Developing State Policies Supportive of Bioenergy Development

Technical Progress Report
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Abstract

Working within the context of the Southern States Biobased Alliance (SSBA) and with officials in each state, the Southern States Energy Board (SSEB) is identifying bioenergy-related policies and programs within each state to determine their impact on the development, deployment or use of bioenergy. In addition, SSEB will determine which policies have impacted industry's efforts to develop, deploy or use biobased technologies or products. As a result, SSEB will work with the Southern States Biobased Alliance to determine how policy changes might address any negative impacts or enhance positive impacts.

In addition to analysis of domestic policies and programs, this project will include the development of a U.S.-Brazil Biodiesel Pilot Project. The purpose of this effort is to promote and facilitate the commercialization of biodiesel and bioenergy production and demand in Brazil.

Introduction

The Southern States Energy Board (SSEB) is an interstate compact that includes 16 southeastern staes and Puerto Rico and the U.S. Virgin Islands. One of the Southern States Energy Board's goals over its 40-year life is to ". . . develop, promote, and recommend policies and programs on energy and environment that encourage conomic development." The Board accomplishes this goal primary through a number of task forces comprised of members from its states, the private sector, non-profits and others.

Southern States Biobased Alliance (Tasks 1-3)

SSEB's Southern States Biobased Alliance works closely with the Southeast Biomass State/Regional Partnership which SSEB hosts. Activities of the Southern States Biobased Alliance are focused on creating awareness and providing information and education for its members. As the members of the Alliance assess the opportunities for biobased products and bioenergy in the region, the group will review and make recommendations on policies and programs that support the use of bioenergy when appropriate.

Working within the context of the Southern States Biobased Alliance and with officials in each state, SSEB is identifying bioenergy-related policies and programs within each state to determine their impact on the development, and use of bioenergy. In addition, SSEB will determine which policies have impacted industry's efforts in the use of bioenergy products and technologies under Task 1-3 of this project.

U.S.-Brazil Biodiesel Pilot Project

On June 19, 2003, Energy Secretary Spencer Abraham and Brazilian Mines and Energy Dilma Rousseff signed a Memorandum of Understanding (MOU) to conduct a Ministerial Summit in energy issues by January 2004 in Brazil. Pursuit of joint objectives in clean energy and biofuels were specifically addressed in the MOU. In support of this collaboration, U.S. DOE modified this cooperative agreement DE-FC26-01NT41128 to include a U.S.-Brazil Biodiesel Pilot Project as a bilateral effort to enhance the prospects for success in developing biodiesel use in Brazil.

Executive Summary

Goal

The goal of this project is to have state and international policies positively impact the development, deployment, or use of bioenergy and are consistent among states.

Statement of Work

Southern States Biobased Alliance (Tasks 1-3)
Working within the context of the Southern States Bio-Based Alliance and with officials in each state, a staff member and/or contractor will identify bioenergy-related policies and programs within each state and determine their impact (in any way) on the development, deployment, or use of bioenergy. The staff member and/or contractor will be asked to determine as quantitatively as possible how this impact occurs, and how the legislation originally came to be promulgated.

Additionally and simultaneously, the staff member and/or contractor will be interviewing bio-based industry officials to determine what policies (or lack of policies) have impacted their efforts to develop, deploy, or use biobased technologies or products. The staff member and/or contractor will also try to determine the nature of these impacts and how policy changes might address any negative impacts or increase positive impacts.

In addition to attaining the project goal, this project approach will facilitate information sharing and education on state policies and their ramifications, create peer reaction, and ultimately provide more uniform regulations across the region that are supportive of bioenergy development, deployment, and use.

U.S.-Brazil Biodiesel Pilot Project (Task 4)
Task 4 is to develop a U.S.-Brazil Biodiesel Pilot Project to promote the commercialization of biodiesel and bioenergy production, technologies, and usage in Brazil. This task will consist of three primary components: Policy and Program Development; Feasibility Study and Technical Analysis; and bioenergy meeting design and execution to meet the U.S. Department of Energy goals.

Experimental

Due to the nature of the project, no experimental methods, materials or equipment are necessary.

Results and Discussion

Task 1-3 Activities

The SSEB, through the Alliance, is assisting the U.S. Department of Energy to determine the effectiveness of relevant government policies and programs. The **goal of this project** is to identify and compile into one document bioenergy and biobased-related government policies

and programs in the US and to determine the effectiveness of these policies and programs. Part of this activity is to interview biobased industry officials and other stakeholders. The survey results are meant to serve as a resource for industry that has interest in and need for this specific information, and for government officials contemplating modification of existing legislation or creation of new legislation, policies, or programs. As a result, government officials will be able to learn from the experiences of others and efficiently create new model legislation for their states.

One task of this activity was to interview biobased industry officials to determine the impact of existing and/or lack of polices on efforts to develop, deploy, or use biobased technologies or products. A listing of selected industry representatives and other beneficiaries of the legislation and programs was compiled from existing SERBEP databases, after being updated from industry lists. Although this project is focused on the Southern US, there was interest in policies and programs from all levels of government both inside and outside the US. The study was also interested in all sizes of projects and technologies from utility scale to residential applications and all aspects including environmental, siting, and financing. Therefore, although this survey was focused on industry, in some cases, questionnaires were sent throughout North America to trade associations, and a few questionnaires were sent to selected government officials and academia throughout North America. Recipients of questionnaires sent to organizations were offered the opportunity to respond for the organization they belonged to or reply as individuals.

The survey asked for comments on the effectiveness of the existing policies and programs, and asked to suggest changes in the existing policies and programs or suggest new policies and programs that are needed. The survey also asked those suggesting changes or new policies and programs to explain the rationale for their suggestions.

The questionnaire advised readers to interpret the term "governmental policies" very broadly and could include such things as federal, state, or local government policies (e.g., strategies, plans, guiding principles, courses of action, and procedures) such as the Kyoto Greenhouse Gas Treaty; government purchases of bioenergy and biobased products, and assistance with fuel certification. Legislation could also include financial support programs (e.g., subsidies, loans, grants, equity positions, interest buy-down programs, access to government bond programs, government payment for infrastructure development), tax credits or rebates, reasonable environmental and zoning legislation, Renewable Portfolio Standards, Renewable Fuel Standards, System Benefit Funds, and deregulation, among other things. A copy of the questionnaire is in Appendix I of this report.

Questionnaires were sent out in early August 2003 by email, fax, or through the U.S. Postal Service. The rate of response for a questionnaire of this type was fairly typical. Of the 1,476 questionnaires sent out, 146 were returned due to bad addresses or other reasons, and 29 responses were received, for a total response rate of 10 percent.

