for cattle feed. These types of trade-offs concern many farmers, like this young man with a mid-sized farm and an off-farm job, who says:

It was like I was talking to that dairyman earlier, there has never really been a time where cattle farmers and grain farmers have both prospered at the same time. It is generally at the stake of the other one. You know I mean grain producers are having
it good right now and that has caused a little bit of hardship on cattle producers. While cattle producers have had it good the last few years and that is because of there had been $2 and $2.50 corn. So someone is generally hurting for the other one to prosper and it seems like it always runs in cycles.

Competition is an important consideration for the logistics of agricultural biofuels. Corn prices rose dramatically in 2007 and 2008, because of competition between feed and fuel demand. The economic feasibility of biofuels rests on whether they can compete with fossil fuels. This farmer’s concern, however – the competition between farmers – is a key obstacle to rural economic development. Will promoting switchgrass for biofuels inevitably hurt cattle farmers who need cheap hay? Will it contribute to further divides between animal and crop agriculture? Project participants are aware that these questions have yet to be adequately answered, and so they have low expectations that energy crops will provide rural revitalization.

*Agribusiness Not Conducive to Small-Scale Benefits*

Another concern was that any significant profits made available in a bioeconomy will be reaped by big business. The role of large-scale corporations (I mentioned Cargill, BP, and Monsanto as examples) was a prominent issue in the interviews. The general sentiment expressed by Kentucky project participants is that in order for local residents to see economic benefits, it would be best to avoid corporate involvement in bioenergy industry development. Several of these respondents, however, admit that they believe a corporate role to be inevitable. As one middle-aged farmer with a young family, newly-retired from an off-farm job as a game warden, and dedicated to attracting wildlife with native plants, puts it, “I don’t think you can stop those people.” Others were unsure or
neutral, but only one participant advocates for the role of private industry in the development of the bioenergy sector.

At the same time a few participants point out that the small farms of the region have compelled little corporate investment thus far, and explained that they doubt agribusiness would have any interest in the (minor) scale of bioenergy industry which northeastern Kentucky would most likely be able to develop. There was a clear understanding that large corporations like Cargill or Monstanto are organized to have economic relationships with large, productive farms. That does not describe the agricultural production of the study region. Several farmers told me how they had to drive long distances to sell their hay or row crops – large-scale agricultural corporations have little incentive to invest in such an economically marginal area. Overall, project participants are pleased to be overlooked by these corporations.

A common reason articulated for this position was that although these types of corporations are good at business, and have the resources and skills to further bioeconomy development, history has shown that neither their logistical organization nor their priorities are in line with those of small farmers (and that is putting it politely, relative to the way some participants phrased it). As one farmer says, “you know and I know that they’re no good, but they have money and power and that’s just the way it is.” Another mid-scale farmer with a full-time job explains that small farmers need a “bill-of-rights” to protect them from the maneuvers of big corporations:

Farmers need a bill of rights. These large corporations, they are the ones that got the voices in Washington, and Monsanto, they get a huge return on a bag of seed. When it is all said and done, the farmer stands by himself.

He goes on to explain:
The farmer never would unite in a cooperative, I mean I have seen when I was younger, NFO and different ones, that they wanted to stop milk production or they wanted to do whatever until the prices came to where there was a margin there where you could afford to live. There is no energy amongst farmers. They will never organize. They will never control production to where as supply and demand puts them in a reasonable spot. So based on that there needs to be a bill of rights for farmers and the corporations that are dealing with farm products, there needs to be someone sitting there standing up for the farmers.

This interesting comment ruins my neat organization into remarks about industry, cooperatives, and then state programs, but it touches on a variety of important issues to the situation of farming today. This farmer acknowledges at once the seemingly all-encompassing power of agricultural corporations, the marginal economic role for farmers, the need for some sort of government protection to accompany farmers on the road to liberalized agri-food systems, and the fiercely independent nature of farmers.

Though a more common stance among participants in Iowa than in Kentucky, this desire for autonomy is still clearly a constraint to cooperative organization. But in this particular farmer’s comment, we hear concern for autonomy with oversight.

*Cooperatives Promote Equal Treatment for Farmers of All sizes*

Kentucky project participants tend to be advocates for cooperative organization as a solution to the bramble of problems associated with corporate dominance. They see a cooperative model as a way of building a community bill of rights, keeping profit circulating locally, and creating systems of decision-making that distribute power and voice equally to larger-scale and smaller-scale farmers. This last consideration – equal treatment (including payments and voice) regardless of scale – was an especially important concern to project participants. A youngish, native, ex-tobacco producer and now part-time cattle farmer with a full-time job remarks, “I think a co-op would be a good thing as long as it is run right and everybody is treated fair. You know, even though
a guy can bring in ten ton to sell versus the one that is only bringing two ton to sell, they would get the same respect and the same price for the product.”

Again, this sentiment seems to be a product of this specific place and its legacy. Because a farmer could make a living on a very small acreage of tobacco in northeast Kentucky, economies of scale have been less important in this region. The burley tobacco cooperative was organized so that price per ton was the same regardless of how many tons a farmer had to sell. This system contributed to the economic sustainability of small-to-mid-scale farms, and left behind an insistence on this kind of equal treatment. In the current agricultural economic climate surrounding many commodity crops, however, economies of scale often make for large power differentials, and project participants have learned that they are marginalized in terms of the national market.

This reiteration of the marginal position of small farmers, and project participants’ identification as small farmers led to another position – that large-scale corporations will have no interest in the project region because of its low productive capacity. Because of the legacy of the region, project participants express a sense of pride in fighting the pressure to “get big or get out.” One middle-aged, native farmer and ex-trucker explains the importance and logic of staying small-scale:

You have to supposedly make more and become bigger when really we ought to trim back and concentrate on doing a better job and smaller investment. But it has continued that way for several years now and I don’t know… I don’t think it is particularly good. It is like large companies. It seems like every time a big company buys out a lot of smaller companies, the quality of life for the workers and everybody else goes down.

In this way the potential for cooperative organization to support economically sustainable small-scale farms and enterprises is attractive to Kentucky participants. Past experience with the burley tobacco cooperative and the success of farmer-owned
biorefineries in the Midwest seem to make project participants optimistic about the opportunity for cooperative organization. A project facilitator maintains, “I think they have an openness to what will work. An openness to working together with each other.” But as these comments show, participants remain more reserved than enthusiastic: “I think that there is a structure already out there where individual corn growers have invested in ethanol plants. If that is the template that they are talking about, a cooperative for switch grass, that one might have some merit. That might be able to work.” Project participants in Kentucky, including this native county agent and part-time farmer, are just now at the stage of thinking that far into the future, but many seem to think it has the most potential for keeping economic benefits circulating locally.

