**FINAL REPORT
(SEPTEMBER, 1999 – FEBRUARY, 2002)**

INSTRUMENT NO. DC-FC02-99EE50597

**Office of Transportation Technologies
3.C. Public Outreach and Information Dissemination
Cellulosic and Corn-Based Ethanol Outreach Project**

HISTORY

The purpose of the Environmental and Energy Study Institute's (EESI) ethanol project was to conduct educational outreach and disseminate information to the environmental community, the agricultural community and other key stakeholders regarding cellulosic and starch-based ethanol. Our previous work with these key stakeholders had demonstrated that they were largely unaware or even misinformed about the environmental and economic benefits provided by ethanol, particularly cellulosic ethanol.

EESI proposed to help educate and disseminate information to the environmental and agricultural community about the environmental benefits of ethanol, particularly those related to greenhouse gas reductions, through a newsletter, one-on-one contacts with environmental organizations, environmental and other stakeholder meetings, participation in relevant conferences, and agricultural community outreach.

Specifically, EESI's goals were to help educate the environmental community, the agricultural community, policymakers, and other stakeholders about:

1. The environmental benefits of starch-based and cellulosic ethanol (including greenhouse, air and water quality and pollution prevention).
2. The economic and local economic development benefits of ethanol (including creating revenue streams from waste streams and badly needed diversification in the agriculture sector).
3. The role of cellulosic ethanol as a keystone for a thriving biomass-based product market.
4. The role that ethanol and other biofuels can play in reducing over dependence on fossil fuels and oil imports.

PROGRESS

1) *Ethanol, Climate Protection, Oil Reduction Newsletter*

We have published sixteen editions of our well-received *Ethanol, Climate Protection, Oil Reduction* (ECO) newsletter. ECO was created to provide timely information on the latest federal and state policy initiatives, scientific research, and market developments concerning ethanol. We have provided in-depth coverage of many timely issues, including, but not limited to:

- The debate about the net-energy benefits of ethanol;
- Progress of proposed ethanol incentives in Congress, including the proposed creation of a national Renewable Fuels Standard;
- The nationwide debate about banning MTBE, and using ethanol as a replacement oxygenate;
- Air quality attributes ethanol blended reformulated gasoline;
- Technological and market hurdles to full-scale commercial production of cellulosic ethanol;
- Local and state initiatives to promote ethanol development;
- The latest studies, reports, and technological advances concerning ethanol;

ECO now reaches over 450 subscribers from the environmental and public health communities, industry, academia, all levels of government, and throughout the world including Australia, Brazil, Canada, China, Columbia, Egypt, Italy, the Netherlands, Spain, Uganda, and the United States. We have received overwhelmingly positive feedback from our readers. The newsletter was intended to serve as a public forum, and foster creative and constructive discussions. To further that goal, we have published numerous commentary and article submissions from our readers:

Academia: Mark Delucchi, Univ. of California at Davis; Thomas Jeffries, Univ. of Wisconsin – Madison; Lee R. Lynd, Dartmouth College; Valerie Thomas, Princeton University

Public Interest: Jack Brondum and David Morris, Institute for Local Self-Reliance; Blake Early, American Lung Association; Henry Echeverri-Campuzano, CORPODIB (Colombian NGO); Elisa Lynch, Bluewater Network; Jason Mark, Union of Concerned Scientists

Industry: Davis Bischel, California Forestry Association; Chip Clements, Clements Environmental Corporation; Barbara Charnes, The Western Biomass Consortium; Stephen Gatto, BC International; Trevor Guthmiller, American Coalition for Ethanol; Philip D. Lusk, Resource Development Associates; Doug MacKenzie, Pacific Rim Ethanol; Jeff Passmore, Iogen Corporation (Ottawa, Canada); Scott Sklar, National BioEnergy Industries Association; Eric Vaughn, Renewable Fuels Association

Government: Alan Berkowitz, U.S. Department of Transportation; Ralph Groschen, Minnesota Department of Agriculture; Elizabeth Peelle, Oak Ridge National Laboratory; Michael Wang and Dan Santini, Argonne National Laboratory; Tim Simonson, U.S. Forest Service

2. Educational Outreach through “one-on-one” contacts, small meetings, and conference participation

EESI conducted outreach to educate key stakeholders from the environmental, agricultural, and public health community about the multiple benefits of ethanol. We have used a number of venues to reach these stakeholders, including conferences, workshops, one-on-one meetings, and trade press. We have also worked within established coalitions to get biofuels on their agenda, and helped form new coalitions when necessary. Below are examples of our work:

Staff:

CW = Carol Werner, EESI Executive Director

JA = Jeremy Ames, Policy Associate

DH = Doug Howell, Former Transportation Director

LJ = Libby Jones, Former Program Assistant

- CW served on the California Energy Commission’s 1999 Peer Review Committee, which produced a report for Governor Davis entitled “Evaluation of Biomass-to-Ethanol Fuel Potential in California,” supporting the creation of a California ethanol industry.
- CW used her role on the editorial board of *BioCycle* magazine, which reaches thousands of municipal waste managers throughout the country, to promote the production of ethanol from municipal solid waste (MSW). She has submitted story ideas and contacts, been quoted in several stories, and EESI has contributed articles as well. Carol has also spoken at several of *BioCycle*’s renewable energy conferences.
- EESI organized and hosted two environmental outreach meetings in February and March of 2000, to educate key environmental and public health leaders about the air quality benefits of ethanol, and to develop guidelines for consensus on renewable fuels.
 - Participating organizations included: American Lung Association, Clean Air Trust, Climate Action Network, Natural Resources Defense Council, Northeast States for

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Coordinated Air Use Management, Sierra Club, Tellus Institute, Union of Concerned Scientists, US Public Interest Research Group.

- In January 2000, LJ and Bill Holmberg of Global Biorefiners hosted the Environmental News Network's (www.enn.com) first live chat concerning ethanol.
- DH worked with DOE staff and the Washington and Oregon Energy Offices to help organize the April, 2000 Regional Biomass Program Workshop, which featured several sessions on ethanol. DH also served on the planning committee for the "Harvesting Clean Energy for Rural Development" conference, held January 2001 in Spokane, WA. The conference, attended by over 300 people, educated farmers about economic development opportunities in renewable energy, including biofuels, in the Northwest.
- In June 2000, EESI hosted a roundtable discussion for the environmental community entitled "Cornucopia or Scarcity: Can We Have Biomass For Fuel and Eat It Too?" featuring Dr. Bruce Dale, chair of the Department of Chemical Engineering at Michigan State University, an expert on biofuels and biobased products.
- In July 2000, DH was invited to make a presentation before the state representatives of the Governors Ethanol Coalition (GEC) on forging common ground with the environmental community. The GEC later invited JA to their February 2001 meeting as a panelist on a roundtable discussion entitled "Legislative Outlook: What's Next?"
- CW is a board member of several organizations, including DOE's State Energy Advisory Board, Sustainable Energy Coalition, National Council of Churches, and the New Uses Council. She has used her positions to get biofuels on the agenda of these groups, and to build new partnerships for promoting renewable fuels.
- CW participated in the Renewable Fuels Association's 2001 annual conference in Las Vegas, Nevada, and moderated a panel discussion entitled "Environmental Regulations Driving Energy Markets."
- In early 2001, CW and JA began meeting with national renewable fuel and agriculture organizations supportive of the establishment of a renewable fuels standard. The group eventually adopted the name "Coalition for a Renewable Fuels Standard," and has created press releases and fact sheets to educate policymakers about ethanol and biodiesel.
 - EESI is the sole environmental group in the coalition, which includes: American Bioenergy Association, American Corn Growers Association, American Coalition for Ethanol, American Soybean Association, American Farm Bureau, Clean Fuels Development Coalition, National Corn Growers Association, and the Renewable Fuels Association.
- EESI staff has met with officials from the U.S. Department of Agriculture's office of Energy Policy and New Uses on numerous occasions, to discuss USDA's biofuel efforts.
- EESI, along with the Bluewater Network and Climate Solutions, was also instrumental in the formation of the Renewable Energy Action Project (REAP), a coalition of local environmental and agricultural groups interested in promoting the energy, environmental, and economic development benefits of biofuels. The coalition has been active in the California debate on phasing out MTBE and replacing it with ethanol. REAP Director Brooke Coleman has had several op-eds and letters to the editor published in CA newspapers. REAP has also been active in the federal renewable fuel standard debate, producing timely fact sheets on the environmental benefits of biofuels.
- In November 2001, JA gave a presentation on agriculture-based renewables, including biofuels, at the West Penn Power Sustainable Energy Fund's "Agri-Energy Conference" in State College, PA. That same month, CW spoke about renewable fuels development at the Governor's Conference on Energy and the Illinois Environment.
- EESI assisted in the planning of the International Development Seminar on Fuel Ethanol, sponsored by DOE and the Governors' Ethanol Coalition, held in December 2001.

3. Communication Tools Development

- LJ wrote a guest editorial for *Municipal Solid Waste Management* magazine, which was published in the Jan/Feb. 2001 edition. The editorial "The New Waste Era," addressed the potential for converting MSW into ethanol.
- At the request of Senate Agriculture Committee staff, EESI wrote a policy paper entitled "Revitalizing the Farm Economy Through Renewable Energy Development" which outlined several policy opportunities for promoting agriculture-based renewable energy, including biofuels. The report, which was well-received by policymakers and other stakeholders, and was downloaded off the EESI Web site by at least 800 visitors. The final bill contained over \$400 million in new mandatory money to promote renewable energy.
- CW and JA wrote abbreviated versions of EESI's policy paper on renewable energy and the farm economy for *BioCycle* magazine, which reaches at least 12,000 subscribers, and *In Business magazine*, which reaches 3,000 energy and environmental entrepreneurs.
- In 2001, EESI produced a short fact sheet comparing proposed Renewable Fuel Standard proposals introduced in Congress. EESI has also worked with other REAP coalition members to produce and distribute an analysis of the impact of replacing MTBE with ethanol in California's gasoline.

With support from other sources, EESI conducted *policymaker education* activities. This work complemented DOE's funded activities listed above.

As mentioned in our DOE proposals, EESI was founded by a bipartisan group of Members of Congress who felt it is important to educate federal policymakers about energy and environmental issues, and to work toward the development of sound public policy. EESI holds over 20 Congressional briefings a year, in which we bring an expert panel of speakers to address timely policy issues. Our briefings are well attended by staff, and our briefing summaries are distributed to all Congressional offices.

Briefings

- **Energy Efficiency & Renewable Energy: The Missing Link in the Energy Crisis Debate (October 2000)** – The briefing featured a panel of several renewable energy experts, including Dan W. Reicher, then Assistant Secretary of the Office of Energy Efficiency and Renewable Energy, U. S. Department of Energy, who addressed DOE's research efforts to commercialize the production of cellulosic ethanol.
- **Energy Efficiency & Renewable Energy in the Midwest (June 2001)** – The briefing addressed how renewable energy and energy efficiency benefit the economy and environment in the Midwest. Bill Lee, the general manager of Chippewa Valley Ethanol Company, spoke about the rural economic development potential for biofuels.
- **National Energy Security: Implications for National Energy Policy (October 2001)** – The briefing brought together a panel of national security and energy experts, including Bill Holmberg of Global Biorefiners, a retired Marine Corp Lt. Colonel, who discussed the role biofuels can play in displacing foreign oil. Particularly the potential for developing "biorefineries" to process cellulosic biomass into ethanol and other co-products.
- **Renewable Energy and the Farm Bill** – The briefing provided an overview of the proposed new energy provisions in the Senate Farm Bill. Krysta Harden of the American Soybean Association talked about the effect of past federal incentives on emergence of the ethanol and biodiesel industries.

ETHANOL CLIMATE PROTECTION OIL REDUCTION

A Public Forum

Issue I
September 24, 1999

Welcome to "ECO." This newsletter, distributed primarily to environmental organizations, will provide the most current information about ethanol and serve as a public forum. The Environmental and Energy Study Institute (EESI) hopes to build consensus within the environmental community regarding the potential benefits of ethanol -- and particularly the expanded opportunities provided by cellulosic ethanol -- with a special focus on climate protection. Ethanol can also be a political bridge to broader alliances in support of climate initiatives.

Many in the environmental community have made strong statements in support of ethanol as a low-carbon fuel with large potential benefits to reduce life-cycle greenhouse gas (GHG) emissions. Ethanol also reduces carbon monoxide emissions and our reliance on oil, contains no sulfur and helps to eliminate smog through its use as an oxygenate for gasoline. Cellulosic ethanol, which is produced from waste products, provides even greater GHG emission reductions than corn-based ethanol, promotes rural economic revitalization and offers a solution to waste disposal problems.

However, there have been concerns about ethanol such as volatile organic compounds (VOCs) and corporate welfare. We will address these and other issues and explore which steps are appropriate to take in support of ethanol. Please tell us your views and we will address them in "ECO."

In this issue:

- **COMMENTARY:* Why Should Environmentalists Care About Ethanol?**
- **What is Cellulosic Ethanol?**
- **California's MTBE Phase Out: Paving the Way for Ethanol?**
- **EXCERPTS FROM RECENT STUDIES***
- **Senator Lugar's Bill May Help Farmers and Climate**
- **President Signs Executive Order: Building Bridges with "Ags" and "Enviros"**
- **NOTABLE QUOTABLES***

***These will be regular features in the newsletter**

COMMENTARY

Why Should Environmentalists Care About Ethanol?

The environmental community is acutely aware of the strong opposition to climate initiatives on Capitol Hill, especially to the Kyoto Protocol. At the same time we see some traditionally conservative legislators -- primarily from the Midwest -- beginning to talk about ethanol's greenhouse gas (GHG) emission benefits. We at EESI believe exploring possible collaboration over ethanol to be extremely important.

Producing and using ethanol instead of gasoline for transportation fuel significantly reduces CO₂ emissions. Studies at Argonne National Laboratory concluded that corn-based ethanol, which currently dominates the market, provides an approximate 20-30 percent reduction in GHG emissions, while cellulosic ethanol could provide a 60-110 percent reduction. Despite these GHG emission benefits, we must ensure that there is no backsliding of overall air quality or other environmental standards. Just as most environmentalists won't support highly efficient diesel engines as a climate mitigation strategy because of their high PM, NOx and toxic emissions, we should not support ethanol unless air quality standards are guaranteed.

Cellulosic ethanol production in particular helps to improve land and water quality. By converting agricultural, forest and municipal waste into resources, it can substantially reduce landfill disposal and open field burning. Sacramento Valley, for example, currently produces enough rice straw waste -- 500,000 tons of which is burned in the field -- for 100 million gallons of cellulosic ethanol annually.

There are concerns related to ethanol such its ability to become cost competitive, its travel range performance and its effect on multi-national corporations through tax subsidies. Most of these issues can be addressed, but others will require some political (but not environmental) tradeoffs. In any case, the political alliance between conservative farm states and the environmental community for mutual climate benefits, with no sacrifice of other environmental standards, should be worth pursuing.

This is why EESI wants to hear from you, the environmental stakeholders, about the possibility of supporting ethanol.

What is Cellulosic Ethanol?

It's the liquid transportation fuel derived from renewable, essentially inexhaustible resources that could be an important part of the solution to our petroleum supply problems for the next century and beyond. As opposed to corn ethanol, the starch-based fuel produced from the most valuable and nutritious part of corn, cellulosic ethanol is derived generally from waste products. Its sources include agricultural and forest wastes such as sugar cane bagasse, rice hulls and forest thinnings, municipal waste

such as waste paper and yard waste, and industrial waste such as pulp/paper and sludge. Cellulosic ethanol is also versatile because it can be blended with gasoline or used as a pure fuel.

Because cellulosic ethanol's resources are so extensive, its future production and utilization will greatly enhance and expand a market currently dominated by corn-based ethanol. Researchers at the National Renewable Energy Laboratory estimate that the United States potentially could convert 2.45 billion metric tons of cellulosic biomass to 270 billion gallons of ethanol each year, which is approximately twice the annual gasoline consumption in the United States.

Blends of 85 percent and 95 percent cellulosic ethanol have been tested and demonstrate excellent efficiency and performance. Although ethanol has only two-thirds the energy content of gasoline, redesigned engines could increase ethanol's performance by 15 percent. Cellulosic ethanol, also used as a hydrogen fuel source for fuel cells, could become a vital part of the long-term solution to climate change and foreign oil dependence.

California's MTBE Phase Out: Paving the Way for Ethanol?

California Governor Gray Davis signed an Executive Order on March 25, 1999 to phase out the gasoline oxygenate known as MTBE in the next three years. The Order followed recent controversy regarding the environmental benefits of MTBE and its contribution to groundwater contamination.

Additionally, Davis launched several studies to examine the environmental and human health effects of ethanol versus MTBE. After evaluating these tests, the California Energy Commission will decide by December 31, 1999 whether to foster cellulosic ethanol development. Without the use of MTBE to meet existing vehicle emissions requirements, many see ethanol as its best substitute, for it does not pose a threat to ground and surface water. Additionally, ethanol has nearly two times the oxygen content of MTBE and is therefore a more efficient oxygenate. According to Senator Tom Harkin (D-IA), "there is no question that ethanol is the natural choice to replace MTBE in gasoline." (8/5/99) Even if California receives a waiver on oxygen requirements in gasoline, financial analysts believe that Southern California will need to use at least 100 million gallons of blended ethanol during winter months to help meet air quality standards. Additionally, California is expected to use approximately 150 million gallons per year of ethanol as an octane enhancer. If ethanol is to be used, most environmentalists in California would prefer that it come from cellulosic biomass and not corn starch, regardless of MTBE and the oxygenate requirement.

There are other concerns, however, about ethanol's VOCs and acetaldehyde emissions. The California Air and Resources Board (CARB) will address these issues in their December report later this year.

Following California's action, the EPA released a Blue Ribbon Panel Report on July 27, 1999 that supports a substantial decrease in MTBE use nationwide. Senator Dianne Feinstein (D-CA), a strong supporter of the MTBE phase out, believes that "it is simply not acceptable to achieve cleaner air at the expense of cleaner water" and has made efforts to gain Congressional support for "the removal of MTBE in the shortest time possible." (7/27/99)

EXCERPTS FROM RECENT STUDIES

The *Energy Innovations* study was the product of a nearly two-year long collaborative effort by the Alliance to Save Energy, The American Council for an Energy-Efficient Economy, the Natural Resources Defense Council, the Tellus Institute, and the Union of Concerned Scientists. Included in its initiative to put the United States on a path for an economically and environmentally sustainable energy future are programs to implement cleaner and more efficient fuels and vehicle designs. The following are excerpts from the transportation chapter of the study.

"A comprehensive package of mutually re-enforcing policies is needed to secure a shift from a petroleum-based to a sustainable transportation fuel system. Major markets for lower carbon fuels for all vehicle classes can be developed through [several] policies."

"We lay out two illustrative scenarios by which targeted fuel GHG intensity reductions might be achieved. One is based on hydrogen fuel cell vehicles (H2-FCVs) and the other on ethanol hybrid electric (HEVs) vehicles with combustion engines."

"Fuels from renewable feedstocks combined with advanced efficiency vehicle designs have the potential to meet a large portion of the U.S. transportation energy needs."