A summary of the responses is contained in the next section of this report. Unfortunately, not all responses followed the format of the questionnaire with their responses. As would be expected, responses were governed by the responders' respective interests and most

responses centered on economic or financial issues. Appendix I contains the description and purpose of the survey as well as the list of questions and other information requested of the recipients.

Note: The responses summarized below contain direct quotes from the surveys and do not portend any position of the Southern States Energy Board.

Questionnaire and Summary of Results

Question 1. Considering EXISTING bioenergy and biobased programs and policies, please list all (federal, state, and local) programs and policies that you are familiar with in the order of top priority for your company (number 1 highest). Please make your descriptions as clear as possible.

Perhaps the most surprising result was the number of responders that were not aware of existing state and federal incentives and programs—even for there own state. The state incentives that people were most familiar with seemed to be those in California. Of the federal programs, responders seem more knowledgeable and supportive of USDA programs. Along a similar theme, responders wanted to see more public education about biomass energy. Specifically, more activity from the Southern States Energy Board and the Alliance were mentioned.

Of the federal programs, responders were more familiar with the Section 29 (biomass gasification) and Section 45 tax credits (closed loop biomass and REPI), which are older programs. Most government financial incentives mentioned or requested were tied to electricity production. Some referred to animal waste management. One responder indicated that no incentives were needed providing that conventional competing fuels also were not subsidized.

Another result was that government placed too much emphasis on R&D and not enough on application and commercialization of technology. Some expressed frustration on their ability to obtain funding through existing federal government programs. Frustration was also expressed at the government's funding of research to develop technologies that were already commercial, or promotion of projects and technologies that had failed or been abandoned.

Although some responders indicated awareness of the federal government's Small Business Innovative Research (SBIR) Program, they did not indicate how they felt about the quality of these programs.

Perhaps as a result of the surplus of pulpwood and Conservation Reserve Program (CRP) wood in the South, responders wanted to see more emphasis on the use of wood feedstocks—especially pine trees—for energy and the use by utilities of biomass fuels. Along these lines, responders wanted to see more emphasis on developing technologies usable at the utility scale and more appreciation in the bigger picture for the importance of rural economic development.

The importance of the USDA Value-Added program was mentioned in this context, as was the need for state legislation to support biodiesel. The importance of the availability of tax-exempt financing and funding for working capital was mentioned.

Question 2. What is it specifically about your higher ranked bioenergy and biobased programs and policies that make them more important to you? If they need improving, how would you improve on them (be as specific as possible)?

Some respondents felt that more financial assistance was needed for low value materials as well as energy crops, since energy crops continue to be fairly high cost. Good methods to internalize what are currently externalities are needed in order to allow the industry to benefit from the true value of their efforts.

Others felt that existing federal incentives, such as Section 45 tax credits, were too restrictive to be practical. Some felt that utilities were not using their true avoided costs and thus did not pay enough for electricity generated by small providers.

More respect and financial assistance is needed for private companies and—especially—small companies and for real world applications. Solicitations should have longer lead times (announcements at 6-9 months were suggested) and more communication should occur during the solicitation period. Frustration was expressed that much of the results of government-sponsored research is no longer available to the general public. And, in general, more funding is needed for all bioenergy programs.

Education programs focused on environmental regulators is especially needed to assist these regulators to understand the benefits and opportunities of bioenergy, the science behind the technologies, and the need for reasonable and practical regulations and permitting procedures.

More integration with current government economic development programs is needed. Bioenergy can assist depressed agricultural and forestry industries; however, the use of bioenergy as an economic development tool must be incorporated into economic programs and activities.

Some felt that biomass fuel should be included in all state electrical energy portfolios. Also, in addition to a Renewable Portfolio Standard (RPS), utilities should be required to pay a minimum amount of 5.5 to 10 cents per kWh or $5 to $6 per million Btu for renewable energy. States with Renewable Portfolio Standards should encourage the use of standard power purchase (or energy purchase) agreements that would provide fair interconnection and standby or station power standards that would apply to both energy suppliers and purchasing utilities. Furthermore, a rule should be adopted that would not require renewable energy users to pay exit penalties to the utilities.

Section 29 tax credits were cited as being particularly helpful to creating a financially viable landfill gas industry and building the present landfill gas industry (as well as thermochemical

biomass gasification). One specific suggestion for Section 29 was to allow to be used by the people that earn them, without regard to the limitation of the Alternative Minimum Tax. This change would make the tax credits more attractive to a wider range of companies.

It was suggested that Section 29 tax credits be extended a minimum duration of seven years from commencement of operations or Section 45 tax credits be modified to incorporate gasification. Section 45 needs to be broadened in general.

The California Energy Commission renewable energy payments were cited as a good program that ties economic support to renewable energy electric production. This program provides five years of payments awarded through a bid process in which projects request a certain level of support based on need.

A farm organization felt that it was important that no feedstock, so long as it meets the required standards, should be penalized or treated unfairly by legal means. The responder stated that ". . .the country needs all renewable resources to compete in the global market."

In addition, the following comments were made related to this question:

- Funding for SBIR and other programs to assist private industry needs to be increased so that more people have the opportunity to participate in these programs. Programs to provide financial assistance to the private sector should be considered investments by the government—not expenses—and the necessary information to verify the value of these investments needs to be collected and made available.

- Private businesses should not have to compete against the federal agencies that are putting the solicitations on the street. It is very misleading for the government to say that there is X amount of funding available when in reality a large portion is staying with government.

- EPA needs to change its position on the availability of air emission credits to landfills that are subject to NSPS and that develop an energy project thereon.

- Programs that support harvesting and use of crop residues are needed.

Question 3. What NEW bioenergy and biobased policies and programs are needed? List your suggestions for new policies and programs in your order of priority with number 1 the highest and be as descriptive as possible.

a) Change IRS regulations to allow easier access to Tax Exempt Bonds to fund Biomass projects.

b) Establish enhancement for supplier bonds for wood fuel suppliers, similar to the construction bonds provided through the SBA for construction contractors.

More focus and money needs to be directed to small businesses working in the bioenergy area. The existing SBIR program is a good start but needs improvement. For example, Phase

I funding is often inadequate and there is a mandatory gap between Phase I and II. The gap is sometimes difficult for small companies to bridge.

Mandatory cost sharing can also be a problem for small business. Cost sharing requirements are the same regardless of whether one is competing against a large company or a government-run laboratory. Cost sharing requirements should either be waived for small companies or scaled to company size.

Government-sponsored research should consist of a mixture of government research on a 5-year (or less) plan combined with seed money to small entrepreneurial businesses, which are willing to take risks and try new approaches. The government needs to talk to entrepreneurs and find out what their problems and needs are.

It is not believed that new DOE programs are needed. Rather existing programs, especially those like the Regional Biomass Energy Program and State Energy Program that support industry, need greater funding and authority—including the authority to continue to fund applied research on a limited basis.