[Pelletizing] gives people a feeling that they are utilizing something local. It could be marketed within their own area. When you look at the profitability for producers something like that could be even developed into a small co-op of ten or twenty farmers who build a facility and buy a small machine to pellet the product and then retail it. So not only are they selling the raw product, but they are adding value to it and then capturing some of that in the market place.

Kentucky project participants, in general, are not looking to compete on a national basis in biofuels production. The emphasis here is on the viability of small-scale farmers, and creating sustainable regionally-integrated enterprises. Cooperative organization may be one method of accomplishing this, but state support could either stall or facilitate this type of development.

State Programs Need Restructuring

The general impression about government funding for supporting agricultural bioenergy is fairly homogenous across Kentucky respondents. Project participants feel that government funding needs to move down the chain and focus more on (especially
small) farmers as opposed to having the majority of incentives at the refinery or pump level. “They just need to involve us more,” insists one young, part-time farmer. Some project participants see government programs as the only way to avoid corporate domination, despite the fact that they feel that most government programs, too, end up designed to favor big farms. One older, full-time tobacco and row-crop farmer explained to me the trials he experienced in efforts to participate in a government cost-share program that was unequipped to deal with a farmer of his (small) size.

Participants also speak to how government-provoked demand for biofuels is trickling down to farmers more successfully even than programs specifically catering to agriculture. The renewable fuels incentives have contributed to a rising demand for corn which has raised prices dramatically, which have in turn contributed to higher farm incomes. A businessman and part-time farmer says, “Well, I think the [2007] energy bill will pass with the incentives for the construction of the plants and so forth. It is going to be a boost. I was listening to a farm show last night. They said a lot of farmers consider [the 2007 energy bill] the farm bill.”

These types of comments display the degree to which project participants – farmers, facilitators, and researchers – are aware of large-scale trends and the ways in which their community and local economy might fit into and/or clash with those developments. To a large degree, it is the clashes that participants highlight in their comments. Participants’ understanding of the specific biophysical, socio-economic, and historical characteristics of their place allow an acknowledgement of the constraints facing an agricultural bioeconomy that benefits small-scale farmers and marginalized regions. They are suspicious that corporate investment will create economically
sustainable opportunities for farmers like themselves, and they are doubtful that state programs will facilitate scale-sensitive networks. Their optimism rests in locally-integrated cooperative enterprises that are lower-technology and diversely-integrated – not one small producer in a giant ethanol industry. To a large degree these reactions are shared with participants in the Iowa project, but there are also some interesting variations between the two places that highlight how specific legacies may influence different interpretations.

**A Legacy of Development: Iowa-Kentucky Comparison**

Variations across the Iowa and Kentucky projects were most apparent in three main areas. Participants differed in their emphasis on environmentally-sustainable farm practices, on their perspectives about corporatism, urbanism, and sprawl, and in terms of their receptivity to cooperatives and the importance of scale. Each disparity between participants in the two regions, however, was accompanied by values and attitudes held in common. Indeed, the two projects were comprised overall of participants who expressed more similarities than differences, which intuitively fits with the model of legacy, since the two regions were fairly similar in terms of landscape, economic marginality, and lifestyle. These broad similarities, as a result of being rural residents in relatively economically-marginal, hilly regions however, are textured by more subtle differentiation as referred to above, in terms of specific livelihoods and legacies.

*Environmentally-Sustainable Farm Practices*

One of the variations uncovered in comparing the views and concerns of participants across the Kentucky and Iowa projects concerned engagement with environmental issues. Almost all respondents in both states identify as environmentalists
when asked, but Iowa project participants are much more likely to qualify the term (e.g., practical environmentalist, or conservationist). Kentucky participants tend to be more comfortable with the environmentalist label. But participants in the Iowa project tend to be more enthusiastic about the potential environmental benefits of bioenergy development, especially on-farm benefits. Only one Kentucky participant cites environmental benefits such as carbon emissions or soil conservation as a priority, and Kentucky farmers had to be persuaded to describe their on-farm environmental management. The following exchange in an interview represents a fairly typical response when I asked Kentucky farmers about their on-farm management for ecological benefits:

Q: What environmental issues do the farmers around here have to deal with and how do you deal with them?
A: Hm, that is a good question. I don’t know…. I have not really thought about that.
Q: Well you have hills here. Do you have a soil erosion problem?
A: Not really because I try not to cultivate slopes very high. The percentage of sloping land and rotate crops to grass and to row crops back and forth.
Q: So that is how you manage it?
A: Yes.
Q: And is that how your dad did it? Is that how things have always been managed here?
A: Well pretty well. I am actually not doing as good a job as they did. They rotated more often than I do. They did not have the row crops that I have had to maintain. It was mostly grass. You know they would cultivate ten acres maybe or twenty at the most in a year’s time and then sow it back down.
Q: Wow. Do you do no-till at all?
A: Yes some. Some no-till. Some minimum till. A little bit of full till, but a lot of no-till and a lot of minimum till.
Q: Do you decide which of those you are going to use based on the land or how do you decide?
A: Some on the land. Some on the time of year. The crop that was in previously. It is different. I do different things different years. You know depending on the situation.
Q: Right. You sound like you are good farmer.
A: Ah, so, so.
Q: If you didn’t have any financial constraints, how would you manage your farm? Would you grow more like your dad or….
A: Probably. We would go back to more grass and especially at my age and right now, but with price of crops and price of cattle right now, I really can’t afford to. I have to raise several row crops for my income.

This interview took place in a tobacco barn, sitting on a trailer, and the farmer, an ex-trucker farming land that has been in his family for generations, went on to tell me how he was hoping his daughter would continue to farm, at least part-time. I highlight this exchange because it demonstrates how the Kentucky farmers in practice tend to be stewards of agricultural operations just as ecologically-sensitive as those of the Iowa farmers, but still remain much less likely to identify their practices as explicitly “environmental.” Kentucky farmers needed to be prodded to discuss their conservation tillage and crop rotation practices as instances of environmental management. When farmers with the CVBP in southern Iowa were asked the same initial question, “What environmental issues do the farmers around here have to deal with and how do you deal with them?”, they quickly listed various, widely recognized “environmental management” techniques they use to address soil erosion, steep slopes, water quality, and wildlife concerns.

