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“Strategically Locating Soybean and Biodiesel Processing Facilities in Nebraska”

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Nebraska Soybean Association

USDA – Rural Development Value Added Producer Grant:

“Strategically Locating Soybean and Biodiesel Processing Facilities in Nebraska”

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Forward

Thank you for your interest in the Nebraska Soybean Association – Value Added Producer Grant - STRATEGICALLY LOCATING SOYBEAN AND BIODIESEL PROCESSING FACILITIES IN NEBRASKA. The overall objective of the project was to conduct a statewide assessment to support the development of profitable soybean processing and biodiesel production facilities. Following is a summary of the activities and findings of the statewide assessment, which focused on available feedstocks, markets, and infrastructure across the state of Nebraska.

The primary objectives of the study were to:

- conduct a third party feasibility study and market analysis to evaluate the potential success and risk of investment associated with soybean processing and biodiesel production facilities located in Nebraska;
- identify key site selection criteria for soybean processing and biodiesel production facilities and conduct a statewide assessment of the criteria (feedstocks, markets, and infrastructure) to identify the best location(s); and
- identify and evaluate multiple business structures to position Nebraska soybean producers to capture the greatest value from soybean processing and biodiesel production.

To complete these objectives, a project development team was formed of representatives from the Nebraska Soybean Association, University of Nebraska, Nebraska Department of Economic Development, Nebraska Department of Agriculture, Nebraska Agricultural Statistics Service, Nebraska Ethanol Board, Nebraska Soybean Board and Nebraska Public Power District. The Nebraska Soybean Association also contracted with the Independent Biodiesel Feasibility Group (IBFG) to conduct the feasibility study and the University of Nebraska – Industrial Agricultural Products Center (IAPC) to provide further technical expertise, to coordinate the efforts of representatives from the multiple state agencies, and to prepare the final report of activities associated with the project.

Executive Summary

Is the production of biodiesel feasible in Nebraska? A standard answer depends on the business operating condition. More specifically, a statewide, as opposed to a site specific, study conducted by the Independent Biodiesel Feasibility Group (IBFG) in July 2005 for the Nebraska Soybean Association (NSA) concluded a positive return on equity could be expected. At that time, the return was estimated to be poor for the small scale, 5 million gallons per year (MGPY) scenario analyzed and only modest for the mid, 15 MGPY, and larger scale, 30 MGPY scenarios¹. For a complete copy of the feasibility study, contact the Nebraska Soybean Association (NSA) office.

Many factors have changed since July 2005 though, most notably the continued escalation of petroleum fuel prices, the tremendous growth in the renewable fuels industry, the increased time/cost to build plants, and the government support for renewable fuels. This report provides a summary of activities and findings for the specified objectives of the project and an update to the July 2005 study, based on further evaluations by the project development team, recent industry developments and reports that address key issues such as:

- an updated outlook for soybeans, soybean meal, and soybean oil production, ProExporter Network report (PRX Grain Database, section C soybeans);
- an updated outlook for soybean oil markets, Promar International report; and
- an updated outlook for petroleum prices, US Department of Energy EIA-AEO report.

The issues addressed include: biodiesel demand, biodiesel market price, estimated biodiesel production costs, competition in the biodiesel industry, availability of feedstock resources, and government incentives and public policy.

Biodiesel demand

By estimating market penetration for select market segments, the IBFG study projected a potential market for biodiesel (B100) to be 8 MGPY in Nebraska and 24 MGPY for Nebraska and the surrounding region (CO, IA, KS, MO, SD, and WY). The estimates were based on the

¹ IBFG Feasibility Study and Market Analysis, July 2005, page 58.

concept that biodiesel would not compete directly on a cost basis with petroleum based diesel fuel, and it would primarily penetrate niche market segments at a slight price premium. With the increase in petroleum fuel prices to \$3.00 +/- per gallon, the relatively steady price for biodiesel feedstocks to date (\$0.25 +/- per pound of crude soybean oil), and the extension of the federal excise tax credit (\$1.00 per gallon) through 2008, biodiesel is able to compete dollar for dollar with petroleum diesel. If biodiesel is considered a suitable substitute for petroleum diesel fuel and can be priced competitively to the consumer, the potential demand is virtually the demand for diesel fuel regardless of the source (petroleum or renewable biodiesel). However, it is not expected that the market place will widely accept biodiesel blends above B20. With this in mind, a large-scale (above 10 MGPY) biodiesel production facility in Nebraska will need to market its biodiesel on a national level.

