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# Hope and skepticism: Farmer and local community views on the socio-economic benefits of agricultural bioenergy

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## ABSTRACT

U.S. government policies and programs promoting agricultural bioenergy development have tended to prioritize national goals of energy security, economic growth and environmental improvement, while marginalizing the local experiences, views and concerns of farmers and rural communities that will produce the needed energy crops. Based on qualitative field interviews with 48 farming and non-farming participants in two switch-grass bioenergy projects (in southern Iowa and in northeastern Kentucky), this paper examines local perspectives on the potential opportunities, drawbacks, and tradeoffs of the emerging agricultural bioeconomy for rural people and places. Individual project participants expressed both positive and negative perceptions about the impacts of the agricultural bioeconomy, with local and regional revitalization being the benefit most desired and also least expected. Skepticism about the social impacts of the agricultural bioeconomy often stemmed from observations of corporate control in agriculture more generally. This research suggests that narrow instrumental views of farmers and rural communities as technical providers of energy feedstocks can be misleading, because they omit the local social and cultural context that complicates rural responses and receptivity to the development of the agricultural bioeconomy.

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## 1. Introduction

Energy supply issues have gained new salience with recent political, economic, and environmental policy shifts. Meanwhile, decline in rural America as evidenced by aging farmers, rural outmigration, and weakened local economies, remains a challenge [1]. Production of perennial agricultural feedstocks for bioenergy has been framed as a way to achieve needed energy supplies, with possible contributions to rural revitalization and environmental protection. But rural stakeholders often remain invisible in more expert-based approaches to resource and development decision-making [2]. National and

state policy discussions and directives tend to focus on geographic and agronomic considerations of where such biomass crops might be grown, rather than on social considerations of who will produce these biomass crops and with what consequences. Farmers tend to be seen *instrumentally*, as ready and unquestioning providers of now needed energy feedstocks, rather than *expressively*, as rural actors with their own distinct voices and views about such development. Whether directed toward the current reality of corn grain-based ethanol or toward aspirations for a cellulosic perennial-based biofuel future, both public and private investment have generally overlooked the firsthand perspectives of people in

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rural areas now beginning to produce perennial agricultural bioenergy feedstocks. This paper examines how farmers and stakeholders in local rural communities in the U.S. themselves view the potential opportunities, drawbacks and possible tradeoffs in development of a larger scale, next generation bioeconomy. It builds on growing theoretical and applied attention to the interests and influence of stakeholders on a wide range of natural resource management contexts and development interventions [3].

Speculation about the timing of “peak oil,” concern about U.S. dependence on energy supplies from politically unstable parts of the world, volatile gasoline prices and stronger consensus on global climate change have stimulated American interest in energy issues. As government programs and private investors commit to research on and development of new domestic and renewable sources of energy, agricultural biomass has now attained a position of greater prominence in the national energy discourse. Such prominence derives not so much from its current contribution to energy supply, which remains modest, but rather from assertions that development of an agricultural biomass sector will yield cleaner energy, environmental improvement, rural revitalization, new “green” jobs, a good income stream for farmers, and profit for investors [4]. Drawing on qualitative interviews with farmers and community facilitators associated with pilot switchgrass bioenergy projects in Iowa and Kentucky, this research examines patterns of uncertainty and ambivalence in local perspectives about the likely impacts of increased agricultural biomass energy development, particularly as it relates to the prospect of rural revitalization.

## 2. Discourse on the benefits and drawbacks of agricultural bioenergy development

The term “bioeconomy” refers to an economy involving the production of materials, chemicals, and energy (for heat, electricity, and transportation fuels) from biomass (such as various crops and trees) and made possible by innovations in the biosciences [5]. The greatest potential in terms of energy is seen, not in currently dominant corn grain ethanol, but in the multiple and integrated energy and other bio-based products that will be derived from next generation grass- and woody biomass-based cellulose. Researchers, investors and observers articulate growing consensus that the high inputs required for conventional corn production and the relatively low energy conversion efficiency of corn ethanol necessitate an eventual transition to lignocellulosic ethanol [4]. Switchgrass (*Panicum virgatum*), a grass adapted to many regions of North America, including marginal production environments, has attracted scientific and commercial attention as a potential cellulosic feedstock [6].

In the U.S. context, foundational documents guiding research and development, such as the Vision for Bioenergy and Biobased Products [7], the Roadmap for Biomass Technologies [8], and the joint U.S. Dept. of Agriculture/Dept. of Energy “Billion Ton Report” [9], make the case for bioeconomy development by asserting the potential national-level benefits [10]. Three main goals of bioeconomy development tend to be stressed. The first goal targets national energy supply, and

includes benefits such as a more diverse energy portfolio, energy security, energy independence, and the reduction of fossil fuel import dependence. The second goal centers on national economic growth, usually in industrial terms, and highlights the benefits in strengthening, diversifying, and providing new opportunities for more competitive biomass providers, biofuels producers, and others in the extended supply chain. Localized community dimensions of economic growth, including “rural distributed energy systems” and “localized biomass production and processing facilities” receive some mention after the original 2002 Vision document was reviewed and revised in 2006 [7]. The third goal of bioeconomy development emphasizes environmental improvement, including benefits from reduced carbon emissions, enhanced water quality, biodiversity conservation, and improved air quality.

