SWITCHGRASS FOR ENERGY IN SOUTHERN IOWA: DEVELOPING AND MAINTAINING PRODUCER INVOLVEMENT

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ABSTRACT

A major objective of the Chariton Valley Resource Conservation and Development (RC&D) Area in southern Iowa is to create markets based on locally sustainable resources to increase rural incomes and job opportunities. Perennial forages and grasslands are compatible with the area's soil resources, but have limited markets. In the Chariton Valley case, establishing a market for biomass as an energy crop is attractive to local producers, but complicated by a variety of economic and environmental issues.

Organizing, assisting and actively involving potential biomass producers at the local level is an integral part of developing an energy crop industry. Producer involvement is key in field level production research. This involvement leads to a better understanding of the value of biomass crops. Producer led demonstrations of harvest and handling creates confidence that agriculture can serve effectively as an energy supplier. Producers also provide an important political constituency to support public policy changes needed to more accurately value the environmental and rural development benefits of energy crops.

Keywords: biomass, switchgrass, cooperatives, and technology transfer.

BACKGROUND

Dedicated energy crops are a major long term source of renewable fuel to establish domestic energy independence, address global warming, relieve over-production in the agricultural sector, reduce water pollution and increase rural incomes (DOE, 1992). The Midwest, and especially Iowa, has been recognized as having a high potential for energy crop production (Brower, 1993). Switchgrass, a herbaceous species native to Iowa, has been cited as having high potential as an energy crop (Woolsey, 1992; McLaughlin, etal. 1995).

Switchgrass can reduce soil erosion to almost zero, requires relatively low inputs, grows well on marginal soils, and adds significant amounts of carbon to the soil as a sequestering method for atmospheric C02 (Downing, etal. 1993).

More than three-quarters of all the cropland in southern Iowa is subject to excessive soil erosion when used to produce traditional row crops (Local USDA Estimates). Many of the soils of southern Iowa are, however, well suited to the production of perennial forages and grasses. Farm program changes and the eventual end of the Conservation Reserve Program (CRP) makes adding value to and establishing long-term markets for perennial forage crops vital for the area's continued prosperity. Energy crops provide such an opportunity and are attractive from a long-term resource management perspective because of benefits to water quality, sustainable soil capabilities and the local economy.

Chariton Valley RC&D Inc., a USDA affiliated rural development organization based in southern Iowa, and Alliant Power, a major Iowa energy company, are leading a statewide coalition of public and private interests to develop a sustainable biomass industry. Alliant Power is working to develop the technology to convert agricultural crops to energy to serve as the basis for sustainable commercial energy production. Plans call for modifications to a 750 MW Alliant Power coal plant that will allow switchgrass to be co-fired with coal. A %5 co-fire rate would produce 35 MW of electrical power production and require a 50,000 acre dedicated supply of biomass in southern Iowa.

A major impasse for this and other dedicated biomass projects is the need for significant quantities of established energy crops prior to the construction or modification of a biomass power facility. Concerned about availability and reliability, energy producers, such as Alliant Power, are hesitant to install biomass based technologies. Conversely, producers have no incentive to establish a large-scale biomass plantation to demonstrate the ability of agriculture to produce biomass, because there is no current market. Chariton Valley RC&D is working with local producers and agricultural professionals to address this impasse and to develop a biomass supply infrastructure.

Methods for producer involvement and the transfer of agricultural technology have been well documented. The adoption-diffusion model has long been accepted as descriptive of technology transfer within the farm community (Bohlen, 1967). In essence farmers go through a process of learning and evaluation that can result in adoption or rejection of a technological innovation. Socioeconomic and educational variations, as well as interaction within the local agricultural community effect the speed of adoption. (Beal and Bohlen, 1957). Barriers to adoption include complexity, incompatibility, economics, risk and capital outlay (Vanclay, 1992).

Most new ideas or technological innovations have a near term producer benefit. Dedicated biomass crops are not yet economically feasible in most cases unless market intervention occurs to capture public benefits. Producers that become involved in biomass feedstock projects not only face the transfer of a new technology, but also must understand the economics and public policy implications as well. Energy crops present a unique synthesis of technology issues, establishing the crop and the market demand congruently.

