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OUTLOOK SUMMARY FOR
GOVERNORS ETHANOL COALITION
November 12 - 13, 2003 - Grand Forks, North Dakota

You asked for a summary on what we believe should be the focus over the next two to three years, and specifically, activities for the GEC to support that objective. I polled EPAC Board members and we believe that increasing awareness of ethanol's benefits is still a number one priority.

There will always be legislative issues, even if the Energy Bill is passed with all ethanol incentives, etc. intact. The industry will continue to need lobby efforts. Myths have been laid to rest in the past, but they always return, and we need organized groups to counter those myths. Myths such as it takes food from people, such as it takes more energy to produce than it returns, etc. The oil industry is not going to give up and will ensure that people will hear the myths. So ethanol supporters need to constantly be telling about the advantages.

What specifically can the GEC do? Governors can to do press releases. A press release from the Gov. carries a lot of weight. When a new plant is being built, and when the state fleet adds an AFV, put out positive press. A Governor recently went to the opening of an E-85 station. This does not cost a lot, and will create a huge amount of awareness. Press releases travel beyond state boundaries.

EPAC also feels that more focus could be placed on E-85 fuel and alternative fueled vehicles. Specifically, the GEC could ask auto manufacturers to advertise to the general public and be proud that they sell alternative fueled vehicles. Even the owners manual of an FFV says very little about the fact that the vehicle will run on 85% ethanol fuel. I recently shopped for an E-85 car, and local dealers and their sales persons are often at a loss when you ask about flexible fueled vehicles. They need to be better informed.

I still hear mechanics bad mouth ethanol fuel, both the 10 and 85 percent levels. I am not sure what Governors can do about this but states could host a "mechanics seminar", and ask dealers to send a mechanic to a seminar that is focused on ethanol and E-85. It would be beneficial to educate the people who are in charge of state fleets.

Another target for education would be Governors who are inactive or who are not members of GEC. Specifically, when Governors have regional or national meetings, encourage an alternative energy session with intelligent speakers who
can explain the economic benefits of establishing an ethanol plant in a rural community.

A final suggestion is that for the next couple of years, the northeastern U.S. should be targeted with an aggressive marketing campaign touting all the benefits of using ethanol. With a market potential of over a billion gallons of ethanol this would help bring many ethanol plants on line. California was the target for the past couple of years, and it has proven successful, and we need to carry that education to the Northwest.

Thanks for this opportunity to provide input.

Shirley Ball, Executive Director
EPAC
November 6, 2003

Mr. Lance Gaebe
Governors Ethanol Coalition
P.O. Box 95085
Lincoln, NE 68509-5085

Dear Mr. Gaebe:

On behalf of General Motors, I am pleased to offer the following suggestions for expanding the use of ethanol in transportation fuel. As an auto manufacturer, my recommendations include supporting information that we have developed to help make the case for expanding the use of ethanol.

General Motors supports increased use of ethanol in transportation fuel because it has the potential to address greenhouse gas, US energy security and petroleum fuel use concerns. Studies and available information indicate that ethanol could be a cost-effective means of displacing 15 to 20 percent of the US gasoline pool, and thereby address energy security concerns. As the cost of cellulose-derived ethanol is reduced over time, ethanol could also become a cost-effective means of reducing greenhouse gas emissions. The GM-sponsored Well-to-Wheel study indicated that cellulose derived ethanol could essentially eliminate CO2 emissions from vehicles. Ethanol can be a relatively near term means of addressing these issues as compared to longer term petroleum fuel replacements such as hydrogen.

Increasing the use of ethanol by this amount within the next 10 to 20 years will require efforts in several broad areas; building a broad coalition of support, communications and promotion activities, advocacy for incentives and subsidies, and research. A broad coalition of support should include the traditional supporters in the agricultural and auto industries, but also be expanded to include environmental groups. Potential energy company support should be pursued on a limited issue basis. Focusing on increasing the use of ethanol in transportation fuel could help to take advantage of supporters of both E10 and E85 fuels. While each “fuel” has advantages and disadvantages, the long term potential should allow for developing united support. For example, E85 is limited by infrastructure and distribution issues, and E10 must address vehicle evaporative emissions issues. The strategy should leave room for potential intermediate blends such as E30 or E40.