This difference may arise from two aspects of legacy. First, despite similar topographies (and more marginal land in the Kentucky study region), the southern Iowa study region faces greater pressure to plant row crops on marginal land. Since corn and soybeans are dominant agricultural commodities in much of the state, the agricultural media outlets, the extension service, and the farm supply stores focus overwhelmingly on those crops. In northeast Kentucky’s hills, on the other hand, pasture and hay have been recognized supplemental enterprises to tobacco production for the past generation or two. This pressure to grow row crops in Iowa must be countered by an explicit awareness of
reasons to counter the profitability of corn, and these generally tend to be ecological reasons – that the land is too vulnerable for this type of row crop farming. A second likely reason is that the Iowa farmers were all (but one) enrolled in the Conservation Reserve Program, which makes explicit both the need for environmentally sustainable farm practices, and pays a higher price for best practices.

Related to this issue, however, both groups hold precious the aesthetics of their farms, and have had to come to terms with the shaggy residue on no-tilled fields, or with the sparse, weedy stands that are switchgrass in its first year. Many farmers from both Kentucky and Iowa, however, made this transition, and find deep beauty in wilder-looking perennial grasses and the wildlife habitat they provide, as reported earlier in this chapter.

This identification with the non-economically productive capabilities of their land is important as it serves as a motivating factor for participation in an agricultural bioeconomy from which they expect little economic benefit for their farms or communities. Wildlife habitat, especially, was seen as an asset for hunting as well as for the aesthetic and recreational pursuit of bird watching. These qualities express the multifunctional ability of small farms to create various benefits.

Another commonality across the study regions was that neither set of participants emphasized carbon emissions or global climate change as issues for which energy crops are important. One or two individuals in each group briefly mentioned decreased emissions as a benefit of agricultural biofuels, but it was not emphasized as a priority. This could be seen as a scalar issue. This research indicates that farmers are most concerned (if skeptical) about local socio-economic benefits, and then about national
energy security, which in turn impacts global diplomacy. But countering global climate change is still perceived to be outside the arena of immediate possible impacts.

Corporatism, Urbanism, and Sprawl

Another difference between participants with the two projects is that the “avoid corporations” sentiment in Kentucky can be seen as more practical/logistical in nature – that the region cannot produce on a large enough scale to interest big industry. In contrast, participants with the Iowa project voice more explicitly anti-corporate stances. Some Kentucky participants do express anti-corporate sentiments, and a core group of Iowa participants express very favorable opinions about large-scale corporations, but the original distinction was clear. This may, again, be due to the prominent role of agricultural corporations like Cargill, ADM and Monsanto in Iowa. Kentucky agriculture, especially in the project region, is less centered on commodity crops, and thus these types of corporations exert less of a presence.

Rural out-migration and (sub)urban sprawl are encroaching in both regions however. A commonality across study groups was dissatisfaction and concern with urban sprawl. While both the Chariton Valley and the northeast Kentucky region remain rural in character compared to other areas of their states, they are experiencing both land purchases by absentee landowners interested in recreational land uses, and also more rural neighborhood subdivisions. Participants with both projects fear that these developments will raise land prices and take land out of agriculture permanently. As briefly discussed above, project participants advocate for multifunctional landscapes, (although they might not use the term “multifunctional”). In fearing that land might be taken out of production, they are concerned not necessarily or solely about losing
productive resources, but more so about the loss of lifestyle, aesthetic changes, and encroaching urbanism. This suggests a lay concern about the multiple functions which farms can serve. These fears are not necessarily directly tied to the development of a bioeconomy, but are underlying concerns that may nevertheless be affected by increased production of energy crops. For example, some Iowa participants speculate that absentee landowners could have switchgrass grown on their rural acreages with very low labor and input requirements. This enterprise would defray the costs of owning a “country home” and could accelerate purchases of agricultural land by absentee landowners.

*Cooperatives and Scale*

The necessity of avoiding negative impacts is paralleled by efforts to amplify potential benefits. An additional distinctive divergence between project participants in the two study regions was their attitudes toward cooperative organization. The Iowa project participants express less willingness to become part of a producer collective arrangement, while the Kentucky project participants convey readiness to participate in such a system. Kentucky project participants make a bigger point of talking of themselves as “small” farmers, and perceive cooperative organization as a way to gain power and voice. This difference may be linked to psycho-social patterns and propensities not directly studied here, but it is equally possible that largely favorable experiences of many Kentucky farmers with the burley tobacco cooperative gave project participants there an auspicious impression of cooperative bargaining power.

Interestingly, if this is so, the impression may be mistaken. The tobacco co-operative was unique in being shaped by a specific set of historical, economic, climactic, topographic, and political circumstances, and it is by no means representative in
organization or outcomes of all agricultural cooperatives. One project facilitator speaks
of the burley co-op as an arm of government. Farmers and ex-members spoke of it in
ways that suggested they saw it as an independent entity, and saw themselves as clients,
rather than as active members. This is a different cooperative model than that envisioned
by Iowa project participants, who saw cooperative members developing and regulating
their own economic organization. This dissimilarity may link to different legacies – the
interaction of experience with different cooperative models, different production
practices, etc. In other words, the socio-economic history of each place has led to the
circulation of different mental models of what a cooperative can be. This variation may
be useful, however. If participants are unlikely to participate successfully in a traditional
cooperative model, perhaps the burley tobacco coop could be a model for a state-
industry-producer collaboration.

The ties between these variations across place and legacies may produce some
fruitful insights. Project participants’ perspectives seem to be shaped by both historical
patterns and current circumstances. Together, facets of the past and the present create
regionally-specific viewpoints that are not always internally consistent within regions,
but that do lend insight into why different individuals within the broader category of
“farmer” may maintain certain positions. Notably, the participants in this research tend
to be natives of the study regions, and thus potentially grounded by ancestral history, and
affected by the specific historical turns experienced by the region. The ways in which
ancestral experiences with soil erosion may affect current attitudes toward environmental
on-farm management is one example of this. Common factors also, to some degree, may
be explained by similarities between the two study regions. Both southern Iowa and
northeast Kentucky are economically vulnerable regions relative to the rest of their respective states, and the climate and topography are similar. These parallels may shape, or at least help explain, analogous perspectives across regions.

The key question is whether the study regions, and the legacies each one carries, are more similar than different. The commonalities are significant, which is one reason why switchgrass projects were initiated in each: to promote agricultural economic development on land not suited for large-scale corn production in economically disadvantaged locales. The specifically unique legacies of each region, however, do seem to inspire different perspectives camouflaged by their broad similarities. It is these subtle differences, such as divergent views on corporate involvement, which legacy informs and highlights. Rural, hilly, economically-marginal areas are not all the same, and do not house residents with the same attitudes and goals. The distinctive socio-economic, cultural, and biophysical histories of particular places and regions bring about inimitable experiences and thus perspectives in the people which live there.