In general, then, U.S. government goals for bioeconomy development assume a macro-scale focus, with attention to benefits accruing at a more national or even global level. Industrial economic development tends to be prioritized and elaborated much more than local or regional rural revitalization. Sustainability concerns do receive explicit, though brief mention in some later policy statements [7,11]. However, farmers remain submerged within generic discussions of feedstock supply production and logistical issues. This underscores the instrumental view taken of farmers in most official “visions” and “roadmaps” for the bioeconomy.

By 2006–2007, more critical public and academic assessments of bioeconomy development provided contrast to the initial strong optimism of industry and government proponents concerning benefits [12,13]. Concerns about the environmental impacts of land use change, the competition between food and fuel production, and the fair distribution of economic risks and benefits have now become more widespread in discussion about the bioeconomy. A report published by the World Resources Institute [14], noted that “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.” The complexity surrounding scale and location of land use conversion for bioenergy crop production has raised questions about unintended negative environmental and climate impacts of bioenergy development [15]. Food security threats from increases in bioenergy cropping have drawn attention, in both developed and developing country contexts [16]. Finally, as local ownership of many first generation ethanol plants in the U.S. has given way to external and corporate control, concern has grown about the ability of the biofuels sector to deliver on its early promise to revitalize struggling rural regions of the U.S. Midwest [17,18]. In short, the scope of societal concern about the goals, benefits and drawbacks of agricultural bioenergy has widened and a broader range of groups are now engaging with these issues, both in the U.S. and worldwide. Research and development interest in farmers and rural stakeholders, however, remains focused on their instrumental role in producing and delivering energy feedstock supplies to address governments’ renewable energy supply targets. This focus fails to consider how farmers and rural stakeholders formulate and express their views, not just about providing energy feedstocks, but about the wider,

possibly more equivocal implications of agricultural bioenergy development for their localities and regions.

### 3. Conceptualizing farmers and rural stakeholders in the context of agricultural bioenergy

Farmers' adoption of new agricultural technologies, crops and practices has been a longstanding concern of the rural social sciences, which have historically sought to understand and promote modern agricultural development [19]. Research since the mid-1970s has taken a more critical stance, seeking to understand dynamic and intensifying processes of restructuring in North American agriculture, which have included the rising influence of corporate agribusiness, the decline of the family farm and the marginalization of many rural communities [20]. Scholarship on general processes of social differentiation and structural change in agriculture is abundant. Far fewer empirical studies have examined farmers specifically as current or potential agricultural biomass feedstock producers. Most such studies have taken an instrumental view, with research questions centering first on what factors might inhibit or induce farmers to produce energy feedstocks to support a bioenergy transition. In a qualitative interview study of potential feedstock producers in southern Iowa in the early 2000s, Hipple and Duffy examined farmer motivations surrounding adoption of switchgrass production for energy use [21]. Not surprisingly, they found that profitability most guided farmers' decisions about whether to produce a "new" crop like switchgrass. However, they also noted that farmers' judgments about profitability were influenced by non-economic considerations, including values, beliefs, aesthetics, and extended benefits for family and community.

Survey research conducted in Tennessee found that specific farm characteristics, especially farm size, influenced landowners' willingness to convert cropland to switchgrass for energy [22]. The larger the farm, the less likely the farmer was to express willingness to convert additional acres of production to 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 USDA's Conservation Reserve Program also influenced the amount of land Tennessee farmers were willing to convert to switchgrass. Another study involving three farmer focus groups in the UK found that perception of uncertain financial returns from perennial energy crops (specifically, short rotation coppice willow and miscanthus) constituted an important attitudinal barrier to adoption [23].

While these studies usefully investigate various micro-level perceptions and attitudes of potential feedstock producers, they still portray producers foremost in instrumental terms. Farmers' motivations (or not) to adopt bioenergy crops may be related to multiple, cross-cutting issues, which merit attention to the extent they shed light on the problem of recruiting the needed base of feedstock producers. Farmers' and rural stakeholders' own wider views and concerns about the potential benefits and drawbacks of the

developing agricultural bioeconomy remain marginalized and often unrecognized knowledge. Top-down approaches to resource development, including bioenergy, often deny or overlook the relevance of local knowledge in favor of expert-generated guidelines for technically rational and universally applicable solutions [2,24]. To reduce the marginalization of farmer and rural stakeholder knowledge requires "a negotiation of knowledge where stakeholders' different knowledge, perceptions and understandings are brokered within the context of a locality and project" ([24], p. 225). Adequately recognized and negotiated knowledge of local actors can help to facilitate better adapted designs and decision-making concerning bioenergy implementation in specific rural places [25].

