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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.

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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 scenarios[1]. 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.

<u>Biodiesel demand</u>

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 Case[3]. 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 2006[4]. 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 International[5]. 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.

<u>Estimated biodiesel production costs</u>

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 Pruszko[6] 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).

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[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.

<u>Competition in the biodiesel industry</u>

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 website[8] 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 Magazine[9]. That list does not include numerous projects that are in pre-construction or anticipating the development of biodiesel production facilities.

A recent survey[10] 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.

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[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 Board[11] 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 Campbell[12] 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 diesel[13]; 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 higher[14];
- 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 2016[15].

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.

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

SUMMARY OF ACTIVITIES AND FINDINGS

The project development team held numerous meetings and events to support the efforts of this study. In many cases, the events were coordinated specifically to not only support the project development teams understanding of the biodiesel industry, but also to provide information to NSA members, soybean producers, soybean processors, alternative feedstock suppliers, economic development resource providers, and potential biodiesel producers. Examples of such events are:

- the Mobile Biodiesel Workshop to West Central Cooperative's soybean processing and biodiesel production facilities in Ralston, IA; January 2005[16];
- the IBFG – Feasibility Report presentation to the NSA and NSB board of directors; July 2005;
- the Biodiesel Plant Development Seminar presented by IBFG and other state resource providers; August 2005[17];
- the National Biodiesel Board presentation to the NSA and NSB regarding federal and state regulatory issues and opportunities for Nebraska legislation; December 2005;
- the Biodiesel Plant Development Workshop presented by the IAPC and the Iowa State University Center for Industrial Research and Service; March 2006[18]; and
- numerous community and individual based presentations.

This report provides information to update and supplement the July 2005 study conducted by IBFG and distributed as a preliminary report in September 2005. In this regard, the reports should be considered complementary reports that, together, fully address the outlined objectives and tasks of the overall study. It also should be noted that numerous factors can impact profitability and must be considered on a time specific and a project specific basis. Therefore, this report should not be considered a substitute for a site specific or project specific business analysis.

Objective 1 – Evaluation of the Potential Success and Risk

To address this objective, the Nebraska Soybean Association (NSA) contracted with the Independent Biodiesel Feasibility Group (IBFG) to conduct a statewide, not site specific, feasibility study. This study was completed in July 2005, presented to the NSA and Nebraska

[16] The Nebraska Soybean Board funded travel support for this event, 38 individuals participated.
[17] This event was coordinated with the Nebraska Value Added Partnership, 160 individuals participated.
[18] This event was hosted by Nebraska Public Power District in Columbus Nebraska, 75 individuals participated.

Soybean Board (NSB) on July 20, 2005, and has been distributed to NSA members upon request since September 2005. 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.

Task 1: A review of the types of technology for the production of biodiesel.

The review of biodiesel production technologies was well documented in the July 2005 study and the information will be very useful in initiating the selection process for a technology provider. The expansion of the biodiesel industry in the past year has brought many new technology providers and systems to the market. The 2006 Biodiesel Industry Directory[19] provides an extensive list of process technology providers. This will make the selection of a suitable technology provider more challenging because more options are available and the providers with an established track record of success will be in very high demand. This challenge should not lower the expected standard to identify a technology provider that matches the specific needs of a project and one that can demonstrate their ability to produce quality product at a competitive costs with reasonable production guarantees. Specific projects may vary greatly in feedstock availability, plant size, and marketing strategies. Therefore, the selection of a project specific technology provider will be necessary.

Task 2: An evaluation of small-scale crushing technologies versus other methods of feedstock procurement.

The evaluation of small-scale soybean crushing technologies versus other methods of feedstock procurement was addressed in the July 2005 study. With the baseline assumptions used for the analysis, a positive return on equity could be anticipated. However, the study also indicated profitability would be highly dependent on the selling price of meal, which would be highly sensitive to market competition from the large number of existing protein producers. The sensitivity analysis demonstrated a $5 per ton swing in meal price could have a dramatic effect on the overall return on equity for the soybean crushing enterprise. The effect of the $5 per ton

[19] 2006 Biodiesel Industry Directory, BBI international Publications, Grand Forks, ND, December 2005; http://www.biodieselindustrydirectory.com/.

swing in meal price was illustrated to affect the breakeven point of the 5-year return on equity by as much as 9%.[20]

It appears from the initial study the key to a successful soybean crushing investment will hinge on the ability to profitably sell soybean meal. With this in mind, a further review was made of the potential for expanding Nebraska's soybean crushing industry. The University of Nebraska conducted a study in 1998 that indicated the potential for additional small scale crushing capacity in northeastern to north central Nebraska. Since that time, Bunge Corporation has opened a soybean crusher-refiner with the largest oil extractor in the U.S. at Council Bluffs, Iowa[21], pork production in Nebraska has continued to decline, and traditional soybean meal markets for fattening beef cattle have given way to competitively priced distillers grains from the expanding ethanol industry.

Additional concern exists from the continued projections for expanding ethanol production from corn. Table 1 illustrates Nebraska's current and developing ethanol facilities will soon produce the equivalent of 4.6 million tons of dried distiller grains with solubles (DDGS)[22].

Table 1. Estimated DDGS from current, expanding, and under-construction ethanol facilities in Nebraska.

Nebraska Ethanol Production	Ethanol MGPY	Annual Grind (million bu/year)	DDGS (tons/year
Current Production	560	303	2,272,500
Expansion and Development	824	316	2,370,000
Total	**1,384**	**619**	**4,642,500**

Much of this by-product may be sold wet, but the equivalent amount of soybean meal is likely to be displaced at the local, national, or global level. Overall on the national scene, the animal protein industry is likely to experience a dramatic oversupply as the grain based ethanol industry continues to expand and the expanding soybean based biodiesel industry will both supply significant quantities of animal protein feed. If entering this market, it will be key to have significant cost advantages over the competition. If done on a small scale, the most important advantage may be the local animal feed market and it will be important to size processing

[20] IBFG Feasibility Study and Market Analysis, July 2005, page 75.
[21] http://www.bungenorthamerica.com/about/history.htm as of June 2, 2006.
[22]Assumes 15 pounds of DDGS per bushel of annual grind.

capacities to that market. In most cases, the soybean oil from this scale of production will not justify a biodiesel processing facility unless other feedstock sources also are available.

Task 3: Identification of markets for high-energy meal, biodiesel, and co-products of the esterification process (glycerin).

The identification of markets for high-energy meal has been discussed in the previous section and will be a key component to such an enterprises profit potential. The primary markets for high-energy meal in Nebraska will be in dairy, swine, and poultry rations.

<u>Biodiesel demand</u>

The IBFG study projected a potential market for biodiesel (B100) in Nebraska to be 8 MGPY and for Nebraska and the surrounding region (CO, IA, KS, MO, SD, and WY) to be 24 MGPY considering specific market penetration for specific market segments. In general, it was assumed the market segments would be for B2 blends (on-highway), B5 blends (agricultural – off-road), and B20 blends (regulated fleets and emissions, environment and health) and that a Nebraska biodiesel producers could capture 50% of the Nebraska market and 10 to 20% of the market in surrounding states.

This assumption seems to be based on the concept that biodiesel would not directly compete on a cost basis with petroleum based diesel fuel, and that it would primarily penetrate niche market segments. With the increase in petroleum fuel prices to $3.00 +/- per gallon, the relatively steady price for biodiesel feedstocks to date ($0.20 to $0.25 per pound of crude soybean oil), and the extension of the federal excise tax credit ($1.00 per gallon) through 2008, biodiesel may be 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 could virtually be the demand for diesel fuel regardless of the source (petroleum or renewable biodiesel).

The Energy Information Administration (EIA)[23] reports distillate fuel sales for Nebraska were 730 million gallons in 2004. Of that, 240 million gallons were for farm use, and 403 million were for on-highway. These two categories account for 88% of the distillate fuel sold in Nebraska. This looks like a very large market, but even with optimistic projections it is clear

[23] Energy Information Administration, Fuel Oil and Kerosene Sales 2004.

that large-scale (above 10 MGPY) biodiesel production in Nebraska will need to market biodiesel on a national level.

The need for a national marketing program is illustrated in the following example, which assumes biodiesel and petroleum diesel are priced cost competitive at the retail level and are considered interchangeable substitutes up to B20 blends. Considering a 50% market penetration for the respective biodiesel blends, the farm market could consume 6 MGPY of biodiesel at a 5% blend or 24 MGPY of biodiesel at a 20% blend level. Similarly, the on-highway market could consume 4 MGPY at a 2% blend, or 10 MGPY at a 5% blend level. In this example, the Nebraska biodiesel market could range from 10 to 34 MGPY. In reality there will be regional sales among surrounding states that need to be accounted for, but the national markets will need to be considered and Nebraska may have transportation advantages for the large markets in California and Texas.

Glycerin demand

The glycerin market was addressed specifically as the significant growth in the biodiesel industry is expected to put further downward price pressure for this by-product. The University of Nebraska has patented glycerin processing technology that currently is being marketed to potential commercial licenses. This technology produces an ester of glycerin as a pour point suppressant, which complements the biodiesel industry very well due to the industries concerns regarding the cold flow characteristics of biodiesel. The biodiesel industry will need to determine the economic potential for this technology at a commercial scale, although preliminary analysis by the University indicate the raw material costs for this fuel additive would roughly range from $2.50 to over $4.00 per gallon.[24] This preliminary analysis recommends a complete engineering analysis be preformed to better identify the cost of production including processing costs (equipment, labor, and utilities) at various commercial scales. A key to the economic potential for this technology may be determined by the fuel additives classification for renewable fuel tax credits. Would the fuel additive be considered biodiesel for the basis of the tax credits? An initial review appears that it would not qualify under current definitions. However, the concept of the fuel being derived from renewable agricultural based resources is met and it is a

[24] Robert Weber, Etherfication of Glycerols Process Summary, March 2006.

by-product of the biodiesel production process, so a case may exist for the fuel additive to be included in the definition.