The forestry industry is seriously struggling at present and use of wood for bioenergy, which is very feasible, could greatly assist the industry. Policies thus need to be implemented that encourage the use of wood fiber for energy purposes—especially harvesting residues and unmerchantable wood. A Federal renewable portfolio standard could achieve this (as could state RPS's; however, a federal RPS would be uniform and universal).

The various definitions for biomass sometimes serve as an impediment. Biomass should include any biomass produced from industry or forestry operations and provide incentives for development of, or investments in, new technologies, plants, or equipment.

The new policies and programs most needed are those that result in getting existing knowledge and funding into the field where it is needed.

A clean carbon credit policy would allow biomass plantations to be financed.

The forest products industry is facing a critical time in its history. Forest product companies continue to struggle to produce profits, and property owners continue to pay increasing taxes while hoping for improvement in demand for their timber. We have a significant raw material supply coupled with declining demand. Therefore, new markets, products, and technologies must be encouraged and developed in order to help insure the long-term health and viability of the southeast's forest products industries, the infrastructure that supports them, and ultimately, our forests. Utilization of forest biomass for energy production on a commercially viable scale is an alternative that should be pursued and encouraged.

Production of energy from wood is not new. In fact, many forest products manufacturing facilities have produced much, if not all, of their own electricity for many years. The general consensus is that utilizing existing technology, bioenergy production is not economically justifiable unless oil prices are well above their long-term averages. However, there are

several new technologies being developed and tested which may lead to more cost competitive and acceptable alternatives. Also, bioenergy is widely accepted as a "green" energy alternative as it produces less pollutants (SO_x, NO_x) than coal, and net greenhouse gasses (CO_2, CH_4) are significantly decreased. Finally, increased use of bioenergy also has the potential to mitigate the negative social, economic, and environmental impacts from continued US dependence on foreign oil.

Currently, this biomass issue is being addressed nationally in the Healthy Forest Initiative (HR 1904) and the Energy Bill (S.14). In both bills, biomass definitions include only pre-commercial thinning, wood waste, or wood by products "of preventative treatments…a) to reduce hazardous fuels; or b) to reduce the rise of or contain disease or insect infestation." This legislation should be broadened to include ***any*** biomass produced from industry or forestry operations and provide incentives for development of or investments in new technologies, plants, or equipment.

Therefore, policies should include:

- SSEB should support the development and production of bioenergy from wood and wood waste on an economically viable, ongoing basis.
- SSEB should attempt to influence natural resources and energy legislation that favors bioenergy production from forest products and provides incentives to companies that might develop or implement such new technologies.
- SSEB should encourage research of new technologies at the state, federal, and private levels.
- SSEB should facilitate the sharing of knowledge and encourage cooperation between other similar bioenergy development efforts.

A national policy requiring utilities to pay 3-5 cents per kWh over their avoided costs is needed.

Utility interconnection issues remain a major impediment. Implementing uniform interconnection guidelines that are adopted nationally by FERC edict would help industry tremendously. The recent drafting of such guidelines by IEEE has been a positive first step.

(a) Expand the availability of low-cost tax-exempt bond financing through set-aside of bond cap allocations specifically for biobased energy projects in each state. Expand other state biobased energy financing programs that would make low-cost financing available to biobased energy projects. Allow the pooling of such projects to achieve economies of scale in financing (i.e., to reduce the issuance costs of debt with placed securities). Provide state credit enhancement (e.g. guarantees) to bond issuances to allow for lower interest costs.

(b) Federal, state and local governments should adopt policies that require their agencies to purchase a specified percentage of renewable source energy, including biobased energy. Such policies should recognize that the purchase of such energy will come at an initial increased cost, due to the increased costs associated with producing such energy, which tend to be generated by smaller projects in the case of landfill gas. Other forms of biobased energy can be larger, but raise other issues such as certainty

of available biomass resource (e.g., wood waste, agricultural waste and municipal refuse). Included in any such policies should be a pricing mechanism and the ability for such governments to purchase renewable energy through direct access transactions (which would compel the utilities to allow use of their transmission and distributions systems in exchange for a fair cost). Since government represents a significant additional market and would directly support the development of additional biobased energy projects. However, higher pricing, available financing and the ability to authorize a direct access system (or its equivalent) are all essential for this policy to become effective.

(c) Adopt federal or state policies that would override the policies of regional air quality management districts, such as the South Coast Air Quality Management District, that would establish a policy that would allow for the siting of biobased energy production facilities (such as electric power or cogeneration) that would have less restrictive standards for Best Available Control Technology in order to be employed. Currently, in part due to flaws in the EPA's air models, more electric power generation could be employed at larger landfills in California but for restrictive air emission policies. There should be a trade-off recognized that there may some incremental increase in pollution from energy technologies employed using landfill gas due the inherent issues of dealing with the chemical constituents in landfill gas. For instance, siloxanes and other chemicals in landfill gas, without using expensive pretreatment equipment, do not allow for the use of selective catalytic reduction equipment to reduce emissions. Even if they did, the requirement for the use of SCR air pollution control equipment would make already difficult economics untenable for such projects-unless substantial economic incentives are made available.

(d) Adopt a federal statute or state statutes in states that do not currently have them that would exempt from regulation as a utility any biobased energy project, whether its end use energy is sold at wholesale or at a retail to fewer than 3 customers. Some states, such as California have extensive statutes exempting landfill gas and other renewable energy projects from such regulation. Other states, such as Washington, have no such legislation, even under circumstances when such projects are exempt from federal energy regulations pursuant to PURPA or as an exempt wholesale generator. Evan G. Williams, Cambrian Energy Development LLC

Industry standards need to be developed.

More support is needed to develop densified wood for industrial, commercial, and governmental use.

Funding for demonstration of technology, including loan guarantees, needs to be made available. Both state and federal governments could establish programs to provide performance bonds, performance guarantees, and insurance (especially liability insurance) for new bioenergy products and services. Such things are virtually impossible to obtain through the private sector, but are essential for business.

Policies need to be changed to decrease the focus on R&D, and to decrease the emphasis on funding only PhDs. Funding to bridge the gap between R&D and commercial status is

needed. Even for technologies that require relatively little assistance, funding is not available from government sources.

Question 4. What bioenergy and biobased programs and policies does your state have? Please make your descriptions as clear as possible.

Some responders were not aware of any programs or policies in the following states: VA, GA, AL, and MO
Some responders said they were aware of programs and/or policies in the following states: IL, CA (several), MN, and AL

The final report of the survey and results will be completed during the next quarter.

Other Activities

Also, during this quarter, state legislatures in the SSEB member states have introduced several important bills. Since most member state legislatures were still in session for this reporting period, all new legislation will be reported next quarter to reflect significant bills that were passed and signed by the Governor of each state.