A comprehensive nationwide communications program that describes and explains the benefits of ethanol is needed to develop broad public support. This effort should include programs already completed or underway by General Motors, NEVC, CFDC, ALA and others. Including spokespersons from the auto industry, government, and environmental groups could help to minimize the impact of campaigns such as efforts in California effort to discredit ethanol, or the Pimentel energy balance issue.
Already effective advocacy efforts should be strengthened by combining as much as possible the resources from groups such as RFA, NEVC and CFDC. A long term goal of increasing the use of ethanol to 20 percent of US gasoline should allow for the promotion of as much E10 and E85 as production capacity would allow. Promoting increased E10 use offers perhaps the greatest potential for increasing ethanol use in the near term since infrastructure implications are minimal and nearly all vehicles in the fleet are capable of using it. Increased E10 use should be promoted, primarily in the winter season and in ozone attainment areas under the new 8-hour ozone standard. Mitigating strategies should be proposed proactively to address potential evaporative emissions increases. Increased use of E85 should be promoted concurrently to reach capacity limits. This will require a substantial infrastructure development expansion plan. Creative strategies will be required to compare the costs of ethanol to scenarios to reduce greenhouse gas emissions, petroleum supply disruptions and long term petroleum shortages.

The advocacy strategy should include the promotion of much greater penetration of flexible fuel vehicles (FFVs) into the US vehicle fleet to make use of existing E85 fuel and create a demand for additional E85 and the supporting infrastructure. This would also provide increased opportunity for intermediate ethanol blends. To help offset the increased cost of FFVs, an expanded credit/incentive strategy would be required which both supports the current CAFE credits program to insure current production levels, and advocates much larger volumes of FFVs.

Substantial research will also be required to provide the necessary supporting data and analysis. Areas for research should include production of ethanol from bio-mass, methods of reducing the cost of ethanol, mitigation of vehicle evaporative emissions with E10 blends, evaluation of the benefits of ethanol fuel use, use of ethanol fuels with advanced propulsion technologies and ethanol as a renewable source of hydrogen. Collaborative research programs should be pursued with government agencies such as DOE NREL and California Energy Commission, auto manufacturers, academic institutions and environmental groups. The research should comprehend global opportunities for ethanol in developed and developing nations.

I look forward to working with you to discuss these opportunities further and to provide support wherever possible.

Sincerely,

Gary A. Herwick
Director,
Public Policy Center
Nebraska’s Outlook Summary
Governors’ Ethanol Coalition Meeting
November 12-13, 2003
Grand Forks, North Dakota

- **Obtain Significant New Ethanol Research Funding**

  Today, ethanol supplies about one half of one percent of the nation’s transportation fuels. By 2012 – when the RFS is fully implemented and the nation is using 5 billion gallons a year – ethanol will supply just one percent of the nation’s transportation fuels. We’ve worked very hard to reach that one percent. *But, it’s only one percent.*

  Merely securing a market for a growing volume of ethanol will not guarantee success for the industry. Even if the goal of producing and using 5 billion gallons a year in the nation’s cars and trucks is realized by 2012, that may not spell success. A lot can happen in a decade.

  When Congress passed the *Energy Policy Act* in 1992, many thought the nation’s energy problems were solved when the bill became law. But very few of the provisions of the act went into effect or were even funded by Congress.

  During the 1970s there was a renewed interest in alternate transportation fuels like ethanol and hydrogen. A hydrogen powered Cadillac was featured in President Carter’s Inaugural Parade. And in 1978, the nation’s first pump with 10 percent blended ethanol fuel opened in Lincoln, Nebraska. Later that year, five pumps began serving ethanol blended fuel at farm coops in Iowa.

  What’s happened in the past 25 years has been an education in how public policies work – or don’t work. After a burst of interest – and millions of dollars in research – interest in hydrogen faded fast.

  Fortunately, ethanol’s fate was different although the path was not easy. Pump by pump, plant by plant, ethanol’s place in the nation’s fuel mix grew. By the late 1980s, its growth had attracted attention. Forces in the transportation arena lined up on opposing sides of the fuel. The one thing that remained constant, however, was a flow of research dollars. That was one of the critical differences in the growth of ethanol.