Task 4: Economic evaluation of the potential risk and profitability of soybean processing and biodiesel production.

The economic evaluation of the potential risk and profitability of soybean processing and biodiesel production was addressed in the July 2005 study. The study concluded a positive return on equity could be expected, however at that time the return was estimated to be poor for the small scenario analyzed (5 MGPY) and only modest for the mid (15 MGPY) and larger size (30 MGPY) scenarios[25] (see Table 2 for details).

Table 2. Financial measurements for 5, 15 and 30 million gallons per year (MGPY) biodiesel operations.

	5 MGPY		**15 MGPY**		**30 MGPY**	
	3 year	**5 year**	**3 year**	**5 year**	**3 year**	**5 year**
Return on Assets[26]	0.1%	0.5%	9.4%	10.9%	14.1%	15.4%
Return on Equity[27]	0.0%	0.6%	12.5%	13.6%	17.7%	18.5%
Internal Rate of Return[28]	(40.1%)	(15.8%)	(11.3%)	12.1%	4.6%	27.2%

As noted earlier, many factors have changed since July 2005. To provide a perspective of the previous analysis one year later, July 2006, this report provides updated information regarding:

- the biodiesel market price as it relates to petroleum fuel,
- competition in the biodiesel industry,
- biodiesel feedstock resources, and
- government incentives and public policy, which are addressed under task 5.

[25] IBFG Feasibility Study and Market Analysis, July 2005, page 58.
[26] Return on Assets (ROA) – Net Income/Total Assets.
[27] Return on Equity (ROE) – Net Income/Shareholder Equity.
[28] Internal Rate of Return (IRR) - Essentially, this is the return that a company would earn if they expanded or invested in themselves, rather than investing that money.

Biodiesel market price

The July 2005 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)[29] and the associated October Oil Futures Case[30]. These reports lead to the diesel fuel price projections presented in Table 3[31], 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 February 2006 in the Annual Energy Outlook 2006[32]. The revised EIA study accounts for the much higher world oil prices in 2006 and projects crude oil prices will decline from current levels in 2006, and then rise steadily through 2030. Incorporating the EIA revised projections the selling price for biodiesel in 2010 would raise 33 cents per gallon to $1.50 per gallon pre tax.

Table 3. EIA crude oil and diesel fuel price projections for 2006-2010.

	2006	2007	2008	2009	2010
Reference World Oil Price Case					
World Oil Price ($/barrel)	$30.00	$27.35	$26.15	$25.30	$25.00
Diesel Fuel ($/gallon, pre tax)	$1.101	$1.060	$1.038	$1.015	$1.025
October Oil Futures Case					
World Oil Price ($/barrel)	$37.97	$35.25	$33.25	$32.00	$30.99
Diesel Fuel ($/gallon, pre tax)	$1.313	$1.270	$1.230	$1.192	$1.176

Using 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, an estimated wholesale B100 biodiesel price would be $2.80 per gallon. However, the IBFG study assumed a ¾ cent premium is 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. The IBFG study also assumed the $1.00 per gallon blenders excise tax credit would be fully realized by the biodiesel producer. From industry reports and discussions at the 2006 National Biodiesel Conference it does not appear that will be

[29] Energy Information Administration, Annual Energy Outlook 2005.
[30] Energy Information Administration, October Oil Futures Case.
[31] IBFG Feasibility Study and Market Analysis, July 2005, page 57.
[32] http://www.eia.doe.gov/oiaf/aeo/index.html.

the case. A more realistic estimate may be a $0.85 to $0.95 per gallon credit at the producer level. The reduced realization from the blenders excise tax credit is approximately offset by the inclusion of a small producer tax credit of $0.10 per gallon of B100 produced. This incentive was a part of the Energy Policy Act of 2005, which is described further under task 5 in the government incentives and public policy section.

<u>Estimated biodiesel production costs</u>

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 Pruszko[33] 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 as illustrated in Table 4. In both cases, feedstock was the leading costs of production at 70% for a 3 MGPY facility and 84% for a 30 MGPY facility.

Table 4. Cost of biodiesel production – 3 vs. 30 MGPY.

Cost of Biodiesel Production (3 MGPY vs. 30 MGPY)	**3 MGPY** soybean oil, $0.22/lbs.		**30 MGPY** soybean oil, $0.22/lbs.		
	$ per Gallon	% of total	$ per Gallon	% of total	Difference
Cost of Feedstock	$1.71	71.5%	$1.61	83.9%	$0.10
Cost of Chemicals	0.24	10.0%	0.18	9.4%	0.06
Cost of Energy	0.04	1.7%	0.02	1.0%	0.02
Cost of Labor	0.14	5.9%	0.02	1.0%	0.12
Depreciation and Maintenance	0.2	8.4%	0.08	4.2%	0.12
Administration and Overhead	0.06	2.5%	0.01	0.5%	0.05
Biodiesel Cost per Gallon	**$2.39**	**100.0%**	**$1.92**	**100.0%**	**$0.47**

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).

33 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.[34]" As illustrated in Table 5, 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.

Table 5. Cost of biodiesel production – soybean oil vs. animal fat.

Cost of Biodiesel Production (soybean oil vs. animal fat)	**10 MGPY** soybean oil, $0.22/lbs.		**10 MGPY** animal fat, $0.14/lbs.		
	$ per Gallon	% of total	$ per Gallon	% of total	Difference
Cost of Feedstock	$1.61	80.9%	$1.02	70.3%	$0.59
Cost of Chemicals	0.18	9.0%	0.18	12.4%	0
Cost of Energy	0.02	1.0%	0.04	2.8%	-0.02
Cost of Labor	0.04	2.0%	0.04	2.8%	0
Depreciation and Maintenance	0.12	6.0%	0.15	10.3%	-0.03
Administration and Overhead	0.02	1.0%	0.02	1.4%	0
Biodiesel Cost per Gallon	**$1.99**	**100.0%**	**$1.45**	**100.0%**	**$0.54**

A United Soybean Board report[35] prepared by Promar International conducted an extensive analysis of the effect of soybean oil prices as they relate to biodiesel production and a comparison to the petroleum fuel market. The analysis concluded the cost for biodiesel feedstocks would rise over time and provides breakeven analyses for a varying soybean oil feedstock prices over a range of crude oil prices. Figure 1 from the report illustrates that biodiesel production is not expected to be profitable if crude soybean oil rises to 28 cents per pound while crude oil is at $50 per barrel. When crude oil is at $70 per barrel, soybean oil could raise as high as 33 cents per pound. However, as consumption of biodiesel feedstocks increase, eventually the food value of the feedstock will come into play and set the upper value for vegetable oil feedstocks.

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[34] 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.
[35] 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.

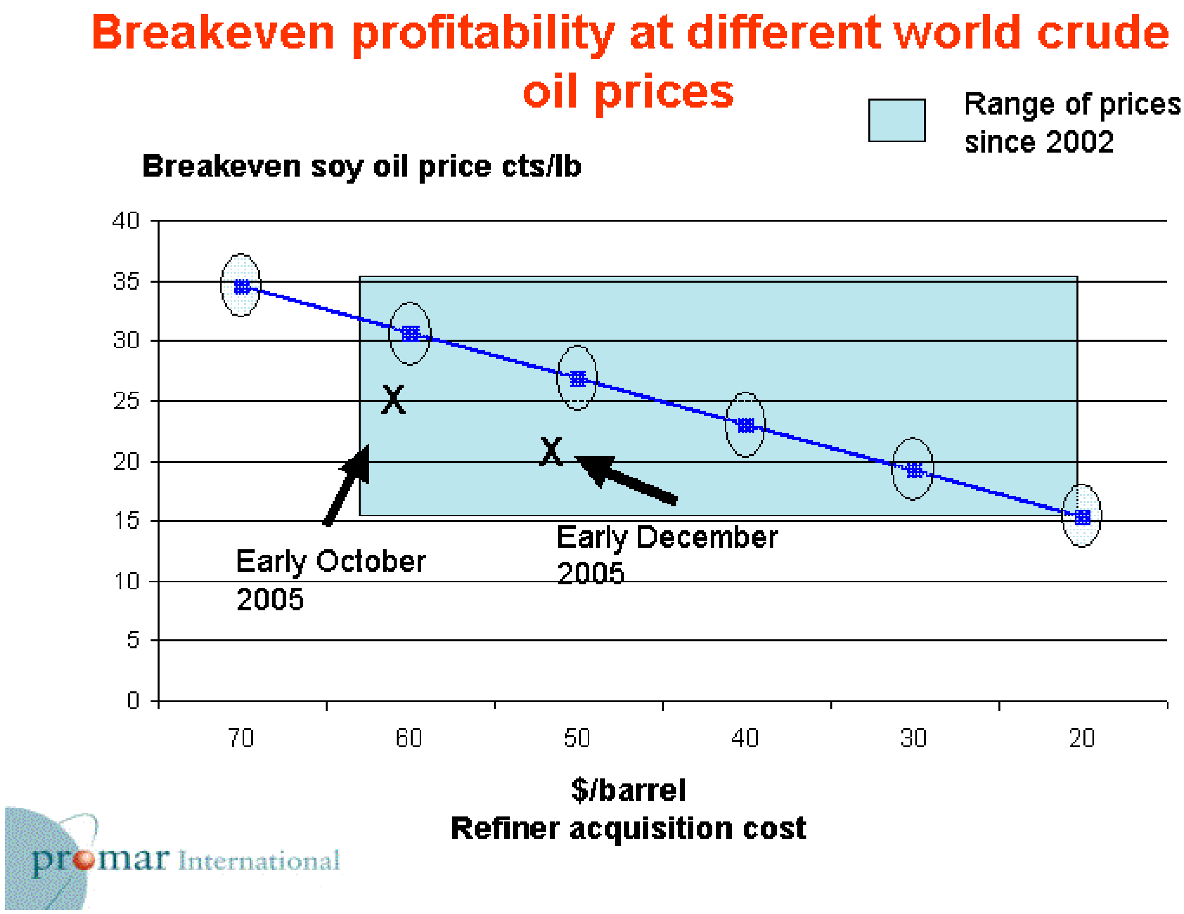

Figure 1. **Breakeven profitability at different world crude oil prices.**

<u>Competition in the biodiesel industry</u>

According to industry reports presented at the 2006 National Biodiesel Conference and through the National Biodiesel Board's website[36] biodiesel production capacity is expected to reach 1 billion gallons per year in 2008. This will be over a 10-fold increase in the industries production capacity since 2005. Appendix A identifies the current biodiesel production facilities that are in production, and under construction according to surveys by Biodiesel Magazine. That list does not include numerous projects that are in pre-construction or anticipating the development of biodiesel production facilities.