In addition to these activities, plans for convening a joint meeting of the Southern States Biobased Alliance and the Southeast Biomass State and Regional Partnership are underway. The agenda will focus on developing a "regional action plan" to build a biobased economy by assisting with the creation of large, economically viable markets for bioenergy and biobased products.

Task 4 Activities

As stated in the project proposal, the overall objective of Task 4 is to provide market development assistance to the Brazilian biodiesel market by assisting with an evaluation of the economic viability of producing biodiesel. Specifically, the following aspects will be addressed in the pre-feasibility study:

- Feedstock Assessment
- Technology Evaluation
- Brazilian Market Segmentation (opportunities & barriers)
- Evaluation of Petroleum Distribution Channels
- Market Drivers & Demand Potential
- Evaluation of Economic Viability
- Factors to Consider and Recommendations

We continue to monitor developments which affect biodiesel production in Brazil and in the U.S. which could have an impact on accelerating the development of biodiesel production and markets, including additional areas where Brazil and the U.S. can collaborate technically

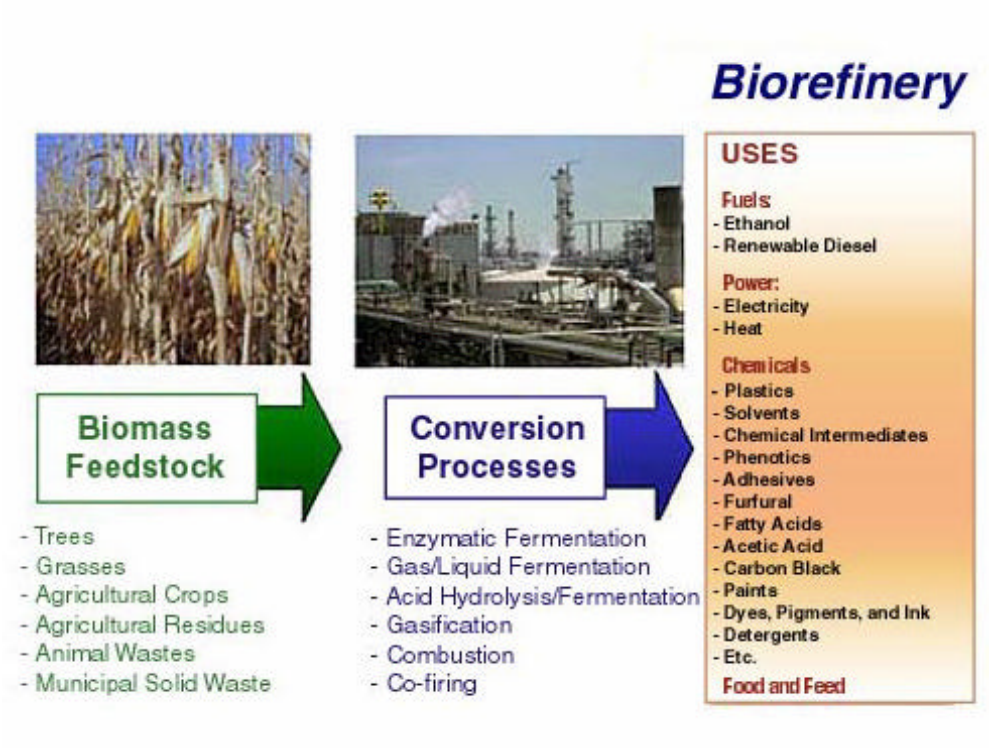
and commercially in support of the MOU signed April 20, 2004 by Energy Secretary Abraham and Dilma Rouseff, Minister for Mines and Energy in Brazil.

In April 2004, project principal, Andrew Paterson participated in and led a workshop on Risk Assessment for Bio-refineries at the World Congress for Industrial Biotechnology and Bio-refining in Orlando, FL (more information available at www.bio.org)

Results from this workshop provide beneficial perspective on key business risks which must be addressed to move forward in the expansion of biofuels.

Overview

Bio-refineries can provide not just biofuels, but bioproducts (polymers, chemicals) and can be utilized to generate electricity.



Business Risk Survey Results

During April 2004, leading up to the workshop at WCIBB detailed questionnaires on key business risks were gathered from 30 U.S. executives and government officials directly involved in biofuels production and bio-refineries. The survey and other relevant information is attached under Appendix II.

Observations about Overall Ratings of Business Risks (30 questionnaires):

- Industry rates bioprocessing risks highest, particularly elevated capital and operating costs. Technical advances are still needed to bring costs down.

- Feedstock issues are rated lowest. Farmers and agribusiness appear confident in their ability to grow with high yield. Brazil soy farming is expanding faster than in the U.S. And, a number of U.S. agribusinesses are participating in Brazil.

- Transportation issues are the chief concern in delivery and storage arena.

- Rise of oil and gas prices make bioproducts more competitive. Risk of gas prices coming down is seen as a low probability, but may carry high severity if it occurs. Oil and gas prices are driven by global factors and would carry over to Brazil.

- Plant owners remain skeptical that CO2 advantages will materialize through regional or national policy. Conflict remains between agricultural, energy policy. Brazil national policy is stronger on biofuels than in the U.S.

- Economic feasibility may ride on crop specifics, regional production and market factors, and other outside issues, e.g., higher oil prices, weather. All of these factors apply in Brazil as well because of similar regional differences between the South and Northeast, though weather differences are less severe in Brazil.

- Without some early production incentives to stimulate larger volumes and offer downside protection, financing will encounter some difficulties. Brazil faces special financing constraints due to much higher interest rates (3x U.S.), and due to a large national debt overhang (>$120 Billion), which requires debt service.

- Might need to offer government financing to reduce equity investment required, thereby enhancing return on equity, e.g. 80/20 debt-equity vs. 50-50.

- Workforce issues (for construction and operation) were rated low. Brazil has no labor shortage problems, though training is important.

Specific Risk Areas:

A) Feedstock production risks posed little specific risk, and these ratings should come out similarly in Brazil. In the next several months, we will look to vet these initial results with counterparts in Brazil.

	Risk Area for Biotechnology	A	B	A x B
	Feedstock Production	**Probable**	**Severity**	**Rating**
1	Lack of Improved Yield	2.1	2.7	5.7
2	Soil erosion	1.9	3.3	6.4
3	Liability from gene flow	2.7	3.3	9.0
4	Regulations reduce profitability	3.0	3.5	10.6
5	Negative public reaction	2.6	3.4	8.8
6	Market shift from price changes	2.7	3.4	9.1
7	Market shift from trade agreements	2.5	3.1	7.5
8	Glut in feedstock market	2.1	2.5	5.1
9	Loss of ethanol subsidies	2.6	3.8	9.7

B) In Delivery and Storage, transportation costs would pose higher risk in both the U.S. and Brazil, perhaps more so in Brazil because the highway infrastructure and truck sizes are not as well developed.