**Producer Perspectives in Context – Goals, Strategies, and Agents**

Variation across scale (not just across regions) may also be tied to legacy and place. Beyond orienting the reader to the rapidly-changing arena of bioeconomy development, the context presented in Chapter Two serves an analytical role in this chapter. The visioning and roadmap documents, legislation, and developments allow for comparison between the concerns of more place-grounded residents who are also participants in bioeconomy projects and concerns stressed in initiatives planned and implemented with a national-scale perspective.
A perspective grounded by the comments of project participants about preferred goals, strategies, and agents can enrich the wide-angle views evident at a national scale, and create a rich, multi-level vision that distributes benefits across scales and to real people in specific places. As discussed above, to couch bioenergy development in the context of rural socio-economic circumstances, I asked project participants about several intersecting community trends including: increasing hardship for mid-sized farmers, deteriorating small towns and county seats, the rising average age of farmers, barriers to entry for new and young farmers, the potential for significant land transfer in the near future, and the widespread tendency toward fewer, larger farms. Participants were regretful, but in many cases resigned to the idea that small-to-mid scale farming is threatened. They resented some of the more macro-scale influences (like Wal-Mart type supply chains) but also acknowledged the desire for a different type of lifestyle (suggesting an increased desire for consumer goods, as well as for the opportunity to build college funds and greater family financial security) as a contributor to the decrease in farming as a way-of-life. Some project participants specifically pointed to state programs conducive to large-scale commodity agriculture, and market concentration in these commodities, as reasons for these patterns. Globalization, the “get big or get out” sentiment, and corporate concentration and control were often credited with the construction of serious constraints to economically sustainable small-to-mid scale farmers.

Several project participants felt that these trends toward farm concentration and rural restructuring are either neutral and inevitable, or positive and natural consequences of modernization. The large majority, however, would prefer to see viable small-to-mid
sized farm operations, increased opportunities for new and young farmers, and revitalized communities. Despite this desire, most project participants are resigned to the likelihood that those days are past, that small-to-mid scale full-time farming is no longer a financially-viable enterprise, and they expect little, if any, rural revitalization.

When asked if an ideally organized bioenergy market could reverse these trends, then, it was unsurprising that project participants offered a somewhat dismal slate of answers. About half of respondents expect no impact, or believe that a large-scale ethanol industry will actually speed rural disintegration. The other half anticipates only minor improvements. One young farmer in Kentucky, the seventh generation working his family farm, explains, “I don’t think that for mom-and-pop farmers, it’s going to be their salvation, and I sure don’t think that the guys that are in my fraternity at UK, that would really love to go back to the farm, I don’t think it is going to be that thing that gets them back on the farm.”

In comparison to the visions in the policy documents that predict “new opportunities for rural America,” this farmer’s skeptical comments suggest that state and national strategies both for government programs and industry investment in the agricultural bioeconomy overlook the small-to-mid scale farm enterprise. An older farm couple from Kentucky, vocal advocates for both state farm programs and corporate capabilities (they glowingly refer to Cargill as an “excellent company”), admit that neither institution is “for the small farmer or the small business.” This reveals a contrast between a history of state and market programs that follow an industrial model and a vision statement for bioenergy development that mentions “new economic opportunities for rural America” but lacks an agrarian-level strategy for achieving this goal.
That said, comprehensive rural revitalization is an immense task, and many farmers and facilitators did expect a well-managed switchgrass production, processing, and distribution system to create important benefits for themselves and their communities. When asked about the most important potential benefits of a bioenergy economy, an extension agent in Kentucky replies:

I think a stable economy. A dependable clean fuel…. Well you maybe don’t remember it but I can remember when somebody worked for a company that picks up trash and …. You can think about them twenty five years ago. People kind of looked on them as second class citizens and now they are very, very wealthy outfits. They pay their employees well and they have nice equipment and today it has changed completely. I think it would be similar type of situation like that. It will change. I think of the farmer. It would be neat to think that the farmer was the supplier of the fuel. I mean wouldn’t that be neat to…. It might even change the whole thought of the farming community. I know I am dreaming, but that’s part of this process is learning how to dream about this stuff.

This middle-aged, non-farmer but native, county agent’s dream was not unique – the cultural, political, and economic importance of the farm as fuel supplier was echoed by many other project participants. Additional broad goals cited by project participants for bioenergy development include environmental improvement (e.g., decrease in air pollution, soil conservation, soil and water quality, carbon sequestration, wildlife habitat) and secondary economic impacts in the rural economy (beyond farm income, per se).

A part-time farmer with a full-time off-farm job explains: “overall I support biofuels because I mean, our dependency on foreign oil is bad, what it does to the environment is bad. There are plenty of incentives to thinking bio fuels is a good improvement over what we have today. I do support it. But as far as farm incomes, it’ll be another product available to us to grow, and that’s good. But I think the profit margin will be narrow.” This comment captures how project participants’ goals actually echo
those described in the policy documents. This farmer is growing switchgrass and contributing to bioenergy development in the expectation that it could achieve very broad goals (i.e., energy security and environmental improvement) for the public good on a global scale. He expects the benefits for the farmer will be minor. He expects an industrial model.

On a farm level, about a third of project participants expected bioenergy to be potentially or partially (and it was this qualifier that was emphasized) profitable for part-time and small scale farmers. Many other project participants suspected it will have greater financial benefits for large-scale and absentee landowners. About another third put greater emphasis on non-economic on-farm benefits including: crop and market diversification, land management, wildlife habitat, low input requirements, and ecological impacts.

In a perhaps whimsical summary question, I asked participants if they were the king or queen of their respective state, how they would organize a bioenergy economy, from farm to end use, in order to best create and sustain the objectives they cited. Respondents touched on a wide variety of potentialities. Most interesting, perhaps, was the mix of angles on cooperative organization. Many acknowledged that some sort of brokerage-type system would be required to get the feedstock from the farm to the end user (be it biorefinery, power plant, or pelletizer). It is unlikely that a processing facility of any significant size would be able to deal separately with the hundreds of farmers required to provide an adequate supply of, in this case, switchgrass. Therefore, many participants suggest a co-op type system, but more than a few quickly add that they would rather not participate in a cooperative. This resistance to cooperatives may come
from a variety of emotions and experiences. A part-time farmer with a full-time job and a dream of farming full-time in the near future explains:

You know it is just [local small-scale farmers] are independent souls. They are not well organized. The independence of the farmer is probably one of the things that attracts me back to it after being in the business world, to be able to work independently and do your thing without anybody telling you what to do. There is a lot of value in that. A farmer is not one that is going to give that up easily. That is one of the few attractions there for doing what he is doing.