  This year, hydrogen has again been embraced as the “fuel of the future” – much like it was 25 years ago. Congress is poised to spend more than a billion dollars on hydrogen fuel research over the next five years. It’s important that those research funds not come at the expense of funds for ethanol research. If anything, we should argue for a comparable level of financial support for ethanol.

  Why is research so important to ethanol’s continued growth? One of the underlying assumptions in the RFS is that research will enable new and less valuable
feedstocks to be easily converted into ethanol. What we've talked about for so long would finally become a reality. Not only would the corn kernel be used, but the corn cob and the stalk as well. Other non-grain resources could be used including biomass resources such as fast-growing trees, rice and wheat straw, and even garbage. Research at public and private laboratories will be key to this progress.

None of us wants ethanol's future to be limited to grain-based feedstocks. A recent survey in Nebraska revealed that now one-quarter of the state's corn is converted to ethanol. After a number of new plants open over the next year, nearly one-third of the corn grown in Nebraska will be used in ethanol plants. We already convert three quarters of our grain sorghum to ethanol. The addition of new biomass sources to traditional grain feedstocks is one way for ethanol production to expand beyond the Midwest. That's why research -- and the dollars to support it -- will be critical. The continued growth of ethanol will be based on the utilization of new feedstocks and improved conversion processes. These paths may be how the ethanol industry moves above the one percent mark in transportation fuels.

As ethanol production ramps up to meet the goals in the RFS, we also need to make sure that markets exist for the other byproducts of the conversion process. Plants cannot be profitable from just making ethanol. We must also maintain the environmental standards that are expected of renewable products. This goal can be advanced by additional research into the role agricultural products can play in reducing greenhouse gas emissions via carbon sequestration. Emerging agronomic technology and practices offer considerable promise for carbon sequestration. When renewable feedstocks are converted to biofuels the environmental advantages of ethanol are increasingly more apparent. Documentation of these benefits will help to generate additional support for biofuel programs.

Growth can also come from new uses -- and new processes -- for agricultural commodities and biomass. One of the more exciting research concepts is the biorefinery. Think of this plant as an ethanol plant on steroids. Today's ethanol plant is simple: typically one feedstock is converted using a biochemical process. A biorefinery is capable of processing multiple feedstocks using both biochemical and a thermo-chemical processes. The plant will produce a lot of its own power as well as a variety of fuels, chemicals and other materials. It's very much like a regular refinery, but without the oil. This is the ethanol plant of tomorrow, and one that the National Bioenergy Center can help refine.

- **Develop National Marketing Campaign that is funded both publicly and privately.**

- **Expand Public Outreach Activities, especially in California and the Northeast**

When informed of the benefits of biofuels many consumers embrace this fuel option. Information about environmental benefits of ethanol relative to MTBE and
gasoline components, messages about air quality improvements related to ethanol use, and facts about economic benefits of using ethanol tend to sway not only public opinion but consumer choice. Expanded outreach activities have been successfully conducted by the Coalition in several instances. The *Ethanol Fact Book* is one example of a widely acclaimed document distributed nationally and to 25 foreign countries via support form the Coalition website. The Ethanol Across America program is another example of a focused ethanol information and outreach effort. Ethanol workshops have also been conducted in California and are scheduled in the Northeast states during late 2003 and 2004. The participation of the Coalition lends credibility to these activities and to the messages conveyed by Coalition publications and information resources.

- **Increase Governors’ Ethanol Coalition membership to include Tennessee and California**

  Contact has been initiated with Tennessee representatives affiliated with the Governors Office responded in an affirmative manner when asked about potential interest in Coalition membership. Tennessee Senator Lamar Alexander addressed the Coalition at an Iowa meeting several years ago and the new gubernatorial administration is examining ethanol as both a CO reduction strategy for major Tennessee cities and as a rural economic development initiative. Tennessee is the top ten ethanol production state not represented on the Coalition.