The frequent marginalization of producer and rural stakeholder knowledge can parallel a marginalization of local control over economic benefits from production systems. In current large-scale agricultural systems and of concern in the emerging bioeconomy sector, profits tend to be concentrated among corporate actors, with less distribution to farmers and stakeholders in rural communities [26,27]. Milder et al. note that "as rising prices for biofuels create financial incentives for large-scale production, smaller actors may be marginalized" ([26], page 109). This marginalization of farmers and rural stakeholders in agricultural bioenergy can arise through the organizational and contractual relationships that develop between feedstock producers and processors [28]. However, farmers have some options for enhancing local economic benefits and countering their own marginalization in interactions with powerful industrial agricultural corporations. Welsh observes that "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" ([27], page 503).

In first generation biofuels development in the U.S., collective action by corn ethanol feedstock producers appeared to promote such advantages of farmer control and profit redistribution for local communities. By 2007, about half of the ethanol plants in the U.S. were farmer-owned, representing 30–40 percent of sector capacity [29]. Whether through producer owned LLCs or cooperatives, local investment in corn ethanol was cast as a way of retaining value-added dollars and contributing to local rural revitalization [17,30]. Although the more recent wave of financial turmoil evident in bankruptcies, acquisitions and shelved plans for new corn ethanol plants has significantly tempered local and outside investor enthusiasm about the biofuels sector, some analysts maintain that farmer cooperatives remain a promising approach for second generation biofuels development. Indeed, some claim that the new technologies and systems required for a cellulosic ethanol sector may be a particularly good fit for the more "patient capital" of local farmer investors, and thus better able over time than corn ethanol to support farmers and rural revitalization [31].

While the relative success of collective associations at reducing marginalization may hinge on their fit with a particular technological production system, other researchers suggest that the organizational agendas and approaches of

current models of farmer cooperatives can limit the impact and efficacy of such cooperatives. Downing et al. see a challenge in developing effective cooperative efforts in renewable energy due to “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.” ([32], page 433). This focus on economic and market issues over the wider policy context contributes to a potential tension between promise and outcome in how producer cooperatives will figure in agricultural bioenergy. Thus, in keeping with prior patterns of agricultural development, agricultural bioenergy presents a context where the knowledge of actual farmers and rural stakeholders has been marginalized. Farmers and rural stakeholders in agricultural bioenergy face further challenges, given mixed evidence on the organizational and economic arrangements that will best ensure benefits to rural areas. With this background, the perspectives of agricultural bioenergy farmers and rural stakeholders on their experiences of opportunity and marginalization in this developing sector merit closer investigation.

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#### 4. Methods and study sites

Given this study’s aim to understand agricultural bioenergy feedstock producers in other than instrumental terms, a qualitative research approach was deemed most appropriate. Qualitative social research aims to describe and understand complex and sometimes contradictory patterns of human perception, meaning and experience, and is particularly useful in research with marginalized or understudied social groups [33]. It is oriented toward identifying patterns of meaning and expression within a theoretically or purposively selected sample, rather than determining the magnitude of variables or their inter-relationships in a random sample representative of a larger population. This research included field studies in two regions – southern Iowa and northeastern Kentucky. The regions were chosen to meet three criteria: 1) presence of an active switchgrass production project focused on bioenergy; 2) that enrolled independent farmers as participants, and 3) included regional rural revitalization among the formally stated goals of the pilot project.

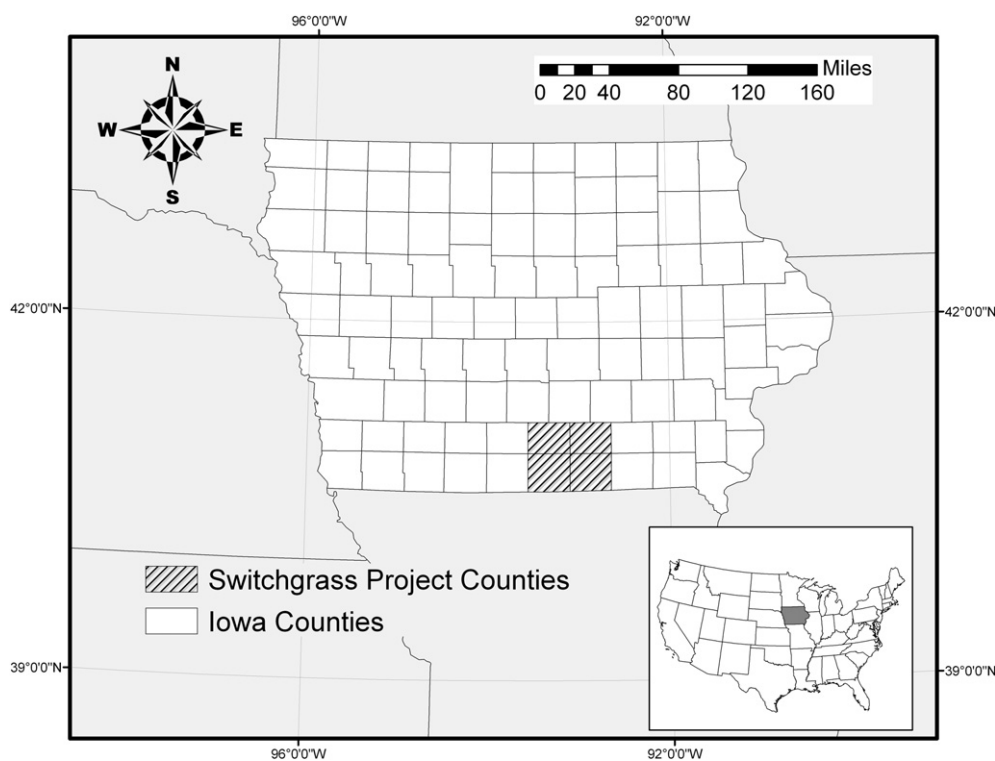
We report findings from the Iowa and Kentucky field studies jointly in this paper; a separate analysis examining the implications of historical and present differences between the two study regions appears elsewhere [10]. The Iowa and Kentucky switchgrass projects share many features; they are formatted similarly, with small plots on multiple farms, shared management responsibilities, and a local coal-fired power plant as partner and primary end-point for the harvested feedstock. Farmers in both projects were recruited by word of mouth and received non-market-based financial compensation for the acres they converted to switchgrass. The two projects represent two of the earliest fully operational ventures in the U.S. where independent farmers have produced switchgrass for energy uses. Thus, the two projects approximated as closely as possible at the time of research an eventual switchgrass-based biofuel feedstock production sector.

