Shaping a functional and sustainable biofuels industry through bridging industrial needs with farmer production capabilities

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Abstract
In order for the biofuels industry to survive and succeed, it will need the cooperation of Iowa farmers to supply biomass. Farmers have concerns about production that need to be addressed in order to create a sustainable industry.

Keywords
Agronomy, English, Political Science, Statistics, Chemical and Biological Engineering, Sociology, Bioeconomy and energy

Disciplines
Agribusiness | Agronomy and Crop Sciences | Applied Statistics | Biochemical and Biomolecular Engineering | Biotechnology | English Language and Literature | Power and Energy | Rural Sociology

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Are farms capable and willing to meet the cellulosic feedstock needs of the emerging cellulosic biofuel industry?

A positive answer suggests strongly that farmers will have another income stream. A negative answer suggests that either industry requirements must be modified, farmer practices must be altered, or if it is a farmer risk issue, policy tools should be considered to move this renewable energy industry forward in a sustainable way.

Background

The project investigators sought to coordinate the needs of the developing cellulosic biofuel industry with the ability of Iowa farmers to supply that biomass. If there is a gap between what farmers can or will supply and what the industry needs, it is unlikely that a sustainable industry will emerge. Focus groups conducted earlier suggested that farmers have several concerns about working with the biofuels industry:

- the cost of producing, harvesting, storing, and delivering biomass may be too high;
- natural resources could be degraded through biomass removal from fields;
- loss of organic matter and nutrients through biomass removal would be cost-prohibitive considering the expense of fertilizer inputs;
- increased labor requirements may be too expensive or the required labor may be unavailable; and
- it may be impossible to harvest the quality of feedstock necessary for the industry.

This project studied these issues and addressed the reasons why farmers might be reluctant to supply feedstocks of suitable quantity and quality for this industry.

Objectives of the project were to:

1) Identify feedstock needs of the cellulosic biofuel industry for two separate cellulosic biofuel platforms,
2) Determine challenges and potential barriers that producers may encounter when producing and delivering the required feedstock,
3) Identify policy options to minimize barriers to development of a sustainable biofuel feedstock supply, and
4) Identify research necessary to overcome barriers that policy either cannot address or for which policy would be too expensive to implement.

Approach and methods

Two approaches were used for data collection: Delphi survey and focus group conversational interviews. Through these surveys and focus groups involving farmers, industry representatives, state legislature representatives, and researchers, investigators identified:

- industry feedstock needs for both thermo-chemical and biological conversion platforms;
- feedstock needs that farmers thought they were
either unable or unwilling to meet; and 3) reasons that farmers thought they either could or could not meet the identified needs.

**Results and discussion**

Discussion focused on three feedstocks: corn cobs, corn stover and switchgrass. These crops are dominant in Iowa and at this early phase of development, industry and farmers have much more experience with these crops. Other feedstocks were mentioned, such as woody biomass, sorghum and city wastes, and it should not be assumed that because of low frequency of citations that they are unimportant.

Qualitative content analysis identified many reasons why farmers and industry representatives believed use of selected feedstocks may be good and achievable, and whether or not they are willing to participate in this industry with a given biofuel feedstock. Removal of corn stover was a touchy issue, especially with farmers, although industry also indicated corn stover removal must be approached cautiously. Farmers voiced concerns about a variety of issues related to transportation, harvest, capital investments, sustainability, land ownership, and storage. Yet they saw biofuel production as plausible (the technology will exist and logistics issues may be overcome), and if economics are favorable at least some farmers appear willing to consider corn residue harvest for this industry.

Corn cobs can serve as a viable cellulosic feedstock, especially from industry’s perspective. Farmers from outside the area where cobs are harvested (as most of these were) were unfamiliar with cob harvest and sales, and seemed more skeptical. Industry repeatedly indicated it was learning by doing and most of the farmer participants had not yet been involved with ‘learning by doing’ for this industry. Producers generally were apprehensive, but were open and willing to learn.

Switchgrass was mentioned less frequently, but the comments were more often favorable than unfavorable (especially from farmers). Considering the dominant role that corn and soybeans have in Iowa agriculture, this sentiment is understandable. Some farmers seemed to recognize the part that this perennial grass might play as it relates to timing of harvest and sustainability issues. Both farmers and industry identified the need to improve yields of perennial grasses to make them competitive with other potential feedstocks.

Industry needs a large, stable and continuous supply of quality feedstock; farmers want a continuous, stable feedstock market. Despite this area of agreement, farmers repeatedly voiced concerns (independent of feedstock type) regarding economics, harvest, long-term contracts for feedstocks from rented lands, sustainability, and logistics. To help minimize the long-term contract and capital investment risk, industry proposed that an aggregator could play the role of a contracted supply agent with industry, and that the aggregator could contract with farmers to obtain the quantities of biomass needed by industry. Farmer’s responses were generally positive on logistic issues, but cautious relative to natural resource impacts. They were especially concerned about impacts of a third party’s management practices: would they remove residues with heavy machinery causing compaction, would the aggregator operate on soils that were too wet, and would they leave sufficient residues in locations that are sensitive to soil erosion?
Policy-related comments focused on establishing or maintaining economic stability of farmers who were attempting to get into the cellulosic feedstock business and on the stability of the industry – if industry fails, so do the farmers involved. Yet mandates for biofuel use generally were not viewed favorably. Policies that would open existing CRP land for perennial production of biofuels were identified as important multiple times, as was the need to increase ethanol blend limits.

Education and connection among farmers, industry, and science was deemed necessary. Industry recognized the need to be engaged with farmers and both recognized the need for education and connection to policy makers. They all agreed that the success of this industry is dependent largely on collaborative work among key stakeholders, such as industry, producers, scientists, and legislators.

**Impact of results**

Findings of this study resulted in three key recommendations from the research team:

1. To move this industry forward in an economically viable and sustainable manner dialogue among industry, farmers, and legislators is required.
2. To support informed decision-making by farmers about participating in this industry, we need to develop increased educational opportunities for farmers.
3. To increase use of more sustainable practices, we need to consider: 1) why adoption of practices or technologies favoring sustainability does or does not occur; 2) what barriers restrict increased implementation; and 3) what policies would remove the factors identified as barriers to participation and increased use of more sustainable practices.

**Leveraged funds**

No additional funds have been leveraged at this time.