Senator Lugar's Bill May Help Farmers and Climate

On July 29, the Senate Agricultural Committee unanimously supported Senator Richard Lugar's (R-IN) bill, the National Sustainable Fuels and Chemical Act (S.935), which will advance research on producing fuels, chemicals and electricity from cellulosic biomass. A companion bill sponsored by Representative Thomas Ewing (R-IL) and a similar bill sponsored by Representative Mark Udall (D-CO) were introduced in the House during the first week of September.

One aspect of this bill, converting biomass to cellulosic ethanol, has tremendous implications for the transportation sector. Ethanol, a fuel currently used mostly as a gasoline oxygenate, is produced primarily from corn. The addition of cellulosic ethanol, however, would utilize numerous raw materials, and provide greater competition in the ethanol marketplace. Cellulosic ethanol's increased production, a projected four billion gallons by 2010, would also give ethanol greater availability and use as a fuel, rather than as an oxygenate exclusively.

Utilization of agricultural waste products that would normally contribute to water and land pollution provides a tremendous benefit for the environment, for it reduces landfill disposal and agricultural waste burning in open fields. Additionally, by creating markets for formerly unused agricultural products that are costly to dispose of, cellulosic ethanol production gives farmers greater economic stability. The co-products of cellulosic ethanol also can be sold as chemicals and high-value feed for livestock, and therefore add even more economic viability to the agricultural community. Lugar believes that "at a time when farmers are struggling, technologies for producing fuels and chemicals from biomass offer new sources of income and a diversification of agricultural markets." (8/12/99)

Although reducing GHG emissions poses a great challenge for the United States, cellulosic ethanol may provide a promising means by which to significantly reduce GHG emissions. According to the 1999 Argonne Study, E95 blend, a fuel composed of 95 percent cellulosic ethanol and five percent fossil fuel, has the potential to reduce these emissions more than 100 percent over petroleum. Because biomass removes carbon dioxide from the atmosphere as it grows, the carbon released during combustion creates no net increase in carbon dioxide emissions. It may even lead to a net decrease as more efficient technologies are created.

With Lugar's bill, there is the opportunity to capitalize on the most recent technological and scientific innovations to support low-carbon fuels. Agriculture Secretary Glickman states, "as a clean-burning fuel, ethanol reduces GHG emissions. It improves automobile engine performance, helps correct our trade imbalance, and reduces our dangerous dependence on foreign oil." (8/12/99)

The National Sustainable Fuels and Chemical Act authorizes \$49 million a year for six years to further research the production of biofuels and biochemicals. It has received support from the National Corn Growers Association, the Biotechnology Industry Association, the Clinton Administration, the American Farm Bureau, the American Soybean Association, various environmental groups (including supportive testimony provided by the Union of Concerned Scientists and the National Resources Defense Council), and leading technical groups in biomass. The bill is cosponsored by the following Senators: John Chafee (R-RI), James Jeffords (R-VT), Wayne Allard (R-CO), Pete Domenici (R-NM), Patrick Leahy (D-VT), Larry Craig (R-ID), Tim Johnson (D-SD), Tom Harkin (D-IA), Frank Murkowski (R-AK), Thomas Daschle (D-SD), Robert Kerrey (D-NE), Joseph Lieberman (D-CT) and Charles Grassley (R-IA).

President Signs Executive Order: Building Bridges with "Ags and Enviros

On August 12, President Clinton, joined by Agriculture Secretary Glickman, Energy Secretary Richardson, Senator Lugar, EPA Administrator Browner and other key representatives, signed an Executive Order authorizing a biomass research initiative to further develop strategies for the production of cellulose based fuel, chemicals and electricity. The Order calls for tripling the nation's current use of bioenergy and biobased products by the year 2010, and establishes a permanent council, composed of the Secretaries of Energy and Agriculture, the EPA Administrator and other agency heads, which will develop an integrated biomass research program and promote the use of bioproducts and bioenergy.

Although great advances have already been made with cellulosic ethanol, this program requires agencies to reevaluate their contribution to biomass research with the hopes of further accelerating its development. In addition to cellulosic ethanol, this initiative will develop a technology platform for other biobased chemicals and in turn lead the way to a "carbohydrate economy." Biorefineries would produce chemical intermediates, such as lactic and citric acid, fermentation feedstocks and other biobased materials in addition to fuels.

With this Order, cellulosic biomass for ethanol can play an important part in developing a more holistic and environmentally focused path for material use in the

agricultural sector. It also may further open the door to potential "ag-enviro" collaboration. Farmers may support such initiatives and want to join hands with environmentalists to help assure their increased financial gain. The Administration projects a \$15 to \$20 billion increase in farmer income by 2010 through market development, waste revenue and tax credits as a result of this initiative. Additionally, environmentalists see tremendous potential for significant environmental improvement with initiatives that reduce GHG emissions and recycle waste products.

NOTABLE QUOTABLES

"What this means for the agriculture community, ethanol producers, environmentalists, and policy makers is that ethanol fuel deserves a major role in any global climate change strategy to reduce greenhouse gas emissions in the transportation sector." Illinois Governor Jim Edgar, December, 1997

"Extension of the ethanol incentive is essential to continued investment in expanded ethanol production throughout the Midwest. Ethanol is good for the environment, the rural economy and it helps reduce America's dependence on foreign oil." Senator Chuck Grassley (R-IA), June 27, 1997

➤ *Please let us know if you would like to receive the next edition of ECO by fax or by email.*

Information for this newsletter was gathered from the following sources:

Argonne National Laboratory

BC International

California Energy Commission

The U.S. Department of Energy

Energy Innovations Study by Alliance to Save Energy, The American Council for an Energy-Efficient Economy, the Natural Resources Defense Council, the Tellus Institute, and the Union of Concerned Scientists

President Bill Clinton's Executive Order: 8/12/99

California Governor Grey Davis' Executive Order: 3/25/99

Senator Dianne Feinstein's (D-CA) Statement: 7/27/99

USDA Secretary Dan Glickman's Statement: 8/12/99

Senator Tom Harkin's (D-IA) Statement: 8/5/99

Senator Richard Lugar's (R-IN) Statement: 8/12/99

ETHANOL CLIMATE PROTECTION OIL REDUCTION

A Public Forum

Issue II
October 25, 1999

Welcome to "ECO." This newsletter, distributed primarily to environmental organizations, will provide the most current information about ethanol and serve as a public forum. The Environmental and Energy Study Institute (EESI) hopes to build consensus within the environmental community regarding the potential benefits of ethanol -- and particularly the expanded opportunities provided by cellulosic ethanol -- with a special focus on climate protection. Ethanol can also be a political bridge to broader alliances in support of climate initiatives.

Many in the environmental community have made strong statements in support of ethanol as a low-carbon fuel with large potential benefits to reduce life-cycle greenhouse gas (GHG) emissions. Ethanol also reduces carbon monoxide emissions and our reliance on oil, contains no sulfur and helps to eliminate smog through its use as an oxygenate for gasoline. Cellulosic ethanol, which is produced from agricultural or wood wastes, provides even greater GHG emission reductions than corn-based ethanol, promotes rural economic revitalization and offers a solution to waste disposal problems.

However, there have been concerns about ethanol ranging from volatile organic compounds (VOCs) to corporate welfare. We will address these and other issues and explore which steps are appropriate to take in support of ethanol. Please tell us your views and we will address them in "ECO."

In this issue:

- **COMMENTARY:*** Cellulosic Ethanol and the Environment: What are the Key Issues?
- The California Air Resources Board Says Ethanol Use in California is Inevitable
- Corn Ethanol Paves the Way for Cellulose
- **EXCERPTS FROM RECENT STUDIES***
- The Potential of Ethanol Use in Fuel Cells
- **GOVERNMENT ACTIVITY***
- Farmer Co-ops Gaining Market Share Ethanol Production
- **NOTABLE QUOTABLES***

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COMMENTARY

Cellulosic Ethanol and the Environment: What are the Key Issues?

Lee R. Lynd, Ph.D., Professor of Engineering, Dartmouth College

To approach systematically the question of whether cellulosic ethanol deserves the support of environmentalists, it is necessary to first identify the key issues that impact the environmental efficacy of this technology path.

Let us start with what are not the issues. I believe that the points listed below are strongly supported by the literature and are widely accepted by the experts in the field having both technical and environmental perspectives.

Points of widespread agreement:

- a) Security, rural economic development, and balance of payments benefits are expected to accompany expanded use of cellulosic ethanol.
- b) Full cycle greenhouse gas emissions are a small fraction of those associated with a gasoline base case.
- c) Ethanol is a high performance fuel that is relatively compatible with the existing transportation infrastructure, there are also increasing indications that ethanol is likely to be compatible (via an on-board reformer) with fuel cells.
- d) Low-level ethanol blends result in little or no benefits in terms of criteria air pollutants in new vehicles. High-level blends in internal combustion engines are likely to result in significant reductions in criteria pollutant emissions, particularly with respect to air toxics and evaporative emissions. However, these benefits are likely smaller than with some other alternative fuels (e.g. natural gas). Emissions from fuel cell-powered ethanol vehicles can be expected to be very low.
- e) The ratio of net energy out: energy invested (for feedstock production and conversion) is very favorable.
- f) Compared to conventional row crops, cellulosic crops require less energy, herbicides, and pesticides and result in higher levels of soil carbon.

I would add a caveat to item (b) from above which I believe is strongly supported by the literature although not yet widely appreciated: When electricity co-product credits, mature technology, and carbon sequestration in soils are taken into consideration, it can be expected that some cellulosic ethanol fuel cells will result in emission reductions substantially better than 100% those of a gasoline base-case.

So what then are the issues? In my discussions of cellulosic ethanol, I have found that most people's reservations ultimately stem from one of three underlying concerns, listed below.

*Points of widespread concern: **

- a) **Resource availability.** Is there enough land available to make a substantial contribution to meeting energy needs while still maintaining soil fertility, wildlife habitat, and our ability to feed a growing population?
- b) **Competitiveness with other alternatives.** Is the case for cellulosic ethanol sufficiently compelling that it is preferred to other possible sustainable transportation sector alternatives? In particular, is it realistic for cellulosic ethanol to be as desirable as hydrogen as a transportation sector energy carrier for the long term?
- c) **Price.** Will cellulosic ethanol cost a lot more than what we pay now for a transportation energy carrier, and if so, will society be willing to pay this higher price?

*These concerns are based on my impressions of concerns that others have, and do not necessarily reflect my own concerns.

Of the concerns listed above, (a) and (b) are probably of chief concerns to the environmentalists, and the answer to the question of competitiveness (item b) may depend to a significant extent on resource availability (item a).

The California Air Resources Board Says Ethanol Use in California is Inevitable

With the pending phase out of MTBE in California, the California Air Resources Board (CARB) says ethanol use is inevitable, even if Congress or the Administration grant a waiver to the oxygenate standard. The 1990 Clean Air Act requires reformulated gasoline (RFG) sold in certain areas -- in California these areas include the LA-Anaheim-Riverside, Sacramento and San Diego markets -- to contain an average of 2.0 percent oxygen by weight for ozone and carbon monoxide emission control. MTBE, which currently is used in more than 85 percent of RFG, has been a popular gasoline oxygenate because of its widespread availability, cost, blending characteristics and low vapor pressure. Following recent concerns about its contribution to groundwater contamination, however, California Governor Gray Davis ordered a phase out of MTBE in all California gasoline by 2002.

Ethanol, although currently used in only eight percent of RFG, is the most likely alternative for replacing MTBE. CARB predicts that oil companies will use up to 100 million gallons a year for carbon monoxide reductions in the winter. They expect refiners throughout the state to use an additional 50 million gallons of ethanol a year as an octane booster for premium gasoline. This annual 150 million gallons total would be a huge increase from the current use of three to four million per year. CARB believes the ethanol market could possibly grow to 300-500 million gallons per year. The remaining question for CARB and California is not whether they will use ethanol, but whether they will develop a cellulosic biomass industry in California to provide the ethanol.

Corn Ethanol Paves the Way for Cellulose

Without corn-based ethanol, cellulosic ethanol may not be viable in the marketplace. The market penetration and acceptance, the research and development, and the technology development have all progressed with the groundwork laid by corn-based ethanol.

With the projected increase in ethanol demand from a possible nationwide MTBE phase out, it now appears that we may need cellulosic biomass to meet market demand for ethanol, for corn growers will face tremendous pressure to simultaneously supply the food and ethanol market. The introduction of ethanol derived from a variety of waste products including corn stover, bagasse and rice straw will help alleviate this supply side ceiling on ethanol demand. With the infrastructure and widespread acceptance of corn ethanol already in place, the ability to expand the cellulosic ethanol market is greatly enhanced. The growth of the cellulosic ethanol market has been aided by the corn ethanol industry in the following ways:

- Cellulosic ethanol production will most likely begin with utilizing corn derivatives. Corn harvesting residues are the single largest source of biomass in the United States and can supply 100 million dry tons per year for a potential nine billion gallons of ethanol. Corn stover, which includes the leaves, stalks and cobs of corn plants, is

widely available and corn fiber, the residual product from corn ethanol production, is already on site at the plants.

- Corn has made possible the \$0.54 per gallon federal production tax credit, which must exist for cellulosic ethanol production to be successful.
- Processors are familiar with the infrastructure and technology needed to produce ethanol from corn products and can apply this knowledge to cellulosic ethanol production, thus being among the first to use the new technologies.
- Corn ethanol producers have established widespread marketing, distribution and consumer acceptance for ethanol, thereby making the addition of cellulosic ethanol relatively simple. For example, shipping ethanol is more economical when large quantities are transported, therefore adding cellulosic ethanol to existing corn processing plants is not only feasible, but beneficial.
- The enzyme industry is closely related to corn producers and has made significant advances in developing cellulase enzymes, which are crucial for a viable cellulosic ethanol market.

As ethanol use continues to increase due to its emissions and octane benefits, the need to utilize resources other than corn for its production will become increasingly important. Corn and cellulosic ethanol production also can increase the agricultural sector's support of greenhouse gas emission reductions by demonstrating their contribution to such efforts. Although environmentalists traditionally have concerns about corn for ethanol, it is important to recognize the significant role that corn plays in paving the way for cellulosic ethanol production.

EXCERPTS FROM RECENT STUDIES

In September 1999, the California Energy Commission (CEC) presented a report, "Evaluation of Biomass-to-Ethanol Fuel Potential in California," to California Governor, Grey Davis, and the Secretary of the California Environmental Protection Agency. The purpose of the report, as directed by Davis following his Executive Order D-5-99 calling for the phase out of MTBE, was to evaluate "what steps, if any, would be appropriate to foster waste-based or other biomass ethanol development in California should ethanol be found to be an acceptable substitute for MTBE." The following are excerpts from the report's executive summary.

"A number of potential public benefits may be derived if a biomass-to-ethanol industry develops in California. Biomass-derived fuels such as ethanol may offer an effective option for reducing greenhouse gases that may contribute to global climate change. Studies have shown that greenhouse gas reductions are possible with ethanol produced from biomass compared to non-renewable fuels."

"Biomass is also becoming a larger waste disposal issue as agricultural residues, forest and urban wastes grow and the cost for disposing increases. In the past, large quantities of agricultural and forest wastes were burned. Burning of such wastes as rice straw impacts air quality. Open-field burning of rice straw is being phased out and rice straw biomass-to-ethanol facilities could further reduce air pollutants and divert wastes from landfills."

"Converting forest biomass to ethanol can help improve forest health and reduce the risk of catastrophic wildfires that cost the state millions of dollars a year. Other benefits that could arise if a biomass-to-ethanol industry develops are the creation of a new industry that could provide new jobs and tax revenue for the state's agricultural, rural and urban economies."

The Potential of Ethanol Use in Fuel Cells

Fuel cells produce electricity without combustion by capturing the electrochemical energy of combining hydrogen and oxygen. They provide an attractive alternative to current power sources because they increase energy efficiency, reduce carbon dioxide emissions and decrease dependence on foreign oil. Fuel systems can be used to power commercial buildings, homes, small generators, cars, buses and even computers. Fuel cell vehicles are especially attractive because they have more than twice the energy efficiency of internal combustion engines and near zero emissions. Additionally, using fuel cells in just 20 percent of cars would reduce 1.5 of the current 11 million barrels of oil imported to the United States every day.

While the introduction of fuel cells for vehicles would provide substantial environmental benefits, the storage and supply of hydrogen, its primary fuel source, poses a great challenge. Using ethanol as the hydrogen source in fuel cells can alleviate this difficulty. With the development of an electro-chemical reforming process, it is now possible to extract hydrogen from ethanol on board a vehicle.

Methanol is also used in fuel cells and currently is preferred to ethanol because it is easier to reform. However, there are significant and unique benefits realized when using ethanol in fuel cells. Because ethanol is produced from wastes and feedstocks, it is renewable, whereas methanol, which is produced mostly from natural gas, is not. Additionally, the lifecycle production of ethanol emits less greenhouse gases than that of methanol and is considerably less toxic. Furthermore, ethanol's production and use can help alleviate waste problems that contribute to land and water pollution.

Ethanol use in fuel cells provides significant infrastructure advantages as well, for its production and distribution are currently in place. Ethanol can also be dispensed like gasoline and stored on vehicles.

Despite the advantages of ethanol use in fuel cells, there are concerns regarding its relative inefficiency with respect to hydrogen. While hydrogen provides approximately 2.2 times the efficiency of internal combustion engines, ethanol can only offer 1.5 times the efficiency since energy is lost in the ethanol-to-hydrogen reforming process.

Additional technologies to expand ethanol's market for fuel cells are developing quickly. Epyx Corporation, in Cambridge, Massachusetts, has created a multi-fuel processor capable of converting renewable fuels and gasoline into hydrogen to power various fuel cell applications. Water vapor and heat are the principal by-products of this process.

Epyx also has developed a multi-fuel processor that combines with a proton exchange membrane (PEM) fuel cell and can be used in an automobile or bus. The Chicago Transit Authority (CTA) plans to use this multi-fuel processor in an ethanol fuel bus program beginning in March 2000. By operating on ethanol, the PEM fuel cell provides a low emission, high efficiency and strong performance alternative to those processors powered by gasoline. Ethanol proves to be a viable alternative to gasoline, which is expected to be the most widely used fuel for fuel cells.