Biodiesel market price

The IBFG study based the selling price of biodiesel on the Energy Information Administration (EIA) diesel fuel price projections from the Annual Energy Outlook 2005 (AEO 2005)² and the associated October Oil Futures Case³. These reports led to the diesel fuel price projections, which range from \$1.31 in 2006 to \$1.17 in 2010 pre-tax based on world crude oil price projections declining from \$38 per barrel in 2006 to \$31 per barrel in 2010. EIA has since revised its projections, which were published in February 2006 in the Annual Energy Outlook 2006⁴. The revised study accounts for the much higher world oil prices and projects oil prices will decline slightly from current levels in 2006, then rise steadily through 2030. To incorporate the EIA revised projections for 2010, the biodiesel selling price could be raised 33 cents per gallon to \$1.50 per gallon pre-tax and then use the same assumptions as the original IBFG study to account for factors such as biodiesel fuel premiums, distribution chain margin, transportation costs, and the excise tax credit. However, the IBFG study also assumed a ¾ cent premium was viable for on-highway diesel fuel at the B2 blend level justifying a 37.5 cent premium for B100. With the overall increase in fuel prices and the concept that biodiesel will need to compete with petroleum diesel at the industries commodity value, these differences may fully offset each other.

² Energy Information Administration, Annual Energy Outlook 2005.

³ Energy Information Administration, October Oil Futures Case.

⁴ <http://www.eia.doe.gov/oiaf/aeo/index.html>.

The IBFG study also assumed the \$1.00 per gallon blenders excise tax credit could be fully realized by the biodiesel producer. From industry reports and discussions at the 2006 National Biodiesel Conference it does not appear that is the case. A more realistic estimate may be a \$0.85 to \$0.95 premium paid to the producer for B100 based on the blenders tax credit. The small producer tax credit, which is \$0.10 per gallon for the first 15 MGPY of production for plants under 60 MGPY, also may offset this adjustment.

A more current analysis of the relationship between biodiesel and petroleum fuels is available in a United Soybean Board report prepared by Promar International⁵. This report provided a breakeven analysis for varying soybean oil feedstock prices over a range of crude oil prices. The analysis concluded the cost for biodiesel feedstocks would rise over time. With crude oil prices at \$70 per barrel, soybean oil could go as high as 33 cents per pound. However, if crude oil prices would drop to \$50 per barrel, biodiesel production would not be profitable if feedstock costs were 28 cents per pound. As consumption of biodiesel feedstocks increase, eventually the food value of the feedstock also will come into play, which may limit the profitability and growth of the biodiesel industry.

Estimated biodiesel production costs

The production costs associated with producing biodiesel can vary widely depending on project specific issues such as: feedstock resources, processing technology, scale of production, and infrastructure to name a few. At the Biodiesel Plant Development Workshop held in March 2006, Rudy Pruszko⁶ presented October 2004 estimates from a reputable technology provider for a 3 MGPY and 30 MGPY facilities. The estimated cost to produce biodiesel at a 3 MGPY facility was \$2.39 per gallon versus \$1.92 per gallon at a 30 MGPY facility. These estimates were based on a soybean oil feedstock priced at \$ 0.22 per pound or \$1.67 per gallon. In both cases, feedstock was the leading costs at 70% for a 3 MGPY facility and 84% for a 30 MGPY facility. Other key differences were the cost of labor (14 cents per gallon versus 2 cents per gallon), depreciation and maintenance (20 cents per gallon versus 8 cents per gallon) and cost of chemical (24 cents per gallon versus 18 cents per gallon).

⁵ Promar International, A report prepared for the United Soybean Board – Evaluation and analysis of vegetable oil markets: the implications of increased demand fro industrial uses on markets & USB strategy. November 2005.