But what is remarkable is that despite this legitimate resistance to the cooperative model, it was nonetheless endorsed by a significant majority of project participants. Most farmers and facilitators are clear that farmers need to align in order to obtain a voice in bioenergy development. Project participants recognize that broader policy incentives and strategies neglect the farmer perspective, at least to some degree, and explain that in order to achieve the benefits they would prefer, rural residents need somehow to increase their power.

That said, the young seventh-generation farmer from Kentucky feels differently, “I would be okay with being in a cooperative. If I made the decision that I was going to be a switchgrass grower, I would actually feel more comfortable as part of a cooperative. Because you have…. I mean if I am part of….. Taking the corn ethanol template, if I know I am part owner in the ethanol plant, I know I got a place to take it. If I am not then they might not want my bale of switchgrass.” (As discussed above, there was actually a distinctive difference here between the Iowa and Kentucky project participants, with Iowans expressing much more distrust of cooperatives than do Kentuckians.)

Farmers and facilitators alike suggest that state programs could supplement or replace cooperatives in developing bioenergy networks that do not exploit the feedstock producer. Project participants advocate for a significant role for government funding,
mandates, and incentives. While few individuals envision concrete funding platforms, most had general impressions about the appropriate focus for funding. Many project participants feel that incentives (project grants, tax credits, cost-share, and other funding) need to move down the commodity chain, and focus more on farm-level production in addition to the existing incentives at the biorefinery and gas pump level. Others focus less on how government involvement should specifically be directed, but described specific areas that would benefit from state involvement including provisions that minimize the potential for industry monopolization, maximize non-economic benefits, like wildlife habitat, and establish and develop logistical and other needed infrastructure.

And yet given assumptions expressed in previous responses, project participants see this first objective – that of minimizing industry monopolization – as outside the focus of usual governmental practices. Since this is part of the question wherein the project participant is king or queen, and has ultimate decision-making power for bioenergy development, this response reveals a normative recommendation. This objective is unlikely, but it would facilitate the benefits preferred by project participants, and from a conceptual level, facilitates an agrarian model

This point is central. Project participants in both states, when asked about the appropriate role for industry (specified as corporations such as agribusiness giant Cargill or energy company BP), were wary about the influence of big business. The large majority of project participants maintain that it would be best to avoid corporate involvement if possible, for the purposes of keeping profits circulating locally and obtaining a larger voice for the farmer. This wariness ties closely to the discussion in the theoretical chapter about the role of civil society in creating an agrarian model which
contributes to the public good. The Market, as a powerful Leviathan, undermines the influence of public involvement. However, despite this wariness and the goal of avoiding corporate control, most project participants expect large-scale industry participation to be inevitable. The industrial model is prominent, and current infrastructure in the United States tends to favor large-scale, export-oriented industry. As an Iowa facilitator explains:

They do have the capital and they are the system, so it’s just a recognized part that they are there. To the extent that you can minimize the control of an industry at least until it gets up and going I think is good. The tragedy is that, just like many of the ethanol facilities that even didn’t start early with farm-based cooperatives, they are selling out to large entities. So that’s kind of a strange dynamic, too, in that even though you do have something that does incorporate or create local opportunities and bring local growers together and local producers, the natural progression is if they get it successful it’s worth a lot of money, so a Cargill or ADM is buying it anyway.

Again, however, project participants speak to both sides of the issue. Several participants are steadfast in their advocacy for corporate involvement, explaining that the resources, human capital, and infrastructure that a company like Monsanto could provide are essential to the development of the bioenergy sector. An Iowa farmer says, “Hopefully they will take an interest in the potential that’s there, because financially they could help a whole bunch in making some of these processes happen if they showed an interest in the use of this product for their ethanol plants.” In sum, there seems to be a dialectic between the need for industry’s resources to help push bioenergy developments forward and the fear that industry involvement will subsume the benefits most precious to feedstock producers and their communities.

Again, here project participants echo the findings of research discussed in the theoretical chapter. An advantage of the industrial model is that infrastructure is currently designed to facilitate growth and investment. In a new industry like bioenergy,
that advantage is important. But the benefits of the agrarian model for rural revitalization in general, and for a variety of other specific public goods, are prioritized over the industrial aims of productivity and corporate profitability.

Ultimately it seems that the most engaged farmers and facilitators (enthusiastic project participants who take initiative in learning about bioenergy, and who seem especially invested in their communities, and who serve in various service capacities) are advocating for an agrarian model of bioenergy development over an industrial model. One farmer with a full-time job at a Toyota factory, who also works more than fulltime at his farm and serves on a long list of boards and service organizations, draws his preference for a locally-integrated switchgrass market from the recent history of his region:

Right now we are really a bedroom community. We used to not be. We used to have nice industry here. I mean you could come into town and get a good paying job in industry and also still farm almost full time and you could bring your crops to town and sell. And not have to go to Lexington or Maysville or something to find a market for your crops. My grampa, I remember, when he used to milk cows and every day he would, take his milk down to Berry, which is a small community north of Cynthiana, and it was on the railroad tracks and he would take his milk cans down there and put on the train. They would bring it up here to the cheese factory. We used to have a cheese factory here. Like I said we used to have Seagram’s distillery and they made their whisky here in Cynthiana, but in the process they grew the corn here, raised the corn for the distillery, but they also had a hog operation that they feed the mash and everything from the distillery to the hogs and they sold the hogs to Wilbur Sausage. It used to be up the road here about ten miles. So everything years ago used to be centrally located here and you know everybody if you did not work for the distillery you worked as a butcher at the hog place or you was growing corn for the distillery or you was raising hogs for Wilbur Sausage you know. Or you was milking cows and stuff for the cheese factory to try to….. You know everything was community related.

This part-time farmer with a full-time factory job (and almost another full-time job in community service) prioritizes rural revitalization and small farm viability over many
other potential bioenergy benefits. He is one of the many project participants who do not expect to be able to raise a family (his daughter raises sheep for 4-H on the farm) on a farm without a full-time job, but rather hopes simply to build opportunities for farmers to maintain a small farm with off-farm income, and sees a diverse and integrated local economy as best being able to provide those opportunities in a sustainable manner. Policy-level and community-focused priorities do overlap significantly, but this farmer, and this research, suggests that the same model cannot adequately address both sets of concerns.