[36] National Biodiesel Board; nbb.org.

A recent survey[37] of current and potential biodiesel producers indicates the increase is not only in the number of plants, but the size of facilities also is increasing as illustrated in Table 6. 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.

Table 6. Size of existing and future biodiesel production facilities.

Plant Size (gallons per year)	Existing Plants (53 total)	Plants Under Construction (42 total)	Plants in Pre-construction (22 total)
< 1,000,001	12	12	1
1,000,001 – 5,000,000	26	15	3
5,000,001 – 10,000,000	3	8	5
10,000,001 – 15,000,000	6	1	3
15,000,001 – 20,000,000	1	1	1
>20,000,000	5	5	9

<u>Biodiesel feedstock resources</u>

If the high petroleum prices continue, the rapid expansion of the biodiesel industry may not cause an over supply of biodiesel in the near term. However, the competition to produce and supply biodiesel may increase the demand and price for biodiesel feedstocks, thus limiting profitability. This will be a critical issue if production capacity expands to the point it drives up feedstock costs and then petroleum prices drop from the historical highs we are experiencing.

On a national basis, 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 Board prepared by Promar International[38], indicates 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.

[37] Leland Tong, Marc IV consulting.
[38] Promar International, "Evaluation and analysis of vegetable oil markets: The implications of increased demand for industrial uses on markets and USB strategy" November 2005.

An earlier evaluation of the potential feedstocks for biodiesel by Hanna, Isom, and Campbell[39] 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 primarily would 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:

- 40 million pounds of crude soybean oil from extrusion/expeller soybean processors[40];
- 570 million pounds of refined soybean oil from solvent extraction soybean processors[41];
- 340 million pounds of refined corn oil available from corn wet mills[42];
- 170 million pounds of crude corn oil could potentially be available from current dry grind ethanol plants[43];
- 720 million pounds of crude corn oil could potentially be available from expanding or developing dry grind ethanol plants[44];
- 908 million pounds of animal fat available from large commercial cattle slaughtering facilities[45];
- 207 million pounds of animal fat available from large commercial hog slaughtering facilities[46]; and
- 10 million pounds of recycled cooking grease (animal fat and vegetable oil blends)[47].

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[39] Hanna, Isom, Campbell, "Biodiesel: Current perspectives and future", Journal of Scientific & Industrial Research, Vol. 6, November 2005.
[40] Victor Bohuslavsky's survey of soybean processors, 2005.
[41] Victor Bohuslavsky's survey of soybean processors, 2005.
[42] Extrapolated from processors estimated daily grind at 2.24 pounds per bushel.
[43] Extrapolated from processors estimated daily grind at 1.12 pounds per bushel.
[44] Extrapolated from processors/developers estimated daily grind at 1.12 pounds per bushel
[45] IBFG Feasibility Study and Market Analysis, July 2005, page 44.
[46] IBFG Feasibility Study and Market Analysis, July 2005, page 44.
[47] IBFG Feasibility Study and Market Analysis, July 2005, page 47.

This 2.9 billion pounds of potential feedstock is equivalent to approximately 390 million gallons of biodiesel if prices support the processing of all feedstock to biodiesel fuel. Clearly, this will not be the case as most of this feedstock has existing applications in the food and animal feed industry. 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. This will have a significant effect on profitability as feedstock costs typically represent 75% of the production costs for biodiesel.

Task 5: Identification of selected risk factors that should be considered in a biodiesel commercialization effort, especially the potential impact of current and pending legislation.

The July 2005 IBFG study identified various risk factors to be considered in a biodiesel commercialization effort. The USB study by Promar International also addressed risk factors to consider and clearly illustrated the largest risk factor is the selling price for biodiesel, which will rely heavily on the overall energy market and specifically the petroleum energy market. To a lesser extent there also is the commodity risk on soybean oil or soybeans, which may be subject to price variability from both world weather events and inelastic consumption demand for food grade vegetable oils.

<u>Government incentives and public policy</u>

Since the July 2005 IBFG study, 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 increase to 7.5 billion gallons by 2012.
- Biodiesel Tax Credit Extension through 2008, which extends the $1.00 per gallon tax credit available for agri-biodiesel that is used in blending with petroleum diesel to fuel blenders through 2008[48].

[48] 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.

- Small Biodiesel Producer Credit established, 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 higher[49];
- 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
- 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 2016[50].

Nebraska only has one initiative under consideration that is likely to have any effect on the biodiesel industry in Nebraska, which will relate primarily to increasing market availability. This may be a very logical approach for a developing industry, but many other states in the region and across the nation are being more proactive than Nebraska. This will put Nebraska at a disadvantage compared to other states for the establishment of biodiesel production facilities. Appendix B provides a fact sheet from the National Biodiesel Board that highlights 2006 state legislation activities recently enacted or under consideration.

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[49] http://www.biodiesel.org/resources/pressreleases/gen/20030612_IL_legislation.pdf, as of July 11, 2006.
[50] Funding is limited to 3.5 million dollars, so the incentives are will be prorated for production beyond 11 MGPY.

Objective 2 – Statewide Assessment

To address this objective, the Nebraska Soybean Association (NSA) planned to contract with the Nebraska Department of Economic Development. However, due to contracting and software related conflicts; the Nebraska Department of Economic Development was only able to provide support to the statewide assessment efforts, which was redirected to the University of Nebraska – Industrial Agricultural Products Center. Data identified in the site selection criteria were collected and illustrated in visual maps, but unfortunately it was not integrated with the existing Department of Economic Development database as originally proposed.

Task 1: Identification of key site selection criteria.

Key site selection criteria was identified by IBFG and reviewed by the project development team, this criterion is included in Appendix C. Site selection criteria from other sources also were reviewed, but for the purpose of this study, priority was given primarily to feedstock availability (quality and cost issues also were addressed in the July 2005 study), existing and potential competition, and infrastructure including proximity to rail and road access, and synergy with existing fuel infrastructure (petroleum pipeline terminals and ethanol production facilities). Other site selection criteria as described in Appendix C, will need to be considered when site-specific studies are conducted.

Task 2: Conduct a statewide assessment of available resources to meet the criteria.

As noted, the primary focus of the statewide assessment was feedstock availability, existing and potential competition, and infrastructure. The assessments of these areas are specifically described in the following sections.

Feedstock availability

To support the assessment of available biodiesel feedstock resources, the seven-year averages of soybean and corn production (1999 to 2005) were mapped for Nebraska counties and the adjacent counties in surrounding states. These data provide an interesting perspective for the potential feedstock availability from vegetable oil. However, the true feedstock for biodiesel production is not the grain or oilseeds, but rather the oil resulting from the processed agriculture commodities. In this regard, Nebraska is limited by its soybean processing capacity in

comparison to its overall soybean production. It was initially estimated that only 25% of Nebraska's soybeans (60 million bushels)[51] were processed in the state, while the remaining soybeans were sent out of state for processing or exported to international markets. However, a recent ProExporter report indicates the in state crush is 84 million bushels per year (average for 01 to 05 crop year), which is 41% of the 206 million bushels of production (average for 01 to 05 crop year)[52].

The soybean processing facilities were identified and their processing capacities were estimated as illustrated in Figure 2. Similarly, corn-processing facilities (ethanol plants) were identified and industry standards were used to estimate the corn oil feedstock available at each of the wet mill facilities currently producing corn oil. Growth in the ethanol and biodiesel industries also has stimulated technology developments to extract corn oil from dry grind ethanol plants as well. This is not currently an adopted practice but potential feedstock availability from these processing facilities was estimated at 2%, half of the theoretic potential. Corn oil estimates are illustrated in Figure 3.

Animal fat also was considered as a supplemental feedstock for biodiesel production based on its traditionally lower cost and the excess supply of this livestock-processing by-product. It was not possible to obtain specific estimates of feedstock availability from specific livestock processing facilities, but processing location are identified in Figure 4 along with cattle on feed on a county basis as of 2002. The animal fat feedstock on a statewide basis was estimated to be over 1 billion pounds or the equivalent of 139 million gallons of B100 biodiesel[53]

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[51] The five-year average soybean production for Nebraska reported by the Nebraska Agricultural Statistics Service is 200 million bushels. Loren Isom, University of Nebraska and Victor Bohuslavsky, Nebraska Soybean Board estimated the soybean processing capacity to be 60 million bushels per year.
[52] ProExporter Network, PRX Grain Database section C soybeans, May 14, 2006.
[53] IBFG Feasibility Study and Market Analysis, July 2005, page 44 (based on 2002-2004 slaughter statistics from NASS, USDA).