In the late 1990s, the Chariton Valley Resource Conservation and Development (RC&D) Council initiated the Chariton Valley Biomass Project (CVBP) [34] in the southern Iowa counties of Lucas, Wayne, Appanoose, and Monroe (Fig. 1).

The Council is part of a national voluntary program administered by the Natural Resources Conservation Service of the U. S. Dept. of Agriculture (USDA). Encouraging local partnerships, the Resource Conservation and Development Program aims to “...accelerate the conservation, development, and utilization of natural resources, to improve the general level of economic activity, and to enhance the environment and standard of living in authorized RC&D areas” [35]. The individuals who conceived of the CVBP had observed the northern regions of Iowa invest heavily (and, especially in the early phases, profitably) in corn grain ethanol production. They knew the southern part of the state was not as environmentally suited to monoculture corn production, and therefore investigated the idea of growing switchgrass on the Chariton Valley’s sloping erodible hills as a more locally-appropriate form of bioenergy production. The original idea anticipated eventual conversion from using the biomass in an electrical generation plant to directing the biomass for cellulosic ethanol, but a cellulosic biorefinery has yet to manifest in the region. For this project, the RC&D partnered with Alliant Energy, Prairie Lands Biomass LLC, and the U.S. Department of Energy to recruit local farmers to grow switchgrass under the USDA’s Conservation Reserve Program (CRP), to manage, harvest, store, and transport the feedstock, and to process it to be co-fired at a rate of 2.5% with coal. The project succeeded in arranging a waiver so that farmers could harvest the switchgrass they were growing under the CRP and still receive CRP payments. Through the 2000s, the CVBP developed logistical procedures for processing and handling switchgrass and gathered data at multiple co-firing test burns at the participating power plant.

Though newer, the Kentucky switchgrass project still parallels the Iowa switchgrass project in many ways. Research and extension professionals at the University of Kentucky initiated and currently facilitate the Kentucky project, which has been launched through a four year grant to the Kentucky Forage and Grassland Council from the Kentucky Agricultural Development Board (KADB). The project has initially worked with farmers in an eight county region of northeastern Kentucky [Fig. 2].

Environmentally-appropriate regional economic development is a central priority of the project, but grassland and forage management for other end-uses (such as hay for the region’s horse farms) remains an important goal for key project supporters. Tobacco was until recently Kentucky’s predominant cash crop, but recent legislation has phased out most regional production, leaving empty tobacco barns and farmers looking for alternatives. The switchgrass project is one of various efforts in Kentucky now seeking to develop regionally feasible, financially viable alternatives to tobacco as an agricultural enterprise. The project assists participating farmers with establishment, management, harvesting, and storage of their switchgrass, which is then co-fired with coal at a local power plant. The first switchgrass crop was harvested in 2007. The Kentucky project currently focuses more on feedstock production and management, while the Iowa



**Fig. 1 – Location of Iowa Switchgrass Project.**

project has over time come to emphasize market development in industrializing cellulosic bioenergy production.

The Iowa fieldwork was conducted during the summer of 2006, while the Kentucky fieldwork took place during the winter of 2008. Although the Iowa project was longer established than the Kentucky project and more than a year elapsed between fieldwork at the two sites, as indicated in the findings reported below, participants in the two projects still expressed broadly similar views on bioeconomy benefits and drawbacks. We interviewed a total of 33 farmers and 15 facilitators associated with the two projects, including 31 interviews with Iowa participants (20 farmers and 11 facilitators) and 17 interviews with Kentucky participants (13 farmers and 4 facilitators).