GOVERNMENT ACTIVITY

- A hearing was held on September 30, 1999 by the Subcommittee on Energy and Environment of the House Committee on Science to review the scientific validity of the oxygenate mandate and determine its implications for the Reformulated Gasoline (RFG) Program. RFG stakeholders on different sides of the issue, including representatives from the Renewable Fuels Association, the Oxygenated Fuels Association, Northeast States for Coordinated Air Use Management (NESCAUM), and the gasoline industry, offered testimony. The witnesses discussed the future of the RFG program and its effects on our nation's air and water quality. EPA has yet to announce how it intends to proceed based on this evidence.
- The Subcommittee on Risk Management, Research, and Specialty Crops of the House Committee on Agriculture held a hearing on October 19, 1999 to review H.R. 2827, The National Sustainable Fuels and Chemicals Act of 1999, which is sponsored by Representative Thomas Ewing (R-IL). Representatives from the Department of Agriculture, the Department of Energy, the National Corn Growers Association and the American Soybean Association, along with Representative Mark Udall (D-CO), who has introduced a similar bill, and others, discussed the benefits, limitations and future of biomass utilization for energy, chemical and fuel production. The schedule for further action on this bill remains to be determined.
- The mark-up of H.R. 11, scheduled for October 13, 1999 in the House Commerce Committee, has been postponed. This controversial bill, sponsored by Representative Brian Bilbray (R-CA), would lift the oxygen mandate in the Clean Air Act that requires a two percent-by-weight level of oxygenates in gasoline. The most widely used oxygenate, MTBE, has been criticized recently for its contribution to groundwater contamination, and many believe that H.R. 11 would remove the human health risk posed by MTBE. Future plans for the bill are still unclear.
- *For more information, please contact Libby Jones, Program Assistant, The Environmental and Energy Study Institute at ljones@eesi.org or call (202) 662-1897.*

Farmer Co-ops Gaining Market Share in Ethanol Production

Despite previous concerns regarding the ability of small farmers to compete with large corn processing corporations, their contribution to the ethanol market has been increasing steadily, while dominant ethanol producers such as ADM have not increased production since 1990. Farmer co-ops currently produce more than 40 percent of ethanol in the United States and are expected to increase production to 50 percent as plants continue to be introduced in several states including Minnesota, South Dakota, Nebraska and Missouri. Their contribution to the ethanol industry is especially remarkable in Minnesota, where 95 percent of the ethanol is produced by farmer co-ops.

Construction and operation of ethanol plants stimulate economic diversity and provide job opportunities for those in the local community and nearby counties. Ethanol

plants typically employ around 27 people and provide good wages and benefits. Most cities also improve their roads or utility infrastructure when developing new ethanol plants. Local officials hope that these types of improvements will increase their ability to attract and retain other business ventures.

Co-ops provide additional benefits to farmers as well. Not only do farmers obtain a portion of the co-op's profits, which are distributed to all owners, but they receive revenue from raw materials that, in the case of cellulosic ethanol, were previously waste products. By providing a value-added market for farmers' crops, co-op ethanol production brings substantial benefits to rural communities. "At a time when small farms are struggling, ethanol is providing a critical economic lifeline to many small family farms. The bulk of the industry's growth today comes from small farms joining together in co-ops that produce and sell ethanol," said Dan Glickman, Agriculture Secretary.

NOTABLE QUOTABLES

"As the President of BC International Corporation (BCI), a developer of biomass ethanol facilities, I have been often asked to comment on issues pertaining to existing state and federal air policies....BCI does not support any waiver that would lead to backsliding on air quality benefits that have been achieved throughout the country.....In California, BCI wholeheartedly supports the air quality benefits and emission reductions that have resulted through the use of reformulated gasoline. In addition, we support the California Air Resources Board's continued efforts to achieve further emissions reductions."

Stephen J. Gatto, President and CEO, BC International, August 1999

"The federal benefits afforded ethanol-blended fuels have been an important, pro-competitive influence on the nation's gasoline marketers to price-compete with their integrated oil company competitors and providing an alternative to MTBE, this program has increased independent marketers' economic viability and reduced consumers' cost of gasoline."

Society of Independent Gasoline Marketers of America, Letter to House Ways and Means Committee, April 8, 1997

ETHANOL CLIMATE PROTECTION OIL REDUCTION

A Public Forum

Issue III

November 23, 1999

Welcome to "ECO." This newsletter, distributed primarily to environmental organizations, will provide the most current information about ethanol and serve as a public forum. The Environmental and Energy Study Institute (EESI) hopes to build consensus within the environmental community regarding the potential benefits of ethanol -- and particularly the expanded opportunities provided by cellulosic ethanol -- with a special focus on climate protection. Ethanol can also be a political bridge to broader alliances in support of climate initiatives.

Many in the environmental community have made strong statements in support of ethanol as a low-carbon fuel with large potential benefits to reduce life-cycle greenhouse gas (GHG) emissions. Ethanol also reduces carbon monoxide emissions and our reliance on oil, contains no sulfur and helps to eliminate smog through its use as an oxygenate for gasoline. Cellulosic ethanol, which is produced from agricultural or wood wastes, provides even greater GHG emission reductions than corn-based ethanol, promotes rural economic revitalization and offers a solution to waste disposal problems.

However, there have been concerns about ethanol ranging from volatile organic compounds (VOCs) to corporate welfare. We will address these and other issues and explore which steps are appropriate to take in support of ethanol. Please tell us your views and we will address them in "ECO."

In this issue:

➤ **COMMENTARY:***

- In Response to Issue II by Mark Delucchi
- MSW to Ethanol by Chip Clements
- Playing the Market Like a Mutual Fund by Scott Sklar

➤ **The California Energy Commission's Economic Evaluation of a Biomass-to-Ethanol Industry in California**

➤ **EXCERPTS FROM RECENT STUDIES***

➤ **The California Air Resources Board Assesses the Proposed RFG III**

➤ **GOVERNMENT ACTIVITY***

➤ **NOTABLE QUOTABLES***

*These are regular features in the newsletter

COMMENTARY

In Response to Issue II

Mark A. Delucchi, Institute of Transportation Studies, University of California at Davis

- As regards the use of corn ethanol as a transitional fuel to cellulosic ethanol, the ultimate question, from a policy standpoint, is whether or not the \$0.54/gallon subsidy is justified. On the basis of my own social cost work, and the economic analyses of others, I find no support for such a large subsidy. I have yet to see an one make a convincing argument that the subsidy improves social welfare (in the economic sense).

It seems clear to me, and probably to most economists and I hope objective environmentalists, that the reasonable course is to eliminate the corn ethanol subsidy, and then -- if we agree on the benefits of cellulosic ethanol -- subsidize the development of biomass production and conversion technologies. If we can develop biomass ethanol into a cost-effective alternative fuel, then everything else will fall into place quite nicely; we won't need to have transferred money from us taxpayers to big corporations.

- In the discussion of fuel cells, bio-ethanol should be compared with bio-methanol, as well as with fossil-methanol and hydrogen.
- For the most part, I agree with Lee Lynd's characterizations. I wouldn't be quite as sure as he is about the "greater than 100% reductions" in GHG emissions, because of the deficiencies in analyses that purport to make such a finding. I also would emphasize that the question of "which pathway -- hydrogen or ethanol?" is indeed very important, and should be taken up here.

MSW to Ethanol

Chip Clements, Clements Environmental Corporation

In California, a number of converging factors support the use of Municipal Solid Waste (MSW) as feedstock for bio-refineries that will convert the waste organics into ethanol:

- **Ethanol demand:** With the Governor's ban on MTBE and the continued pressure to reduce air emissions, the State-wide demand for ethanol as an oxygenate, octane enhancer, and clean fuel is expected to climb dramatically in the near term to a level of 150 million to 650 million gallons per year
- **AB 939 50% Diversion Mandate:** All jurisdictions in the State are mandated to achieve a 50% diversion rate from landfilling by the year 2000. In order to reach this goal, most cities and counties are turning to the residual organic fraction of their MSW (what's left after recycling). This is precisely the target feedstock for bio-refineries.

- **Feedstock Supply and Pricing:** A large percentage of MSW in California is already processed through Material Recovery Facilities (MRFs) and transfer stations. This means that the collection, and much of the processing of the feedstock, is already occurring at no cost to the bio-refinery. In addition, the refinery can collect a tipping fee for this material in the range of \$10 to \$20 per ton or more, depending on prevailing hauling and disposal pricing. Guaranteed long-term supply contracts (10 to 20 years) are available through the MR operators.
- **Global Warming:** The world community is growing more and more concerned about greenhouse gases and global warming. Ethanol from MSW is a net zero greenhouse generator, and perhaps even a reducer of CO₂.

Several projects are now in the planning stages and expectations are for a first plant to go into development in the year 2000, and be operational by 2002.

Feel free to call with inquiries.

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Playing the Market Like a Mutual Fund **Scott Sklar, Executive Director, National BioEnergy Industries Association**

If we take hard look at the biomass-to-energy industry, it would be very much comparable to brokerage companies dealing in "boutique" or "niche" stocks. Most of the biomass industry is playing into very customized markets, each with their own challenges and incentives.

But many experts know, that relying on one stock to build a fortune is usually not the preferred route. Most brokers encourage a portfolio approach, mixing high yield stocks with sure bets such as blue chip or government bonds. Those of us looking at the biomass markets are now beginning to wonder why our biomass energy generators aren't taking a similar approach. Farmers that rely on one cash crop are at the mercy of the market, but those farmers with multiple crops have more flexibility when prices fall.

The premise is that the biofuels industry that makes ethanol, soydiesel and other fuels along with the biomass -electric industry that generates electricity and heat and other products -- should be engaged in melding resource preparation, conversion and coproduct marketing. This "biorefinery" approach mimics other industries.

Why doesn't this happen more often? Government RD&D and incentives are part of this problem. Rather than encouraging resources and output diversity, the focus on increasing the efficiency in a one dimensional market. Again, many biomass experts are looking into biomass as the oil or chemicals industry looks at petroleum --

refining a multitude of products from the same resource. And in fact, some of this occurs naturally in the biomass energy markets where distillers dry grains (DDG), fusil oils, and ash are sold in separate markets. But this is far from the biorefinery concept employed in traditional industries.

Consider utilizing grains for blending with automotive fuel with the traditional output of DDG -- and add biomass electric generation for the green market with the waste heat for biomass drying and utilization in the ethanol conversion process. The electricity is sold for a higher premium to green power marketers, and the biomass wastes that don't make it into DDG goes for fertilizers. Production of lubricants, resins, building materials, silicates for glass, are also potentials for sale as by-products depending on the processes used for fuels and electricity conversion. The idea is not new -- but is not being wholly driven in the market.

The time has come for those involved in the biomass industry, agricultural reform, environmental groups, and sustainable economic development -- to lead the dialogue and refocus the federal, state and government programs to support a more flexible, sustainable biomass energy and coproducts industry. Not only will this make the biomass industries more resilient, but create a more substantive approach to rural economic development, -- and deter forest fires, landfill overcapacity, and water shed pollution and emissions causing climate change. Not shabby for a resource that is ubiquitous but totally reliant on government subsidy rather than the market. It's time to turn this situation around.

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The California Energy Commission's Economic Evaluation of a Biomass-to-Ethanol Industry in California

Though it is difficult to assess the economic viability of a cellulosic ethanol industry in California, the California Energy Commission (CEC) has evaluated the relative benefits and risks of pursuing its implementation in their report, "The Evaluation of Biomass-to-Ethanol Fuel Potential in California." The CEC concludes that it is possible for a biomass-to-ethanol industry to be economically beneficial for California when certain conditions are met.

Among the greatest benefits of cellulosic ethanol production is its ability to utilize agricultural wastes that would otherwise contribute to land, water and air pollution. Rice straw, for example, which has been routinely burned in open fields, can be made into

ethanol, thereby providing an environmentally sound alternative for disposal. Additionally, the occurrence of forest fires could decrease since potential wildfire fuels such as forest trimmings and debris are removed and used in cellulosic ethanol production. Cellulosic ethanol has been shown to have the potential to reduce greenhouse gas emissions by up to as much as 100 percent when compared to gasoline, and thus provides many emissions and air quality benefits.

The CEC also suggests that a California biomass-to-ethanol industry will stimulate the state's economy by creating jobs and a new tax base for economic development. California will become less dependent on out-of-state oxygenates and fuels, whether they be ethanol or MTBE, when producing its own ethanol.

Despite the widespread benefits possible with a cellulosic ethanol industry, the CEC highlights many risks associated with its implementation in California. There must be a large enough ethanol market in California, defined as over 100 million gallons per year, if the ethanol industry is to develop. Additionally, for California's cellulosic ethanol to be competitive with other sources of ethanol, biomass feedstocks must have a relatively low price. Finally, the development of reliable biomass technology and establishment of a coproduct market has potential to decrease ethanol production costs and therefore ultimately determine the viability of a California-based biomass-to-ethanol industry.

EXCERPTS FROM RECENT STUDIES

At the National Conference on Ethanol Policy and Marketing on February 26th and 27th, 1998 in Albuquerque, New Mexico, John Sheehan of the National Renewable Energy Laboratory in Golden, Colorado presented his report, "The Role of Bioethanol in Global Climate Change." The purpose of the report was to demonstrate the "projected impacts of an aggressive research and development program on the effectiveness of bioethanol as an option for reducing greenhouse gas emissions from the transportation sector." The following excerpts illustrate the fundamental arguments of the study.

"Bioethanol's penetration of the fuel blend market results in a roughly three percent decrease in projected emissions of carbon dioxide by the year 2015 (or, 17 million metric tons of carbon equivalent avoided). The transition to the neat fuel market provides the real payoff. The combined blend and neat fuel markets captured in the year 2020 could reduce projected emissions from transportation by 14 percent, representing 79 million tones of carbon emissions avoided."

"No single technology, including bioethanol, can be expected to completely address climate change. Even the aggressive scenario presented here demonstrates a capability to provide at most 14 percent reductions in future carbon emissions. We should see bioethanol as one part of a comprehensive portfolio of technological and policy solutions."

"While the focus of this paper had been on greenhouse gas mitigation, let us not forget that bioethanol has equally important impacts on the question of national security and other environmental issues."

The California Air Resources Board Assesses the Proposed Reformulated Gasoline III

The California Air Resources Board, as directed by California Governor Grey Davis' Executive Order D-5-99, will adopt the third phase of regulations for California Reformulated Gasoline (RFG3) by December 31, 1999. The purpose of RFG3 is to provide additional flexibility regarding the required oxygenate level while maintaining current emissions and air quality benefits. The Governor also signed the Senate Bill 989 on October 10, 1999, requiring CARB to ensure that RFG3 provides emissions and air quality benefits that are equal to or better than those provided by RFG2.

Unlike RFG2, RFG3 will include the addition of hydrocarbon impacts. This will encourage ethanol use by allowing higher Reid Vapor Pressure (RVP) fuels to be produced, provided that an increase in evaporative emissions are offset by exhaust emission reductions. RFG3 will also permit a hydrocarbon credit that provides carbon monoxide emission reductions in fuels with more than two percent oxygen by weight. When fuels with less than two percent oxygen are used, a carbon monoxide credit would apply. By 2005, the proposed RFG3 standards are expected to achieve daily reductions of 0.5 tons for hydrocarbon emissions and 20 tons for NO_x emissions.

CARB states that "the proposed specifications are intended to strike a balance between providing as much flexibility as possible in producing complying gasoline without MTBE, preserving and obtaining additional cost-effective emissions benefits, and minimizing the loss in supply from in-state gasoline production due to the removal of MTBE." Ethanol provides a viable alternative to MTBE, for it is biodegradable, and therefore less likely to contaminate groundwater, and contains less benzene, a known human carcinogen. CARB expects the greenhouse gas emissions to remain neutral with RFG3, unless California's cellulosic ethanol production increases.

GOVERNMENT ACTIVITY

1) The Subcommittee on Energy and Environment of the House Committee on Science held a hearing on October 28, 1999 to review H.R. 2819, the Biomass Research and Development Act of 1999, sponsored by Representative Mark Udall (D-CO), and H.R. 2827, a companion bill to Senator Richard Lugar's (R-IN) bill, S.935, The National Sustainable Fuels and Chemicals Act of 1999, sponsored by Representative Thomas Ewing (R-IL). Both bills propose increased funding for biomass conversion research and development and request that the Secretaries of Energy and Agriculture help to promote this initiative through a new Advisor Committee. The definition and nature of this Advisory Committee differs between the two bills.

The Honorable Dan W. Reicher, Assistant Secretary for Energy Efficiency and Renewable Energy with the U.S. Department of Energy, stressed the need for more integrated and coordinated work between industry and government. Mr. Steve Clemmer, Senior Analyst at the Union of Concerned Scientists, highlighted the environmental and energy security benefits realized when creating a biomass industry.

Other witnesses included The Honorable I. Miley Gonzales, Under Secretary for Research, Education and Economics, U.S. Department of Agriculture, who stated that strengthening energy security is among the most important benefits of bioenergy, and Dr. Bruce Dale, Co-Chair, Committee on Biobased Industrial Products, National Research Council, National Academy of Sciences and Chairman Department of Chemical Engineering, Michigan State University, who emphasized the need for more research on production costs of bioproducts to increase its competitiveness. The schedule for further action on these bills remains to be determined.

2) The California Energy Commission (CEC) held a workshop on September 10, 1999 to review their draft report, "The Evaluation of Biomass-to-Ethanol Fuel Potential in California." The purpose of the report, as directed by Davis following his Executive Order D-5-99 calling for the phase out of MTBE, is to evaluate California's "potential to develop a waste-based or other biomass ethanol industry." Eighteen presentations evaluated the history and future of the ethanol industry as well.

The CEC's Fuels and Transportation Committee held a public hearing on November 19, 1999 to receive comments on the final draft of "The Evaluation of Biomass-to-Ethanol Fuel Potential in California." The Committee's analysis shows that cellulosic ethanol has the potential to meet the State's growing fuel and gasoline oxygenate needs while providing many benefits. The final draft will be released to the full Commission on December 15, 1999.

For more information, please contact Libby Jones, Program Assistant, The Environmental and Energy Study Institute at ljones@eesi.org or call (202) 662-1897.

NOTABLE QUOTABLES

"Our analysis shows you can use ethanol in RFG II, although blendstocks would have to lower RVP....There's some cost, less than a penny per gallon. There's no reason why that can't be done, but at a cost....[The EPA is] looking to see if we can provide some flexibility to facilitate the transition, but we see no technical ban to Phase II RFG using ethanol."

Bob Perciasepe, Assistant Administrator for the Office of Air and Radiation, United States Environmental Protection Agency, October 1999.

"We have replaced MTBE with ethanol in our gasoline, because it helps clean the air without harming our drinking water."

GETTY oil company, The New York Times, October 13, 1999.

ETHANOL CLIMATE PROTECTION OIL REDUCTION

A Public Forum

Issue IV

December 21, 1999

Welcome to "ECO." This newsletter, distributed primarily to environmental organizations, will provide the most current information about ethanol and serve as a public forum. The Environmental and Energy Study Institute (EESI) hopes to build consensus within the environmental community regarding the potential benefits of ethanol -- and particularly the expanded opportunities provided by cellulosic ethanol -- with a special focus on climate protection. Ethanol can also be a political bridge to broader alliances in support of climate initiatives.

Many in the environmental community have made strong statements in support of ethanol as a low-carbon fuel with large potential benefits to reduce life-cycle greenhouse gas (GHG) emissions. Ethanol also reduces carbon monoxide emissions and our reliance on oil, contains no sulfur and helps to eliminate smog through its use as an oxygenate for gasoline. Cellulosic ethanol, which is produced from agricultural or wood wastes, provides even greater GHG emission reductions than corn-based ethanol, promotes rural economic revitalization and offers a solution to waste disposal problems.