A Place for an Agrarian Bioeconomy

It is clear that farmers, project facilitators, and rural residents are thinking about bioenergy development from a different perspective than many the policymakers and authors behind more macro-level statements setting forth directions for an agricultural bioeconomy. Farmers producing switchgrass for energy focused more on local and on-farm socio-economic and environmental benefits, compared to the legislation and policy documents (overviewed in Chapter Two), which seemed to express equal concern for energy security, environmental benefits, and economic development (often described in larger-scale, more market-oriented terms, compared to farmers who spoke more specifically of on-farm income streams). However project participants, too, were excited by the potential to supply a renewable fuel that would contribute to energy independence, and foster environmental improvement both on their farms and on a global scale. In general, the goals described by both project participants and policymakers/document writers coincided more than they contrasted.
The differences showed more starkly in the strategies for achieving those benefits and agents best suited to implement them. Again, the interviews allowed for a more nuanced analysis, but it is still fair to say that the documents conveyed, and indeed normalized a more conventional science/state/market model. The farmers and facilitators in this study tend to advocate, not surprisingly, for a model in which state incentives are focused more on the farm and associated micro-enterprises, and less on the processing, distribution and marketing nodes of the larger supply chain. Also, project participants express a nearer-term perspective, envisioning a model that might work in the next few years, as opposed to the macro-focused documents which consider and prioritize the longer term, envisioning an industry that would need significant investment in research and development. These large-scale, long-term, high-level perspectives of government agencies, as well as some non-governmental agencies, tend to align with an industrial model.

An industrial bioeconomy model is simpler to establish in a national economy which is used to the industrial model, but it produces a different array of public and private goods, prioritized in a different order, than the model implied by Iowa and Kentucky project participants. An agrarian model may be more conducive to rural revitalization, but involves organizing reluctant farmers into biomass cooperatives, eliciting state investment in unusual areas, avoiding corporate ascendancy and dominance, and still somehow obtaining expensive new technologies and infrastructure. The role then, for future research, and even more so for policy deliberations, is how to integrate the two sets of goals, strategies, and agents, to establish perhaps both agrarian
and industrial models which can cooperate, so that the public good is maximized, and so public “bads” are diminished.

If Iowa and Kentucky project participants were asked to compose a national-level policy document to lay out the goals, strategies, and agents by which to best achieve a sustainable national bioeconomy, they might well recreate the bioeconomy documents reviewed and analyzed in this dissertation. If the policymakers, industry leadership, and research professionals who composed those documents were to describe goals, strategies, and agents best suited to creating benefits for their own local communities, they might advocate for a more agrarian model of bioenergy development. What matters here, it seems, is not who is speaking, but the perspective, or scale, from which he or she views the situation.

Policymakers are unaffected by the legacy impacts which color the comments of project participants. Based on their prior experiences and history in their regions, these Kentucky and Iowa farmers expect to see a very narrow profit margin for energy feedstocks. Policymakers may be less familiar with agricultural economics and the plight of specifically small-to-mid scale farmers. In this case, project participants can see beneath the level on which policymakers stand, and in so doing, highlight important goals, design innovative strategies, and provide unusual roles for bioenergy developers to prioritize farm viability over large-scale efficiencies.

Similarly, project participants in different places express some different perspectives based on unique qualities of their own place, and the legacy which characterizes it. The variation in opinions about cooperative organization, for example, may reveal some benefits of a model like the burley tobacco cooperative, which despite
the heavy role of Market and State in what is generally seen as a tool of civil society, proved a viable tool for organizing one commodity. In addition, the many issues on which participants with both projects agree can emphasize these points. For example, farmers with both the Iowa and Kentucky projects were interested in playing a role in an agricultural bioeconomy despite their suspicion that economic benefits to themselves and their communities will not materialize. They are nonetheless interested in on-farm environmental management, aesthetics and wildlife habitat, land conservation, and contributing to national energy independence.

Incorporating these insights, understanding the complicated trade-offs between farm income, soil erosion, and community socio-economic trends, listening to voices on the ground, and addressing the importance of place and legacy to development projects could create an agricultural bioeconomy that curtails difficulties and amplifies benefits. In the final chapter, I address this opportunity, provide some concluding remarks, and identify areas where additional research is needed.
This dissertation has engaged directly with the concerns and preferences of practicing bioenergy feedstock producers, addressing a gap overlooked by most governmental and nongovernmental plans and recommendations. Most pertinent to potential feedstock suppliers are the implications of the industry for rural economic growth and development—rural revitalization. Project participants express considerable skepticism about the degree to which a bioeconomy will actualize those benefits. The Iowa and Kentucky project participants are also interested in environmental benefits and especially in contributing to energy security and independence goals. But environmental benefits are far from certain at this stage in development, and research has yet to find that biofuels could have a dramatic impact on national fuel supply.

Further, some of these benefits are contradictory. It may be that energy independence (or biofuels production maximization) would come at a cost to the goal of decreasing carbon emissions (which would be maximized by displacing coal with biomass for electricity generation). It is likely that maximizing biomass production for either of these end uses would favor an industrial model that privileges production over local input and rural revitalization. In this case, the agrarian model’s incorporation of democratic deliberation by civil society to decide on an ethical distribution of public and private goods would also be undermined.

Participants’ impressions are complex, varying both within places and between the study regions in Iowa and Kentucky. The Iowa project participants expect a more industrial model of biofuel production, are fairly trusting that commercialization will
occur, and are more wary of corporate involvement. Among the Iowa project participants, opinions ranged about the role of cooperative organization, and the potential for and desirability of rural revitalization. Kentuckians expected a more agrarian model, are less likely to expect the industry to develop in the near future, and are more concerned about equal treatment for farmers of various (but particularly small) scales.

I now return specifically to the research questions guiding this dissertation. The first question asked, “what are the chief concerns and interests about agricultural bioeconomy development articulated by agricultural bioenergy project participants?” As suggested above, project participants express a complex range of preferred benefits, goals, models, and agents, as well as a broad array of concerns and hopes about the likely direction and potential opportunities of the bioeconomy. Overall, however, the glowing description of the bioenergy industry as a tool for rural revitalization does not resonate with most of these rural stakeholders.

For the most part, participants remain skeptical that rural revitalization (which they saw as including well-populated small towns, thriving locally-integrated industry, a stop to outmigration, especially of young people, and profitable farms of many scales) is even possible considering current economic and agricultural trends. They tend to cast this vision as an unretrievable past. Nonetheless, they are interested in environmental benefits, and the potential to contribute to energy security, and are hopeful (though not confident) about the potential for biomass feedstock production to diversify their operations and potentially generate additional farm income.

As for concerns, project participants (especially in Iowa) fear that a large-scale biofuels industry will funnel all available profits out of rural areas (as is indicated in
Milder et al. 2008). They are concerned that the oil industry will undercut biofuels and leave all bioenergy participants in debt, or that biorefineries will contract with large corporate farms which could produce feedstocks below a profitable threshold for smaller landholders. They have some worry about logistical issues, about transferring acres to perennials to establish feedstock supply and then lacking a market for it. For the most part, they do not anticipate any significantly negative aspects to the development of the industry, but neither do these project participants expect any major benefits.