Facilitators in Iowa included individuals with the RC&D Council, CVBP managers, and a few other individuals closely associated with running and organizing the project, but who did not themselves grow switchgrass to supply to the power plant as part of the CVBP. Facilitators in Kentucky included researchers and project managers associated with the University of Kentucky, and County Extension Agents in the counties where participating farmers were located. Farmers in both projects included those who grew switchgrass dedicated to their respective projects. 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. The line between farmer and facilitator was often blurred; several of the “farmers” were professionals (e.g. bankers and businessmen) with large

acres, some of which were rented to other farm managers, while a few of the “facilitators” were mid-sized farmers (but not switchgrass growers), who relied primarily on an off-farm job for their livelihood.

The in-depth interviews with study participants ranged from 40 min to 2 h. Participants from both regions were predominantly male. They were small-to-mid scale farmers with an average education of 14 years. They tended to be native to their regions, often with families farming in the same county for multiple generations. The Kentucky participants’ average age was 50 years, while Iowa participants’ average age was 62 years. Most of the Iowa farmers were retired, compared to less than a third of the Kentucky farmers. Of those who were not retired in both project samples, most had some type of off-farm job. At least half of both samples served in leadership positions in their county (e.g., Soil and Water Conservation District Commissioner).

A semi-structured interview guide was employed to ensure that key topics were addressed, while also allowing flexibility to pursue unanticipated, but illuminating themes, or to bypass less relevant topics. Interview topics included experiences and concerns growing switchgrass for energy production, conservation programs, and environmental and energy perspectives. A central focus was farmers’ and facilitators’ views on the potential and constraints for energy crops, and on the prospects for 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 for themes, and analyzed.

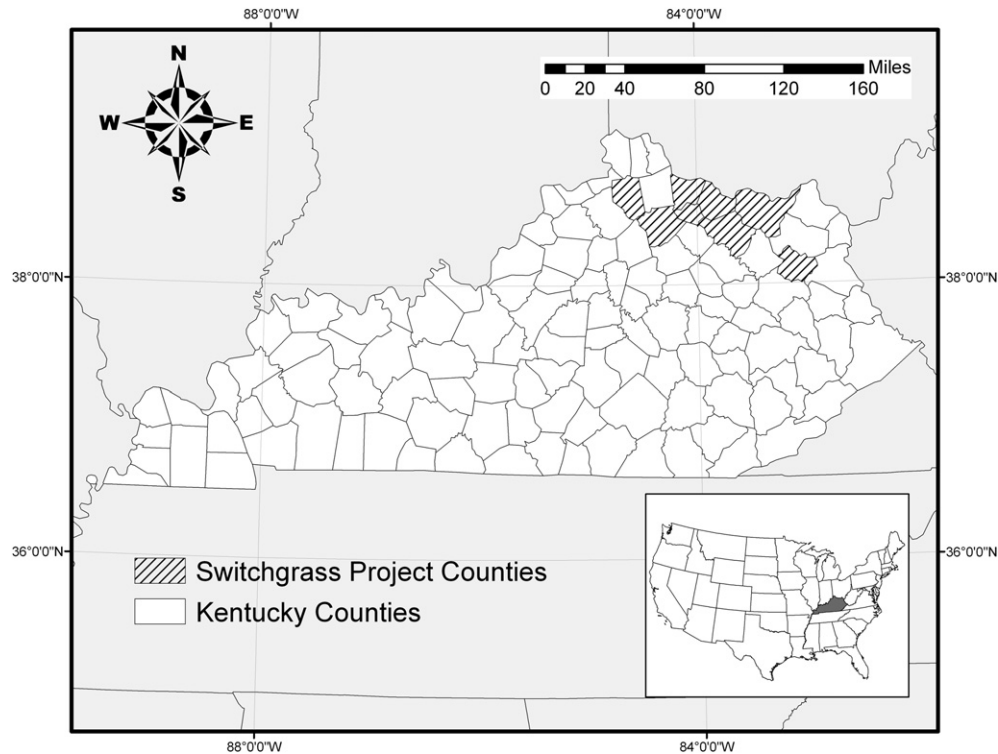


Fig. 2 – Location of Kentucky Switchgrass Project.

## 5. Findings: uncertainty regarding agricultural bioenergy development

Overall, switchgrass project participants in both states expressed uncertainty about two aspects of bioeconomy development. First, they voiced doubts that an agricultural bioeconomy would be of significant economic benefit to farmers like themselves (e.g., small-to-mid scale) and second, they remained tentative about whether a viable agricultural bioeconomy would manifest at all. This uncertainty informed a mixed response to the emerging bioeconomy among most study participants. They articulated hope for long-deferred and needed economic and environmental benefits for their regions as a product of a mature bioeconomy. However, they were ultimately skeptical that these desired benefits could be achieved under prevailing economic conditions and institutional arrangements, particularly the emphasis on large-scale firms and vertical ties in the energy and agricultural sectors.