However, there have been concerns about ethanol ranging from volatile organic compounds (VOCs) to corporate welfare. We will address these and other issues and explore which steps are appropriate to take in support of ethanol. Please tell us your views and we will address them in "ECO."

In this issue:

- **COMMENTARY:**
 - Tom Jeffries' Response to Mark Delucci
 - Cellulosic Biomass to Ethanol by Bill Holmberg
- **EXCERPTS FROM RECENT STUDIES***
- **Ethanol Co-products – The Biorefinery Concept**
- **GOVERNMENT ACTIVITY***
- **NOTABLE QUOTABLES***

*These are regular features in the newsletter

COMMENTARY

In Response to Mark Delucchi

Thomas Jeffries, Department of Bacteriology, University of Wisconsin - Madison

I agree with Mark Delucchi that ideally there should not be a \$0.54/gallon blender's tax credit for ethanol from renewable resources, but it is worthwhile to consider this program in two ways:

(1) By some calculations, The federal government actually saves money by giving a blender's tax credit rather than paying farmers for excess corn or paying to not produce corn in the first place. That is to say, the amount of money spent annually on the blender's tax credit is less than what was historically spent on grain repurchasing or land set aside programs. With the continuing increase in farm productivity, the savings would probably be greater now than they were at the start of the program. Farmers receive on average about \$0.15/bushel more for corn than they would without the tax credit. Farmers are among the least compensated workers in our entire economy, and from a social welfare perspective, I would hope that we would find ways to increase their incomes rather than reduce them.

(2) The \$0.54/gallon is actually a tax credit (in essence a tax reduction) given to fuel distributors -- against a tax that would normally be used to subsidize the construction and maintenance of roads and bridges. Most economists prefer to see taxes cut wherever possible. I find it interesting that it is considered OK to subsidize the continued (an increasing) use of the non-renewable resource, petroleum, but it is not considered OK to subsidize the use of a renewable resource to displace it. In order for the \$0.54 to actually be a "subsidy" it would be necessary to convert the tax credit into direct support for "development of biomass production and conversion technologies", as Mark has suggested.

Certainly without a corn ethanol industry, the prospect of a renewable fuel industry based on cellulose or hemicellulose would not exist.

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Cellulosic Biomass to Ethanol

"Put the Rumen and Anaerobic Digesters in the Game"

Bill Holmberg, Global Biorefiners, Inc.

The concept of biorefineries, the production of biofuels, bioenergy and biochemicals using ligno-cellulosic biomass is making major progress. This is due, in part, to the determined work of Senator Richard Lugar of Indiana, Chairman of the Senate Agriculture Committee and Jim Woolsey, former Under Secretary of Energy and Director of Central Intelligence.

Through speeches, meetings, op-ed articles, congressional testimony, a major work in Foreign Affairs and emerging legislation, they have helped stimulate interest in a coordinated government program to accelerate the conversion of ligno-cellulosic biomass (LCB) into a full range of products currently being produced by oil, coal and now gas refineries. Their primary concerns are national and energy security issues as well as declining supplies of oil, particularly in the Western Hemisphere. There are also environmental and greenhouse gas stabilization concerns motivating support for biorefineries as well as new, community-based industries and high-quality jobs.

Biorefineries, using carbohydrates (renewable, domestic, clean-burning and greenhouse-gas neutral) will be augmenting hydrocarbon (fossil fuels) refineries to meet the needs of an energy-hungry world economy. The current focus of the biorefinery movement is on LCB -- sugar cane bagasse, rice straw, forest residues (harvested to reduce potential fire damage), yard and garden trimmings, the cellulosic portion of waste heading for landfills, crop residues and energy crops such as switch grass and hybrid trees.

It is critical, however, that we do not lose sight of the pioneering contributions made by the current corn-based ethanol industry that will soon be producing two billion gallons a year of fuel ethanol. That industry is mostly tied to corn, cattle and manure. Unfortunately, too often in the nation's capital, particularly within the environmental and public interest communities, corn ethanol, cattle and manure get a bum rap.

We can turn that "bum rap" into march-ahead music if we can get the "rest of the story" to the public and the policy makers. These facts, if understood and acted on, will keep corn and other feed grains in the ethanol business for many years to come -- and, if our observations are correct -- indefinitely. We all know that it is the net cost of sugars that determines profitability in the ethanol industry. Part of that net cost is the value of the co-products of ethanol production -- carbon dioxide and distillers grains which comprise about 2/3 of the original bushel. We must also look at the "back-side" of the process (anaerobic digesters) converting animal manures into energy and fertilizers, thus closing the loop to the betterment of the environment.

Our best tool in this integrated system is the sun. Plants developed for intensive agriculture absorb roughly 1% of available solar energy reaching the earth, but only 5% of that energy is available to humans directly. Enter ruminant animals (that wonderful rumen). They can convert most of the remaining plant energy to a form usable to humans. Ruminants include beef cattle, dairy cows, goats and sheep. Their rumens permit them to partially digest hemi-cellulose and cellulose using a combined acid and enzymatic process. The products of this process are protein, carbohydrate energy, undigestibles like lignin, and -- methane.

This plant energy will put the first 500 to 700 lb of weight on steers (as mother cows and calves graze on grasses) heading for the feed yards. Here, the next 500 to 700 lbs can be added by distillers wet grains and solubles from an appropriately-sized ethanol plant. These cattle will also be fed carbohydrate energy using alfalfa, silage, crop residues, or other forms of carbohydrates converted into needed energy and additional protein -- the rumen again at work. This is to replace the starch energy that was converted to ethanol to power our cars and trucks, as well as fuel cells of the future. Most American diets, already high in starch, won't miss the loss.

Furthermore, professor Rich Russell (Animal Nutrition and Biochemistry) at West Virginia University has developed data demonstrating that grazing, and then using corn as a finishing ration for cattle, is the most efficient and cost-effective means of providing net protein units (NPU -- a correction measure used in determining the actual value of protein to the human body, i.e., essential amino acids), than comparable amounts of cereals. This assumes cereal grains grown on similar acreage -- amount and quality.

Dr. Russell points out that the ability of ruminants to process carbohydrates into protein and energy puts them ahead of pork and poultry in converting solar energy into human energy. Finally, he sums up by saying, "Crops raised for ethanol production and livestock are 5-40 times more solar energy efficient than crops humans eat directly."

In addition, Dr. Terry Kopfenstein (Animal Sciences) at the University of Nebraska reports that feeding cattle wet distillers grains plus solubles further boosts feeding efficiency about 10%.

There is more good news coming in from Dr. Don Johnson (Department of Animal Sciences) at the Colorado State University. He has demonstrated that cattle fed distillers grains plus solubles will release about 20-45% less methane during the rumination process than when fed a ration without these co-products.

OK, so corn, ethanol and beef look good; but what about the stinking, polluting manure? That valuable bi-product can be refined through an anaerobic digester to produce biogas to power the ethanol plant. The "disgestate" is processed into high-quality bio-fertilizers that can be augmented with minerals, activated with microorganisms, and returned to the soil. These bio-fertilizers will replace some fossil-based fertilizers and pesticides while enhancing the quality of the soil.

What about the ability of these "integrated farm energy systems" to process LCB -- ligno-cellulosic biomass? Here it is critical to consider the important role of the rumen and the integrated system. Right off the bat, we get increased production of ethanol and beef from a given amount of corn (or other feed grains). As a next step, we are working on reducing the amount of corn and increasing the level of wet distillers grains plus solubles and LCB in the feeding ration. This will further increase the amount of ethanol and beef from a given amount of corn with the LCB playing an increasingly important role in this integrated system.

The next step is already available, requiring only demonstration and commercialization. The LCB can be treated with a dilute acid (or a base chemical) to hydrolyze the hemicellulose into 5 carbon sugars which can then be fermented into hydroous ethanol. This ethanol will then join the other stream of ethanol in the integrated system to be distilled to produce fuel grade ethanol. The dilute acid could also partially hydrolyze the cellulose (and possibly even some of the lignin) to increase the feeding value of the LCB as an energy source for the cattle (after passing the material through that wonderful rumen).

The ultimate step, the processing of the LCB through a separate stream hydrolyzing both hemicellulose and cellulose into fermentable sugars, awaits advanced engineering/bioengineering to make the process cost effective. When these technologies become effectively available, the Integrated Farm Energy Systems will be ready.

As can be seen, existing smaller-scale dry milling ethanol plants, co-producing wet distillers grains plus solubles and functioning in concert with those wonderful ruminants, are well on their way to become the next generation of biorefineries.

All of this is good news for, corn, beef, manure, LCD, farm country and the environment.

For additional material on this issue, please e-mail Bill Holmberg at biorefiner@aol.com

EXCERPTS FROM RECENT STUDIES

Public Opinion on Ethanol Tax Incentives:

The Sustainable Energy Coalition commissioned a public opinion survey in September 1998 of more than 1,000 registered voters. The survey was conducted by Research/Strategy/ Management of Rockville, Maryland and included the following questions and responses:

- Various ideas have been offered for reducing our dependency on foreign oil. Please tell me if you strongly favor, somewhat favor, somewhat oppose, or strongly oppose increasing the use of renewable transportation fuels such as ethanol.

Strongly Favor	37%
Somewhat Favor	43%
Somewhat Oppose	10%
Strongly Oppose	5%
Don't Know/Refused	5%

The Renewable Fuels Association, a member group of the Coalition, commissioned a public opinion survey in November 1996 of more than 1,000+ registered voters. This survey was also conducted by Research/Strategy/Management and included the following questions and responses:

- Today, the United States imports more than half of its oil from foreign countries. Experts predict that our dependency on foreign oil will increase over the next ten years. A recent consumer-group study found that current federal tax policies actually encourage this dependency on foreign oil. Some people believe that we should continue to give tax breaks or subsidies to oil companies as a way to ensure a steady supply of oil, even if we are dependent on foreign countries for this oil. Other people believe that we should reduce our reliance on foreign oil by

redirecting these tax breaks and subsidies to encourage the increased production and use of domestically produced renewable fuels from grains and other biological sources called biomass. Which opinion is closer to yours: that we should continue to give tax breaks that encourage dependency on foreign oil to ensure a steady supply, or that we should redirect tax breaks to encourage the use of domestically produced renewable fuels that would reduce our dependency on foreign oil?

Continue Current Tax Breaks to Ensure Steady Supply of Oil	10%
Redirect Tax Breaks to Renewable Fuels to Reduce Dependency on Foreign Oil	82%
Neither; No Tax Breaks Should be Given At All	4%
Don't Know/Refused	4%

➤ One way the federal government has tried to develop a domestic renewable fuel industry is by granting a 5.4 cent per gallon tax exemption for ethanol-blended gasoline. Ethanol is a clean burning, renewable fuel produced from grain and other biomass and is used to reduce harmful automobile emissions. The oil industry has tried to have this exemption removed because they say the tax advantage is unfair and makes ethanol-blended gasoline cheaper than gasoline not blended with ethanol. Do you support or oppose continuing the federal tax exemption for ethanol-blended gasoline?

Strongly Support	38%
Somewhat Support	34%
Somewhat Oppose	11%
Strongly Oppose	9%
Don't Know/Refused	8%

Ethanol Co-products – The Biorefinery Concept

Though the use of cellulosic ethanol as an alternative fuel is attributed with considerable environmental, social and economic benefits, the diversity and utility of its co-products are often overlooked. The refinery concept -- which is currently implemented in numerous corn, soybean, and wheat mills throughout the United States, where value-added products are processed from over 95 percent of incoming feedstocks - can be adopted in fermentation ethanol plants as well.

However, integrating the production of commodities and liquid fuel is hardly a novel idea. In addition to gasoline, petroleum refineries produce organic chemicals and materials. The beauty of biorefineries is their ability to produce these materials as well as foods, feeds and biochemicals. Additionally, biorefineries add tremendous economic viability to the agricultural community, produce potentially less expensive and better performing products, and rely on sustainable, domestically-produced raw materials while alleviating potential environmental problems.

Chemicals, materials and liquid fuels comprise the general areas of commodity production at biorefineries. Specific products include soybean oils and inks, paints and

varnishes, soaps and detergents, synthetic fibers and plastics, bagasse, lignin, ethanol, methanol, acetic and fatty acids, industrial surfactants, and agricultural chemicals. Enzymes, produced primarily through biological fermentation, also play a critical role in a wide range of products including food ingredients, specialty chemicals, laundry detergents, and digestive aids. Several pulp and paper mills also produce ethanol while recycling waste paper and generating steam and electricity.

As research and development for biomass and its derivatives progress, there is a strong potential for biobased products to become cost competitive with those that are petroleum-based. Even more promising are the wide-ranging opportunities for biorefineries that have yet to be realized. Waste paper and municipal sludge are examples of feedstocks that could some day support an entire biorefinery.

GOVERNMENT ACTIVITY

On November 19, 1999, Representative Leonard Boswell (D-IA) introduced H.R. 3464, which was referred to the Committee on Commerce, "to establish a cooperative program of the Department of Agriculture, the Department of Energy, and the Environmental Protection Agency to evaluate the feasibility of using only fuel blended with ethanol to power municipal vehicles."

A pilot program would fund an ethanol based vehicle fleet through competitive grants to local governments that have made efforts to reduce air pollution. Following the enactment of this bill, the Secretary of Agriculture, the Secretary of Energy, and the Administrator of the Environmental Protection Agency would report to Congress on (1) the criteria used to award the grants, (2) the level of funding needed for the program, and (3) the expected duration of the study.

NOTABLE QUOTABLES

"I [support] tax incentives for use of ethanol [because] not only is it good for the farmer, it is good for the quality of air all across America."

Texas Governor George W. Bush, Associated Press, September 1, 1999.

"[The federal ethanol program] has been a real success; it means thousands of jobs and billions in economics activity in this country."

Vice President Al Gore, "Ethanol Report," June 1999.

"I'm convinced many people in Iowa believe as I do that ethanol is good for neither the environment nor the consumer."

Senator John McCain (R-AZ), Associated Press, October 27, 1999.

ETHANOL CLIMATE PROTECTION OIL REDUCTION

A Public Forum

Issue V

February 4, 2000

Welcome to "ECO." This newsletter, distributed primarily to environmental organizations, will provide the most current information about ethanol and serve as a public forum. The Environmental and Energy Study Institute (EESI) hopes to build consensus within the environmental community regarding the potential benefits of ethanol -- and particularly the expanded opportunities provided by cellulosic ethanol -- with a special focus on climate protection. Ethanol can also be a political bridge to broader alliances in support of climate initiatives.

Many in the environmental community have made strong statements in support of ethanol as a low-carbon fuel with large potential benefits to reduce life-cycle greenhouse gas (GHG) emissions. Ethanol also reduces carbon monoxide emissions and our reliance on oil, contains no sulfur and helps to eliminate smog through its use as an oxygenate for gasoline. Cellulosic ethanol, which is produced from agricultural or wood wastes, provides even greater GHG emission reductions than corn-based ethanol, promotes rural economic revitalization and offers a solution to waste disposal problems.

However, there have been concerns about ethanol ranging from volatile organic compounds (VOCs) to corporate welfare. We will address these and other issues and explore which steps are appropriate to take in support of ethanol. Please tell us your views and we will address them in "ECO."

In this issue:

- **COMMENTARY:***
- Eric Vaughn, Renewable Fuels Association
- The Ethanol-CAFE Loophole
- **EXCERPTS FROM RECENT STUDIES***
- The Forest "Waste" Debate
- **GOVERNMENT ACTIVITY***
- **NOTABLE QUOTABLES***

*These are regular features in the newsletter

COMMENTARY

This commentary is provided by the largest ethanol industry trade association. As always we encourage readers' response, and particularly from the environmental community, the major audience of this newsletter.

By Eric Vaughn, President and CEO, Renewable Fuels Association

The ethanol industry is at a crossroads. The controversy surrounding the use of MTBE in clean air programs promises to either substantially increase demand for ethanol and launch a cellulose-based ethanol industry, or result in the loss of the ethanol industry's current largest market.

Established by the CAAA, the winter oxyfuel and federal reformulated gasoline (RFG) programs have successfully and cost-effectively reduced air pollution from vehicles. Covering one-third of the nation's fuel, RFG has reduced vehicle emissions of ozone precursors above and beyond the original goals of the program. A critical component of RFG is the addition of oxygenates, including ethanol and MTBE. Adding oxygenates to gasoline displaces toxics such as benzene and reduces carbon monoxide (CO).

Unfortunately, an unintended consequence of refiners' decision to largely use MTBE is water contamination. While MTBE helps clean the air, it is highly soluble in water and does not biodegrade if spilled or leaked. As a result, MTBE has been detected in drinking water supplies all across the country. The problem has been most severe in California and the northeast where most of the MTBE is used.

As a result, some have called for the elimination of MTBE. The California Air Resources Board (CARB) recently approved regulations banning MTBE after 2002. If ethanol were to replace MTBE in California RFG, a new market for more than 500 million gallons of ethanol would be created. Such new demand would stimulate tremendous new ethanol production in the state, including ethanol production from rice straw. Plans are already well underway for a large-scale cellulose-ethanol production facility in Gridley, CA.

But others are suggesting the solution to the MTBE problem is to eliminate the federal oxygen requirement. If that were to occur, the existing 400 million gallons of ethanol currently sold successfully in the greater Chicago RFG market would be jeopardized, and future development and growth in ethanol production would be foreclosed. The U.S. Department of Agriculture has determined that it would take three billion gallons of ethanol to replace MTBE nationwide while preserving existing markets.

Removing oxygenates will cause air quality backsliding. Refinery modeling shows that in the absence of oxygenates refiners will increase the use of alkylates and aromatics, resulting in increased toxics and CO emissions. CARB attempted to address this issue with more stringent toxics standards and other measures, but did not fully address CO reductions forfeited in the absence of oxygenates like ethanol. The National Research Council has determined that CO is responsible for 15-25% of the ozone forming reactivity of vehicle exhaust emissions. Unless these issues are more fully addressed in a national rulemaking, air quality will suffer.

What is clear in the current debate is that the clean air benefits of RFG must be maintained, water quality must be preserved, and the opportunity to promote expanded ethanol production from new technologies and new feedstocks should not be undermined or lost in the effort to eliminate MTBE use.

The Ethanol-CAFE Loophole

The "Big Three" American automakers – Ford, General Motors and Daimler-Chrysler – are now producing approximately 250,000 flexible-fuel vehicles (FFVs) each year. These FFVs run on gasoline or a blend of 85 percent ethanol and 15 percent gasoline, known as E85. These E85 FFVs provide the automakers with significant credits toward meeting their federal Corporate Average Fuel Economy (CAFE) requirements.

The CAFE law requires automakers to achieve corporate-wide averages for fuel economy or miles per gallon (mpg). If they do not meet these averages – 27.5 mpg for passenger cars and 20.7 mpg for minivans, sport utilities and pickup trucks – then they pay stiff CAFE penalties. The E85 credit helps automakers meet their corporate averages by giving each E85 vehicle a 50-mpg rating. There is no requirement that the E85 FFVs use ethanol, and there are only 200 E85 refueling stations nationwide. As a result, most E85 vehicles do not use any ethanol at all and run entirely on gasoline. Environmental supporters in favor of stronger CAFE standards are well aware of this loophole and do not believe the CAFE credit for E85 vehicles is warranted.