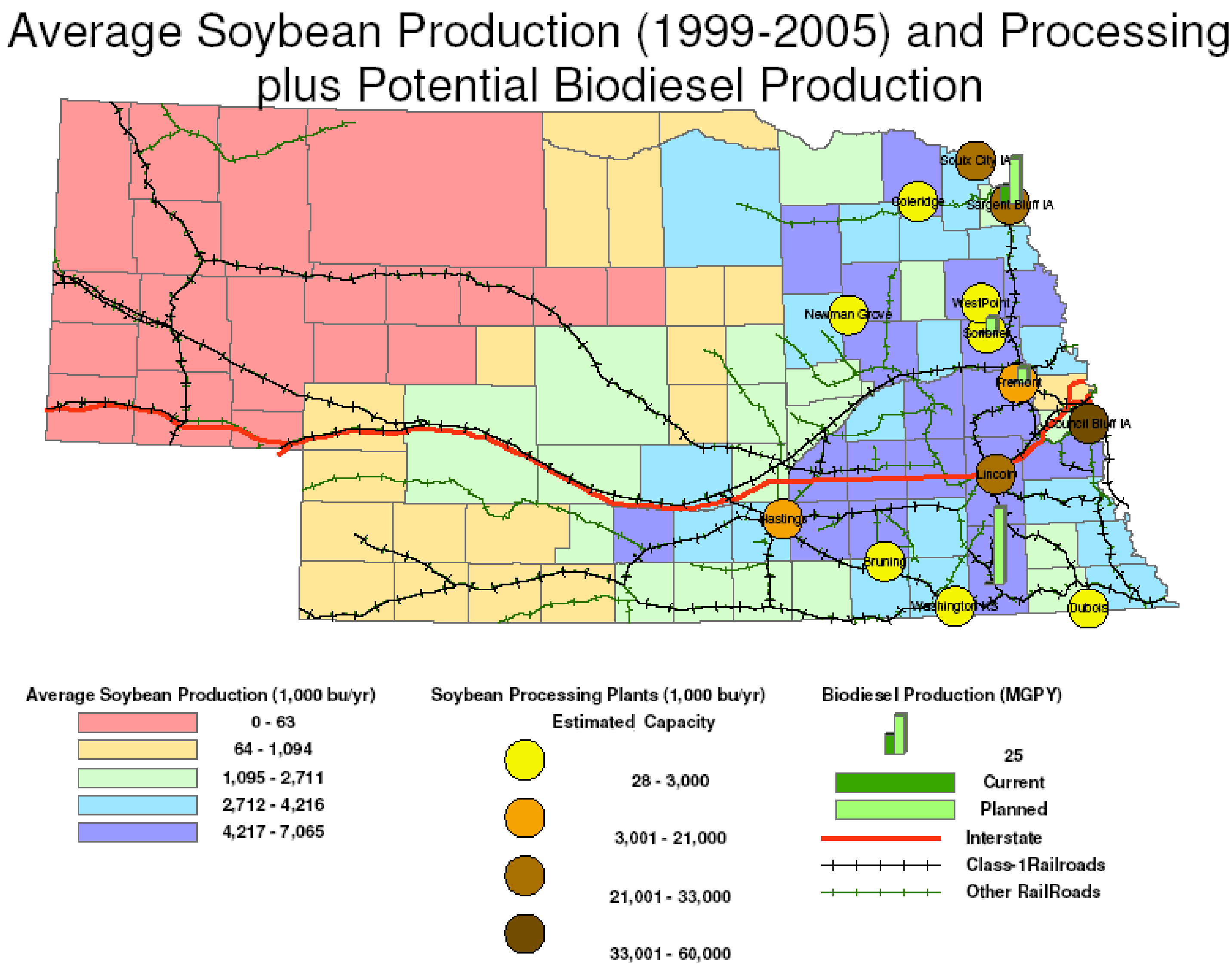

Figure 2. **Potential for biodiesel production in Nebraska.**

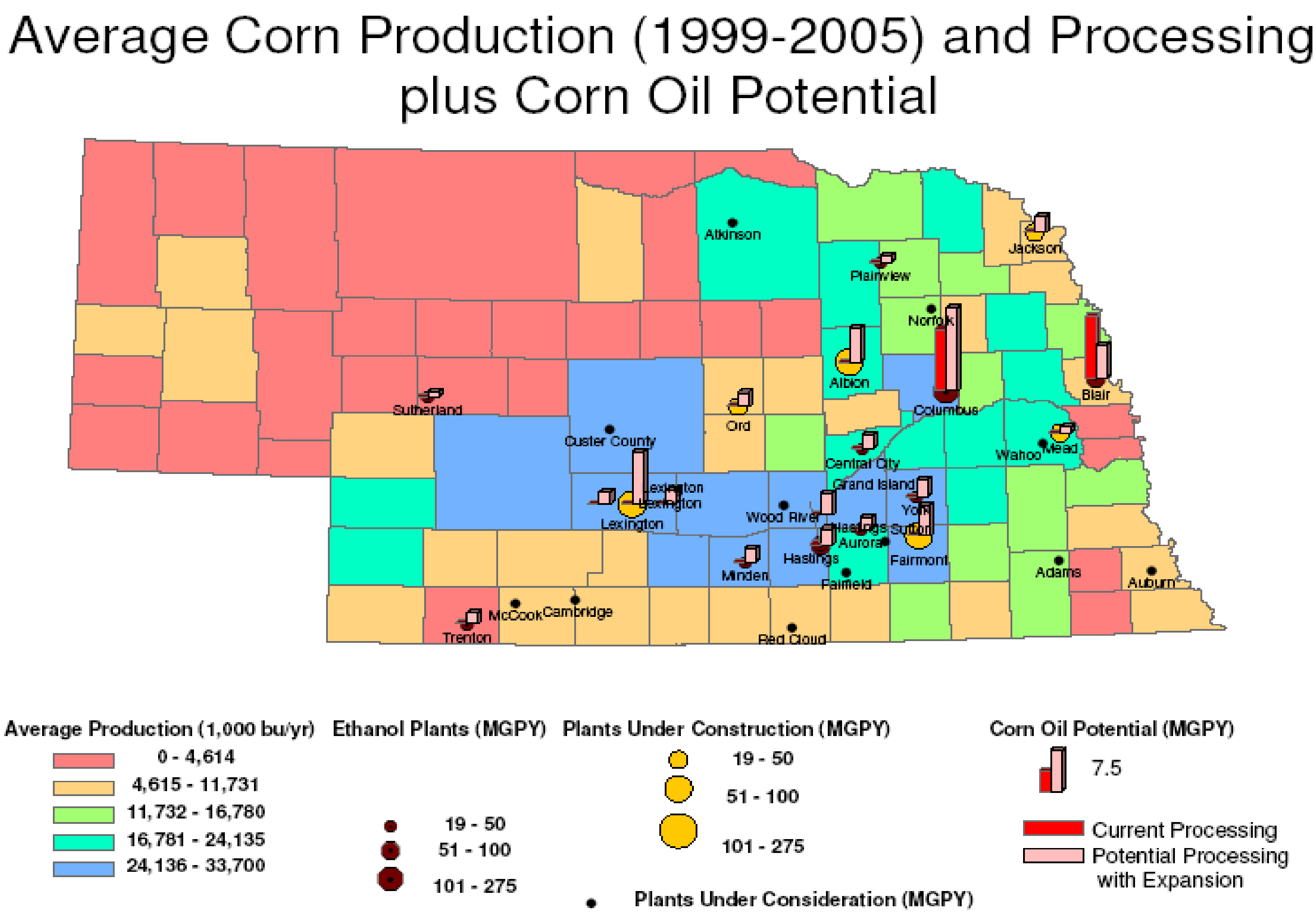

Figure 3. **Average corn oil estimate.**

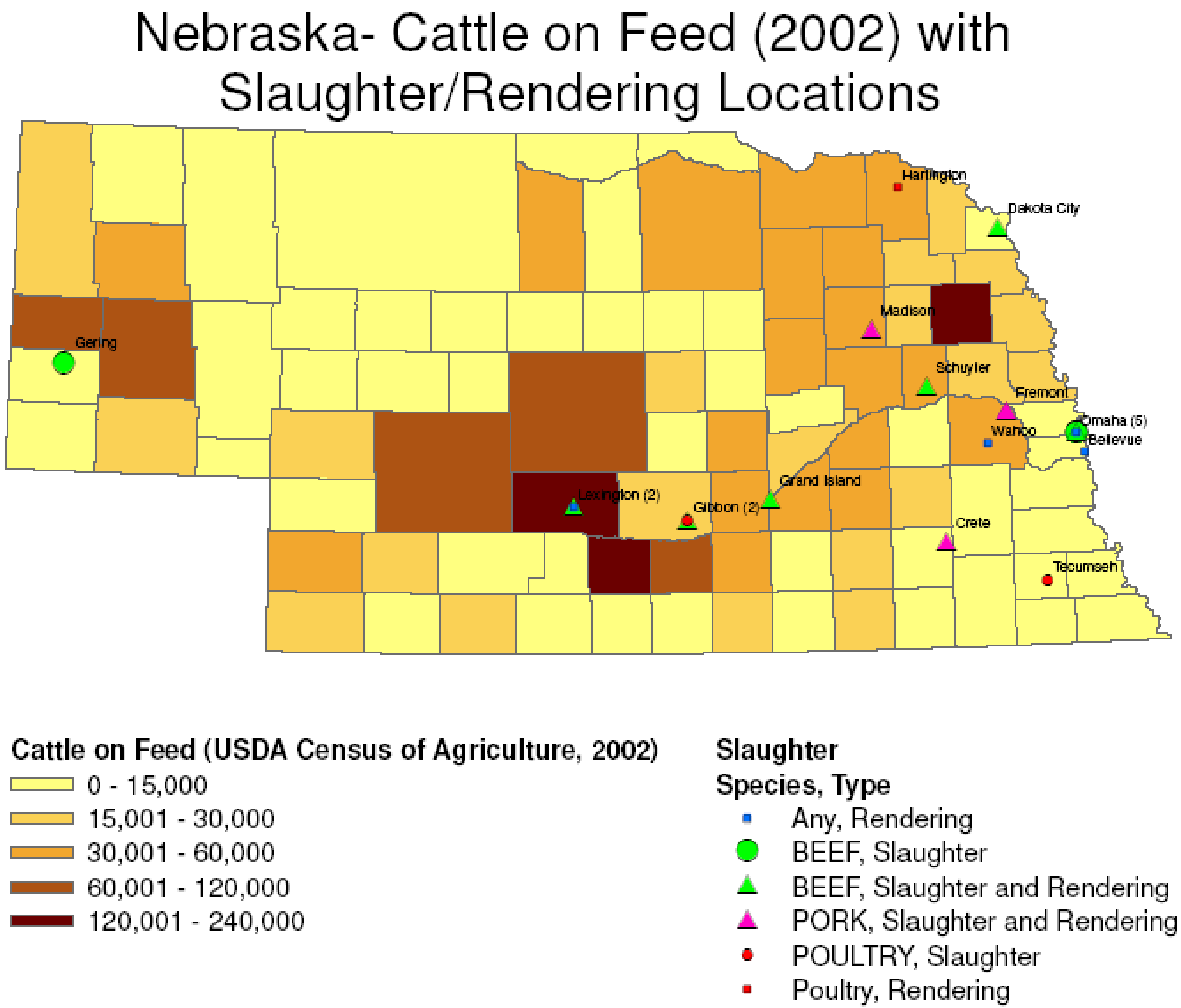

Figure 4. Livestock processing facilities.

Table 7 summarizes the potential biodiesel feedstocks in Nebraska as previously discussed. This total, 2.9 billion pounds (390 gallons), represents the upper end of potential feedstock from current and expanding processing in Nebraska. Many other factors will affect the actual feedstock available for biodiesel production such as food and feed applications, exports/imports (three large-scale soybean processing facilities are located within 10 miles of Nebraska's eastern boarder), continued expansion, and altered agriculture production practices, which may include higher oilseed varieties.

Table 7. Potential biodiesel feedstocks in Nebraska.

Potential biodiesel feedstock available in Nebraska ***Note: major quantities will still go to traditional applications***	**MGPY**	**Million pounds per year**
crude soybean oil from extrusion expellers	5	40
crude degummed or refined soybean oil from solvent extractors	75	570
refined corn oil from wet mill ethanol plants	45	340
crude corn oil potential from current dry mill ethanol plants	22	169
crude corn oil potential from expanding or developing dry mill ethanol plants	95	720
animal fat from cattle slaughtering	119	908
animal fat from pork slaughtering	27	207
yellow grease from restaurants	1	10
Total	**390**	**2,964**

Existing and potential competition