Nor were they confident that switchgrass production alone could support any substantial bioenergy industry. This skepticism emerged partly from recognition of the complex technological, logistic and economic considerations in advancing agricultural bioenergy development, which participation in the projects had helped bring to light. These considerations included the still undeveloped commercial status of proven, cost-effective cellulosic conversion technologies, complicated transportation and storage issues due to the large mass of switchgrass relative to its energy content, and the financial implications of the gap between the price farmers need to produce switchgrass and the amount processing facilities

would likely be willing to pay for these feedstocks. Project participants also articulated the tradeoffs in obtaining benefits with switchgrass for bioenergy. They discussed, for example, the currently available technology for co-firing switchgrass with coal for electricity generation, on which these two projects rely. While knowledge had been gained about switchgrass production, management and logistics, co-firing itself offered only minimal environmental, energy supply, and regional economic benefits. Most participants expressed expectations of more significant benefits from future value-added end products, such as cellulosic ethanol and potentially other bio-based products, should they be developed. In considering models for the sector, project participants also discussed how greater environmental and energy supply benefits might be achieved by a large-scale industrial bioeconomy. However, they generally saw such a model resulting in fewer rural economic development benefits or rural revitalization in their own regions. More detailed perspectives are presented below, often in project participants' own words.

### 5.1. A mix of hope and skepticism

Individual project participants tended to express a mix of both positive and negative views about the potential local social impacts of bioeconomy development. While some hopefulness was evident concerning a new rural role as energy supplier, the current of skepticism ran deeper overall and was particularly pronounced regarding the prospect for rural revitalization. Project participants spoke of energy

independence, which they tended to equate with energy security, as an achievable benefit in growing a domestic biomass energy crop like switchgrass. They saw cellulosic ethanol as ideally and eventually contributing to American fuel independence, although they remained deferential to a role for corn grain ethanol. While most participants acknowledged the growing public criticism of corn grain ethanol production, they saw first generation ethanol production as a necessary contribution in moving the American economy away from oil and toward a more renewable energy supply. A young full-time farmer with deep family roots in his region of Kentucky remarked, "I think the benefit of [corn grain] ethanol is that 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." Many other project participants in both regions expressed this qualified, nuanced perspective about the role of corn grain ethanol. This was consistent with their hope that cellulosic, grass-based biofuels would eventually create more significant and sustainable change in national energy supply.

Pride in their own emerging ability to contribute to energy independence was common among project participants and informed their hopefulness. "Someday we might be the oil company of the west. These other companies, maybe when the Middle East will run out of oil some time, they will be looking at us and they will want oil, mused a semi-retired Iowa farmer now growing switchgrass. This pride and hopefulness regarding being an energy supplier co-exists with awareness of the international political tensions surrounding energy. A middle-aged farmer and lawyer in Iowa explained:

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 in this.

He and several other project participants from both regions stressed such political ramifications, as well as other complex economic and environmental implications in the development of a domestic biofuels industry. A project facilitator in Kentucky similarly made the case that bioenergy must be prioritized for a spectrum of political, economic, environmental, and even ethical reasons.

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.

These assertions accept the unknowns and uncertainties of agricultural bioenergy, but also suggest questions about the tradeoffs among capability, profitability, productive and social concerns, and ecological consideration. Although there was optimism about the potential to address energy supply issues and pride in contributing to national energy security, project participants did not see energy security as the primary goal for agricultural bioenergy development. Instead, the rural revitalization benefits of bioenergy were the most desired, but also the least expected.

The intensity of interest in rural revitalization, yet skepticism that it would be realized was striking with participants in both switchgrass projects. When asked if an ideally organized bioenergy economy could help revitalize rural areas and farm sectors, responses were mixed. Many participants said that if it became profitable to grow energy crops, an outcome by no means yet assured, the bioeconomy could help rural areas perhaps to some extent. A Kentucky farmer with a full-time off-farm job explained:

Your big oil companies are going to spend as little as they have to, 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....It won't be no worse. It would just be the norm.

This was a shared expectation among most of those interviewed, derived from their experiences with other agricultural crops. "The biggest goal," explained an Iowa switchgrass farmer, "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?" Here skepticism about local economic benefits from bioeconomy development was linked to perceptions of entrenched patterns of inequity in the farm and food supply chain.

Now semi-retired, this farmer had long observed producers receiving a comparatively small proportion of the product's profit. Such experience led him to expect a similar tendency in any developing biofuels market. Unless market transactions are organized differently, he anticipated that switchgrass farmers would see little-to-no economic benefit from producing energy crops. When asked whether they thought the development of an agricultural bioeconomy would be good or bad for farmers and landowners like themselves, less than half of the respondents saw likely, partial, or potential benefits. The remainder predicted that benefits would accrue predominantly to large-scale or absentee landowners, in keeping with existing economic patterns and potentially reinforced by who comes to influence the management and logistics of switchgrass production. Participants expressed some optimism that dedicated

energy crops would be good for the rural economy, possibly through multiplier effects, but did not see it being a boon for farmers like themselves or as able to revive the economies of small towns. For example, one Iowa project facilitator, himself a large landholder, asserted:

One biomass energy crop is not going to change the culture of an industry [farming], but what it will do is it will change where the revenue stream goes. If we can co-fire in southern Iowa with switchgrass 5 percent of the heat needs at Alliant Energy, that money doesn't go to the Powder River Basin in Wyoming [for coal]. If we can put 5 or 10 percent of this liquid fuel in ethanol, we don't send that money overseas. It doesn't matter who does it here, as long as we do it here.