	Risk Area for Biotechnology	A	B	A x B
	Delivery and Storage	**Probable**	**Severity**	**Rating**
10	High construction costs	2.9	3.3	9.5
11	High drying costs	3.2	3.3	10.3
12	High transportation costs	3.5	3.5	**12.2**
13	Inadequate rural infrastructure	2.5	3.5	8.7

C) Bioprocessing poses the highest risks, no matter where the processing is done because of higher capital costs, and operating costs which are related to downtime and maintenance. Purchase of reagents and enzymes also must be further investigated for Brazil, though one of the major advantages of biodiesel is that it does not require enzymes for de-estherification, a simple, large volume chemical reaction.

	Risk Area for Biotechnology	A	B	A x B
	Bioprocessing	**Probable**	**Severity**	**Rating**
14	High capital costs	3.6	3.9	**14.0**
15	High operating costs	3.5	4.0	**14.0**
16	Excessive downtime	2.9	3.6	10.5
17	Unreliable feedstock supplies	2.5	3.7	9.2
18	Expensive enzymes and reagents	2.7	3.4	9.2
19	Slow advances in enzyme efficiency	2.7	3.5	9.6
20	Lagging private investment	3.7	3.8	**13.8**

21	Lack of IP protection	2.4	3.1	7.3
22	Shortage of skilled labor	1.6	2.5	4.1

On the low risk side, adequate training in either the U.S. or Brazil would overcome any labor shortage, and could be an area of technical collaboration in the future, utilizing the universities in Brazil as partners.

D) Distribution and Marketing: participants reflected a general belief that oil and gas prices have risen to high levels perhaps for a sustained period. Economic recovery in Asia (versus collapse in 1998-99) appears steady now, and is adding significant demand to bear on world market pricing.

	Risk Area for Biotechnology Marketing	A **Probable**	B **Severity**	A x B **Rating**
23	Slow growth of energy demand	1.8	3.2	5.7
24	Oil and/or gas prices fall	1.9	3.9	7.4
25	Ineffective codes or standards	2.4	2.8	6.9
26	Inadequate distribution systems	2.4	3.2	7.5
27	By-products revenue falls	3.3	3.8	**12.5**
28	Value of carbon savings falls	2.9	3.4	9.8
29	Poor biofuel performance	2.4	3.9	9.4
30	Regional policies fail	3.1	3.7	11.5
31	National policies fail	3.1	4.1	**12.6**

Lack of steadiness or clarity in national policy might actually be rated lower in Brazil, because government announcements and action on bio-fuels has been more pronounced, reflecting deeper dedication to the national policy. The Lula Administration has made biofuels development a first priority in social development.

Additional activities under Task 4 during this quarter included MARC-IV attending the International Fuel Quality Center's (IFQC) Biofuels Briefing held in conjunction with Hart's World Fuel's Conference the week of June 21st in Rio de Janeiro, Brazil. The IFQC's mission is to facilitate improved communications among the world's leading refining, automotive, technology and fuel quality stakeholders for a better understanding of fuel quality issues to help advance their respective goals. As such, many of the Brazilian petroleum and biofuels interests were represented at this meeting (see attached invitation list and agenda for Biofuels Briefing). The briefing was a one-day event centered on biodiesel that was held immediately following a three-day conference on petroleum issue.

During the week, MARC-IV met with and held discussions with representatives of the following groups:

- ANP
- Petrobras
- PAC Labs

- Federal University of Parana (J. Fontana)
- University of Sao Paulo (M. Dabdoub)
- Peugeot
- MCT Representative for RJ
- Octel

Highlights from these meetings include:

National Petroleum Agency (ANP)
Contact: Rosangela Moreira

ANP has been actively involved with all of the Ministry meetings related to the Federal Biodiesel Program Report that was finalized in December, 2003 and recently available to the public. ANP's primary responsibility is relative to specifications and thus, consumer confidence and fuel quality. A number of points are relevant to the biodiesel project.

First, ANP has already released a biodiesel specification for testing purposes. This specification is a combination of the European specification and the U.S. ASTM specification. It should be noted that this specification is ONLY for testing purposes and not for commercial production.

ANP has also announced they will work on a pure biodiesel specification for use as a blend stock up to 2% blends. Thus, ANP will develop quality parameters for B100, but it only applies for B2 blends. Indications from ANP imply that they will be looking closely at oxidative stability test methods and will not set parameters for iodine value.

ANP has also implemented a red dye system to distinguish between metropolitan diesel fuel and interior diesel fuel (which vary by sulfur levels). Metropolitan diesel fuel may require the addition of lubricity additives although this depends upon the quality of the diesel fuel and is most definitely not required for all fuels.

Implications for the Brazilian biodiesel industry and this project*: There are several important impacts of these facts. First, B2 blends would be the blend level utilized in Brazil until ANP develops a different spec. Second, feedstock choices would not be limited by iodine value. It was previously discussed to set the iodine value at the European spec levels. This fact could have ruled out the use of soybean oil for biodiesel production. Third, the use of red dye to distinguish diesel fuel (interior vs. metropolitan) demonstrates that ANP is placing an emphasis on enforcement of policies and highlights the need to detect blend levels and/or the need for pump labeling or consumer protection regulations.*

Next Steps:
- *ANP has been utilized for diesel fuel consumption, by sector, and production/import statistics. Verification of this data will include in the next quarter.*
- *Continued interaction with ANP on specification issues, including the trading of information from U.S. experiences.*