The second question guiding this dissertation asked “how do project participants’ expectations, experiences, and concerns about bioeconomy development merge and diverge based on legacy?” I found diverse patterns corresponding to place-based characteristics in terms of both preference for and willingness to participate in cooperative organization, general impressions about corporate involvement, and approach to environmental issues.

My research design does not allow for an understanding of causal relationships between regional variation and project participants’ perspectives. That said, it seems reasonable to suggest that a person’s prior experiences might shape expectations about benefits and drawbacks of future manifestations of similar or related experiences. One example of this is the way in which the experience of rural stakeholders’ in each study region with various models of cooperatives (i.e. Kentucky with the powerful, well-funded burley tobacco co-op) affects their concept of an organizational model which can vary greatly. In addition, the role of agribusiness in Iowa is more pronounced, while northeastern Kentucky is largely overlooked by agribusiness corporations, and this also seemed to affect participants’ perspectives. Finally, the pressure to grow corn on
marginal land in southern Iowa may create a different environmental ethic than exists in Kentucky, where pasture and hay are the dominant land cover, and farmers could once make a living on a several acres of rotating tobacco land.

The final question guiding this dissertation asked “how do project participants’ expectations, experiences, and concerns about bioeconomy development reflect and contest the visions and recommendations of policymakers and other less local bioeconomy actors?” The most important finding here is the importance of scale, and to where benefits will accrue. Feedstock producers in this study would understandably prefer to keep profits local, which is facilitated best through locally-integrated industries. The recommendations and visions set forth in the policy documents presented in Chapter Two, and the actual policies currently facilitating bioeconomy development tend to favor production and industrial development for greater (though less distributed) economic growth potential. Another significant point here is the lack of communication between potential feedstock producers and more macro-scale planners and investors. The assumption that farmers will grow biomass crops may be mistaken unless partnerships between producers and processors are established at local levels, and education and resources are more widely available. These findings have significant relevance for scholarship, application, and policy.

Contributions of the Research

In terms of scholarship, this research offers two main contributions. First, it provides an actor-centered, experiential account of how tradeoffs associated with resource development are understood. The notion of tradeoffs has been studied in sociology in terms of the distribution of power and decision-making roles, and this type
of analysis needs to be given higher profile. Both the contextual analysis (presented in Chapter Two) and the fieldwork findings (presented in Chapter Five) suggest that how certain benefits are prioritized over others has significant implications for whether and how those benefits are distributed. For example, until recently federal policy has tended to prioritize the industrial development and commercial possibilities of biofuels over any community or environmental benefits. Highlighting the role of scalar and place-based perspectives makes clear that tradeoffs may be prioritized rather different at different levels and in different contexts. However, many policy initiatives are developed on a more macro-scale (national or state level), that assume universal and comparatively homogeneous understandings of what goals are most important. Policymakers may give precedence to benefits which appear to be more generally distributed (for example, increasing the national supply of transportation fuel) or more noticeable (for example, being the world’s largest supplier of ethanol). Rural stakeholders, however, including the project participants in this study, are often more concerned with benefits that are concrete, particular and locally-distributed. Thus understanding that tradeoffs are often inevitable, but still subject to prioritization and hence amenable to planning and management can enrich scholarship on the social impacts of technology change and development at various scales and in many places.

The second significant contribution of this research concerns the ways in which project participants’ understanding of tradeoffs is pertinent to their advocacy for a preferred model of bioeconomy development. I sought to learn what goals and objectives were articulated and what participants were acknowledged, in an effort to understand whether a certain model (either industrial or agrarian, per Thompson 1995, 2007) is being
prioritized, asking “in what ways are agrarian and industrial themes invoked, deployed, allowed to stand, or subordinated?” Iowa project participants tend to express conflict about the twin desires for a rural revitalization and for economic growth. They reveal suspicion that the agrarian model, articulated as rural viability produced by a locally-integrated and rurally-distributed economy, might be unrealistically nostalgic. But participants are also explicitly critical and wary of corporate investment and an industrial model which they believe tends to funnel benefits out of rural places. Kentucky project participants convey less ambivalence, but also have less expectation for any significant rural revitalization. They have less concern that large-scale outsider-based corporations will dominate local industry, but neither do they expect locally-based enterprise to be able to commercialize in the near future.

These findings amplify and complicate Thomspon’s agrarian-industrial typology, if only in emphasizing the degree to which both models overlap. My perception of participants’ comments suggests that they feel caught between an outdated notion of agrarianism and an industrialism which has no need for them. The important point for future scholarship is the need for current, accessible, and practical models of agrarianism (possibly similar to van der Ploeg’s [2000] model of “farming economically”). These models must not lose their ties to the important knowledge and community-integration of times past, but need to make sense and be feasible in the rural regions of the future. They must account for environmental stewardship and the ability of local farmers to contribute to national goals, like energy security. Most important, they must have a proactive and achievable role for rural stakeholders.
Limitations of the Research

Despite its contributions, the research presented here has limitations. First, with respect to methodology, I had hoped to share my findings with the research participants, both to fulfill participants’ expressed desire for additional information about bioenergy development, and to see whether participants found my interpretations and conclusions credible. Due to time constraints, I was unable to carry out this goal though I believe it would enrich my data.

Second, the concept of legacy, while useful, may be more conducive to a research design that allows for examination of causality. I was unable to determine precise relationships between, for example, Iowa as a center of commercial bioeconomy development and participants’ assumptions about corporate involvement. My research design only allowed me to highlight patterns of association between these types of plausibly connected circumstances and perspectives. In addition, the concept of legacy presented here overlaps greatly with notions of place and other conceptions of regional variation in highlighting the important of place identity and consciousness. That said, legacy can be very useful in comparative analyses for highlighting variation across a range of sectors – cultural history, socio-economic trajectories, and biophysical characteristics – and interpreting the ways in which these circumstances interact with stakeholders’ desires, priorities, and attitudes.

Third, this research is limited both spatially and temporally. I sought an in-depth examination of rural stakeholders’ perspectives, and so I limited my study regions to two. A more widely geographically-distributed array of similar case studies would permit
greater understanding of the degree to which regional variation does indeed correspond to
different perspectives about the potential of bioeconomy development to contribute to
rural revitalization. Also, because the subject area is rapidly evolving, developments
significant to the study have occurred in the time between fieldwork in the two study
regions, and between fieldwork and write-up. These changes, for example the dramatic
increase in corn prices, potentially date some of the findings.