Chariton Valley Biomass Project sponsors seek producer involvement in developing biomass technology within an undefined market. This complicates the adoption process and provides special challenges; ultimately raising the question of what motivates producer involvement in biomass projects. The producers' cooperative in the Chariton Valley Project, Prairie Lands Bio-Products provides a good example of successful strategies and methods to involve local farmers. The project has achieved a high level of producer participation and diffusion of biomass production technology despite the economic ambiguity.

STRATEGIES AND METHODS

Involvement of producers in the Chariton Valley Biomass Project is vital to project success. From a technical perspective to help research and develop the technology of biomass production and from a policy perspective as a constituency to help facilitate policy changes that increases the value of biomass crops. Absent a clear market for biomass, a number of strategies are needed to recruit interested producers and keep them involved. In the case of the Chariton Valley Project the following identifiable factors have been key in maintaining active producer interest. These strategies are designed to maximize the adoption of biomass energy crop concepts by individual producers, while addressing the most limiting barriers. Project sponsors have been careful to insure direct producer involvement in project development and implementation, management of producer risk through use of CRP lands, adequate funding to offset capital outlays of producers and a clear definition of potential producer benefits.

Active Producer Involvement

Prairie Lands Bio-Products was organized in June 1997 as a nonprofit corporation in the state of Iowa. The organization's primary purpose is to support and conduct research and education activities that encourage the development of a biomass energy industry in south central Iowa. Prairie Lands is a farmer-based organization with 30 of its 40 members being active switchgrass producers.

Prairie Lands members provide important project support as well as a producer's perspective. Producers are directly involved in the design and evaluation of harvest, transport, and storage alternatives; advising other landowners regarding the establishment and management of switchgrass for biomass production; providing a supply of switchgrass required for research and most importantly for the first co-fire test planned for spring 2000; and securing access to land in support of the project's research activities in the areas of soil quality, water quality, wildlife habitat, yield and biofuel characteristics.

Prairie Lands plans and conducts information and education related to the Chariton Valley Biomass Project. The organization receives funds from the Leopold Center for Sustainable Agriculture in Iowa to support these activities. Prairie Lands has contracted with an education specialist to assist members with these activities. As part of these efforts, Prairie Lands prepares and distributes a quarterly newsletter for its members and others cooperating with the Chariton Valley Biomass Project; prepares and presents project related information to farm, conservation, and civic groups; plans and conducts field days and demonstrations for land owners and resource professionals; organizes special events, including the October 1997 visit to the Chariton Valley Biomass Project by Secretary of Agriculture Dan Glickman and a permanent display about the project at the Iowa State Fair.

Conservation Reserve Program Land Use

One of the most important aspects of the Chariton Valley Project that allows extensive producer involvement is the use of Conservation Reserve Program (CRP) lands for biomass research and production. The Chariton Valley RC&D area has received authorization from USDA Farm Services Agency to use existing CRP land for a 4,000 acre biomass demonstration area. The purpose is to support the development of energy crops as a post-CRP alternative (Memo from USDA, Letter from the Farm Services Agency). These acres have been identified and are currently being used for project research and development activities to improve switchgrass production methods and as a source of biomass for co-fire testing. Project participants from Iowa State University and from the RC&D use these acres to work with Prairie Lands members on improving agronomic management procedures, harvest and transportation efficiency and the transfer of biomass technology into the agricultural community during feedstock scale-up.

The use of CRP lands provides southern Iowa producers an ideal way to demonstrate the ability to produce energy crops. According to the provisions of the USDA Farm Services Agency sponsored demonstration project, landowners continue to receive annual payments while the project uses the land for biomass production. CRP use reduces the risk for producers by providing an income during establishment of the crop and market development. Having a biomass crop available and waiting will in turn allow Alliant Power to proceed with plant modifications and testing. This strategy will have increasing importance as the project grows. Producers are directly involved in policy efforts to expand CRP use for biomass based on the public benefits and rural development potential.