The original purpose of this CAFE credit for FFVs was to stimulate automaker investment in alternative fuel vehicles (AFVs). It was not envisioned that the Big Three would produce hundreds of thousands of these vehicles and never use any alternative fuel. Similarly, the Energy Policy Act of 1992 requires purchase of AFVs but does not require use of alternative fuel. Federal policy has been focused on producing vehicles and not ensuring alternative fuel use. However, defenders of the E85 CAFE credit and the EPACT AFV purchase requirements say these measures have been necessary to overcome the long-standing "chicken and egg" problem, and that is, you can't have AFVs without alternative fuel and you don't need alternative fuel if you don't have AFVs. Now, at least in part, the vehicle part of the problem is beginning to be addressed.

Many environmentalists are not satisfied with this defense of the E85 CAFE credit and would seek to eliminate the credit all together. Other environmentalists are asking if we can turn this lemon into lemonade. Is there a middle ground? Can or should E85 credits be capped or reduced? Can or should there be fuel use requirements? If so, how would you ensure and account for use of alternative fuels?

CAFE is seen as one of the few strong policy options for reducing greenhouse gas (GHG) emissions from automobiles. At the same time, ethanol supporters tout the important lifecycle GHG reductions from ethanol, especially cellulosic ethanol, compared to gasoline. GHG reductions were not the goal for the E85 CAFE credit when it was created as part of the Alternative Motor Fuels Act of 1988. With increasing concerns over global warming, this policy likely will come under greater scrutiny.

There is an additional wrinkle with the use of E85 vehicles that needs to be examined. Low blends of 10 percent ethanol with gasoline (E10) cause increase emissions of volatile organic compounds (VOCs) in hot weather. VOCs are one of the ozone precursors causing urban smog. When E85 users fill up their tanks with E85 (85 percent ethanol) and then use approximately three-quarters of that fuel, but then refill with traditional gasoline, they end up with a tank full of an E10-equivalent which is likely to increase VOC emissions and smog. So some would argue that even if E85 is used,

additional assurances are needed to prevent refilling with gasoline, especially or perhaps only, during the hot summer months in Clean Air Act "non-attainment" areas.

EXCERPTS FROM RECENT STUDIES

Environmental Council Gives Ethanol Clean Bill of Health

The California Environmental Policy Council has awarded ethanol a clean bill of health, paving the way for ethanol as a safe replacement for MTBE in California gasoline. The Council, chaired by California Environmental Protection Agency (CalEPA) Director Winston Hickox, unanimously approved reports from the California Air Resources Board (CARB), the State Water Resources Control Board (SWRCB), and the CalEPA Office of Environmental Health Hazard Assessment (OEHHA), which found no air quality, water quality or health problems associated with the use of ethanol as an oxygenate in California's cleaner burning gasoline program.

Further information is available on the web-site for the California Air Resources Board at www.arb.ca.gov.

Energy and Dollar Costs of Ethanol Production with Corn

Professor David Pimentel of Cornell University recently updated (April 1998) his lifecycle analysis of ethanol in the article: *Energy and Dollar Costs of Ethanol Production with Corn*. This article provides strikingly different results than the lifecycle analysis done by Argonne National Laboratory. The following excerpts are the introduction and conclusion of the Pimentel article.

INTRODUCTION

Ethanol does not provide energy for the future. It is not a renewable energy source, is costly in terms of production and subsidies, and its production causes serious environmental degradation (ERAB, 1980, 1981; Dorving, 1988; GAO, 1990; Pimentel, 1991; Sparks Commodities, 1990; Giampietro et al., 1997).

Clearly, conclusions drawn about the benefits and cost of ethanol production will be incomplete or misleading if only one part of the total system is assessed (Giampietro et al., 1997). The objective of this analysis is to update and assess all the recognized factors that operate in the entire ethanol production system. These include direct and indirect costs in terms of fossil energy and dollars expended in producing the corn feedstock as well as in the fermentation and distillation processes.

CONCLUSION

Ethanol production is wasteful of fossil energy resources and does not increase energy security. This is because considerably more energy, much of it high-grade fossil fuels, is required to produce ethanol than is available in the ethanol output. Specifically, about 71% more energy is used to produce a gallon of ethanol than the energy contained in a gallon of ethanol. Furthermore, ethanol production from corn cannot be considered renewable energy. Its production uses more nonrenewable fossil energy resources both in the production of the corn and in the fermentation/distillation processes than is produced as ethanol energy.

Unfortunately ethanol produced from corn and other food crops is an unreliable source of energy because of uncontrollable climatic fluctuations, particularly droughts which frequently reduce crop yields. The expected priority for corn and other food crops would be for food and feed. Increasing ethanol production will increase degradation of vital agricultural land and water resources and will seriously contribute to the pollution of the environment. In U.S. corn production, soil erodes some 20 times faster than soil is reformed.

If there were no tax payer money paid to subsidize the ethanol production industry, there would be no ethanol produced as a fuel for automobiles. Increasing the diversion of human food resources to support the costly and inefficient production of ethanol fuel raises major ethical questions. This is especially true when there are more than two billion humans who are malnourished in the world.

The Forest "Waste" Debate

Using forest biomass for fuel has sparked considerable debate among environmentalists. Though many view biofuels as an efficient and sustainable solution to waste problems posed by residual forest trimmings, others believe that these natural materials are needed in the forest to promote a healthy stand growth.

Foresters are especially concerned that high rates of tree mortality due to drought and bug infestations builds fuel loading in forests and in turn increases risk of forest wildfires. Removing smaller and often diseased tree is thought to both relieve the stand of fire-prone materials and promote the growth of larger trees. In *The Economic Implications of Energy Production from Forest Residuals*, Gregory Miller states that "the only means to improve the condition of the standing forest is to remove excess biomass." He claims that thinned forests in California are in significantly better condition than untreated stands and allow for better control of prescribed fires.

Though the timber industry publicly promotes sustainable forestry practices, environmentalists, as well as the general public, have questioned this commitment. "Best Management Practices" promote excellence in forestry but are voluntary and lack sufficient regulation. Without a guarantee of sustainable practice measures, the long-term productivity of forests remains uncertain. Additionally, the industry's long history of forest abuse and environmental degradation has created distrust and, therefore, public resistance to forest thinning. Many environmentalists also argue that woody debris promotes forest growth and sustainability through natural decomposition processes, therefore its removal decreases forest viability. If taken too far, attaining revenue for all forest products could cause ecosystem devastation and biodiversity loss.

Although their environmental impact remains undetermined, biomass ethanol facilities within the proximity of forest stands provide a market for residual forest biomass, which helps to mitigate high thinning costs. Additionally, it is projected that these plants could operate at a cost of less than half that expected from future losses associated with wildfires. Despite fears that a market for forest biomass would promote increased logging, the U.S. Forest Service claims that it instead would relieve the large accumulation of fuel that has caused many environmental and economic problems.

What are the appropriate circumstances, if any, under which forest biomass could be used for cellulosic ethanol?

GOVERNMENT ACTIVITY

Letter on Ethanol to California Governor Gray Davis

On October 15, 1999, four of the leading environmental groups in California sent the following letter to Governor Gray Davis about ethanol.

October 15, 1999

The Honorable Gray Davis
Governor
State Capitol
Sacramento, California

**RE: THE USE OF ETHANOL AS AN ENVIRONMENTALLY ACCEPTABLE
GASOLINE ADDITIVE**

Dear Governor Davis:

We are writing because we understand that the phase out of MTBE will result in a large increase in ethanol as a gasoline additive, even if the federal 2% oxygenate requirement is waived. The Air Resources Board estimates that use will increase from 3-4 million gallons a year to at least 150 million gallons/year. Given this situation, we strongly support California ensuring that the production and use of ethanol be done in the most environmentally sustainable manner. We recommend the State of California:

1. ensure no backsliding in air or water quality standards to accommodate increased use of ethanol; and
2. support the development of a cellulosic biomass ethanol industry in California.

CALIFORNIA SHOULD SAFEGUARD AGAINST POTENTIAL ENVIRONMENTAL BACKSLIDING

In response to the Governor's efforts to swiftly phase out MTBE, California must find environmentally sound gasoline additives. If California is going to be using ethanol, we expect the State and the ARB to ensure that any use will not worsen air quality or environmental standards. Our specific recommendations to prevent environmental backsliding are:

- Reid Vapor Pressure (RVP) requirements or any other air pollution standards should not be waved or weakened to accommodate the use of ethanol.

- The State of California should fully evaluate the toxic emissions of ethanol blends to ensure they do not cause an overall increase in potency-weighted air toxic impacts compared to non-MTBE alternatives.
- Water quality concerns should be thoroughly evaluated to ensure that the impact on water supply will be significantly improved compared to the current situation and that it will be no worse than other alternative additives.

We believe if the above conditions are met, then ethanol can play a role in facilitating the swift phase out of MTBE while preserving the smog and carbon monoxide benefits of California's current and future reformulated gasoline programs.

THE STATE SHOULD SUPPORT THE DEVELOPMENT OF A CELLULOSIC ETHANOL INDUSTRY IN CALIFORNIA

We believe that biomass cellulosic ethanol is environmentally preferable to corn-based ethanol that currently dominates the renewable fuels market. We support initiatives by the State to promote the development of a cellulosic biomass production facilities in California. Biomass ethanol solves significant local environmental problems such as rice straw burning and other agricultural waste disposal issues. By relying upon renewable resources, biomass ethanol can also significantly decrease the emissions of carbon dioxide, the primary gas contributing to global warming. The resource potential within California is large and does not appear to be the limiting factor in using biomass ethanol as a gasoline additive. The actions you take in support of a cellulosic industry will have broad impacts throughout the entire country.

We hope this letter helps clarify the position of our organizations as you move closer to making key decisions on the future of a cellulosic biomass industry in California. We look forward to a full review of all issues as called for in your studies, and we will continue to work closely with the state agencies that are taking a lead role on this important issue.

Sincerely,

Roland J. Hwang
Transportation Program Director
Union of Concerned Scientists

Janet Hathaway
Senior Attorney
Natural Resources Defense Council

Sandy Spelliscy
General Council
Planning and Conservation League

Tim Carmichael
Executive Director
Coalition for Clean Air

Cc: Winston Hickox, Secretary of Cal EPA
Alan Lloyd, Chairman of the California Air Resources Board
Michael Kenny, Executive Officer for the California Air Resources Board
Mary Nichols, Resources Secretary
Bill Keese, Chair of the California Energy Commission

Bioenergy Funding Increase

On January 13 President Clinton proposed a \$243 million increase in funding next year to develop technologies that convert agriculture and forest wastes into fuel, energy and other biobased products, such as plastics and chemicals. The proposed FY'2001 budget will ask Congress for a total \$439 million to fund research and grants.

The plan requests \$49 million for the Department of Energy to research cellulase systems and to underwrite development of technologies that develop new consumer products. It also includes \$194 million for Department of Agriculture initiatives, of which approximately \$150 million would be for incentive payments to bioenergy producers to expand their production.

Northeast States, Petroleum Industry and Lung Association Join Forces on MTBE Issue

At a press conference in Washington, D.C. on February 3, Jason Grumet of the Northeast States for Coordinated Air Use Management (NESCAUM), Marc Meteyer of the American Petroleum Institute and Ron White of the American Lung Association announced their collective strategy to repeal the federal oxygenate mandate. Their objectives are to maximize air quality benefits of reformulated gasoline (RFG) while reducing the MTBE concentration in gasoline to protect water resources. Though they are committed to ensuring alternatives to MTBE that would maintain current air quality benefits, the mechanisms for doing so remain unclear.

These groups acknowledge that the repeal of an oxygen mandate would stunt ethanol's industrial and economic growth. They are skeptical of its overall market flexibility and air quality benefits. Jason Grumet, however, mentioned cellulosic ethanol as a possible solution to the distribution and environmental concerns related to corn-based ethanol. All groups refrained from endorsing related legislation, such as bills introduced by Senator James Inhofe (R-OK) Senator Diane Feinstein (D-CA) that give states flexibility in the EPA oxygenate mandate.

NOTABLE QUOTABLES

"Droughts, floods and historically low prices have made times very bad for our farmers. We must work together to strengthen the farm safety net, invest in land conservation and create new markets by expanding our program for bio-based fuels and products.... Before you know it, efficient production of biofuels will give us the equivalent of hundreds of miles from a gallon of gas." President Clinton, State of the Union, January 27, 2000.

"If you don't know about [MTBE] yet, you will. It's a gasoline additive that is contaminating drinking water from Maine to California and has been called the biggest environmental crisis of the next decade.... Ethanol, which is distilled from corn and used to make gasohol, was a favorite of the farm lobby. But it's expensive, difficult to distribute, and not terribly practical outside the Midwest," Steve Kroft, co-host, 60 Minutes, January 16, 2000

EESI's "ECO" Staff

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All comments regarding ECO should be made to Libby Jones at ljones@eesi.org or (202) 662-1897.

Please visit us at www.eesi.org.

ETHANOL CLIMATE PROTECTION OIL REDUCTION

A Public Forum

Issue VI

March 3, 2000

Welcome to "ECO." This newsletter, distributed primarily to environmental organizations, will provide the most current information about ethanol and serve as a public forum. The Environmental and Energy Study Institute (EESI) hopes to build consensus within the environmental community regarding the potential benefits of ethanol -- and particularly the expanded opportunities provided by cellulosic ethanol -- with a special focus on climate protection. Ethanol can also be a political bridge to broader alliances in support of climate initiatives.

Many in the environmental community have made strong statements in support of ethanol as a low-carbon fuel with large potential benefits to reduce life-cycle greenhouse gas (GHG) emissions. Ethanol also reduces carbon monoxide emissions and our reliance on oil, contains no sulfur and helps to eliminate smog through its use as an oxygenate for gasoline. Cellulosic ethanol, which is produced from agricultural or wood wastes, provides even greater GHG emission reductions than corn-based ethanol, promotes rural economic revitalization and offers a solution to waste disposal problems.

However, there have been concerns about ethanol ranging from volatile organic compounds (VOCs) to corporate welfare. We will address these and other issues and explore which steps are appropriate to take in support of ethanol. Please tell us your views and we will address them in "ECO."

In this issue:

- **COMMENTARY:*** Corn-Based Ethanol Does Indeed Achieve Energy Benefits, Michael Wang and Dan Santini, Argonne National Laboratory
- **BC International Receives Approval for Construction of Biomass Ethanol Plant**
- **EXCERPTS FROM RECENT STUDIES:*** Biomass Stakeholder Views and Concerns, Elizabeth Peelle, Oak Ridge National Laboratory
- **GOVERNMENT ACTIVITY:***
 - EPA Advances Two MTBE and Reformulated Gasoline Proposals
 - Senate Approves Lugar Bill to Advance Biofuel and Bioenergy Research
- **NOTABLE QUOTABLES***

*These are regular features in the newsletter

COMMENTARY

Corn-Based Ethanol Does Indeed Achieve Energy Benefits

Michael Wang and Dan Santini, Center for Transportation Research, Argonne National Laboratory

Prof. David Pimentel's 1998 assessment of corn ethanol concluded that corn ethanol achieved a negative energy balance (which is usually defined as the energy in a product minus energy used to produce the product). Unfortunately, his assessment lacked timeliness in that it relied on data appropriate to conditions of the 1970s and early 1980s, but clearly not the 1990s. Prof. Pimentel failed to take into account technology improvements over the last twenty years and their impacts on energy requirements of corn farming and ethanol production.

Technological advancements have undoubtedly helped increase productivity and product performance and reduce input energy requirement in almost every U.S. economic sector. Those of us who have been analyzing transportation-related technologies have noted the dramatic reductions in per-vehicle emissions and increases in fuel economy and vehicle performance because of vehicle technology advancements. We have found, through our analyses, that corn farming and ethanol production are no exception, benefiting significantly from technological advancements. Failure to consider this, as Prof. Pimentel's assessment did, inevitably reaches erroneous conclusions.

Problems with Prof. Pimentel's assessment are found in three key areas: energy use of corn farming, energy use of ethanol production, and failure to credit co-products from ethanol plants. With respect to the first two areas, Prof. Pimentel in his 1998 assessment used data from his 1991 and 1992 publications, despite the fact that a 1995 thorough study on the topic by the U.S. Department of Agriculture (USDA) was readily available. Further, since that time we have conducted our own study of the subject, and the USDA is currently updating its estimates. We anticipate that these studies will support our prior assumptions that progress continues to be made. The farming sector is not technologically mature, as Prof. Pimentel contends. In fact, we found that best practices in corn farming and ethanol production provide reason to believe that the improvements in energy efficiency that we identified are likely to continue.

We conducted a series of detailed analyses on energy and emission impacts of corn ethanol from 1997 through 1999. During our analyses, we researched improvements in energy intensity of corn farming and ethanol production by studying publicly available data and by contacting USDA, experts in the Midwestern farming and meat production communities, and ethanol plant designers and operators. Our research showed that corn productivity (defined as corn yield per unit of chemical input) increased by 30% between the early 1970s and mid-1990s. We also found that energy intensity of ethanol production (defined as energy use in ethanol plants per unit of ethanol produced) decreased by about 40% between the mid-1980s and late 1990s. The table below presents our results, together with Prof. Pimentel's values.

Energy Inputs for a Gallon of Ethanol

Item	Argonne	Pimentel
Corn Farming	26,700	55,300
Ethanol Production	44,300	74,300
Co-Product Credit	-15,400	0
Total	55,600	129,600
Net Energy Balance	20,400	-53,600

In the table, the value for corn farming in our analyses included energy use of powering farm machinery (tillage, irrigation, harvesting, and product drying), energy embedded in fertilizer and pesticides (production, transportation, and application), and energy use for transporting corn to ethanol plants. The value for ethanol production included energy use in ethanol plants and for transporting ethanol from plants to refueling stations.

The most contentious issue on corn ethanol perhaps is how to deal with co-products from ethanol plants. Dry milling ethanol plants produce distillers' grains and solubles together with ethanol, while wet milling plants produce corn gluten feed, corn gluten meal, corn oil, and other high-value products together with ethanol. These products are currently sold in the marketplace as animal feeds and for other uses (e.g., corn oil for cooking). While there are several ways of estimating energy and emission credits of co-products, most analysts now agree that the so-called displacement method should be used to estimate the credits. This assigns a co-product credit based on the input energy requirement of the feed product or good that the ethanol co-product displaces. With the method, we have estimated an energy credit of 15,440 Btu per gallon of ethanol. In contrast, Prof. Pimentel failed to allow any credits for co-products.

It is worth noting that the displacement method gives the least energy and emission credits to ethanol co-products. If other methods are to be used, co-product credits will be higher than that presented in the table. One of us contends that the dollar valuation of products sold should be used to allocate emissions to products produced.