⁶ Rudy Pruszdo, Senior Project Manager, Center for Industrial Research and Service – Iowa State University, rprusko@iastate.edu, 563-557-8271, ext. 251.

A comparison of two feedstocks (soybean oil at \$.022 per pound versus animal fat at \$0.14 per pound) is estimated by the same technology provider as of October 2004 and presented in “Building a Successful Biodiesel Business.”⁷ This comparison illustrates the cost to produce biodiesel from soybean oil at a 10 MGPY facility is \$1.99 per gallon compared to a \$1.45 per gallon if an animal fat feedstock (5% FFA content) is used. The cheaper animal fat feedstock saves \$0.58 per gallon, however slightly higher investment and processing costs reduce the savings to \$0.54 per gallon.

Competition in the biodiesel industry

Growth in the biodiesel industry is unprecedented. According to industry reports presented at the 2006 National Biodiesel Conference and through the National Biodiesel Board’s website⁸ biodiesel production capacity is expected to reach 1 billion gallons per year in 2008. This will be over a 10-fold increase in the biodiesel industry production capacity since 2005. Appendix A gives a list of the current biodiesel facilities that are in production, and under construction according to surveys by Biodiesel Magazine⁹. That list does not include numerous projects that are in pre-construction or anticipating the development of biodiesel production facilities.

A recent survey¹⁰ of current and potential biodiesel producers indicates the increase is not only in the number of plants, but also in the size of the facilities. This survey indicates the average plant capacity will increase from 6.7 MGPY to 22.1 MGPY and the total production capacity will increase from 354 MGPY to well over a billion gallons per year. This growth in the biodiesel industry will increase competition, but if the high petroleum prices continue, the result may not be an oversupply of biodiesel, but rather an excess demand for biodiesel feedstocks.

⁷ Jon Van Gerpen, Rudy Pruszko, Davis Clements, Brent Shanks, and Gerhard Knothe, “Building a Successful Biodiesel Business, www.biodieselbsics.com; January 2005, pages 171-172.

⁸ National Biodiesel Board website; <http://www.nbb.org/>.

⁹ Biodiesel Magazine, BBI International; <http://www.biodieselmagazine.com/plant-list.jsp?country=USA> as of July 19, 2006.

¹⁰ Leland Tong, Marc IV consulting, January 2006.

Availability of feedstock resources

The tremendous growth in the biodiesel industry is expected to have a significant impact on the price of biodiesel feedstocks. A report to the United Soybean Board¹¹ projects vegetable oil prices will rise above historical levels worldwide because of the increased demand for fuel and industrial purposes. Overall, their model projects total revenue to US soybean farmers will rise, soybean meal will become a drag on the market instead of the oil, high vegetable oil prices will stimulate worldwide production of high-oilseeds, and oil will account for more than 50% of the crush value in the United States.

An earlier evaluation of the potential feedstocks for biodiesel by Hanna, Isom, and Campbell¹² also identified the expected price pressures on biodiesel feedstocks. A realistic estimate of the available feedstocks in the USA that could readily be converted to biodiesel were 450 to 900 thousand tons, which is equivalent to 130 to 260 million gallons of biodiesel. Future prospects for biodiesel feedstocks also were evaluated to include projections for expanded oilseed production, higher oil content varieties, and substitution of higher oil content crops. Overall, the conversion of all the existing and potential feedstocks in the USA was estimated to generate no more than 12 percent of the national diesel demand. This evaluation concluded feedstock limitations would primarily limit biodiesel consumption to B20 blends or lower.

A review of potential feedstock in Nebraska that could produce biodiesel is estimated to be 2.9 billion pounds. This is equivalent to approximately 390 million gallons of biodiesel if prices would support the processing of all feedstock to biodiesel fuel. Clearly, this will not be the case as most feedstocks have existing applications in food and animal feed industries. It is anticipated the vegetable oil feedstock can be drawn from the animal feed industry without significant price effects, but once feedstocks for the food industry are required, feedstock prices are expected to increase.

¹¹ Promar International, "Evaluation and analysis of vegetable oil markets: The implications of increased demand for industrial uses on markets and USB strategy" November 2005.