Recommendations for Further Research

These limitations make clear the need for additional sociological research on
bioeconomy development. First, this study is one of a very small number of
investigations thus far into the social impacts of the shift to an agricultural bioenergy
industry. There is a need for more social scientific investigation into the evolution and
consequences of the bioenergy industry in general. More specifically, and related to the
limitations articulated above, more participatory action research with rural stakeholders
and potential participants in an agricultural bioeconomy should be conducted. Feedstock
providers and rural residents are still on the periphery of bioenergy discourse; they
advocate for locally-initiated enterprises, and yet they lack resources to facilitate such
investments. Research that involves rural stakeholders in assessing and developing their
preferred models of bioeconomy development could contribute to more just, realistic and
effective programs and policies in an era of heightening concern about alternative and
renewable energy supplies.

Second, there is a need for more research investigating how legacy shapes and
informs human perspectives on socio-economic, technological and environmental
change. Efforts to strengthen and clarify (or even discard, if it is found unhelpful) legacy
as a conceptual tool can only enhance social scientific appreciation of the role of context in human perception and endeavor. Specific attempts to apply legacy in causal analysis could test whether it is a helpful construct for explaining the social construction of regional variation.

Third, similar research conducted in different places or regions would allow the compilation of analyses about place-bound preferences and concerns for bioeconomy development. An important finding of this study is that regional histories and context help make sense of project participants’ perspectives about preferred goals, models, and agents for bioeconomy. To increase the robustness and usefulness of this finding, studies should be conducted in a wider range of carefully sampled regions.

Implications for Policy and Practice

Despite the small sample of potential feedstock producers on which this study is based, it nonetheless has produced important implications for policy. In general, this study underscores the need for more attention to bioeconomy feedstock producers’ perspectives. Government reports, like the Billion Ton Report (Perlack et al. 2005) tend to look at resource availability with little to no consideration of the residents on the land designated suitable for producing needed energy feedstocks. Based on my experiences at bioeconomy conferences, industry and academia tend to be well-represented, while a single person may be present to represent the thousands of farmers and rural landowners whose participation will be required for the projected boom in biofuels to take off. By interacting directly with potential feedstock producers and their project facilitators, this research elicited their opinions and first-hand knowledge without any goal towards recruiting them or “diffusing” information to them. Unclouded by instrumental program
or project interests, research such as this may be better poised to capture what project participants really think and believe about bioeconomy development.

If the perspectives of project participants in this study are similar to those of most potential feedstock producers, policymakers and bioeconomy facilitators who need to recruit feedstock producers should understand some of the findings from this study. First, since project participants for the most part do not expect to see significant economic benefits from bioeconomy development, they may be more engaged by focusing on other benefits, including farm management advantages, environmental improvement, and energy security. Second, project participants see their role and their knowledge as important. They do not want to have decisions made for them. Rather, they should be involved in the early stages of bioenergy development projects. Their insights about an appropriate distribution of private and public goods are likely to contribute to more feasible and effective plans, which include an appreciation of local environmental and socio-economic circumstances.

With the initial development of an ethanol industry now well established in the U.S., maximizing community economic benefits and environmental goals should be prioritized. This research suggests that integrating local perspectives about regional variation will facilitate those goals by allowing for an understanding of how successful micro-industries can be best oriented to place-specific goals and priorities. For example, perhaps northeastern Kentucky could provide a home for integrated pelletizing, co-firing, and hay/cow-calf operations which reflect local stakeholders’ concern for farm viability, their memory of locally-integrated distillery-dairy-meat industries, and their desire for reinvigorated communities less dependent on factory work in neighboring counties.
Southern Iowa might be more suited to growing switchgrass for an environmentally-sustainable next-generation ethanol facility which reflect local stakeholders’ concerns for ecosystem health, soil conservation, and farm viability. Ultimately successful plans for bioenergy development must integrate farmer knowledge about practices, environment, and history or current trajectories toward the disintegration of traditional farm livelihoods will not be impacted by the bioeconomy.

In Conclusion

Southern Iowa and Northeastern Kentucky are home to what one day may be thriving next-generation biofuels industries. Many project participants and much research suggest that these enterprises could ideally create rural revitalization. They could be systems-oriented, zero-waste facilities that are integrated with local plant and animal agriculture for the maximization of local environmental benefits. They could be locally-owned and supplied, spurring the development of nearby micro-enterprises, and keeping economic benefits circulating locally. They could produce a clean cellulosic ethanol (as well as biochemicals and other products) which, when combined with supply from many other biofuels companies, could contribute to energy security and decrease the geopolitical conflict associated with foreign oil. Criticism aside, it is this vision which inspires many policymakers, journalists, project facilitators, farmers, and this researcher.
APPENDIX

Interview Guide    ----   The Pennsylvania State University
Project: Searching for Sustainability in a Bioeconomy Based on Rural Resources
ID# ______________   Date ______________________

Sex

Age

Retired?

Highest completed formal education:

Were you raised on a farm?

Are you native to this County? This State?

Land resources and ownership structure of respondent:
  Total acres of land ___ (and acres in switchgrass, other productive use of farm,
  ownership structure - acres owned/rented/rented out, land in CRP)

Do you consider yourself primarily a farmer?

Do you/have you served as commissioner of soil/water etc. or other leadership position?

Do you/have you had an off-farm job?

Roughly what percentage of your household income in 2006 came from enterprises on
your farmland?

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How did you get involved with this project? What are your goals in deciding how to
manage your farm?

What are your general impressions about producing feedstocks for energy production?
Do you consider yourself well-informed about developments in the biofuels sector?

You’re probably aware of some overlapping trends such as mid-sized farmers being
squeezed out, small rural towns dwindling, the increasing average age of farmers and
constraints for new/young farmers, the potential for significant land transfer in the near
future.  [Specifics here about the Counties in question – conversion from tobacco, etc.] Would you hope to see these trends reversed or do you see them as part of a natural
modernization process? How do you think an ideal (best-case scenario) bioeconomy would affect these community trends?

On a more individual basis, do you think the development of this sector would be good or bad for landowners who are involved?

How do you see the Conservation Reserve Program and other government funding/policies affecting the commercialization of bioenergy?

What do you think should be the role of corporations like Cargill, Dow, etc. in commercializing bioenergy?

If you were the king/queen of Kentucky, how would you organize a biofuel economy? Who would have what decision-making powers? Where would supply come from, how would it be distributed, what scale would it be on, who would own the refineries, would cooperatives be important, should government have incentives, etc?

Do you consider yourself an environmentalist? What environmental issues do farmers in your area have to deal with and how do you deal with them? Do you think growing perennial crops instead of corn grain, for example, is better for your soil?

What potential pitfalls do you see in the future development of biofuels? How would they best be avoided?

What do you think are the most important potential benefits of a bioeconomy (to the economy, environment, local community, government, on a local, state, national scale)?
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