At present, commercial scale biodiesel production does not exist in Nebraska although three facilities have publicly announced their development intentions for facilities in Beatrice (50 MGPY), Fremont (10 MGPY), and Scribner (5 MGPY). Several other entities also are at various levels of investigating and planning biodiesel production facilities in Nebraska. Biodiesel production outside of Nebraska's boarders has existed for several years and additional expansion is planned in these boarder areas. The existing or potential production capacity for these facilities is identified on the map in Figure 5.

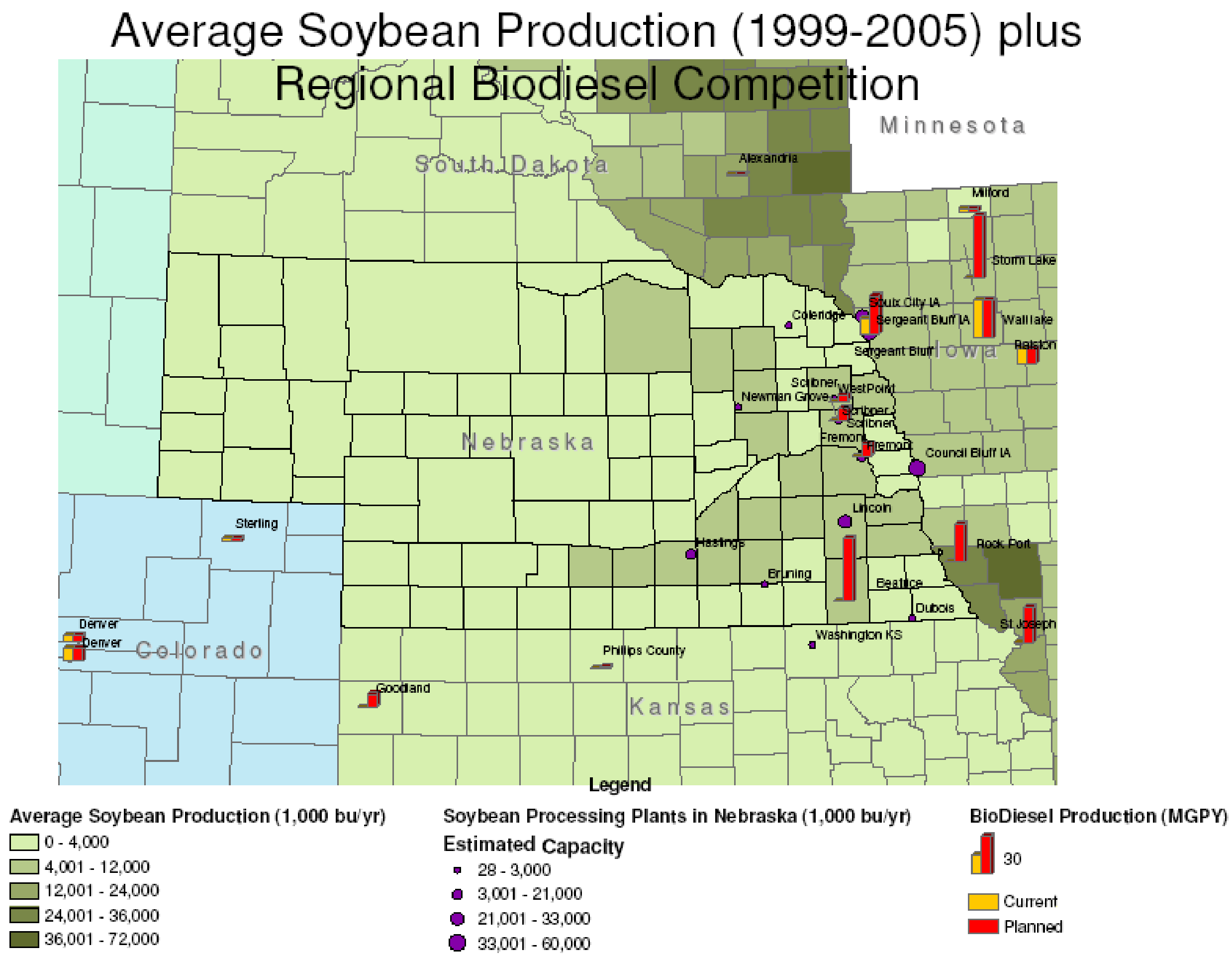

Figure 5. Existing and potential biodiesel competition.

<u>Infrastructure</u>

Rail access is key to biodiesel production on a large scale, as feedstock and chemical inputs to the facility must be competitively priced. Biodiesel also is transported to market by rail or road. Figure 6 illustrates the class 1 and 2 railroads operating in Nebraska and major roadways in Nebraska. As the biodiesel industry continues to grow, it is anticipated that it may be possible to transport biodiesel or biodiesel blends via the traditional petroleum pipeline system. Magellan Midstream Partners, L.P., an Iowa pipeline and terminal company, recently announced its plans to add biodiesel storage and blending capabilities to its Mason City petroleum terminal.[54] With this in mind, Figure 7 illustrates the current terminal points for petroleum fuel.

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[54] National Biodiesel Board Bulleting, More Pumps, Terminals and Plants Open; June 30, 2006, Biodiesel.org.

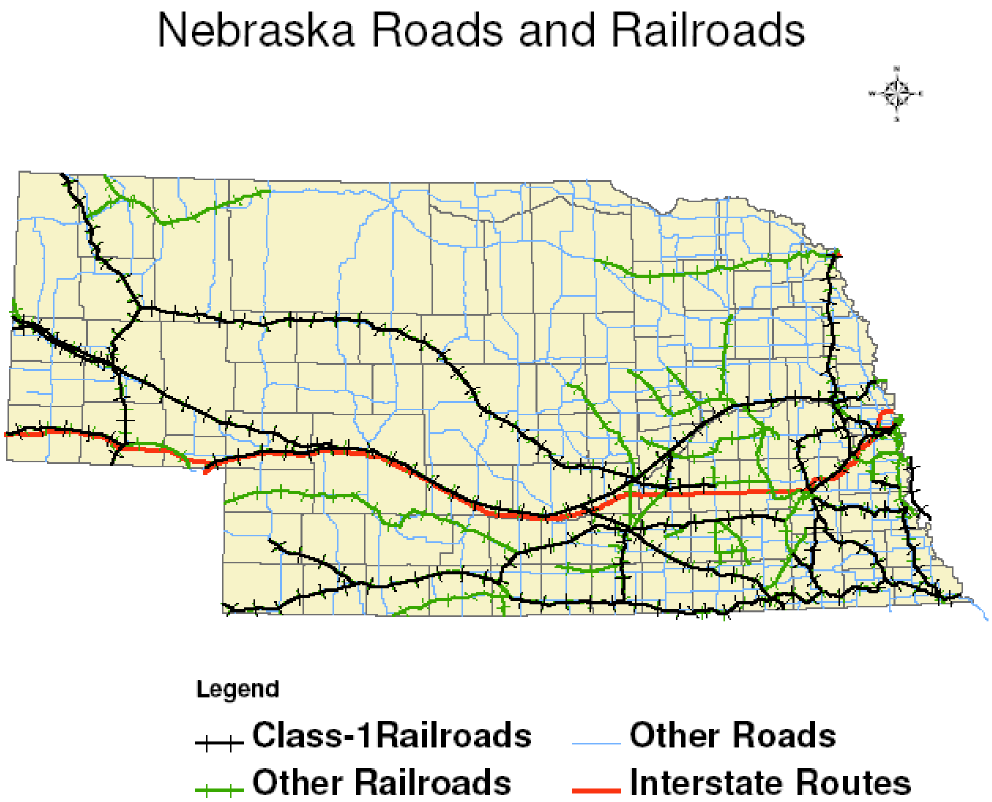

Figure 6. **Railroads and primary roadways in Nebraska**.