¹² Hanna, Isom, Campbell, "Biodiesel: Current perspectives and future", Journal of Scientific & Industrial Research, Vol. 6, November 2005.

Government incentives and public policy

Since the July 2005 study by IBFG, the Energy Policy Act of 2005 (EPACT) was signed into law on August 8, 2005 and contains several provisions related to agriculture-based renewable energy production. Those directly related to the biodiesel industry are:

- National Renewable Fuels Standard (RFS), which requires 4.0 billion gallons of renewable fuels be used domestically in 2006 and progressively increases to 7.5 billion gallons by 2012;
- Biodiesel Tax Credit Extension through 2008, which extends the \$1.00 per gallon tax credit available to fuel blenders for agri-biodiesel that is blended with petroleum diesel¹³; and
- Small Biodiesel Producer Credit, which makes agri-biodiesel producers eligible for an additional tax credit of \$0.10 per gallon on the first 15 million gallons of annual production if their production capacity does not exceed 60 MGPY.

Nebraska currently has no specific legislation that provides incentives for biodiesel production although biodiesel production would qualify for incentives under the more general economic development package “Nebraska Advantage”. Several other states near Nebraska have incentive packages that are designed to specifically provide incentives for biodiesel production. The most notable programs are:

- the Minnesota biodiesel mandate, which requires all diesel fuel sold in Minnesota to contain at least 2% biodiesel;
- the Illinois sales tax exemption program, which exempts \$0.15 to 20 cents per gallon on B11 biodiesel blends or higher¹⁴;
- the Missouri farmer owned reimbursement program, which reimburses development costs for 51% producer owned cooperatives;
- the Iowa income tax credit, which provides a \$0.03 per gallon income tax credit to point of sale retailers for each gallon of B2 or higher biodiesel blend sold, when half of the distributor or retailers diesel sales are B2 or higher; and

¹³ The biodiesel tax credit is \$1.00 per gallon of biodiesel from virgin feedstock and \$0.50 for recycled feedstock. The tax credit is available to the fuel blender at the time the biodiesel is mixed with petroleum diesel. Without the extension, this credit would have expired on December 31, 2006.

¹⁴ http://www.biodiesel.org/resources/pressreleases/gen/20030612_IL_legislation.pdf, as of July 11, 2006.

- the Kansas biodiesel producer incentive, which provides a \$0.30 per gallon incentive to biodiesel producers up to 11 MGPY beginning in April 2007 through 2016¹⁵.

The July 2005 IBFG feasibility study and this report, July 2006, provide a perspective of the biodiesel industry, but numerous factors can impact profitability and must be considered on time specific and project specific bases. Therefore, this report should not be considered a substitute for a site or project specific business analysis. With this in mind, the project development team has drawn the following conclusions:

- Current economic conditions (\$0.26 per pound soybean oil, over \$70 per barrel crude petroleum oil, and federal incentives) make biodiesel production look very profitable on a national basis.
- On a regional basis, state based incentives and feedstock availability likely will determine the development of the biodiesel industry. In this regard, Nebraska has no specific incentives for biodiesel production while neighboring states (MO, KS, IA, and MN) have implemented significant incentive packages. Ideally, an incentive program would complement current federal incentives and provide a safety net for biodiesel producers. Production based incentives are preferred because they are only incurred if biodiesel production develops in Nebraska. If the safety net concept were included, it would provide incentives only if basic economic conditions warrant support, such as a significant drop in crude petroleum oil (biodiesel price) or a significant rise in feedstock costs.
- Efforts should continue to develop incentives specific to biodiesel production so Nebraska is competitive with neighboring states in attracting biodiesel producers. The project development team is willing to support the NSA in efforts to further coordinate with the Nebraska Department of Economic Development, the Nebraska Department of Agriculture, and the Nebraska Energy Office. These agencies traditionally are instrumental in the development of incentive programs and the associated budgets that are presented to the governor and legislature as they identify priority issues for the upcoming legislative year.

¹⁵ Funding is limited to 3.5 million dollars, so the incentives are will be prorated for production beyond 11 MGPY.