We note that Prof. Pimentel fallaciously sets up a "strawman" – an assumption that those analyzing corn ethanol intend for it to entirely replace gasoline fuel. By doing so, he creates a hypothetical arbitrary situation where the quantities of co-products produced are so large as that the market obviously would not be able to absorb the quantities and therefore that co-products become onerous waste products. The situation that our study team analyzed carefully considered the reasonableness of the size of the market that could be served by ethanol production while retaining a market for co-products and avoiding excessive displacement of valuable cropland. In particular, we assumed a scenario of increasing corn ethanol production from the current level of 1.5 billion gallons a year to a level of 3 billion gallons a year by 2010. For this situation, which is the only reasonable one to consider, a co-product credit is appropriate.

Also, our analyses, and most other studies, did not credit ethanol with an octane boosting effect, which does exist when ethanol is blended in small percentages in gasoline, the dominant use of ethanol at this time. Had this effect been included for the case of use of ethanol in "low level" ethanol/gasoline blends, our benefits estimates would have been larger.

In summary, with up-to-date information on corn farming and ethanol production and treating ethanol co-products fairly, we have concluded that corn-based ethanol now has a positive energy balance of about 20,000 Btu per gallon. Our analyses have also concluded that corn ethanol achieves modest to moderate reductions in greenhouse gas emissions, relative to petroleum-based gasoline. Our analyses are documented in several publications available on request. Needless to say, we do not contend that our estimates are valid for the case in which one assumes that corn-ethanol completely replaces gasoline; such an analysis is an unrealistic academic exercise with little value for public policy debate related to continuation or moderate expansion of present corn ethanol production.

Admittedly, our studies are quite limited in the sense that they focus on energy and greenhouse gas emissions impacts of corn ethanol production. We have not explicitly addressed issues of cost effectiveness, water pollution, soil erosion, and ethical and moral issues associated with use of cropland for fuel production, while Prof. Pimentel does tackle them. However, we do implicitly acknowledge that such limits to the use of corn ethanol do exist, by refusing in our analysis to examine cases of excessive rapid expansion of corn ethanol output. The cases that we did examine were tied closely to our estimates of rates of productivity increase, such that little expansion of use of cropland was required to meet our projected expansions of ethanol production.

BC International Receives Approval for Construction of Biomass Ethanol Plant

On February 18, 2000, BC International Corporation (BCI) of Dedham, Massachusetts announced that it has received unanimous approval from the Louisiana State Bond Commission Board, for the issuance of \$120 million in industrial revenue bonds. Goldman Sachs and Lehman Brothers will act as underwriters for the bonds, which are expected to go to market within the next several weeks.

This announcement clears the way for BCI to construct and operate its first commercial biomass-to-ethanol facility in the U.S. The facility will use up to 340,000 dry tons of wastes from sugar cane and rice to produce 20 plus million gallons of ethanol annually. It will be built by Shaw Constructors, Inc. of Baton Rouge, Louisiana, and will be located 30 miles west of Lafayette in Jennings, Louisiana. Construction is expected to commence in June. Ethanol production is expected to start in February 2002, with full operation commencing in August 2002.

Additionally, by summer 2001, Masada Resource Group expects to complete a \$130 million waste-to-ethanol facility in Middletown, NY. The plant will produce nine millions gallons of ethanol per year from the municipal solid waste and sludge of over 20 neighboring communities. The Department of Energy's National Renewable Energy Laboratory has provided \$2 million to support the project.

EXCERPTS FROM RECENT STUDIES

Biomass Stakeholder Views and Concerns: Environmental Groups and Trade Associations

Elizabeth Peelle, Energy Division, Oak Ridge National Laboratory

Executive Summary

This exploratory study of the views and concerns of 25 environmental organizations found high interest and concern about which biomass feedstocks would be used and how these biomass materials would be converted to energy. While all favored renewable energy over fossil or nuclear energy, opinion diverged over whether energy crops, residues, or both should be the primary source of a biomass/bioenergy fuel cycle. About half of the discussants favored biomass "in general" as a renewable energy source, while the others were distributed about equally over five categories, from favor-with-conditions, uncertain, skeptical, opposed, to "no organizational policy."

Considerable concern was expressed in the discussions about land use implications of energy crops, especially since increasing land areas for this purpose could affect marginal and ecologically sensitive areas (wetlands, wildlife habitat) and Conservation Reserve Program (CRP) lands. The environmental impacts of developing/growing/ harvestin biomass crops and the collection of residues and wastes for conversion were discussed as

well as chemical inputs to crops, and impacts on soil, water, and air. Possible impacts upon national forests and use of forest residues drew much concern, as did use of municipal solid wastes.

Conversion technologies, particularly burning of wood and cofiring of wood or residues with coal, drew great interest and questions. About half of the discussants "had no problem" with burning trees, while others expressed concerns about bad experiences with incineration.

Most discussants were full of questions about every aspect of bioenergy fuel cycles and asked for more information. We found a highly variable information base about biomass and bioenergy which affected the study design. Discussants asked for comparisons among biomass sources and between biomass and other fuels.

Issues raised most often within our discussion agenda included sustainable agriculture and forestry, sustainable energy systems, and biodiversity. More issues were volunteered outside of the discussion agenda: land for food vs. energy, subsidies for fossil and nuclear energy vs. equalizing the playing field for renewables, centralized vs. distributed energy systems, how bioenergy fits with utility restructuring, visions of bioenergy futures, who will benefit from biomass programs and subsidies, and scale and size issues.

Values and concerns driving these responses appear to be within the context of moving toward an energy future based upon renewable resources. Other driver issues included concern about global warming and the global carbon balance; developing sustainable energy, agricultural and forestry systems; and doing so in ways that enhance (or at least do not further damage) biodiversity.

Internal organizational issues and strategies are already impacting these stakeholders' reactions to and interest in bioenergy. For instance, groups working on global warming policy and legislation support development of bioenergy. The Sierra Club's campaign to end logging in the national forests and the several campaigns to upgrade or close old coal power plants (Izaak Walton League and others) probably raise obstacles or deflect policy away from biomass. Concern over effects of global warming on wildlife habitat (World Wildlife Fund and National Wildlife Federation) may push toward acceptance of biomass programs.

Sensitive issues and those which raise intense concerns have the potential to slow or stop program development. These may include: municipal solid waste (MSW), genetically modified organisms (GMOs), forest and forest residue use, cofiring as incineration, cofiring which extends the life of old polluting coal plants, and certain aspects of land use involving marginal and CRP lands.

Most of these stakeholders can be described as waiting hopefully for the promise of bioenergy to be demonstrated, but a sizeable minority are (influential) skeptics about the prospects. All want to have more information and analysis of the status, progress and prospects of biomass and bioenergy. The window of receptivity to information and dialogue is open now, but probably not for long.

Recommendations propose research and analysis to produce balanced information on net benefits of bioenergy fuel cycles, tailored outreach to external stakeholders, extended dialogue and involvement of stakeholders including periodic bioenergy/biomass roundtables, and developing the vision of bioenergy futures and various scenarios for achieving these futures.

GOVERNMENT ACTIVITY

EPA Advances Two MTBE and Reformulated Gasoline Proposals

On February 15, 2000, the Environmental Protection Agency advanced two proposals regarding MTBE and the reformulated gasoline (RFG) program to the White House Office of Management and Budget. This action will likely provide momentum for Congress to curb MTBE use. Several bills have been introduced, including:

- H.R. 1367, sponsored by Rep. Franks (R-NJ), to amend section 211 of the Clean Air Act to prohibit the use of MTBE.
- H.R. 1398, sponsored by Rep. Pombo (R-CA), to amend section 211 of the Clean Air Act to prohibit the use of certain fuel additives.
- H.R. 1705, sponsored by Rep. Pallone (D-NJ), to amend the Clean Air Act to waive the oxygenate requirement for RFG and to phase-out MTBE.
- H.R. 3449, sponsored by Rep. Greenwood (R-PA), to amend the Clean Air Act to provide for a State waiver of the requirements concerning the oxygen content of gasoline.
- S. 645, sponsored by Sen. Feinstein (D-CA), to amend the Clean Air Act to waive the oxygenate requirement for RFG.
- S. 1037, sponsored by Sen. Boxer (D-CA), to amend the Toxic Substances Control Act to provide for a phaseout of MTBE.
- S. 1886, sponsored by Sen. Inhofe (R-OK), Sen. Feinstein and Sen. Smith (R-NH) to amend the Clean Air Act to permit the Governor of a State to waive the oxygenate requirement for RFG.

Senator Bob Smith, Chairman of the Senate Environment and Public Works Committee has indicated that he intends to move soon on his MTBE phase out bill, S. 1886.

The EPA's first proposal is to regulate MTBE under the Toxic Substances Control Act, which provides EPA with the authority to prohibit chemicals and substances that pose a risk to health or the environment. The second proposal would relax certain RFG provisions regarding volatile organic compound emissions, as long as carbon monoxide (CO) emissions are reduced. Last year, the National Academy of Sciences concluded that CO is responsible for up to 20 percent of vehicle ozone pollution, but the RFG program lacks a CO standard.

Though the second phase of the RFG program is scheduled to begin early this year, the 23-state members of the Governors' Ethanol Coalition have requested that the Administration delay its implementation until after Summer 2000, in hopes that a resolution regarding ethanol's role will be reached.

Senate Approves Lugar Bill to Advance Biofuel and Bioenergy Research

The U.S. Senate unanimously passed Senator Richard Lugar's (R-IN) legislation, S. 935, the National Sustainable Fuels and Chemical Act. His bill authorizes \$49 million a year for six years to further research on producing fuels, chemicals and electricity from cellulosic biomass. The companion bill, H.R. 2827 sponsored by Representative Thomas Ewing (R-IL) and a similar bill, H.R. 2819, sponsored by Representative Mark Udall (D-CO), were introduced in the House during the first week of September and are still pending.

NOTABLE QUOTABLES

"The oxygen standard must be maintained as originally incorporated in the Clean Air Act Amendments of 1990. There is no debate that gasoline with ethanol as the oxygenate has achieved all of the goals envisioned by those who developed and passed the Clean Air Act. We do not want to backslide by eliminating the oxygenate requirement and allow more toxics into our gasoline. The challenge is to allow ethanol to reach its full market potential and air quality potential in all RFG markets," Governors' Ethanol Coalition.

"We Americans now have the capacity to change the time-worn assumptions underlying oil markets. Plants constitute a renewable, living and energy-rich raw material for producing fuels and chemicals that are often functionally and environmentally superior to their petroleum derived counterparts. By replacing as little as 10 percent of oil imports with domestically produced biofuels and biochemicals, America will diversify its energy portfolio and reap enormous economic, strategic and environmental benefits," Senator Richard Lugar (R-IN), February 29, 2000.

EESI's "ECO" Staff

Writer: Libby Jones

Editors: Carol Werner and Doug Howell

All comments regarding ECO should be made to Libby Jones at ljones@eesi.org or (202) 662-1897.

Please visit us at www.eesi.org.

Ethanol Climate Protection Oil Reduction

A Public Forum

Issue VII

April 3, 2000

Welcome to "ECO." This newsletter, distributed primarily to environmental organizations, will provide the most current information about ethanol and serve as a public forum. The Environmental and Energy Study Institute (EESI) hopes to build consensus within the environmental community regarding the potential benefits of ethanol -- and particularly the expanded opportunities provided by cellulosic ethanol -- with a special focus on climate protection. Ethanol can also be a political bridge to broader alliances in support of climate initiatives.

Many in the environmental community have made strong statements in support of ethanol as a low-carbon fuel with large potential benefits to reduce life-cycle greenhouse gas (GHG) emissions. Ethanol also reduces carbon monoxide emissions and our reliance on oil, contains no sulfur and helps to eliminate smog through its use as an oxygenate for gasoline. Cellulosic ethanol, which is produced from agricultural or wood wastes, provides even greater GHG emission reductions than corn-based ethanol, promotes rural economic revitalization and offers a solution to waste disposal problems.

However, there have been concerns about ethanol ranging from volatile organic compounds (VOCs) to corporate welfare. We will address these and other issues and explore which steps are appropriate to take in support of ethanol. Please tell us your views and we will address them in "ECO."

In this issue:

- **COMMENTARY:*** Phasing Out MTBE and Promoting Biomass Ethanol: A Policy Solution, Stephen Gatto, BC International Corporation
- **Switchgrass: An Uncultivated Resource**
- **EXCERPTS FROM RECENT STUDIES***
- **Government of India Will Permit the Use of Ethanol**
- **GOVERNMENT ACTIVITY:***
 - House Addresses Reformulated Gasoline Program
 - Administration Acts to Boost Ethanol and Reduce MTBE
- **NOTABLE QUOTABLES***

*These are regular features in the newsletter

COMMENTARY

Phasing Out MTBE and Promoting Biomass Ethanol: A Policy Solution

By Stephen Gatto, BC International Corporation

The current debate over the federal 2% oxygenate standard for reformulated gasoline and MTBE is at a critical juncture. Our nation is faced with a choice— whether to increase our use of petroleum-derived fuels, or to increase the use of emerging renewable fuels, such as ethanol made from cellulosic biomass, that would reap environmental and economic benefits. Now is the time to voice your support for an environmentally sound solution that promotes the use of sustainable renewable fuels, such as biomass ethanol.

Renewable fuels, such as biomass ethanol, provide much broader benefits than reformulated gasoline alone. For instance, the biomass ethanol industry provides a sustainable alternative to the landfilling or burning of biomass wastes such as agricultural residues, wood thinnings, and municipal waste. In terms of air quality, the California Air Resources Board Report, "Air Quality Impacts of the Use of Ethanol in California Reformulated Gasoline" finds that the use of ethanol-based gasoline (2% oxygen) compared with 2003 non-oxygenated fuel provides for near identical CO and NOx emissions and ozone level reductions, and a slight increase in acetaldehyde. The use of ethanol-based gasoline would also continue reductions in benzene, butadiene, and formaldehyde emissions. Finally, unlike petroleum-based alternatives, biomass ethanol promotes sustainable economic development, increased jobs, greater fuel diversity, and mitigates global warming.

The oxygen standard is seen by some as a barrier to removing environmentally problematic MTBE from the gasoline supply. But the standard also supports a current market for ethanol, a safer gasoline additive that performs the same oxygenate function without the groundwater risk posed by MTBE. Despite this conflict, the phase-out of MTBE and the increased use of renewable fuels are not opposing goals. As we consider the current dilemma, precipitated by the growing MTBE groundwater problems, we need to focus on thoughtful policy measures --- specifically the combination of an oxygenate waiver and a renewable fuels standard --- that will help to manage the MTBE problem in an environmentally safe and cost effective manner.

A 1% renewable fuel standard for cellulosic biomass ethanol combined with a waiver for the oxygenate requirement is an example of such an approach. This policy would allow states to gain a waiver from the oxygenate requirement in exchange for agreeing to meet a renewable fuel standard. The requirement would grow slowly, beginning at 0.1% in 2002, and would increase 0.1% annually until 2005. It would then increase by 0.2% annually until reaching a cap at 1.0% in 2008. The 1% biomass ethanol standard would provide one instrument for achieving the President's goal of tripling U.S. use of biobased products and bioenergy by 2010. It would also provide an environmentally safe, clean burning oxygenate that would boost the domestic economy. The widespread introduction of a domestic fuel would also help to reduce demand for imported oil, thereby insulating fuel consumers from future gasoline price spikes. For instance, the price of gasoline has risen over 50% in the past several months due to reduced international petroleum production.

The 1% biomass ethanol standard would be both flexible and attainable so that energy companies would have adequate time to integrate renewable fuels into their gasoline supplies. Put into perspective, the gross volume increase in renewable fuels that would result over the lifetime of a 1% biomass ethanol standard would be significantly less than the forecasted increase in hydrocarbon gasoline consumption over the same period. Moreover, the standard would provide gasoline suppliers with the flexibility to meet the standard through nationwide averaging over the course of a year. To further increase flexibility, credit trading with other suppliers would be permitted. The standard would also grant the U.S. Environmental Protection Agency (U.S. EPA) and U.S. Department of Agriculture the authority to waive the renewable fuels standard for up to one year at a time if supply or other issues were likely to result in fuel shortages and price spikes. However, experience illustrates that the increased use of biomass ethanol will increase the supply of gasoline, reduce dependence on imports, generate increased competition and innovation among fuel suppliers, and actually reduce the cost of gasoline to the consumer.

While some critics may argue that the repeal of the oxygenate requirement is all that states need to protect air and water quality, they are ignoring the many additional life cycle benefits of renewable fuels. The U.S. EPA Blue Ribbon Panel that investigated MTBE in 1999 noted that the oxygenate requirement "sought to advance several policy goals (energy security and diversity, agricultural policy, etc.)" in addition to clean air benefits. Recognizing that a discussion of these benefits was outside the scope of its deliberations, the Panel stated that if the oxygenate requirement were removed, "Congress will likely seek other legislative mechanisms to fulfill these other policy interests."

The 1% biomass ethanol standard would help to achieve the broader policy goals alluded to by the Blue Ribbon Panel. Combined with a waiver, the standard provides states that use large quantities of MTBE with the ability to seek a waiver from the oxygenate requirement, and it supports the continued growth of renewable fuels. It also gives gasoline suppliers far more flexibility to cost effectively blend clean-burning gasoline than would the phase out of MTBE combined with the preservation of the oxygenate requirement. The commercialization of biomass ethanol technology would also allow for ethanol production in every region of the country --- whether in the grain rich Midwest, the rice-growing and forested regions of California, the paper and pulp industry of the Northeast, or any other state with a steady supply of biomass waste or a potential to grow dedicated biomass crops. The 1% biomass ethanol standard would launch the creation of a truly national renewable fuels industry with local production centers across the country.

Support for biomass ethanol is gaining momentum. Recently, Getty Petroleum wrote to Senator Thomas Daschle (D- SD) voicing its support of specific measures to support biomass ethanol. The Northeast gasoline marketer uses 40 million gallons of ethanol as a gasoline additive each year, citing its economic and environmental advantages as well as increased customer satisfaction. However, further broad stakeholder support is needed to enact a 1% biomass ethanol standard combined with a waiver for the oxygenate requirement. Broad stakeholder support will not only ensure the timely phase out of MTBE, but will also help our nation build a bridge to a sustainable energy future.

If you are in support of the 1% cellulosic biomass ethanol standard, I urge you to write to Senator Daschle or contact Sarah Woodhouse at 617-443-1333 or sarah_woodhouse@efinc.com for more information.

Switchgrass: An Uncultivated Resource

Switchgrass may be this country's energy crop of the future. As a native of the midwestern plains, switchgrass is not only resistant to many plants and pest diseases, but it is able produce high yields with little fertilizer. Additionally, switchgrass is extremely adaptable, able to withstand poor soils, flooding and drought, thereby allowing it to grow throughout the eastern United States, a region where corn is typically unsuccessful.

Penetrating over ten feet into the ground, switchgrass' extensive root system allows it to find water efficiently and prevent erosion by binding onto soil even in winter months. As a perennial crop, switchgrass can be cultivated semiannually for more than ten years before replanting, allowing it to control erosion throughout the year and add organic matter to the soil. Its large roots and high growth rate also help to increase soil fertility and sequester carbon better than most other crops.