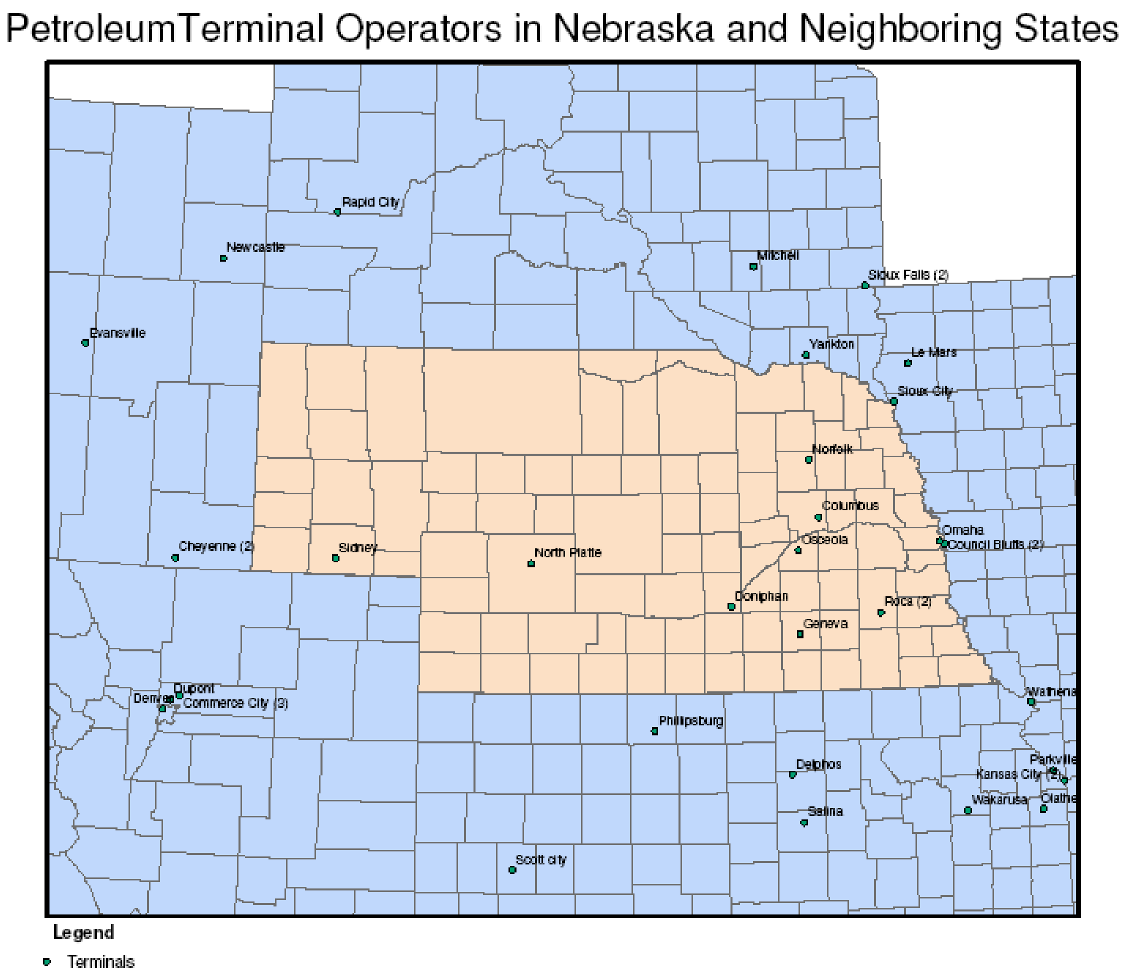

Figure 7. Terminal points for petroleum fuels.

Task 3: Expand the Nebraska Department of Economic Development GIS database to include key agricultural feedstocks and other site selection criteria.

As noted previously, this task was not achieved as originally proposed although efforts were made to develop the data in a similar format (ArcMap software) that could be implemented with the Nebraska Department of Economic Development GIS database at a later date.

Objective 3 – Evaluating Multiple Business Structures

This objective was intended to evaluate and identify various business structures that should be considered by potential investors in a biodiesel production entity. The intention of the Nebraska Soybean Association is not to form a specific business entity, but rather its members may chose to establish or join a biodiesel production entity. With this in mind, the efforts related

to this objective were to identify key issues related to the formation of the business entity and make that information available to NSA members.

The Nebraska Ethanol Board was contracted to provide this analysis as a part of an existing program to revise a biofuel processing project development guide that was intended to assist communities, cooperatives and other agricultural organizations in making an initial determination regarding the economic feasibility of renewable fuel projects. Earlier versions of this guide jointly addressed biofuel-processing projects due to the similarities of biofuel projects such as ethanol and biodiesel. This continues to be the case, but the revised guide only references ethanol plants. This guide "A Guide for Evaluating the Requirements of Ethanol Plants"[55] was developed by The Clean Fuels Development Coalition and the Nebraska Ethanol Board in cooperation with the U.S. Department of Agriculture.

NSA funding specifically supported the development of the section, "Formation of the Business Entity", which is directly applicable to this projects objective. In most cases, the issues and criteria addressed in this guide should be considered more critical for the biodiesel industry, due to its infancy, compared to the commercial scale production of ethanol.

The guide does not intend to recommend any one form of business entity over another. However, it does address a variety of issues that should be evaluated thoroughly. The project development team or organizing board should considers the needs of the venture and evaluate the business entity options with the aid of legal and financial counsel. Then the group should determine the best from of governance on a project specific basis. The preferred business entity should be designed to incorporate federal and state tax incentives and other advantages that accrue to the business entity. The guide provides a great deal of information regarding capitalization options, financial guidelines, and risk assessment. It notes that many of the ethanol projects currently under development in the U.S. are either cooperatives or LLCs, which are typically initiated by farmer based groups. Generally, the LLC option allows broader participation for equity investors and greater flexibility in distribution of tax benefits than the cooperative option. However, in some cases the cooperative structure may qualify for unique financing or grant programs not eligible to other entities. A complete copy of this guide is available from the Nebraska Ethanol Board, NSA or Industrial Agricultural Products Center.

[55] "A Guide for Evaluating the Requirements of Ethanol Plants" developed by The Clean Fuels Development Coalition and the Nebraska Ethanol Board in cooperation with the U.S. Department of Agriculture. Summer 2006.

Appendix A - Biodiesel Plants Currently in Production

Plant Name △	City	State	Feedstock	Capacity *	Start Date
Ag Processing Inc.	Sergeant Bluff	IA	soy oil	12	N/A
Agra Biofuels Inc.	Middletown	PA	soy oil	3	Jan 2006
Agri Energy Inc.	Lewisburg	TN	soy oil	5	Jan 2006
Alabama Biodiesel Corp.	Moundville	AL	soy oil	10	N/A
American Ag Fuels LLC	Defiance	OH	soy oil	3	2006
American Biofuels Corp. °	Bakersfield	CA	soy oil/tallow/waste vegetable oil	5	N/A
American Biorefining Inc.	Saybrook	IL	soy oil	10	N/A
Bean's Commercial Grease	Vassalboro	ME	waste vegetable oil	0	N/A
Bently Biofuels	Minden	NV	multi-feedstock	1	2006
Bio-Energy Systems LLC	Vallejo	CA	virgin oils/yellow grease	2	N/A
Biodiesel Industries of Greater Dal	Denton	TX	multi-feedstock	3	2006
Biodiesel Industries-Port Hueneme N	Ventura	CA	multi-feedstock	3	N/A
Biodiesel of Las Vegas Inc.	Las Vegas	NV	soy oil	3	N/A
BioEnergy of Colorado	Denver	CO	soy oil	10	N/A
BioFuels of Colorado	Denver	CO	soy oil	5	N/A
Central Texas Biofuels	Giddings	TX	vegetable oils	0	N/A
Channel Chemical Corp.	Gulfport	MS	soy oil	5	N/A
Columbus Foods Co.	Chicago	IL	soy oil	3	N/A
Earth Biofuels	Durant	OK	multi-feedstock	10	N/A
Earth Biofuels	Meridian	MS	multi-feedstock	2	N/A
Eastman Chemical	Batesville	AR	soy oil	6	Oct 2005
Environmental Alternatives	Newark	NJ	soy oil	13	N/A
FUMPA Biofuels	Redwood Falls	MN	soy oil/animal fats	2	N/A
Green Country Biodiesel Inc.	Chelsea	OK	soy oil	2	N/A
Griffin Industries	Butler	KY	soy oil/tallow/yellow grease	2	N/A
Huish Detergents	Pasadena	TX	tallow/palm oil	4	N/A
Imperial Western Products	Coachella	CA	yellow grease	7	N/A
Johann Haltermann Ltd.	Houston	TX	soy oil	20	N/A
Keystone Biofuels	Shiremanstown	PA	soy oil	2	Jan 2006
Midwest Biodiesel Producers	Alexandria	SD	soy oil	2	N/A
Minnesota Soybean Processors	Brewster	MN	soy oil	30	N/A
Missouri Better Bean LLC	Bunceton	MO	soy oil/animal fats	4	N/A
NextGen Fuel	Fulton	NY	soy oil	5	Feb 2006
NuOil Inc.	Counce	TN	soy oil	1	N/A
Organic Fuels LLC	Houston	TX	multi-feedstock	30	N/A
Pacific Biodiesel Inc.	Honolulu	HI	yellow grease	1	N/A
Pacific Biodiesel Inc.	Kahului	HI	yellow grease	0	N/A
Patriot BioFuels	Stuttgart	AR	soy oil/animal fats	3	N/A
Peach State Labs	Rome	GA	soy oil	5	N/A
Peter Cremer (TRI-NI)	Cincinnati	OH	soy oil	30	N/A
Philadelphia Fry-O-Diesel	Philadelphia	PA	brown grease	0	N/A

