Proposal for Biobased Industry Center Grants Program

Project Title: Cellulosic Biofuel Potential under Limited Land Use Change: Feedstock Supplies, Costs, and Locations

Project Leadership:

<table>
<thead>
<tr>
<th>Name (PI/Co-PI)</th>
<th>Department</th>
<th>Phone No.</th>
<th>E-mail</th>
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<tbody>
<tr>
<td>John Miranowski</td>
<td>Economics</td>
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Research Priority Addressed by this Project:

Previous research supported by the Biobased Industry Center (BIC) developed a flexible program to evaluate the economic feasibility of cellulosic biofuel production under varying market, policy, and technology conditions. The Biofuel Breakeven program (BioBreak) estimates the breakeven supply cost for commercial scale biomass under regional market and environmental conditions. Although the regional analysis provides an evaluation of cellulosic biofuel market feasibility, BioBreak is currently limited in its ability to estimate biomass supply curves and costs at a disaggregated level.

We propose extending the BioBreak program to the county-level for the purpose of estimating local biomass supplies (quantity and cost) for cellulosic biofuel within a framework that accounts for RFS2 cellulosic biofuel mandates and limited land use change. The model will initially consider biomass from two sources - stover from land currently allocated to corn production and switchgrass from land enrolled in the Conservation Reserve Program (CRP) – but, additional land will likely be needed to meet the RFS2 mandates. Data exist for individual offers to enroll in the CRP that were not accepted for enrollment and these data contain the spatially explicit information the model requires such as soil characteristics, parcel characteristics, offered rental rates, and contract details that can be utilized to evaluate the potential biomass supply from land that was offered for enrollment into the CRP. This dataset offers a unique perspective not otherwise attainable because we observe landowners who were willing to enroll in the CRP program and are therefore likely candidates for alternative cropping systems such as switchgrass production. Ultimately, the model will identify the optimal location for cellulosic biofuel production along with potential aggregate feedstock and biofuel supplies given current land allocation and limited land use change. This research would address two of the research priorities established for the Biobased Industry Center Grants including: 1) Costs, structures, and prices in markets to grow, ship, and process biobased products and 2) Environmental impacts of biobased industries and their applications for regulatory and economic incentives.

Objectives:

1. Develop an economic model and corresponding program capable of internalizing local land uses and market characteristics to estimate potential biomass supply quantity and costs at the county level.
2. Identify the optimal location for cellulosic biofuel production in the U.S. and potential cellulosic biofuel supply given current land allocation and limited land use change.

Approach:

Using county-level data on land allocation, CRP enrollment and offers, soil quality, and climate characteristics, we will develop an extension to the BioBreak program that estimates the local costs and supplies of available biomass under different land availability scenarios. For each scenario, the program will identify the supply potential and cost of each feedstock within each disaggregated area. Given biorefinery technology assumptions and biomass supply potential, we can identify the optimal location and number of potential biorefineries within the U.S.
Our baseline scenario is consistent with minimal land use change and considers only stover from land currently allocated to corn production and switchgrass from land enrolled in the Conservation Reserve Program (CRP). Since the RFS2 mandates will likely require more feedstock than provided by stover and CRP switchgrass production, we consider additional sources of land for biomass production. Identifying potential land for biomass production is difficult due to uncertainty and heterogeneity in the opportunity cost of land and willingness of land owners to switch away from traditional production practices. Data on CRP offered but not enrolled identifies a pool of land owners willing to forgo cash crop production in exchange for a fixed payment amount and also provides information on the opportunity cost of the land.

Non-enrolled CRP offers fit two categories: 1) offers that met the minimum environmental benefits index (EBI) criteria for enrollment but denied because the county CRP acreage cap was met, and 2) offers that did not meet the minimum EBI criteria. These two classifications outline two alternative scenarios to our baseline land availability scenario: 1) baseline land (corn and CRP acreage) plus land denied CRP offers due to county CRP cap and 2) baseline land plus any land denied CRP offers. Currently, we can observe county-level characteristics (rental rate offered, soil quality measures, etc.) of CRP contract offers that were enrolled. However, we are exploring obtaining, via an USDA interagency agreement, updated CRP offers data to conduct the analysis using farm level land characteristics captured in both enrolled and not-enrolled CRP offers. These data would permit a more refined and accurate estimate of available acreage and local biomass supply curves and permit deriving supply estimates with and without inclusion of CRP acreage.

**Workplan and Schedule**

Phase 1 (July-November 2011): Collect and organize data needed for county-level analysis including land use, CRP enrollment and offers, soil quality, and climate characteristics.

Phase 2 (December 2011-June 2012): Develop extension to BioBreak program using disaggregated data to determine local biorefinery supply potential and feedstock costs.

**Budget** (indirect not allowed)

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<th>CATEGORY</th>
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Miranowski, John A.

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Academic Background
PhD: Harvard University - 1975
AM: Harvard University - 1969
BS: Iowa State University - 1966

Positions Held
Chair of the Department of Economics, Iowa State University, 1995-2000
Director, Resources and Technology Division & CED, ERS, USDA, 1984-1995
Executive Coordinator, Secretary’s Policy Coordination Council, USDA,1990-1992
Assistant and Associate Professor of Economics, ISU, 1975-1984

Recent Publications
- Liquid Transportation Fuels from Coal and Biomass: Technological Status, Costs, and Environmental Impacts, Alternative Liquid Transportation Fuels Panel Report, National Academies.
- Amenities and Non-Farm Employment Growth in the U.S. Midwest: The Impact of Recreational Amenities in Neighboring Counties, Daniel Monchuk, John Miranowski, The Review of Regional Studies, Forthcoming
- Genetic Information in Agricultural Productivity and Product Development, David A. Hennessy, John Miranowski, Bruce A. Babcock, American Journal of Agricultural Economics, Vol. 86, 1, pp. 73-87, February 1, 2004
Keri L. Jacobs
Assistant Professor of Economics
166D Heady Hall
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Phone: 515-294-6780; Fax: 515-294-4545; Email: kljacobs@iastate.edu

Academic Background
Ph.D., Economics, North Carolina State University, 2010
B.A., Business Administration and Economics, Coe College, 1996

Professional Positions Held
Assistant Professor of Economics, Iowa State University, 2010-present

Research Interests
Impact of agricultural and conservation policies on land use and production decision; farm level decisions under uncertainty

Selected Honors
Nominated by the Department of Agricultural and Resource Economics at North Carolina State University for the College of Agricultural and Life Sciences (NCSU) Kenneth Keller Research Award for excellence in doctoral dissertation research. 2011.


2010 Heading South Award Winner, Awarded by the Agricultural and Applied Economics Association and the Australian Agricultural and Resource Economics Society.