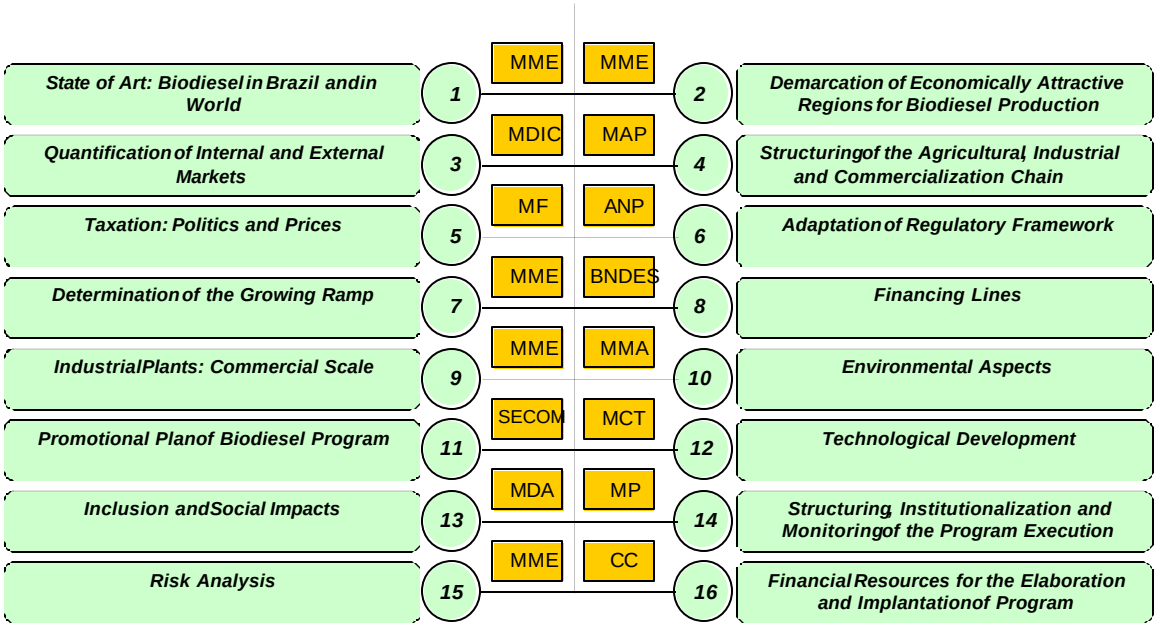
Federal Biodiesel Report

As noted above, the report that was prepared by the Interministerial Working Group was finalized in December, 2003. This ministry working group was created after the Presidential decree by President Lula on July 2, 2003. The decree was after the signing of the memorandum of understanding between the U.S. and Brazil in June, 2003.

The challenge given to the working group was to:

> "Implant a sustainable project, regarding price, quality and supply guarantee of BIODIESEL, produced from different oilseeds, in different economical activity regions, climate, depending on the region, not favorable for foodstuff cultivation, generating incomes, fighting social exclusion and poverty."

This charge is important as it points to feedstock preference and how the Brazilian government may try to direction production geographically. The working group had sixteen topics they addressed:



Source: MME

Conclusions from this report (as reported by ANP) are:

- Adopt social inclusion and regional development
- North and Northeastern with different treatment (poor regions and with potential possibilities to insert in biodiesel market)
- Not to prevail technological routes, feedstocks, agricultural production scales and regions
- To authorize officially the biodiesel use in national level (Responsible: MME)

- To carry out additional tests for biodiesel use in blendings or pure in vehicle and stationary engine (fuel for urban transport, agriculture maschinery and electricity generation) (Responsible: MME/MCT)
- To establish agreement between Brazilian Government and other countries in which produce biodiesel (France, Germany, US and Argentine) (Responsible: MME, MCT and MDIC)

Source: ANP Presentation

In April, 2004 after a working group meeting, the following main points were announced to the public.

- Authorize the use nationwide of biodiesel blending (B2)
- Develop mechanisms seeking the social inclusion in the production of biodiesel
- Definition of the taxation model incident in the biodiesel chain
- Market segmentation and its priorities for the use of biodiesel

Source: ANP Presentation

As an outcome of the report, the Brazilian Government is pursuing a national program of biodiesel inclusion at the 2%, by volume, level. According to official releases, Brazil's mines and energy ministry plans to announce regulations for the use of biodiesel as an additive to diesel by November. MME minister Dilma Rousseff has stated,

> "We still don't know whether to make the addition of biodiesel to diesel obligatory or optional, but it will likely be increased in different steps."

Meetings with various firms and agencies has indicated that the national program would begin with B2 blends and then consider ramping up to B5.

Implications for the Brazilian biodiesel industry and this project*: The final report, just available to our project team, has several implications on this project. The Brazilian Government is pursing commercialization of biodiesel as a method to increase employment and create economic development opportunities. Therefore, less than industrial sized facilities may be given preferential treatment. In addition, preferential treatment may be given to facilities located in specific geographic regions. Finally, feedstocks (e.g. castor, nabo) that are not used for edible purposes may be given preference. All of these aspects are currently speculative.*

Next Steps:

- *Translation of primary points and some details from full report (in progress)*
- *Follow-up relative to certain outcomes such as the conclusion to, "establish agreement between the Brazilian Government and other countries" and potential preferential treatment.*

Petrobras
Contact: Francesco Palombo

Petrobras has a large research program that includes biodiesel and have announced their intention to produce 2,300 barrels of biodiesel per day by 2010. This announcement is part of their 2010 strategic plan. The Petrobras research program, as previously noted in progress reports, is working with castor beans as the primary feedstock. Castor fits the criteria from the government report of being a non-edible crop and having the capability of being produced in impoverished regions of Brazil (most notably the Northeast). Petrobras is also working on a new technology that would start with the castor seed (not the oil) and utilize local ethanol instead of methanol.

Implications for the Brazilian biodiesel industry and this project*: Petrobras is the most significant petroleum entity in Brazil and will be a primary player in the biodiesel industry. The technology being developed is similar to a process being researched at the USDA-ARS lab in Philadelphia.*

Next Steps:

- *Follow-up on the process technology being investigated by Petrobras.*
- *Determine whether the MARC-IV economic model needs to be modified before finalizing economic portion of report.*

University of Parana and Sao Paulo

Federal Universities, although hampered by lack of federal/state dollars, continue to conduct research programs. The University of Parana and Tecpar have had long standing research programs. However, these programs have been primarily funded by state and federal research dollars. The research programs at the University of Sao Paulo are primarily funded by private dollars and cooperation from private firms.

Specifically, Dr. Dabdoub (U of Sao Paulo in Ribeirao Preto) is examining various feedstocks, the use of ethanol in the transesterification process, and emissions testing.

Next Steps:

- *Continued interaction with academic researchers.*

Octel

Contact: Iwaldo Miranda

Octel is a leading manufacturer of fuel additives. Octel has previously developed cold flow additives in Europe and is working on cold flow additives in the U.S. In addition, Octel has developed microbial and stability additives.

Implications for the Brazilian biodiesel industry and this project*: As noted previously, Brazil is currently pursing a B2 market. This, coupled with Brazil's average temperatures should not require the use of additives. Development of additives for pure biodiesel, however, may remain important (for storage and blending infrastructure).*

Next Steps:

- *None planned at this time.*

PAC
Contact: Michael Downey
Pensalab/PAC markets fuel testing equipment.

Implications for the Brazilian biodiesel industry and this project*: It is yet to be determined whether or not biodiesel would be blended at the refinery or the terminal level if a nationwide program is implemented. The ability to determine blend levels will be important for the distribution industry.*

Next Steps:

- *None planned at this time.*

Conclusion

Beyond the potential economic development benefits, states gain the opportunity to strengthen and integrate the work of energy, agriculture, forestry, environmental and other state agencies. Where issues are the same among several states, strategies can be developed to address these issues without regard to state borders. Examples include the development of similar legislative actions, working with the private sector with multi-state locations, and multi-state training and outreach to economize resources.