Appendix A – Biodiesel Plants Currently in Production – continued

Purada Processing LLC	Lakeland	FL	multi-feedstock	18	N/A
Renewable Alternatives	Howard	WI	soy oil	0	N/A
Renewable Energy Systems Inc.	Pinellas Park	FL	recycled vegetable oil	0	N/A
Rocky Mountain Biodiesel Industries	Berthoud	CO	multi-feedstock	3	N/A
Safe Fuels Inc.	Montgomery County	TX	soy oil	1	N/A
Seattle Biodiesel LLC	Seattle	WA	virgin vegetable oils	5	N/A
Sequential-Pacific Biodiesel LLC	Salem	OR	yellow grease	1	N/A
Smithfield Bioenergy LLC	Cleburne	TX	animal fats	12	Jan 2006
SMS Envirofuels Inc.	Poteet	TX	soy oil	2	N/A
South Texas Blending	Laredo	TX	beef tallow	5	N/A
Soy Solutions	Milford	IA	soy oil	2	N/A
SoyMor	Glenville	MN	soy oil	30	N/A
Stepan Co.	Joliet	IL	multi-feedstock	21	N/A
Sun Cotton Biofuels	Roaring Springs	TX	cottonseed oil	2	N/A
U.S. Biofuels Inc.	Rome	GA	poultry grease/soy oil	4	N/A
United Oil Co.	Pittsburg	PA	multi-feedstock	2	N/A
Virginia Biodiesel Refinery	New Kent	VA	soy oil	2	N/A
West Central Soy	Ralston	IA	soy oil	12	N/A
Total Plants: 59			**Total Capacity:**	**386.0**	

° denotes plants that are not currently producing.

* Capacity noted in MMgy.

Appendix A – Biodiesel Plants Under Construction

Plant Name △	City	State	Feedstock	Capacity *	Start Date
Ag Solutions Inc.	Gladstone	MI	soy oil	5	N/A
Anamax Energy Services	DeForest	WI	multi-feedstock	20	N/A
Axiom Fuels	Conroe	TX	tallow/soy oil	40	N/A
Bay Biodiesel LLC	Martinez	CA	virgin oils/yellow grease	2	N/A
Big Daddy's Biodiesel Inc.	Hereford	TX	multi-feedstock	30	N/A
Blue Ridge Biofuels	Asheville	NC	multi-feedstock	0	N/A
Blue Sky Biodiesel	Kingston	TN	multi-feedstock	0	N/A
Blue Sun Biodiesel	Monte Vista	CO	canola oil/soy oil	3	N/A
Cargill Inc.	Iowa Falls	IA	soy oil	37	N/A
Central Iowa Energy LLC	Newton	IA	multi-feedstock	30	N/A
Clinton County Bio Energy	Clinton	IA	soy oil	10	N/A
Evergreen Renewables LLC	Hammond	IN	soy oil	5	N/A
Filter Specialty Inc.	Autryville	NC	soy oil/yellow grease	1	N/A
GeoGreen Fuels	Gonzales	TX	soy oil	3	N/A
Integrity Biofuels	Morristown	IN	soy oil	5	N/A
Jatrodiesel Inc.	Dayton	OH	multi-feedstock	5	N/A
LC Biofuels LLC	Richmond	CA	multi-feedstock	0	N/A
Maryland Biodiesel	Berlin	MD	soy oil	0	N/A
Mid-America Biofuels LLC	Mexico	MO	soy oil	30	N/A
Mid-Atlantic Biodiesel	Clayton	DE	multi-feedstock	5	N/A
Mid-States Biodiesel LLC	Nevada	IA	multi-feedstock	0	N/A
Missouri Bio-Products	Bethel	MO	soy oil	2	N/A
Pacific Biodiesel Texas	Carl's Corner	TX	multi-feedstock	2	N/A
Piedmont Biofuels	Pittsboro	NC	yellow grease/animal fats	1	N/A
Redland Industries	Guymon	OK	multi-feedstock	30	N/A
ReNewable Enregy Resources	Goodland	KS	multi-feedstock	10	N/A
Riksch Biofuels	Crawfordsville	IA	multi-feedstock	9	N/A
Tri-City Energy	Keokuk	IA	multi-feedstock	5	N/A
U.S. Biofuels Inc.	Rome	GA	multi-feedstock	10	N/A
United Biofuels Inc.	York	PA	soy oil	1	N/A
Western Iowa Energy	Wall Lake	IA	soy oil-animal fats	30	N/A
Total Plants: 31			**Total Capacity:**	**331.0**	

° denotes plants that are not currently producing.

* Capacity noted in MMgy.

Appendix B – 2006 State Legislation Highlights

NATIONAL BIODIESEL BOARD

2006 State Legislation Highlights

Highlights of 2006 State Legislation Through May 25, 2006

- The National Biodiesel Board is currently tracking more than 160 pieces of biodiesel legislation at the state level
- The bills includes incentives, use requirements, point of taxation clarification, authorization of studies, state fleet use requirements, biodiesel promotion, and others
- Below are some examples of bills under consideration or have been adopted into law in various states.

Arizona
SB 1346
Sen. Huppenthal
Awaiting Governor's signature
Use of Biodiesel to Meet Alt. Fuel Vehicle Purchase Mandates - This bill allows for a fuel purchase equivalency for biodiesel at one vehicle equivalent for every 450 gallons of neat biodiesel or 2,250 gallons of diesel fuel substitute. The bill also adds property that is used specifically to produce biodiesel fuel to qualify as a Class 6 Property, for purposes of taxation. Currently, Class 6 property is assessed at a 5 percent assessment ratio.

Arkansas
HB 1002A
Rep. Petrus
Signed by Gov. Huckabee 04/10/2006
Tax Refund for Biodiesel Fuel Suppliers – provides for an excise-tax refund of 50 cents for each gallon of B100 that is used to produce any biodiesel mixture. Refund is limited to first 2 percent of total gallons of biodiesel blended.

California
Executive Order
Issued by Gov. Schwarzenegger 04/25/2006
Executive Order that, among other things, establishes a target for the state of California to produce and use a minimum of 20 percent of its biofuels within California by 2010, 40 percent by 2020, and 75 percent by 2050. Biofuels includes both ethanol and biodiesel. In addition, the E.O. urges CARB to consider as part of its rulemaking the most flexible possible use of biofuels, which includes its Rulemaking to Update the Predictive Model and Specification for Reformulated Gasoline

2006 State Legislation Highlights

Colorado

SB 3
Sen. Kester
Signed by Gov. Owens 03/31/200
Use of Biofuels in State Buildings – The life-cycle cost analysis performed for each major facility will now include the use of biofuel to provide supplemental or exclusive heating, power, or both for the major facility. The cost analysis regarding the use of biofuel must consider stranded utility costs. Definition of biofuel includes biodiesel.

SB 16
Sen. Entz
Signed by Gov. Owens 03/31/2006
Use of Biodiesel in State Fleets – Requires all state vehicles be fueled with B20, by Jan. 1 2007, subject to availability and so long as the price is no greater than 10 cents more per gallon than regular diesel fuel. Law goes into effect July 1, 2006.

Georgia

SB 636
Signed by Gov. Perdue on 04/28/006
Defines biodiesel according to ASTM D 6751. It also makes it illegal to sell, purchase or blend biodiesel unless it meets this definition.

Hawaii

HB 2175
Rep. Say
Signed by Gov. Lingle 05/12/2006
State Fleet Use – State agencies with diesel fuel purchases are directed to evaluate a purchase preference for biodiesel blends. Also allows agencies that use biodiesel fuel to offset their vehicle purchase requirements at the rate of one vehicle for each 450 gallons of neat biodiesel fuel used. Defines neat biodiesel fuel as B100 by volume.

Indiana

HB 1285
Rep. Heim
Study on Use of Biodiesel – Requires Environmental Quality Service Council to study, among other things, the feasibility of requiring motor vehicles sold in Indiana to meet standards for B20 use.

SB 353
Sen. Weatherwas
Signed by Gov. Daniels 03/21/2006
Tax Credits for Biodiesel Production, Blending & Retail Sales - Increases the maximum amount of credits that may be granted for biodiesel production, biodiesel blending, and ethanol production and indicates that the Indiana economic development corporation may grant a credit that is less than the maximum permissible statutory credit. Extends the tax credit for the retail sale of blended biodiesel to 2010.

Kansas
SB 388
Signed by Gov. Sebelius 04/18/2006
Establishes the Kansas Qualified Biodiesel Fuel Producer Incentive Fund (KQBPIF), which will provide qualified biodiesel producers a $.30/gallon production incentive for each gallon of biodiesel sold by the producer. A "Kansas qualified biodiesel fuel producer" is any producer of biodiesel fuel whose principal place of business and facility for the production of biodiesel are located within the state of Kansas. The Fund is to be administered by the state Dept. of Revenue. Program begins April 1, 2007 with an authorized transfer of $437,500. Beginning July 1, 2007, and quarterly thereafter, $875,000 will be made available to the KQBPIF. The program expires July 1, 2016.