Adequate Funds to Offset Producer Costs

While producers freely give of their time and donate considerable labor and equipment use, direct costs of producer activities are covered by the project or by Prairie Lands from a variety of sources. It is very important to provide this type of an arrangement to participating farmers. Prairie Lands' status as a non-profit has helped to secure direct funding to carry out feedstock development activities. For example, Prairie Lands has worked with the Iowa Farm Bureau to secure $20,000 in funds to partially support research that will assess the net impact on atmospheric carbon of producing and using switchgrass as a biomass crop to generate energy. Investigators at Iowa State University and the University of Iowa will conduct the research. Prairie Lands members will participate in the research by providing access to land that they own and manage as well as identifying additional land available for the collection of field data.

Prairie Lands has also received funds and technical assistance from the USDA and Iowa Farm Bureau to evaluate organizational structures to undertake the production and

marketing of biomass. It is anticipated that Prairie Lands will be a precursor to, or assist the formation of a for-profit organization. Producers are also partially compensated for individual capital expenditures through Biomass Power for Rural Development funds received by Chariton Valley. As noted above producers are active in many hands-on project aspects. Producer inputs provide a significant non-federal contribution to the project.

Producer Understanding of Individual Benefits

The commercialization of switchgrass as a dedicated biomass feedstock in southern Iowa is dependent on the economic viability of the project. Factors that may contribute to favorable economic conditions are tax incentives for renewable fuels, expanded use of CRP lands to support production, creative contractual arrangements with Alliant such as tolling and the marketing of the green energy. Producers are made aware and kept updated as to progress in securing market incentives. Many participate in providing information to legislators with respect to the incentive impacts on rural farmers.

The current condition of southern Iowa agriculture contributes to producer interest. Southern Iowa producers are faced with reduced federal supports and limited soil resources. Many local farmers are looking for alternative markets for sustainable grasses and forages that will protect the environment as well as boost the local economy. The recognized potential of switchgrass as an energy crop and the need for agricultural markets for products grown on marginal lands attracts many producers to participate.

As the project moves to a large-scale co-fire test, Alliant Power views Prairie Lands as the fuel supplier. This role also supports continued producer interest and involvement. Steps are underway to develop a formal relationship between the producers and Alliant. This activity will produce model legal tools such as agreements and contracts essential to the future marketing of switchgrass.

CONCLUSIONS

It is safe to say that without the current level of producer involvement, the Chariton Valley Project would not be successful. Producers are integrally involved or directly responsible for a majority of feedstock development activities. The outcomes of these producer-based activities indicate that methods employed to involve producers have been successful. The switchgrass producer organization Prairie Lands Bio-Products continues to play an essential role in the Chariton Valley Biomass Project. Currently, 47 producers who own and manage over 4,400 acres of switchgrass are cooperating with the project. Most of these producers are members of Prairie Lands. Notably, some of these acres are not CRP land. Use of private lands has been provided by interested landowners to further benefit the project.

Producer involvement and feedstock supply will become increasingly important over the next two years. Engineers with Alliant Power and the US Department of Energy (DOE) have initiated the final design of co-fire modifications at the Alliant facilities. Plans are for the final engineering design to be completed and installation of co-firing facilities at OGS to begin in fall of 1999. A series of large-scale tests of the co-firing facilities are scheduled for 2000 and beyond to demonstrate the technical feasibility of combining switchgrass with coal as fuel to generate electricity. Approximately 1,500 - 2,000 tons of switchgrass will be required for the first co-fire test. Local producers will be primarily responsible for developing the switchgrass procurement plan, for coordinating implementation activities, and ultimately the harvest, transport, and storage of all switchgrass needed for the test. Without producer involvement the test would not be possible.

The Chariton Valley Project clearly demonstrates the importance of producer involvement in the development of dedicated energy crop markets. We see producers working together in a cooperative setting to partner with the utility and government to advance biomass as a potential fuel supply industry. The key is to adequately address known barriers to technology adoption. Producers must have a strategy to reduce risk and capital outlays. They must also have sufficient project involvement to understand the complexity of the issues and how biomass production potentially fits in their farming operations. Producers, by learning the technology and promoting the benefits, hope to derive future market opportunities. This motivation in conjunction with removal of key barriers can increase producer involvement to drive the adoption process in the absence of near term economic gain.

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