  California contacts requested that the Coalition initiate an invitation to Governor Schwarteneger. Meetings with political advisors have been initiated. California ethanol interests have asked that the Coalition immediately consider a letter of invitation to the new governor.
To: Members, Governor’s Ethanol Coalition

From: John G. White, Senior Analyst
Oregon Department of Energy

Date: November 6, 2003

Subject: Ethanol Activities in Oregon

Production

In recent years, several companies have expressed interest in locating ethanol facilities in Oregon. These companies are attracted in part by Oregon’s proximity to the California market, the refineries in Washington and the Pacific Rim. Altogether, these facilities have a potential production capacity of 183 million gallons per year. In most cases, these projects would rely primarily on corn grown elsewhere in the country and shipped to the state by rail. One company, Sustainable Energy Development, proposes to produce ethanol from lignocellulosic biomass (wood waste).

The following companies have announced plans to develop ethanol production facilities in Oregon:
- Cascade Grain Products (Fagan, Inc.)
- Northwest Ethanol
- Sustainable Energy Development
- Treasure Valley Renewable Resources
- Oregon Ethanol

R&D

Oregon’s long-term interest in ethanol production is utilization of the state’s abundant lignocellulosic biomass feedstock. Oregon has substantial quantities of biomass feedstock consisting of straw, agricultural residues and wood. The Oregon Department of Energy has begun to lay the groundwork for a future biomass–ethanol industry. The Department has published several recent studies characterizing the quantities and characteristics of the feedstock. These studies include the Oregon Cellulose-Ethanol Study (2000), Western Forest Health and Biomass Energy Potential (2001) and Biomass Resource Assessment and Utilization Options for Three Counties in Eastern Oregon (pending publication).

In addition, the Department is funding research by Montana Microbial Products on cellulase preparations for conversion processes focused on producing ethanol from grass varieties grown in Oregon.
The Department of Energy's biomass program encompassing research, development and deployment is focused on science and technology to establish biomass as a significant source of environmentally sound, sustainable and renewable fuels, heat, power, chemicals and materials. The Bioenergy Center, housed at the National Renewable Energy Laboratory, coordinates the research and development work for DOE that is managed within NREL and at ORNL, PNNL, INEEL, and ANL.

The research conducted in the feedstock interface, the sugar platform and the integrated biorefinery are of direct interest to the ethanol industry. The research agendas for these areas are intended to address hierarchies of technical barriers that were identified through a planning process conducted in 2003 which included representatives of industry, environmental groups, transporters, farmers and USDA. A summary of the technical barriers is offered to the Governors' Ethanol Coalition for the planning process at the November 12-13, 2003 meeting.

Hierarchy of Technical Barriers Facing the Feedstock Interface Area

The work in the Feedstock Interface is focused on near term issues. Long-term barriers are appropriately addressed directly by USDA.

- **Biomass Variability**
  
The characteristics of biomass varies widely in size, shape, moisture content, and bulk densities. These variations can make it difficult (or costly) to The characteristics of biomass can vary widely in terms of physical and chemical composition, supply biorefineries with feedstocks of consistent quality year-round.

- **Engineering Systems**
  
Development of a reliable and cost-competitive feedstock infrastructure requires combining several engineering systems to create total feedstock supply chains. Current systems cannot meet the capacity, efficiency or delivered price requirements of large biorefineries, nor can they effectively deal with the variability of biomass feedstock supplies.

- **Resource Availability**
  
The lack of credible data on price, location, quantity, and quality of biomass creates uncertainty both for investors and for developers of emerging biorefinery technologies

- **Sustainability Requirements**
  
The lack of information and decision support tools to predict effects of residue removal as a function of soil type, and the lack of a selective harvest technology that can evenly remove only desired portions of the residue make it difficult to assure that residue biomass will be collected sustainably. USDA researchers and regulators will need to play a major role in understanding sustainable limits to collection of biomass.