Maryland
SB 54
Sen. Giannetti
Signed by Gov. Ehrlich 05/16/2006
State Fleet Biodiesel Use - Requiring the State to ensure that, in fiscal year 2008 and in each subsequent fiscal year, at least 50 percent of vehicles using diesel fuel in the State vehicle fleet use a blend of fuel that is at least 5 percent biodiesel fuel.

Mississippi
SB 2942
Sen. Lee
Signed by Gov. Barbour 04/24/2006
Creates a Study Committee on the Potential Use of Biodiesel Fuel, effective July 1, 2006. The study committee will study the need for mandated use of biodiesel and the benefits accruing to agriculture and the environment. The committee shall report to the Legislature no later than January 2, 2007.

New York

Bill A11331
Assemblyman Tonko
Signed by Gov. Pataki 05/21/2006
Residential Bioheat Tax Credit. A tax credit for bioheat in residential heating applications will provide one cent ($0.01) per percent of biodiesel per gallon of bioheat with a cap at the B20 level. For example, B5 will be eligible for a five cents per gallon New York State income tax credit, and B20 will be eligible for a 20 cent per gallon tax credit. Higher percentage blends, if used, will receive 20 cents per gallon. Effective July 1, 2006, through June 30, 2007.

SB 6460
Budget Bill
Vetoed by Gov. Pataki
This bill provided, among other things, a Biofuel Production Credit. Biodiesel is defined as a biofuel and eligible under the program. The bill provided for a $.15/gallon after the first 40,000 gallons is produced in a tax year. Credits are capped at $2.5MM per taxpayer/tax year/plant for up to no more than four consecutive taxable years per biofuel plant.

Virginia

HB 680
Del. Wittman
Signed by Gov. Kaine 04/06/2006
Establishes a Biofuels Production Fund and Grant Incentive Program. The Program offers grants to producers of neat biofuels, which includes B100. To be eligible for a grant the producer must produce in excess of 10 million gallons of neat biofuels within the Commonwealth in a calendar year using feedstock originating domestically within the United States. The producer must commence eligible sales on or after January 1, 2007, and pre-existing producers are only eligible if their production increases over prior calendar year levels by at least 10 million gallons of neat biofuels. Producers that qualify for a grant under the program may be granted $0.10 per gallon for neat biofuels produced in the given calendar year. If moneys in the fund are not sufficient to pay all qualified applicants, disbursements from the Fund shall be made on a pro-rata basis. The Program and Fund would expire on December 31, 2016. The payment of grants is subject to an appropriation to the fund.

Washington

SB 6386
Sen. Prentice
Signed by Gov. Gregoire 03/30/2006
Biofuels Education Fund – $98,000 appropriated for FY 2007 is provided solely to establish a biofuels consumer education and outreach program at the Washington State University extension energy program.

SB 6508
Sen. Rasmussen
Signed by Gov. Gregoire 03/30/2006
B2 Requirement –Requires 2 percent of diesel sold in the state to be biodiesel starting Dec. 1, 2008, or when feedstock grown in the state can satisfy the 2 percent requirement; requirement to increase to 5 percent when certain triggers are met (in state crush capacity, grown feedstocks).

OTHER HIGHLIGHTS

- Tax Exemptions, Credits or Rebates – AZ, CA, HI, IA, IL, IN, KS, KY, MA, MD, NE, NH, NJ, NY, OK, SC, SD, VA, WA
  At least 19 states considering some form of tax reform to encourage use and/or production of biodiesel.

- State Fleets – AZ, CO, HI, IL, MI, MO, MS, TN, VA, WA
  At least 10 states considering some form of mandate or encouragement to use biodiesel in fleets.

- B2/B5 Mandates – CA, KS, LA, MO, MS, VA
  At least 6 states considering some form of biodiesel mandate for the state diesel pool.

- Infrastructure – IA, IL, KS, NE
  At least 4 states considering legislation to improve their state's infrastructure to improve access to biodiesel.

- Miscellaneous Incentives – CT, HI, KS, MN, MO, NY, PA, VT, WA
  At least 9 states considering legislation that offer various other incentives for biodiesel use and/or production such as issuance of state bonds, use of public lands for oilseed production, conversion allowance programs and grants.

- Schools and Buses – CT, GA, IA, MS
  At least 4 states are considering legislation that offer incentives to schools and school districts for purchase of biodiesel fuel for school buses.

Note: This document is not intended to be an exhaustive list of biodiesel-related bills under consideration in the states. New bills are continually being introduced in the state legislatures. Every effort is made to track all bills under consideration and are maintained for NBB members at the Members' web site.

For more information: The National Biodiesel Board maintains the most comprehensive biodiesel Web site in the US at www.biodiesel.org. Contact Scott Hughes, Director of Governmental Affairs for the National Biodiesel Board at shughes@biodiesel.org or Josh Zahn at jzahn@sbcglobal.net.

May 2006

Appendix C - Key Site Selection Criteria

It is imperative to look at all these factors before choosing an exact site because even lower tier criteria could be cause to eliminate a site from consideration. However, for the purpose of this statewide assessment, the goal was to identify locations that have the potential to support a biodiesel production facility, but not to specifically identify specific project sites. It is assumed that an assessment will be part of an investor and site-specific feasibility analysis. With this in mind, the primary focus was on the tier one criteria:

<u>Top Tier</u>

Existing and Potential Competitors – How big is your market area (in good times and in bad) and where are the nearest existing or potential competitors? If a potential competitor, what size plant are they likely to install and how does that affect the selling area of your plant?

Selection and Location of Oil and/or Fat Feedstocks – Which oils and fats are you planning to use? Where can it be purchased from (or is it a captive source) and how much will it cost to transport it to your facility?
Who will be competing for these feedstocks?

Quality and Cost of Oil from Source – What are the free fatty acids and other impurity level of the oil sources and what are their costs? Will your process handle them? It doesn't do a lot of good to have a lot of poor quality, inexpensive oil nearby if the process selected will not process it.

Proximity to Rail Access – More and more people are coming to realize that for a plant of any size (over 10 MGPY), access to rail is critical. This is true for procurement of oils and fats and methanol, as well as for transport of glycerin and biodiesel if the biodiesel is not to be sold locally.

Existing Infrastructure Synergy—Steam, Load Out, Tank Farm, Mechanics, Roads – If you choose a site that already has a production facility on it, you may be able to piggyback many of these needed infrastructure items—especially the tank farm and load out facilities—to make a much less expensive product than a company who has to start from scratch.

<u>Middle Tier</u>

Proximity and Reliability of the Biodiesel Market – How close are you to your market area and how far will you need to transport the biodiesel until it is sold? Is your market one that is committed or dedicated to the purchase of biodiesel for one reason or another, or are they likely to switch to diesel only at the drop of a hat? If you are not selling into a dedicated market, you need to be prepared to transport your biodiesel further in order to get it sold.

Reliability of Oil Source – This one is often overlooked. Many times it is asked, 'how much do you have available and at what price' and you get back an answer like, 'we have 30 million pounds per year at approximately 15 cents per pound". Will that be a steady source of oil—same amount per month or per week—or are there seasonal fluctuations or fluctuations due to other technical factors that are non-market related. Are there seasonal changes or other changes, which could affect reliability and price due to market, based factors for the oil sources you select. This is especially important if you are planning to buy your feedstocks from one or two specific plants or small companies.

Proximity from Dwellings – Most industrial scale biodiesel plants have outside lights on 24/7 and can have sounds of pumps and trucks and other equipment, which may be bothersome to local homeowners. In addition, some plants, especially those with used cooking oils or animal fats, may have some odors which some may find objectionable. Lastly, methanol is a Sara 313 regulated chemical, burns with an invisible flame, and is an explosion hazard if not handled properly. These issues are all easily overcome with standard process technology, but the farther away from people you are the less likely that an accident will have adverse consequences.

Ease of Environmental Permits (Multi-Media Study: Air, Land, Water Impacts) – This is another one usually overlooked until it is too late. Check with your local officials before you

select the site. Get your environmental permits before you start building or announcing your plant to the world!

Local Zoning Ordinances – Same as Environmental permits; often overlooked until it is too late. No sense looking further if the site isn't zoned correctly or can't easily be changed.

<u>Lower Tier</u>

Source of Methanol – Most methanol will be received via truck or rail. Rail is much cheaper, if the plant is large enough to accept full railcars.

Source of Ethanol – If you choose ethanol as your alcohol, that can come via truck or rail like methanol with the same implications. Rail is highly preferred. Additionally, the excess ethanol recovered will most likely not be able to be used without significant processing (i.e. removal of small amounts of water), so location at an existing ethanol facility site where the excess, water rich, ethanol stream can be piped back and easily reprocessed would provide significant savings.

Local Sewer Options – What will the COD/BOD of your plant effluent be, and can your existing sewage treatment plant handle the load? Will you need to install your own facilities? This one is highly dependent on local conditions, as well the technology selected.

Fire Protection, Emergency Services – This is a general consideration. Does your site have a local fire station close and how well would they handle an industrial fire should one break out?

Proximity to Paved Roads or Interstate – To bring in raw materials and take out finished product, you will need to have access to good paved roads that can handle a decent amount of truck traffic.

Electricity Costs, Availability, Reliability – This is self-explanatory and its importance depends on the electricity reliance of the production technology…the lower the better and the more reliable the better. Check especially in the summertime, when peak prices for electricity are sometimes charged to industrial plants, which must keep running.

Natural Gas Cost, Availability, and Reliability – Its importance also depends on the natural gas reliance of the production technology. Check especially in the wintertime and the summertime, when peak prices for natural gas can happen due to the high need for electricity in the summer (most of the newer electricity generation capacity is natural gas based rather than coal) and the need for home and industrial heating in the winter. Make sure to check whether your natural gas supply in ‘interruptible’, as industrial applications typically take lower priority than electricity production or heating homes.