Notably, several southern states have long-standing policies and programs that support the use of bioenergy. Therefore, some states have a more developed bioenergy economy than others. However, all states in the southern region have significant biomass resources. SSEB will report these findings in the final report.

During this reporting period, results from the "Bioenergy and Biobased Policy Survey" revealed that public awareness and education of policy incentives are lacking in the private sector. One of the most surprising results was the lack of awareness of existing state and federal incentives and programs. Of the federal programs, responders were more familiar with the U.S. Department of Agriculture programs. Consequently, these incentives are not being optimized to expand the bioenergy and biobased products industry and markets. When the incentives are utilized, the efforts seem to be focused in specific geographic areas and/or regions. As a result, outreach efforts are even more critical if the benefits of using biomass are to be realized.

At the same time, SSEB member states continue to introduce policies and implement programs that support the use of biomass and biobased products. In the next reporting period, new policies will be identified and summarized as part of this project.

Under Task 4, the U.S.-Brazil Biodiesel Pilot Project, continued analysis and specific application is needed of business risks to design approaches to overcome key risks and barriers to financing. Raising investment sources and options is a top priority for the Ministry of Mines and Energy in Brazil. In the upcoming quarters, work will continue to review results of risk analysis with potential university and industry partners in Brazil for completion in third quarter.

References

No new references were used for this quarterly report.

APPENDIX I

Bioenergy and Biobased Policy Survey and Relevant Information

The Southern States Energy Board (SSEB) is assisting the U.S. Department of Energy to determine the effectiveness of bioenergy and biobased-related government policies and programs in the US. Part of this activity is to interview biobased industry officials to determine the impact of existing policies or lack of polices on efforts to develop, deploy, or use biobased technologies or products. The Southern States Energy Board has identified your company as a private industry either active or at least having a vested interest in the biomass field. Therefore we are asking you to provide comments on the effectiveness of existing bioenergy or biobased-related policies and programs, and to suggest changes in the existing policies and programs, or suggest new policies and programs that are needed. The rationale for your suggested changes will be most helpful to use in transferring your visions and needs to others.

Formed in 1960, the SSEB is an interstate compact that includes 16 states plus Puerto Rico and the Virgin Islands—thus it covers roughly one-third of the United States. The Board is comprised of the Governor of each member state plus a legislator from each house of each member state. Additionally, the Board includes a federal representative that is appointed by the President. The Board works to improve communication, coordination, and collaboration on energy-related issues among its member states through frequent meetings and joint activities (see www.sseb.org for more information).

The Southern States Energy Board created a task force—the Southern States Biobased Alliance (Alliance)—in September 2000 specifically to focus on bioenergy and biobased product-related issues and to cooperatively build a vibrant biobased economy in the South. The Alliance consists of a legislator and agency head from each state, with both members appointed by their Governor. COLLECTIVELY, THE SOUTHERN STATES ENERGY BOARD AND THE ALLIANCE THUS REPRESENT A DIRECT LINK TO THE HIGHEST LEVELS OF STATE GOVERNMENT IN THE SOUTH AND, WITH YOUR HELP THROUGH THIS SURVEY, PROVIDE AN UNPARALLELED OPPORTUNITY FOR INDUSTRY TO ACHIEVE A MEANINGFUL, LARGE SCALE CHANGE IN THE POLITICAL CLIMATE REGARDING BIOENERGY AND BIOBASED-RELATED ISSUES.

Based on your input, the final report is meant to serve as a resource for government officials contemplating modification of existing legislation or creation of new legislation, policies, or programs. As a result, government officials will be able to learn from the experiences of others and efficiently create new model legislation for their states. It is anticipated that the results of this study will be used not only in the South, but also throughout the US and perhaps even beyond the US.

Note that governmental policies can be very broad and can include federal, state, or local government policies (e.g., strategies, plans, guiding principles, courses of action, and procedures) such as the Kyoto Greenhouse Gas Treaty, government purchases of bioenergy and biobased products, and assistance with fuel certification, etc. Legislation my include financial support programs (e.g.,

subsidies, loans, grants, equity positions, interest buy-down programs, access to government bond programs, government payment for infrastructure development), tax credits or rebates, reasonable environmental and zoning legislation, Renewable Portfolio Standards, Renewable Fuel Standards, System Benefit Funds, deregulation, etc.

Although the SSEB is based in the Southern US, we are interested in information on policies and programs from all levels of government both inside and outside the US. We are also interested in all size of projects and technologies from utility scale to residential applications and all aspects from environmental to siting to financing. Although this survey is focused on industry, in some cases we have asked others to participate in the survey.

The survey is designed to require a minimum amount of your time. We suggest that before you start the survey, you scan down through it quickly to determine the flow and nature of questions. Since many things can influence the development of a biobased economy, feel free to interpret as broadly as you desire what programs and policies are relevant to this survey.

Note: this survey may be sent to several people in the same company. We welcome responses from each individual or, if you prefer, a single collective response from a company. You are also welcome to circulate this survey to others in the private sector to solicit their response.

1. Considering EXISTING bioenergy and biobased programs and policies, please list all (federal, state, and local) programs and policies that you are familiar with in the order of top priority for your company (number 1 highest). Please make your descriptions as clear as possible.

2. What is it specifically about your higher ranked bioenergy and biobased programs and policies that make them more important to you? If they need improving, how would you improve on them (be as specific as possible)?

3. What NEW bioenergy and biobased policies and programs are needed? List your suggestions for new policies and programs in your order of priority with number 1 the highest and be as descriptive as possible.

4. What bioenergy and biobased programs and policies does your state have? Please make your descriptions as clear as possible.

The following information is optional:

What is the nature of your business (check all that apply)?
_____Equipment manufacturer (indicate products:_____)
_____Equipment vendor (indicate products:_____)
_____Consultant (indicate specialty(s):_____)
_____Engineering firm
_____Project developer
_____Biomass producer or supplier
_____Biomass facility operator (indicate kind of facility:_____)
_____Other (indicate nature of business:_____)

_____ Number of employees in company
_____ Years in business
_____ Is your company considered a Small Business by the US Government?

Contact information:
Company name:_____
Individual's name:_____
Individual's phone number:_____
Individual's fax number:_____

Contact information will be used to clarify, if necessary, any responses. Your contact information will not be passed on to others.

We apologize if this survey was inadvertently sent to you in error.

APPENDIX II

Questionnaire and Relevant Information on Risk Factor Analysis for Industrial Biotechnology

For DOE's Workshop on "Building a Bio-Based Economy: Policy and Financial Challenges"

The Department of Energy's Office Policy and International Affairs will be conducting a workshop at the "World Congress on Industrial Biotechnology and Bioprocessing," Orlando, Florida, April 23, 2004. The workshop is designed to elicit industry input that could help guide the development of policies and tools to accelerate market penetration of industrial biotechnology.

