

Regional Economic Impacts of a Cellulosic Ethanol Plant in MI, MN & WI

Barry D. Solomon

Department of Social Sciences

Michigan Technological University, Houghton, MI
49931

*Presentation to the Michigan Economic Development Corp.,
March 16, 2007*



Sustainable Futures Institute
www.sfi.mtu.edu

MichiganTech

The Grain Ethanol Industry in the Upper Midwest States

- As of March 2007:
 - MN # 4 Producer in U.S. with 14 Plants, 466 MGY
 - WI # 8 Producer with 5 Plants, 212 MGY
 - MI #10 Producer with 3 Plants, 150 MGY

 - MN # 4 Ethanol Consumer in U.S.
 - MI # 6 Ethanol Consumer
 - WI # 10 Ethanol Consumer



Commercialization of Cellulosic Ethanol

- 15-20 Pilot Plants Tested Worldwide, Mostly Small Batch Operations
- 2 Demonstration Plants Opened (Ottawa & Japan) with a 2-3 Others to Open Later in 2007
- 15-20 Commercial Plants Being Built Worldwide
 - Large Range of Feedstocks Proposed - Mostly Agricultural & Forestry Residues



Estimating Regional Economic Effects

- Largest Cost Items: Capital & Feedstocks
- Capital Cost for Cellulosic Plants Much Higher than for Grain Ethanol
- Employment Needs Modest, Except During Construction Phase
- Very Few Previous Studies Have Estimated Regional Economic Effects (Most Studies National)
- High Risk & Uncertainty with Cellulosic Ethanol Plants Owing to Lack of Commercial Experience



REMI (Regional Economic Models, Inc.) Model Used in This Study

- REMI Policy Insight is Leading Regional Economic Forecasting & Policy Analysis Model
- Model is Linked Regional Input-Output, Dynamic Econometric System with Neoclassical Assumptions
 - Estimates Direct + Indirect & Induced Effects
- Custom Built for This Study with 70 Sectors & 3 State Region (Michigan, Minnesota & Wisconsin)
- Uses Federal Economic & Demographic Data



Model Assumptions

- Had to Make Several Assumptions That Relied on Industry Data:
 - Employment Level & Wages for Plant Construction
 - O & M Employment & Wages (esp. in Chemical Manufacturing of Ethanol)
 - Demand for Equipment by Sector



Model Assumptions - cont.

- Atypical Intermediate Supplies thru Forestry, Agriculture & Transportation Sectors
- Wage Bill Adjustments to Reconcile REMI Wages by Sector to Likely Project Wages
- Capital Stock Adjustment
- Value Added for Chemical Sector to Reflect Cellulosic Ethanol Capital & Intermediate Input Intensities



Overview of Scenarios Modeled

- Most Pilot Plants are Very Small so Economic Effects are Nil, Thus We Considered:
 - Scenario A: 265,000 GPY & 10 Yr. Operations
 - Scenario B: 20 MGY & 15 Yr. Operations
 - Scenario C: 52 MGY & 20 Yr. Operations



Scenario A Results

- Jobs: 157/Yr. During Construction Phase
- Jobs: 92/Yr. During O & M Phase
- Mostly in Manufacturing & Services

- Increased Real Disposable Personal Income: Avg. \$5.6 Million/Yr (\$2006 Throughout)



Scenario A Results - cont.

- Increased Economic Output: Avg. \$25 Million/Yr.
- Gross Regional Product: Avg. \$12.8 Million/Yr.
 - About Half of Total Output Increase Due to Out of State Purchases of Capital + Product Exports



Scenario B Results

- Jobs: 810/Yr. During Construction Phase
- Jobs: 342/Yr. During O & M Phase
 - Mostly in Manufacturing, Services, Trade
- Increased Real Disposable Personal Income: Avg. \$20.3 Million/Yr.



Scenario B Results - cont.

- Increased Economic Output: Avg. \$93.8 Million/Yr.
- Gross Regional Product: Avg. \$44.7 Million/Yr.



Scenario C Results

- Jobs: 1,647/Yr. During Construction Phase
- Jobs: 526/Yr. During O & M Phase
 - Mostly in Manufacturing, Services, Transportation, Trade
- Increased Real Disposable Income: Avg. \$32 Million/Yr.



Scenario C Results - cont.

- Economic Output: \$148 Million/Yr
- Gross Regional Product: \$65.9 Million/Yr.



Conclusions

- Regional Economic Effects of Commercial Cellulosic Ethanol Plants Much Greater than for Pilot & Demo
 - Significant Job Drop-off After Construction Period
- While MI is Behind MN & WI in Grain Ethanol it Can Catch up via Cellulosic Ethanol Industry
 - Will Not Happen Without Strategic Initiatives of State Government (Too Much Competition)



Conclusions - cont.

- Since MI Has Less Farm & Logging Residues Than MN or WI, MEDC Should Consider:
 - Focus on Feedstocks MI Has More of e.g. MSW
 - Focus on Locations Such as UP Papermills or Demand Centers Such as Detroit or Grand Rapids
 - State Loan Guarantees to Cover Assume Risk