In the long term, large scale replacement of petroleum calls for the introduction of a new generation of energy crops that can dramatically increase the potential supply of energy from biomass, while not sacrificing the supply of food and fiber. The barriers facing this long-term industry include the same ones facing the emerging industry plus a number of new issues such as:

- **Resource Sufficiency**
  
There is no future vision for biomass in U.S. agriculture. We must understand what kind of role biomass can play in America's energy future in a comprehensive vision for how and at what level biomass can impact energy supply. Lacking that vision, biomass will not be a priority in renewable energy.
• **Ag-Sector-wide Paradigm Shift**

Energy crops, per se, cannot simply be added to the list of crops and products that are handled by U.S. farmers. Energy production from biomass calls for a complete rethinking of farming in America, and it may involve dramatic changes in agriculture that may take some time bring about.

• **New Crop Development**

Large and cost-effective energy production on a scale that significantly impacts petroleum use calls for new crops with yield and productivity not currently available.

**Hierarchy of Technical Barriers Facing the Sugar Area**

• **The problem of feedstock variability and its effect on process performance in sugar conversion.**

Much of the focus of OBP-supported work over the past several years has been on corn stover as an available low cost feedstock. Corn stover has proved sufficiently variable in carbohydrate content to warrant the development of analytical methods that provide real time information on potential sugar yield.

• **The need for a cost effective pretreatment step to release hemicellulose sugars and improve the ability to hydrolyze cellulose.**

In the nearer term, developing lower cost pretreatments depends upon the ability to process the biomass at high solids levels in reactors fabricated out of cost-effective materials of construction. In the longer term, continued significant cost reductions in pretreatment technologies require developing a better understanding of pretreatment process chemistries and the roles that biomass structure and composition play in biomass recalcitrance.

• **The lack of cost effective enzymes to catalyze the hydrolysis of cellulose to glucose.**

Enzymes remain a significant portion of the projected production cost of sugars from lignocellulosic biomass, despite tenfold cost reductions achieved in recent OBP-sponsored research. In the nearer term, reducing the cost of enzymatic hydrolysis depends upon developing lower cost enzyme production technologies while identifying more efficient enzyme preparations and enzyme hydrolysis regimes that permit lower dosages to be used. In the longer term, the need is for robust biological and chemical catalysts capable of utilizing all sugars in biomass and able to handle pretreated biomass.

• **The uncertainty surrounding the use of lignin for producing heat, power and other products.**

The process residues remaining after the conversion of the carbohydrates in biomass to sugars contains mostly lignin, a relatively high heat content material that we assumed is used in the sugar biorefinery as its sole source of heat and power. There is, however, no experience working with this relatively high moisture content material in commercial boiler/turbogenerator systems and may offer potential for generating higher value products from lignin.

• **The lack of experience with and understanding of the complex interactions among each of the steps in an integrated process.**

Beyond the core steps of pretreatment and enzymatic hydrolysis, process integration remains a key technical barrier hindering development and deployment of biomass sugar platform technology.
By expanding the view of the technology barriers beyond the existing and emerging technology to consider future technology options yet to be determined, we have identified a number of more fundamental barriers, such as:

- **The lack of understanding of the root causes of the recalcitrance of biomass.**

  Significant empirical work has been done to overcome the natural resistance of biomass to chemical and/or biological degradation and has lead to improvements in yield and cost of accessing the sugars. The leap to competitive technology will require delving into the fundamentals of biomass structure and its effects on chemical and biological hydrolysis; and the interaction between biomass and chemical and biological catalysts.

- **Limited understanding of the potential for alternative conversion technology pathways.**

  Making the leap from technology that can compete in niche or marginal markets for fuels and products also requires expanding the array of possible concepts and strategies for processing biomass such as consolidated bioprocessing which uses a single organism and offers new possibilities for leapfrog improvements in yield and cost. New concepts are likely to arise from the advances in fundamental understanding of biomass and its hydrolysis.

- **Lack of fundamental enabling technology tools**

  More work is needed to develop a comprehensive list of these fundamental barriers. The Office of the Biomass Program uses technoeconomic analysis as a tool to judge the relative cost impacts of addressing these technical barriers for a given technology. An example of such an analysis for a number of the critical barriers identified in the emerging sugar platform based on enzymatic hydrolysis technology is shown in Figure 2. In this case, analysis examined the impact of progress on the following barriers:

  - **Feedstock Interface:** Cost of feedstock reduced from $40 to $30 per dry ton. This or another goal would be better stated in terms of ethanol potential per ton of biomass.
  - **Pretreatment:** Increase yields of hemicellulosic sugars from demonstrated level of 60-70% to 80%
  - **Pretreatment:** Decrease pretreatment systems capital cost by 25-50%.
  - **Enzymatic Hydrolysis:** Reduce the cost of enzyme from $0.64 to $0.10 per gallon of ethanol

**Technical Barriers to the Biorefinery Area**

The barriers to developing and making this core technology available are largely addressed in the technical plans related to the specific core technology needs for the sugar platform, the syngas platform and the conversion of biomass intermediates into products. Nevertheless, there are a number of barriers that are peculiar to the goal of demonstrating and deploying commercially successful biorefinery technology. These include:

- The challenge of end-to-end, feed-to-product, process integration
- The risk of pioneer technology
- The challenge of sharing research results from industry demonstration projects without jeopardizing proprietary information.
MEMORANDUM

TO: Lance Gaebe, Chairman's Representative
FROM: Phil Lampert
DATE: 7 November, 2003
RE: Future Plans of GEC

Lance,

In response to your recent request seeking comments regarding the future direction and work of the Governors' Ethanol Coalition, the National Ethanol Vehicle Coalition is pleased to provide the following for your consideration.

It appears likely that if not by the time of the Grand Forks meeting, then shortly thereafter, the Congress will approve some sort of Renewable Fuel Standard that will broaden the use of ethanol and other bio-fuels. Our comments are provided within the context of the adoption of an RFS or other similar program.

1. As more Americans are introduced to the use of bio-based fuels, it will be important that the industry and bio-fuel advocates provide consumers a choice of the form of such fuels. American drivers should be offered the opportunity to use E10, E85, Biodiesel, and E-Diesel. It would seem that such choice would assist to assuage much of the "mandate" concern and promote public acceptance of the RFS. We would encourage the GEC to strenuously promote and advance all forms of Biofuels. Such advocacy can be based on:
   a. The integration of domestically produced transportation fuels.
   b. The reductions in CO2 provided by such fuels, i.e. E85.
   c. The long-term goal of ethanol production from biomass and other waste materials.
   d. National energy independence.
   e. Domestic job creation.

2. The RFS will clearly introduce more Americans to bio-based fuels and it will be of vital importance to educate consumers as to the benefits of such fuel. Individually, existing ethanol advocacy groups such as the GEC, RFA, NCGA,
ACE, CFDC, EPAC, NEVC and others, do not have the resources needed to accomplish such goal.

a. We would recommend the GEC encourage greater use of partnerships and participatory programs among ethanol advocacy groups to pool limited resources, ensure message consistency, and image uniformity.

b. The GEC may wish to serve as a facilitator to encourage such interaction by holding regular conference calls, etc.

3. The NEVC would encourage the GEC to consider long-term use of ethanol beyond the next 10 to 15 years. As hybrid and fuel cell vehicle introduction increase the national fleet fuel economy, increases in vehicle miles traveled (VMTs) will outstrip any reductions in fuel use provided by these new technologies. The result will be a growing and increased dependency on imported petroleum. Bio-fuels have only a marginal role in current hybrid and fuel cell applications. We would encourage the GEC to consider the following:

a. The use of 85% ethanol and development of E85 fueling stations can have a significant role in highlighting the capabilities of bio-fuels to serve the next generation transportation system.

b. Every E85 station that is established today can serve as one more opportunity to demonstrate the conversion of bio-fuels to hydrogen-based fuels.

c. The GEC may wish to consider becoming more active politically to promote and advocate the use of renewable fuels as a source for future hydrogen production.

In conclusion, as the impacts of a Renewable Fuels Standard are felt around the nation, the GEC, ethanol industry, agricultural groups, and many, many others should be celebrating the success of years of effort to ensure a place for renewable fuels in the nation’s transportation fuel system. The achievement of this objective is mitigated by the recognition that tasks are just beginning, the least of which is to meet, and then exceed, the RFS compliance levels. The National Ethanol Vehicle Coalition pledges our continuing support and assistance to aid the Governors’ Ethanol Coalition in these efforts.

Thank you for the opportunity to provide these comments.

Copy: NEVC Board of Director’s