Switchgrass is an especially attractive biomass resource, for, unlike corn, the entire plant may be used for energy production. Test plots of switchgrass at Auburn University have produced up to 15 tons of dry biomass per acre, and five-year yields average 11.5 tons – enough to make 1,150 gallons of ethanol per acre each year. Oak Ridge National Laboratory physiologist Sandy McLaughlin, who leads the switchgrass research effort, states that “ethanol from switchgrass can produce about five times more energy than you put in. When you factor in the energy required to make tractors, transport farm equipment, plant and harvest, and so on, the net energy output of switchgrass is about 20 times better than corn's.”

There is great potential for switchgrass to be a strong competitor in the biomass market, for the infrastructure needed to grow and cultivate switchgrass is already in place. Farmers are experienced in raising switchgrass for their livestock and erosion control and can use conventional equipment for cultivation, cutting and baling. Its high utility and flexible rotational schedule also give farmers security in knowing that a switchgrass crop is viable and will be put to good use. Together with its soil protection benefits and potential to provide additional income and rural development, switchgrass offers a great opportunity for farmers.

Researchers across the country are currently working to increase switchgrass yields and make it even more adaptable to a wide range of growing conditions without the need for nitrogen and other chemical fertilizers. Though it offers a valuable resource for renewable fuels like ethanol, switchgrass' greatest near-term potential remains in its use in existing plants, where it is co-fired with coal to produce electricity.

EXCERPTS FROM RECENT STUDIES

America's Global Energy Solutions, a 1999 study conducted by the Tellus Institute and prepared by Stephan Bernow, Karlynn Cory, William Dougherty, Max Duckworth, Sivan Kartha, and Michael Ruth, evaluates the nation's carbon emission reduction policies to meet the Kyoto target under 1999 baseline projections. Those policies and measures that would best stimulate rapid adoption of more energy-efficient technologies and low-carbon energy resources were analyzed for each sector and include:

"Research and development for renewable fuels and associated vehicle technologies; renewable fuels commercialization programs in various market segments, including public sector procurement programs."

"A 10 percent contribution of cellulosic ethanol as a blend with gasoline by 2010, based on a carbon content standard and RD&D expenditures of \$150 million per year for five years. The delivered cost of ethanol comes down to about \$1.75 per gallon gasoline equivalent by 2010."

"The carbon content standard met by cellulosic ethanol. [While it] incurs a net cost, it is a measure that begins a process of progressive technological improvement to provide a viable and economic option for the deeper carbon emissions reductions needed later."

Government of India Will Permit the Use of Ethanol

New Delhi, 20 March: The Government of India Minister of Petroleum and Natural Gas, Ram Naik has approved the use of ethanol produced from sugarcane and other agricultural residues such as bagasse as an additive to motor fuels to reduce vehicular emissions. Three pilot projects will be implemented in the states of Maharashtra, Uttar Pradesh, and Tamil Nadu.

The announcement was made following a seminar, "ETHANOL 2000: Sustainable Fuel for the Transport Sector," organized by Winrock International India and hosted by the United Nations Development Programme (UNDP) and the Indian Renewable Energy Development Agency (IREDA). Inaugurating the meeting, Government of India Minister for Chemicals and Fertilisers Suresh Prabhu said that the world is already familiar with ethanol use, citing applications in the United States, France, Sweden and Brazil. "One of the most promising strategies is the use of ethanol as a renewable fuel to reduce environmental pollution from India's transport sector while creating new jobs in the rural communities," Minister Prabhu stated. "If ethanol use is to be encouraged in India, its operation must be economically viable and market competitive."

In the last decade, technological advances have lowered the cost of producing high quality fuels and chemical products from plant matter while environmental regulations

have raised the cost of manufacturing and using petroleum-derived products. Mounting evidence of the potential contribution of gasoline and diesel combustion to climate change and regional air pollution has renewed interest in long term, sustainable fuel solutions for the transport sector.

The ETHANOL 2000 seminar provided information on emerging technologies for ethanol produced from non-traditional biomass feedstocks. These feedstocks include resources high in cellulosic content such as sugarcane bagasse, trees, forestry processing residues, grasses, other agriculture field residues, wastepaper, and municipal solid waste. The advantage of biomass feedstocks is that they are low cost and available in large quantities in almost every geographic region.

Indian sugar and alcohol industry representatives and policy makers from government, agriculture, science, industry, and environment participated in a lively exchange of information with international specialists who shared their experiences on the economic and environmental benefits of ethanol. Speakers from Brazil, Sweden and the US explained how ethanol has helped to create economic development opportunities for urban and rural communities, while protecting the environment and human health by reducing air pollution. The seminar ended with a call for the formation of the "India Ethanol Coalition" which will continue to expand the ethanol industry in India.

Contact: Deborah E. Boldt at DebBoldt@aol.com, Winrock International India, EESI ethanol representative and *ECO* reporter.

GOVERNMENT ACTIVITY

House Addresses Reformulated Gasoline Program

On March 2, the Subcommittee on Health and the Environment of the House Committee on Commerce held an oversight hearing to address the national implementation of the Reformulated Gasoline (RFG) Program. Four panels with a total of fourteen witness testified, including Rep. Bob Franks (R-NJ) and Rep. Ray LaHood (R-IL), who advocated for both phasing out of MTBE and maintaining the oxygenate mandate. Mr. Thomas Skinner, Director, Illinois Environmental Protection Agency, stated his support for expanding the use of ethanol and sited the significant gains made by the oxygenate requirement.

Conversely, Jason Grumet, Executive Director, Northeast States for Coordinated Air Use Management, stressed that the RFG's achieved air quality benefits would be maintained if the oxygen standard were lifted and MTBE phased out. Blake Early, Environmental Consultant, American Lung Association, echoed Grumet's sentiments and asked Congress to repeal the two percent oxygen mandate for RFG in the Clean Air Act. Further action regarding the future of the RFG program remains to be determined.

Administration Acts to Boost Ethanol and Reduce MTBE

As of March 20, 2000, the Clinton-Gore Administration will take action to significantly reduce or eliminate MTBE use and increase the use of renewable fuel alternatives like ethanol. EPA Administrator Carol Browner and Agricultural Secretary Dan Glickman released the legislative framework that aims to:

- Amend the Clean Air Act to provide authority to significantly reduce or eliminate the use of MTBE.
- Ensure that air quality gains are not diminished should MTBE use be reduced.
- Replace the oxygenate requirement in the Clean Air Act with a renewable fuel standard for all gasoline.

Senator Tom Daschle (D-SD), the original author of the RFG program provisions of the Clean Air Act, stated that the Administration's initiative could more than triple ethanol use over the next decade. Establishing a renewable fuels standard will not only reduce our nation's growing dependence on foreign oil, he said, but it will provide an economic boost to farmers and protect the environment.

Browner also announced EPA's regulatory action to phase down MTBE by issuing an Advance Notice of Proposed Rulemaking under Section 6 of the Toxic Substances Control Act.

NOTABLE QUOTABLES

"The announcement today by administration officials is great news for farmers, clean air, clean water, and efforts to reduce our dependence on foreign oil. Under the administration's proposed framework, we can more than triple the use of ethanol over the next decade," Senator Tom Daschle (D-SD), March 20, 2000.

"We believe that the reformulated gasoline oxygen requirement should be maintained and that the proper benefit for the use of ethanol should be incorporated into the RFG program," Thomas Skinner, Director, Illinois Environmental Protection Agency, March 2, 2000.

"The Administration, in short, is not going to take or support any action that undermines the continued growth of ethanol and other renewable fuels as we proceed into the 21st century," Agricultural Secretary Dan Glickman, March 20, 2000.

EESI's "ECO" Staff

Writer: Libby Jones

Editors: Carol Werner and Doug Howell

All comments regarding can be emailed to eco@eesi.org or faxed to 202-628-1825.

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Ethanol Climate Protection Oil Reduction

A Public Forum

Issue VIII

May 2, 2000

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In this issue:

- **COMMENTARY:***
 - Minnesota Co-ops: An Alternative to Agri-Business
 - The Western Biomass Consortium
- **E85 Credit Review**
- **EXCERPTS FROM RECENT STUDIES:*** Ability of U.S. Ethanol Industry to Replace MTBE
- **Canada Advances in Low-Carbon Ethanol Production**
- **GOVERNMENT ACTIVITY:***
 - Senate Reviews Future of Renewable Fuels
 - Ethanol Workshop Series Kickoff
- **Ethanol Plant Project in Washington State**
- **NOTABLE QUOTABLES***

*These are regular features in the newsletter

COMMENTARY

Minnesota Co-ops: An Alternative to Agri-Business

Ralph Groschen, Senior Agricultural Marketing Specialist, Minnesota Department of Agriculture

Ethanol Production -vs.- Market Penetration

Year	(mm = million) Production	Estimated MN Demand	% MN Ethanol Produced Here
1994	24 mm gal.	125 mm gal.	20% of total
1997	112 mm gal.	177 mm gal.	63% of total
1999	190 mm gal.	220 mm gal.	86% of total
GOAL	240 MM GAL.	240 MM GAL.	100% OF TOTAL

Ethanol Plants & Capacities

City & (plant name)	Capacity Gallons/year	mm. bushel corn/year	Start-up year	New Generation Co-op Members
Marshall (MCP)	32 million	12.8 *	1988	4,000
Morris (DENCO)	15 million	3.0	1991	300
Winnebago (Corn Plus)	19 million	7.2	1994	650
Winthrop (Heartland)	15 million	6.0	1995	502
Benson (CVEC)	19 million	7.2	1996	650
Claremont (Al-Corn)	15 million	6.0	1996	358
Bingham Lake (Ethanol2000)	15 million	6.0	1997	244
Buffalo Lake (MN. Energy)	12 million	4.8	1997	325
Melrose (Kraft)	2.6 million	cheese whey	1986	(private)
Dundas (Kor Ethanol)	0.5 million	cheese whey	1992	(private)
Preston (Pro-Corn)	15 million	6.0	1998	170
Luverne (Corn-er Stone)	15 million	6.0	1998	201
Little Falls (CMEC)	20 million	7.5	1999	854
Albert Lea (Exol/Agri Resources)	15 million	6.0	1999	496
St. Paul (Gopher State Ethanol)	15 million	6.0	1999	(private)
TOTAL	225 mm gal.	84.5 mm bus.	8,750 memb.	

The results of Minnesota's Ethanol Program include:

- 1) 10% of the 2.5 billion gallons of gasoline we use each year is replaced by ethanol.
- 2) 15 commercial ethanol production facilities in the state produce a total of more than 220 million gallons of ethanol each year.
- 3) Twelve, of our fifteen, ethanol plants are New Generation Coop (NGC) type corn-milling operations with over 8,000 local farmer members.
- 4) The toxic content of gasoline and exhaust emissions have been significantly reduced.

NGC facilities were built with over two hundred million dollars of local equity capital raised by farmers and local business in a dozen rural communities through out the state. These NGC organizations are unique in that they are designed to:

- 1) be purchased by farmers to process member crops,
- 2) return more cash to farmers than conventional markets would provide,
- 3) be controlled by farmer boards so that farm profits remain a top priority, and
- 4) create local jobs and economic development.

Ethanol, livestock feed, carbon dioxide and industrial alcohol, from these plants provide a local market for about 10% of the state's annual 750 million bushel corn crop. An additional 7% of the state's crop is processed into industrial cornstarch, sweeteners and other feed and industrial products. Before the development of this industry about 2/3 of the state's corn crop was held for export at some of the lowest cash prices in the nation. Perennial low prices contributed to a significant decline in farm income and the rural economy of the state.

Today this NGC milling industry contributes over \$300 million annually to the state's economy. These facilities have created an economic boon to local communities providing increased demand for local goods and services, improved corn markets and hundreds of high paying jobs.

The program is an example of the potential for local farmers and rural businesses to take an active roll in the processing and marketing of their own crops. This is vertical integration from the bottom up. Many farmers see it as an alternative to the social and economic depression stemming from the impact of mergers, consolidation and market power exercised by the agribusiness community.

This new NGC industry is not out of the woods yet. Members are keenly aware of the risky nature of their investments as they find themselves in direct competition with some of the largest agribusiness and petroleum corporations in the country. But farmers apparently consider the risk presented by the status quo greater than sharing the risk of investment with hundreds of other farmers in the same position.

The prospect of ethanol production from cellulose derived from perennial crops holds great promise for lower costs and greater productive capacity. When that day comes these NGC's plan to have the capital and the organizational capacity to take advantage of the opportunity to process and market their crops. If so, they may share in the profits now enjoyed by investors who live far from the communities where the crops are grown.

Stay Tuned!

The Western Biomass Consortium

Barbara Charnes, Executive Director

The health of western U.S. forests is of increasing concern to many diverse groups, including local residents, environmentalists, scientists, biopower industrialists and health officials. For decades, suppression of wildfires has caused a large, abnormal buildup of excess biomass material in these forests. Reducing excess biomass through the production of fuel ethanol and biomass power along with other uses for small diameter trees is receiving more attention. These

industries can provide long-term sustainable options by absorbing the enormous amounts of material that must be removed to improve forest ecosystem health and permit the reintroduction of natural fire. A partial shift to renewable energy would particularly benefit rural areas. A viable biomass energy industry would create jobs and cheaper power. At the same time, the use of fossil fuels is reduced by substituting gasoline with ethanol in transportation fuels, and the use of coal is reduced by substituting it with clean biomass-produced electricity. The conversion of large quantities of biomass to power and transportation fuels will increase energy available at reduced cost to rural areas, mitigate air pollution and greenhouse gas emissions, generate employment in economically depressed rural areas, and improve energy efficiency.

The Western Biomass Consortium (WBC) was established in July 1997, to encourage the development of biomass electricity, fuel ethanol, and other products from biomass available in the western United States. Such regionally specific feedstocks include excess forest residue (small diameter trees) and urban waste material.

The WBC is essentially an educational program designed to further the development of biomass energy by pulling together people who otherwise never talk to each other and don't know each other's technologies. WBC outreach activities and materials help members understand the overlap of forest health concerns, energy production opportunities, and ways to help each other achieve goals.

WBC members recognize that we are dealing with highly contentious issues. One important outcome of the WBC meetings is the ongoing development of guidelines for projects utilizing small diameter forest material. The following principles are being considered for adoption:

WBC promotes actions and activities that:

- Promote economic use of biomass as a means of restoring and maintaining sustainable ecosystems;
- Promote renewable, sustainable, domestically-produced energy based on biomass;
- Restore and protect the values of forests and woodlands that develop and sustain their historical range of physical characteristics, species, and processes;
- Restore and protect forests and woodlands that provide habitats for a diversity of wildlife species, that function as stable watersheds, and that retain their scenic beauty;
- Reduce the wildfire risk to forests, adjoining lands and communities;
- Identify current or developing technologies, enterprises and programs that can aid rural economic development;
- Recognize and respect the environmental, biological, social and cultural character of the affected ecosystem and places;
- Respect the distinctions between private, public and tribal lands, as well as any special legal status that exists;
- Are planned and carried out in collaboration with the people whose environmental, economic, and social opportunities are affected;
- Encourage continuous improvement in forest and woodland management, energy production and use, and sustainable community development through scientific research and development, adaptive management, effective monitoring, and other forms of collaborative learning.

It is our strong belief that these issues will only be addressed successfully if all parties can find some common ground. Through the WBC we are creating a strong support base by gathering people from different places and disciplines to share information and resources, seek common ground and encourage the national shift to renewable energy.

E85 Credit Review

By September of this year, U.S. Department of Transportation National Highway Traffic Safety Administration (DOT/NHTSA) will submit a review of the dual-fuel CAFE credit to Congress. The report will include an assessment of the effectiveness of the credit in promoting the use of alternative fuels, especially that of E85, the alternative fuel blend of 85 percent ethanol and 15 percent petroleum. DOT/NHTSA is currently in the final stages of preparing a Federal Register notice to seek public comments on the credit. Primary issues of concern include credits for E85 vehicles, the program's costs and benefits, infrastructure development, and fuel use.

Many environmentalists are concerned, however, that a CAFE credit for flexible fuel vehicles (FFVs), which are powered by any E85-gasoline mix, impedes effective fuel economy regulation. Though E85 compatible vehicles have been introduced to the marketplace, a lack of a fueling requirement and limited ethanol distribution have caused most E85 vehicles to run on traditional gasoline. Consequently, if automobile manufacturers fulfill their CAFE requirements through vehicles that provide no emissions reduction benefits as a result of an E85 CAFE credit, overall emissions will actually increase.

According to leading environmentalists, an E85 credit could result in a maximum 1.2 mpg decrease in overall CAFE standards, which would eventually lead to billions of gallons of increased gasoline consumption each year. While adhering to these CAFE requirements, automakers could essentially produce two sport utility vehicles for every credited FFV. The question now is whether this loophole can be overcome and which enforcement and regulation strategies will be most effective.

The Minnesota E85 Project, which began in January 1997, serves as a national pilot for marketing E85 and FFVs. The Twin Cities, Chicago and Denver have been working to build the first sustainable markets for E85. By Spring 2000, 30 metro and 10 greater Minnesota locations will supply E85. The Minnesota E85 Project is lead by the Minnesota E85 Team, a private-public partnership including the U.S. Department of Energy, the Governor's Ethanol Coalition, the National Corn Growers Association, American Lung Association of Minnesota, and the automakers.

The Department of Public Service, the local Clean Cities stakeholders, agriculture and industry partners have designed a cost-shared plan that will encourage drivers to refuel FFVs with the E85 fuel. This project provides an opportunity to demonstrate the viability of programs that promote ethanol and E85 vehicle use.

Additionally, the first federal multi-alternative fuels station was recently opened in Washington, D.C. The Citgo station will sell E85 and compressed natural gas in addition to regular gasoline. The E85 fuel will cost the same as a comparable conventional gasoline.

EXCERPTS FROM RECENT STUDIES

Ability of the U.S. Ethanol Industry to Replace MTBE

On March 20, 2000, AUS Consultants released "Ability of the U.S. Ethanol Industry to Replace MTBE," a study prepared for the Governor's Ethanol Coalition. The following are excerpts from the report:

"If the demand for ethanol increased significantly, improvements in operating efficiencies could readily – and inexpensively – improve industry-wide capacity utilization to an average of 90 percent.... Industry sources indicate that an estimated 134 million gallons of new ethanol capacity (121 million gallons of production at a 90 percent utilization rate) is currently under construction and will be brought on line within the next 12 to 18 months."

"The expansion plans discussed above will result in total production of more than 3.4 billion gallons by 2004, 313 million gallons more than will be needed to replace MTBE and meet all other uses of ethanol."

"The ethanol engineering firms contacted for this study report that one-third of new capacity will use biomass to produce ethanol. These plants will use a wide range of feedstocks including forest residues and wood waste, non-traditional agricultural products such as sweet potatoes and rice straw, and municipal sewage waste. The technology supporting biomass conversion for ethanol production is emerging. Maturation and commercialization of biomass conversion technology is expected to provide an almost limitless potential ethanol production."

Canada Advances in Low-Carbon Ethanol Production

Iogen Corporation, a world leader in the clean fuels industry, is building the only biomass-ethanol plant in Canada, in partnership with Petro-Canada, Technology Partnerships Canada, and the Climate Action Fund Team. Plant construction started in May 1999 and ethanol production is expected to begin in August this year. The facility initially will utilize agricultural waste from wheat, oat, barley, and corn stover to produce ethanol, and may expand to soy and switchgrass resources. Co-products include lignin, which will be used for on-site power generation, and sugars used for higher value products.