This facilitator did not believe that growing switchgrass would allow small-to-mid scale farmers to make a better or more stable livelihood, nor would its widespread adoption revitalize local economies. He did, however, think that the state economy would benefit by sourcing more of its energy supply within its borders, and that this would keep more money circulating in the general region. Skepticism about benefits was strongest concerning benefits at the more immediate local level.

## 5.2. Rural revitalization and agricultural bioenergy development

Project participants' generally strong skepticism about the rural revitalization potential of agricultural bioenergy production was shaped by their wider views on the role of large-scale agribusiness and energy companies, such as Cargill, Monsanto and BP. Most project participants in both Iowa and Kentucky expressed the view that in order for local people and places to experience substantial economic benefits, corporate dominance in bioenergy industry development should be avoided or curtailed. As one full-time, larger scale Iowa farmer explained:

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.

At the same time, many participants also voiced a belief that corporate participation in this sector was inevitable. As a full-time Kentucky farmer, recently retired as a Fish and Wildlife law enforcement officer put it, "I don't think you can stop those people." Participants articulated complex views about corporate involvement, claiming that corporations would turn energy crops into yet another commodity and send value elsewhere, but also suggesting that the bioenergy sector may require that very involvement of large-scale agribusiness in order to thrive. An Iowa RC&D facilitator explained:

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.

While many project participants voiced resignation about the threat that corporate involvement would impose on local benefits, they also harbored some hope that aspects of the agricultural bioeconomy which differ from mainstream agricultural commodities for food and feed could lead to better local economic development outcomes. They hoped that these aspects – such as growing public interest in bioenergy alternatives and the political and environmental salience of energy supply, more generally – could steer emphasis to local benefits, including the viability of rural communities, and away from an exclusive focus on industrial economic growth.

Project participants' concerns about the challenge of rural revitalization were also informed by their views on the possibilities in smaller-scale cooperative organization within agricultural bioenergy. Many project participants advocated for cooperative investment at various levels of agricultural bioenergy development as a way to counter corporate dominance. Explaining the logic for more farmer participation, an Iowa farmer closely involved with the CVBP in its early phases said:

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.

Cooperative organization was also seen by such participants as a way to address some of the risks of becoming involved in a new sector. As a young Kentucky farmer explained, "I would actually feel more comfortable as part of a cooperative... 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." However, despite their recognition of the need for farmer cooperation to reduce marginalization in the developing bioenergy sector, some project participants, particularly in southern Iowa, still voiced reservations about this approach. These project participants acknowledged that longstanding cultural values of individualism and beliefs about the importance of farmer independence could make it difficult to form and sustain effective cooperative farmer organizations.

Only a few project participants expected state support to play a significant role in promoting the interests of small-to-mid scale farmers and rural economies. Project participants' views in general about government support of agricultural bioenergy included the assertion that public funds need to move down the supply chain and focus more on (especially



smaller) farmers as opposed to concentrating incentives at the refinery or pump level. “They just need to involve us more,” insisted one young full-time farmer in Kentucky, making a plea for farmers’ expressive contribution and meaningful participation in bioeconomy decisions. Some project participants saw government programs as a method for avoiding corporate dominance of bioenergy, but were skeptical that they will achieve this. These individuals cited their experiences with government agricultural programs, which they saw as favoring large-scale farms and not helping farmers like themselves. They expected state programs supporting agricultural bioenergy to have similar outcomes, whether intended or not.

Overall, project participants – farmers and facilitators – demonstrated strong awareness of national and global economic and political trends shaping agricultural bioenergy and the ways in which their community and local economy might fit into or potentially clash with those developments. To a large degree, it is the clashes that participants highlighted most in their comments. They doubted that high levels of corporate involvement or investment would create economically sustainable opportunities for farmers like themselves, and while they saw some need for government support, they also recognized its limitations. Their greatest hope for local rural revitalization outcomes through agricultural bioenergy rested in locally-integrated cooperative enterprises, yet they identified cultural and organizational challenges for such efforts. Many participants saw a likelihood of increased perennial grass-based bioenergy, like the farmer from Kentucky who declared, “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...” However, uncertainty was never far below the surface, as this same farmer continued, “I hope that it grows faster than I think it will.”