Industrial biotechnology has the potential to provide an alternative to conventional energy and chemical processes that is cost-competitive and has fewer environmental drawbacks. There are many hurdles that need to be overcome to fulfill this potential. In addition to the technical challenges, a number of market and policy challenges need to be addressed to make biorefining commercially successful.

The questionnaire below is designed to identify the most important challenges business leaders and government officials expect to face in the development and commercial use of industrial biotechnology. The Department of Energy (DOE) has engaged Environmental Business International, Inc., (EBI) to receive completed questionnaires independently and to compile questionnaire results. EBI will present the preliminary results in aggregated form at the **"Building a Bio-Based Economy: Policy and Financial Challenges "** workshop. The presentation of aggregated results will be used to guide the discussion during the workshop, enabling us to make the most productive use of the limited time available.

The types of risks identified in the questionnaire affect commercialization and use of industrial biotechnology across the value chain—from feedstock production, storage and distribution, and end-use conversion into products. The insight into the most challenging risks provided through the questionnaire and workshop discussion will be invaluable in formulating R&D and policy priorities.

Name: _____
Title: _____
Organization: _____

Market segments your organization is active in (circle all that apply): production, distribution, end-use.

Additional comments (answer after completing risk rankings on next page):

Please rate the following risk areas from 1 to 5 in both columns A and B:

High risk (5)= Poses a serious threat to commercial development of biorefineries.
Low risk (1) = Low probability and/or is being addressed; or low impact.

Column A = Likelihood of occurrence in future business planning and policy context (1 to 5)
Column B = Severity of impact if event occurred as described (1 to 5)

For example, a particular risk could pose a severe impact if it occurred (5), but be viewed as a very low probability event (1), or have both a high likelihood (5) and a very high threat or impact (5). If you have no opinion, leave the spaces blank.

RATING		RISK CATEGORY (based on *YOUR* projected outlook)
A	**B**	**FEEDSTOCK PRODUCTION**
__	__	Advances in agricultural biotechnology to produce plants with more sugars, starch, or other products or improve yields do not materialize
__	__	Long-term soil erosion leads to lower production
__	__	Liability from gene flow (e.g., pollen from feedstock plants contaminate food crops)
__	__	Onerous regulations governing biotech crops reduce profitability
__	__	Negative public reaction to monoculture or loss of habitat
__	__	Changes in agricultural price supports shift market
__	__	International trade agreements shift domestic market
__	__	Glut develops in feedstock market
__	__	Political support for ethanol subsidies fades
__	__	Other (comment): _____
A	**B**	**FEEDSTOCK DELIVERY AND STORAGE**
__	__	Lack of uniformity for biofeedstock delivery and storage systems raises costs
__	__	Construction costs overrun budget at biofeedstock delivery/storage facilities
__	__	High drying costs reduce profits
__	__	Transportation costs rise, harming profits
__	__	Inadequacy of rural infrastructure results in inefficiencies
__	__	Other (comment): _____
A	**B**	**BIOREFINING/BIOPROCESSING**
__	__	High capital costs/cost overruns for refinery production facilities
__	__	High operating costs for bioenergy production facilities
__	__	Excessive downtime raises operating costs
__	__	Feedstock supplies unreliable (due to natural factors or market conditions)
__	__	Enzymes and reagents cost too much resulting in higher prices
__	__	Advances in enzyme efficiency are too slow, reducing production yields
__	__	Commercial-scale demonstration projects delayed by lagging private investment
__	__	Lack of industry standards for biorefineries systems fail to materialize
__	__	Lack of intellectual property protection delays commercialization
__	__	Shortage of skilled labor to build/operate biorefineries
__	__	Slower long-term growth of energy demand reduces market opportunities
__	__	Oil, gas prices drop from current levels and pose pricing challenges

__ __ Ineffective codes, standards for biofuels
__ __ Product distribution systems inadequate
__ __ Economic value of carbon savings fails to materialize (lack of incentives, etc.)
__ __ Insufficient biofuel performance (e.g., vehicle range, safety) impairs acceptance)
__ __ Regional, state policies fail to provide sufficient incentives to trigger wider bioproduct use (e.g. renewable fuels standards or incentives)
__ __ National policies fail to provide enough incentives for wider bioproduct use

Participants in Bio-refining Risk Rating Questionnaires:

Chemical / Production Companies
Cargill
Cargill Dow
Procter & Gamble
Eastman Chemical

Reagent Suppliers / Tech Firms
Abengoa
Athenix
CEA
Ceres
Diversa
Metabolix
Novozymes
Pharmacognetics

Labs / Universities
Argonne Laboratory
Cornell University
Fraunhofer USA
University of Iowa
Rowan University
University of Tennessee
Washington State University

Associations & Government Agencies
Corn Growers Association
Dept. of Interior
U.S. Dept. of Agriculture
DOE
Iowa Dept. of Economic Development

Excerpts of interviews about risks from questionnaires:
Comments received in conducting the workshop and questionnaire responses illustrate a variety of perspectives:

DOE: "We are looking to accelerate program results and enhance national security with more domestically-grown supply."

Regulator: "Do bio-refineries produce any specialized waste streams? What about "genetic drift"… do we even know how to regulate that?"

Enzyme Seller: "We are just making the "sauce for the system", so, we do not want to be liable for end products."

Lab / University: "Bioprocessing is a terrific field. We will triple production over the next decade with new enzymes and techniques."

Chemical company: "Bioprocessing is a new domain for us… we are still wrestling with the industrial potential. It poses a "paradigm shift" for our operations."

Grower: "Why should I grow energy crops… the government pays me for commodity crops and pays my neighbor not to grow anything?! And what about a crop failure from drought (in the West)?"

BACKGROUND ON DELPHI METHODOLOGY

The Delphi method is an exercise in group communication among a panel of geographically dispersed experts who face high uncertainty. The technique allows experts to deal systematically with a complex problem or task. The Delphi Method is a structured process for collecting and distilling knowledge from a group of experts by means of a series of questionnaires interspersed with controlled opinion feedback. Delphi represents a useful communication device among a group of experts and, thus, facilitates the formation of a group judgment.

The essence of the technique is fairly straightforward. Questionnaires are sent either by mail or computerized systems to a pre-selected group of experts. The questionnaires are designed to elicit and develop individual responses to the problems posed and to enable the experts to refine their views as the group's work progresses. A main virtue of the Delphi method is that it can overcome disadvantages of conventional committee action; for example, surveys can be done ahead of time and submitted independently to guide and stimulate discussion, making meetings more efficient.