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## 6. Conclusions and implications

This qualitative study of two switchgrass bioenergy projects arose from recognition that the knowledge, experiences and concerns of perennial feedstock producers and their allies have received relatively limited research attention. While current and potential feedstock producers are often viewed instrumentally, as human inputs to be recruited and deployed within systems of production [10], this study has emphasized the expressive agency of switchgrass producers and other rural people who have a vested interest in the development of an agricultural bioenergy sector. Rural producers’ and stakeholders’ views should be heard and amplified to understand better the range of local concerns about such development and particularly to consider local knowledge about impacts on specific rural places and regions, as opposed to assuming uniformity in impacts envisioned at more national or global levels.

This research identified mixed responses from Iowa and Kentucky switchgrass farmers and project facilitators regarding the likely prospects for an agricultural bioeconomy, with many individuals articulating both positive and negative perceptions. Local and regional rural revitalization represented a much desired benefit from movement into switchgrass bioenergy production, yet study participants expressed some of their strongest skepticism about the likelihood of this

outcome. This skepticism stemmed from their observations of growing domination by agribusiness in the agricultural and food system, and their expectation of like influence and control by large corporate interests in the bioeconomy. Yet study participants also voiced positive projections about agricultural bioeconomy development, including the opportunity created for individual purpose and regional relevance in advancing national goals of energy independence.

The seemingly contradictory perspectives of these switchgrass energy crop producers and rural stakeholders reflect the complexity and tradeoffs to be negotiated in transition to an energy future that includes bioenergy. The expression of these views helps to counter flatter, more instrumental renderings of the people and places expected to produce bioenergy crops. In addition, evidence of mixed views on the benefits of an agricultural bioeconomy suggests some possible behavioral consequences. Most participants in these two pilot projects had strong agrarian roots and histories, with work ties and social commitments to other facets of their rural communities. Their abiding concern about the need to revitalize their rural communities could mean that they and farmers like them will closely scrutinize proposed arrangements to produce switchgrass for commercial energy applications. For some rural landowners and farmers, individual incentives and technical assistance may be necessary, but not sufficient to compel production of switchgrass for bioenergy, given their skepticism about potential or durable gains for the local community. Their resignation about existing economic arrangements which tend to favor large-scale solutions, however, may also suggest that some rural residents will be quietly critical, but will ultimately accept whatever structures are established by more dominant actors in the bioeconomy. Downstream handlers, processors and energy consumers need to recognize these broader concerns of feedstock producers and rural stakeholders. Such recognition has obvious instrumental implications—it may stimulate ideas for how to ensure needed feedstock production, especially when land is held by private landowners. But such recognition could also put the design of economic and social relations for the bioeconomy on a sounder ethical footing than some past models for agriculture. Such design would more deliberately incorporate and balance both interests and influence up and down the bioenergy supply chain.

The findings of this research are based on qualitative study of two specific switchgrass bioenergy projects and cannot be generalized to rural people and places everywhere. They do, however, offer insights for inquiry and practice in other settings, particularly in other developed countries. Given the need to dedicate high quality arable land to food production, governments may target perennial crops for energy uses, at least initially, on more marginal farmland. As in Kentucky and Iowa in this research, regions of relative agricultural marginalization in Europe have often experienced economic and social marginalization as well [36]. Further research should be conducted on how the objective conditions of rural marginalization correspond to rural residents’ subjective knowledge and experience of marginalization. Comparative research in other settings could shed light on how social and cultural histories influence societies’ abilities to redirect rural land use and economic development toward bioenergy goals.

In terms of policy implications, this research offers cautionary notes concerning the possible outcomes of U.S. policies now in place to promote the production of cellulosic feedstocks by farmers and forestland owners. The recent Food, Conservation and Energy Act of 2008 (i.e., the U.S. “Farm Bill”) included many new energy provisions, as signaled by appearance of the word “energy” in its title. Of particular relevance for prospective bioenergy crop producers is the Biomass Crop Assistance Program (BCAP), a cost-sharing program aimed at promoting cultivation and harvest of cellulosic agricultural and forest crops in a manner consistent with environmental conservation goals. With mandatory funding projected at US\$70 million between 2008 and 2012, the program aims to reduce producers’ risks in converting to energy feedstock production, while technical training and infrastructure development occurs in this new sector. As a larger, more comprehensive government program than either of the demonstration switchgrass projects studied in this research, the BCAP may attract different types of farmers and landowners. Economic incentives and support to producers provide the inducement to participate in the BCAP. However, the USDA’s selection criteria for BCAP projects anticipate some of the concerns identified in this research. Criteria such as anticipated economic impact in the project area, opportunities for local investment in associated conversion facilities and participation by beginning and/or socially disadvantaged farmers or ranchers are to be used to select BCAP projects. If these criteria are given their due weight, the BCAP could address certain local concerns about rural revitalization.

Our responsibility to rural people and places identified as providers of biomass energy supplies requires asking about their knowledge, experience and concerns about the benefits and drawbacks of such energy development. The information gleaned may contribute to better design, implementation and the ongoing improvement of agricultural bioenergy programs and policies. But beyond any instrumental gains in the technical provision of feedstocks, probing local rural knowledge forces us to recognize and address some of the ethical dimensions and dilemmas in turning to farmers and farmland for new supplies of energy.

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