Based in Ottawa, Canada and privately owned, Iogen produces enzymes that are sold around the world and used in many applications including pulp and paper textiles, animal feed and grain processing industries. They are a leading developer of technology to make cellulose based renewable fuel, which is estimated to provide up to 90 percent emissions reductions over gasoline.

Iogen Corporation also will help to assemble an Ethanol Vehicle Challenge (EVC) throughout Ontario in May 2000. EVC is an advanced technology competition in which teams from at least 14 universities will compete in converting gasoline trucks, donated by General Motors, to vehicles powered by E85. This event is intended to raise awareness of ethanol as a clean fuel for the future and stimulate Ontario's ethanol industry.

GOVERNMENT ACTIVITIES

Senate Reviews Future of Renewable Fuels

The Senate Agriculture, Nutrition and Forestry Committee, chaired by Senator Richard Lugar (R-IN), held a hearing on April 11, 2000 to address "the MTBE crisis and the future of renewable fuels." Two panels of witnesses testified, including Robert Perciasepe, Assistant Administrator for Air and Radiation, U.S. Environmental Protection Agency; Mark Mazur, Director, Office of Policy, U.S. Department of Energy; Trevor Guthmiller, Executive Director, American Coalition for Ethanol; and Jason S. Grumet, Executive Director, Northeast States for Coordinated Air Use Management. Testimony was also provided by Keith Collins, Chief Economist, U.S. Department of Agriculture; Honorable Thomas Vilsack, Governor of Iowa, Chairman, Governor's Ethanol Coalition; Nathan Kimpel, President, New Energy Corporation; Rus Miller, Chief Operating Officer, Arkenol, Inc.; and David Morris, Vice President, Institute for Local Self Reliance.

Witnesses emphasized the need to increase ethanol use and production as a vehicle towards national security and environmental protection. Biomass-based ethanol emerged as an especially attractive renewable fuel alternative. The future of the Reformulated Gasoline (RFG) program, however, remains as a particularly controversial issue. "The question is what kind of legislation is needed to facilitate [MTBE's] departure and whether that legislation will be based upon consideration of all of the environmental and energy security issues involved," stated Committee Chairman Dick Lugar.

Ethanol Workshop Series Kickoff

On April 19, 2000, a one-day workshop entitled "A Conversation about Ethanol in the Northwest: Exploring Fuel Ethanol, Climate Change, Energy, and Other Sustainability Issues" was held in Portland, Oregon. Sponsored by the U.S. Department of Energy's (DOE) Office of Fuels Development and the Northwest Regional Biomass Program, the workshop focused on fuel ethanol production and market opportunities in Oregon and Washington. The workshop also discussed emerging technologies that produce ethanol from nontraditional biomass feedstocks.

Two "strawman" proposals were considered during the workshops, which looked at the possibility of ethanol production from agricultural waste and forest waste. On-going discussion on these proposals are expected.

Oregon's ethanol workshop was the first in a series of eight, sponsored by DOE, which will address barriers and solutions to further developing a biomass-ethanol industry. Other workshops are planned in Columbus, Ohio on May 10 and Golden, Colorado on June 13, as well as New York, Pennsylvania, Texas, South Carolina, and Indiana.

Ethanol Plant Project in Washington State

Pacific Rim Ethanol, LCC recently announced plans to build a 40 million-gallon ethanol plant in Moses Lake, Washington. Ritzville Warehouse Company, a cooperative of 1,100 farmers, will contribute \$122 million for its construction. At a time when grain prices are drastically low, the facility offers new economic hope for Washington's farmers.

The plant will utilize the abundance of barley and wheat crops in Washington and will produce wheat gluten, animal feed, and alcohol in addition to ethanol. Construction is scheduled to begin in July 2000 and Pacific Rim anticipates being fully operational by late 2001.

Climate protection advocates in the Northwest now are beginning to have very preliminary discussion with the Pacific Rim to explore the possibility of adding some capacity for cellulose-to-ethanol production. The environmental, business and state stakeholders have identified a list of questions and tasks that need to be addressed in order to evaluate the feasibility of cellulosic ethanol. The basic infrastructure elements appear to be in place and once initial studies and analysis have been conducted, serious negotiations are expected.

Missouri, April 28- The Northeast Missouri Corn Growers Association announced the grand opening of Missouri's first ethanol plant. Located just outside of Macon, Missouri, the farmer cooperative plant will produce 15 million gallons of ethanol from 6 million bushels of corn each year. The plant will also produce over 100 million pounds of high quality livestock feed.

NOTABLE QUOTABLES

"The promise of biomass as a source of energy has an analogy in the possibilities that were created when we began to be able to make integrated circuits out of sand instead of being restricted to making them out of metal and plastic.... One can look forward...to an infinite and renewable supply of raw material for transportation fuels," Ambassador R. James Woolsey, Shea and Gardner, Washington, D.C., April 11, 2000.

"Three times before in history, environmental concerns led the federal government to reformulate its gasoline. Three times before the oil companies chose a 100 percent fossil fueled alternative that created more problems than it solved. Today, for the fourth time, the federal government is demanding changes in our transportation fuels. Let's not make the same mistake. This time we should make sure that a renewable fuel is the additive, and in the long run, the fuel, of choice." Dr. David Morris, Vice President, Institute for Local Self-Reliance, April 11, 2000.

EESI's "ECO" Staff

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Editors: Carol Werner and Doug Howell

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Ethanol Climate Protection Oil Reduction

A Public Forum

Issue IX

May 25, 2000

Welcome to "ECO." This newsletter, distributed primarily to environmental organizations, will provide the most current information about ethanol and serve as a public forum. The Environmental and Energy Study Institute (EESI) hopes to build consensus within the environmental community regarding the potential benefits of ethanol -- and particularly the expanded opportunities provided by cellulosic ethanol -- with a special focus on climate protection. Ethanol can also be a political bridge to broader alliances in support of climate initiatives.

Many in the environmental community have made strong statements in support of ethanol as a low-carbon fuel with large potential benefits to reduce life-cycle greenhouse gas (GHG) emissions. Ethanol also reduces carbon monoxide emissions and our reliance on oil, contains no sulfur and helps to eliminate smog through its use as an oxygenate for gasoline. Cellulosic ethanol, which is produced from agricultural or wood wastes, provides even greater GHG emission reductions than corn-based ethanol, promotes rural economic revitalization and offers a solution to waste disposal problems.

However, there have been concerns about ethanol ranging from volatile organic compounds (VOCs) to corporate welfare. We will address these and other issues and explore which steps are appropriate to take in support of ethanol. Please tell us your views and we will address them in "ECO."

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*These are regular features in the newsletter

COMMENTARY

Can Air Quality Be Maintained Using Reformulated Gasoline Without Oxygenate?

By Jack Brondum and David Morris, Institute for Local Self-Reliance

The following is an excerpt from "MTBE, Ethanol, and the Future of Gasoline," a publication by the Institute for Local Self-Reliance due out in July.

Background

The Clean Air Act of 1990 required that a minimum of two percent oxygen be added to gasoline sold in communities where air quality was inadequate. In 1992 gasoline suppliers in communities with carbon monoxide (CO) concentrations exceeding federal standards were required to sell oxygenated gasoline during the winter months. In 1996 gasoline suppliers to communities with excessive ozone concentrations were required to sell oxygenated fuel year round. Estimates vary, but by 1999 approximately one-third of all U.S. gasoline was Reformulated Gasoline (RFG) with and without oxygenate. MTBE claimed 75 percent of the nationwide oxygenate market and more than 85 percent of the market in those communities where oxygen-containing RFG had to be sold.

Today, because of widespread contamination of ground water by MTBE, California has decided to phase it out over the next three years. The state has requested a waiver from the oxygenate requirement from the EPA. Several bills in Congress would amend the 1990 Clean Air Act to eliminate the oxygenate requirement.

The California refinery industry, the state's elected representatives, and the California Air Resources Board (CARB), the regulators of air quality in the state, all contend that gasoline without oxygenate is now commercially available that will meet or exceed air quality standards. This article examines that proposition.

Previous Experience With Reformulated Gasolines

Historical experience suggests that we should view with caution the claim that another reformulation of gasoline will safeguard air and water quality. Such claims have proven false in the past. In the 1920s the gasoline companies chose to raise octane levels by adding lead. When the federal government phased out lead in the 1970s, oil companies chose to raise the aromatic content of their gasolines. They raised the concentration of chemicals such as benzene, toluene and xylene. The Clean Air Act of 1990 capped toxic concentrations and required the introduction of oxygenates. The oil companies chose MTBE.

Will a new reformulation meet air quality standards?

There is little publicly available data regarding the performance of non-oxygenated RFGs. What we do know is that oxygenates reduce CO and exhaust particulate matter (PM) emissions and generate exhaust toxic emissions which are relatively benign. To compensate for the oxygenates, oil companies will have to rely on other chemicals to achieve high octane levels. It appears that they have two choices: raise the proportion of aromatics or alkylates.

Aromatics

The high octane content of oxygenates generally allows refiners to reduce the aromatic content of gasoline so as not to "give away octane". The octane number of ethanol is 115; of MTBE, 109; and of the average aromatic compound, 104. According to air emissions researcher Michael Graboski, in a typical gasoline aromatics would be reduced by about 1.4% for each 1.0% of oxygenates added.

The majority of aromatics in gasoline are single ring compounds like benzene, toluene, and xylene. The average annual content of aromatics in gasoline peaked at about 34% at the end of leaded gasoline phasedown and has declined to 26% since the introduction of oxygenates. Aromatics are readily obtainable in the reforming process of petroleum refining and it is likely that if oxygenates are eliminated refiners would raise octane levels by increasing aromatic compounds. In Maine, for example, a non-oxygenated, low volatility gasoline now being marketed is significantly higher in aromatics than the RFG previously marketed in the area.

But raising aromatic levels has several drawbacks. It would increase CO emissions and PM levels. Moreover, aromatics are among the more toxic compounds in auto emissions. Benzene is a known human carcinogen; toluene and xylene, while not human carcinogens, are largely converted to benzene during combustion.

Alkylates

Another way to raise octane levels is to raise the concentration of alkylates, another component of gasoline. Alkylates generally have octane levels of 90 to 95. To achieve an overall gasoline octane rating of 88, the percentage of alkylate component would have to increase from its current level of approximately 14 percent by weight to 34 percent.

Compared to other refining products, alkylates are less volatile (low Reid vapor pressure) and have relatively low concentrations of aromatics, olefins, and sulfur, all desirable properties from an environmental standpoint. Alkylates, however, have not yet been examined systematically to assess their potential effects on environmental health and safety.

The question may be moot, though, since current U.S. alkylate capacity is essentially fully utilized. In contrast, refineries have the capacity to increase aromatic production. Thus aromatics could well be the oxygenate-replacement of choice. This likelihood should raise concerns by policymakers.

To replace MTBE with alkylates on a large scale will require a significant capital investment. This raises the issue of cost. Some MTBE plants have already been or are now being converted to alkylate production. According to Chevron's Fuels Technical Service Unit, Chevron is now marketing a regular grade RFG in the San Francisco Bay Area containing alkylates in place of oxygenate that fully complies with CARB air quality standards. However, Chevron's premium fuel in the Bay Area retains oxygenate to maintain its high octane rating.

The oxygenate requirement of the Clean Air Act cannot simply be dropped without acknowledging the need to change other gasoline components. What will those components be? What will be their air and water quality impacts? Given our experience with previous gasoline reformulations and additives, it would be useful for policymakers to take a good long look before they leap.

The Potential for Ethanol Production from Municipal Solid Waste

The role of waste is changing. What was once perhaps the greatest sanitation and health challenge for communities now may prove to be an economic and environmental asset. Waste managers and environmentalists support the latest efforts to utilize municipal solid waste (MSW) for ethanol fuel production. Generating energy from waste not only relieves the increasing pressure on landfills, but it may provide one of the most sustainable forms of energy possible.

Americans produce more than 400 million tons of MSW each year. Though we sort and recycle approximately 20 percent of this waste, an additional 70 percent is compostable and can be diverted from landfill disposal through evaporation, decomposition or cellulose-to-ethanol conversion. By capitalizing on recent technological advancements and utilizing existing infrastructure, waste managers have a unique opportunity to reuse up to 90 percent of our MSW stream while generating short and long-term benefits for themselves and their communities.

There are concerns, however, that converting compostable waste to ethanol may divert efforts for recycling paper products. Ideally, ethanol production from MSW will only add to the percentage of garbage reused, rather than draw away from the material that is currently recycled. Further analysis and system organization will determine exactly to what degree this will be possible.

MSW-to-ethanol facilities provide a local solution to waste accumulation by allowing managers to dispose of materials within a 30-50 mile radius of their generation point. The disposal is safe and permanent, requiring no burning and employing instead a widely accepted acid hydrolysis process. Co-locating an ethanol production plant with a materials recovery facility (MRF) also guarantees managers a long-term feedstock supply, for which they can collect a substantial and stable tipping fee that is independent of market fluctuations.

Communities can expect to reap tangible benefits as well. Using a single facility to process a variety of waste products drives down collection fees by picking up trash, yard clippings and recyclables with one truck, rather than three. According to a recent study of more than 700 collection systems, residents' waste recovery costs were 40 percent more expensive when not done under uniform municipal control. A MRF facility also requires less space than a landfill and, by operating for at least 30 years, stabilizes prices through long-term disposal contracts. Additionally, establishing MSW-to-ethanol plants in rural communities directly improves economic welfare by creating hundreds of construction jobs and permanent operational positions.

Producing fuel from MSW provides a viable solution to multiple environmental problems by simultaneously creating a sink for waste and a source of renewable energy. With the population of the United States expected to grow by 75 million in the next 50 years, the need for waste disposal alternatives is greater than ever. Diverting MSW from landfill

dumping and incineration conserves undeveloped lands while alleviating water, land and air pollution caused by improper disposal and handling practices.

Ethanol produced from cellulosic feedstocks like MSW significantly reduces greenhouse gas (GHG) emissions, by both displacing fossil fuel use and generating a full-cycle carbon dioxide sequestration and emission process. Studies at Argonne National Laboratory concluded that cellulosic ethanol could provide a 60-110 percent reduction in GHG emissions. Ethanol also decreases carbon monoxide emissions, contains no sulfur and helps to eliminate smog through its use as an oxygenate for gasoline. Refiners and engineers find ethanol's versatility especially attractive, for it can be blended with gasoline, used as a pure fuel or adapted as a hydrogen source for fuel cells.

This summer, Masada OxyNol™ will begin construction of a 9 million gallon MSW-to-ethanol plant in Middletown, New York. It will be the first commercial facility to recover recyclables from MSW and utilize residual biomass and sewage sludge for ethanol production. Though only a single and relatively small ethanol production facility, the Middletown plant is a model for future endeavors and is likely to become the cornerstone of an emerging industry.

EXCERPTS FROM RECENT STUDIES

Evaluating Environmental Consequences of Producing Herbaceous Crops for Bioenergy

Sandy B. McLaughlin and M.E. Walsh of the Biofuels Feedstock Development Program at the Oakridge National Laboratory conducted a study to consider the environmental tradeoffs between biofuels technologies and the fossil fuel technologies they displace. "Evaluating Environmental Consequences of Producing Herbaceous Crops for Bioenergy (1997)" focuses on the net energy return and associated environmental benefits of bioenergy production from perennial grasses, such as switchgrass, relative to annual row crops such as corn. The following are excerpts from the study:

"Potential reductions in CO₂ emissions tied to the energetic efficiency of producing transportation fuels and replacing non-renewable petrochemical fuels with ethanol derived from grasses is very promising."

"A comparison of the energy budgets for corn, which is the primary current source of bioethanol, and switchgrass reveals that the efficiency of energy production for a perennial grass system can exceed that for an energy intensive annual row crop by as much as 15 times."

"Calculated carbon sequestration rates may exceed those of annual crops by as much as 20-30 times, due in part to carbon storage in the soil. These differences have major implications for both the rate and efficiency with which fossil energy sources can be replaced with cleaner burning biofuels."

Cellulosic Ethanol's Greenhouse Gas Reduction Benefits

The broad-based support for cellulosic ethanol is due, in large part, to its ability to reduce greenhouse gas (GHG) emissions. Studies at Argonne National Laboratory claim that reductions of up to 110 percent can be achieved through cellulosic ethanol production and use, approximately 80 percent more than that of corn. While the findings allude to a promising future for renewable energy markets and industries, many are still unaware of how these benefits can be achieved and even question their validity. As researchers at Argonne contend, cellulosic ethanol's unique GHG reduction benefits are due to three primary factors.

While corn ethanol plants use fossil fuel for energy, cellulosic ethanol plants use biomass. After ethanol is produced, unfermentable biomass, primarily lignin, remains and is burned to generate electricity, which is in turn used for further ethanol production. Though lignin combustion emits carbon dioxide, its emissions are absorbed as the biomass grows and photosynthesizes. The result is a full-cycle combustion process with net zero emissions.

Cellulosic ethanol production benefits other energy resources as well. The electricity generated in cellulosic ethanol plants exceeds the internal needs of the plant and can be incorporated into the power grid to offset production by electric power plants and provide an electricity generation credit from cellulosic ethanol. These additional co-product credits can be used in related operations, making it possible to acquire greater-than-100 percent reduction for GHG emissions.

Lastly, carbon sequestration from plants used in cellulosic ethanol production account for additional GHG reductions. Biomass crops, such as switchgrass and rice straw, accumulate relatively large amounts carbon in their roots and soil, for they grow quickly, require little to no-till cultivation, and are rotated every several years, rather than annually. Furthermore, biomass management and cultivation demands relatively little energy use and therefore contributes to additional emissions reductions. Though corn has already proven its emission reduction and energy use benefits, more long-term and significant reductions can be realized when adopting biomass crops as primary ethanol feedstocks.

GOVERNMENT ACTIVITY

Daschle/Lugar Introduce Renewable Fuels Bill

On May 4th, Senate Minority Leader Tom Daschle (D-SD) and Richard Lugar (R-IN) introduced bipartisan legislation to curtail MTBE use through a nationwide renewable fuels requirement. The "Renewable Fuels Act of 2000" (S.2503) would allow states to opt out of the current reformulated gasoline (RFG) oxygen requirement if they demonstrate the ability to maintain the program's current clean air benefits.

The nationwide standard for renewable fuels, primarily ethanol, would be phased in over a ten year period and, according to the Senator, would reduce U.S. dependence on foreign oil, protect water supplies from MTBE contamination, and increase demand for U.S. farm products by hundreds of millions of dollars. A similar bill, the MTBE Elimination Act, has been introduced in the Senate (S.2233) by Senator Peter Fitzgerald (R-IL) and the House (H.R. 4303) by Rep. Thomas Ewing (R-IL). It would prohibit the use of water contaminated by MTBE and provide for its remediation.

Markup of MTBE Bill Postponed

The markup of Senator James Inhofe's (R-OK) bill S.1886, which was originally scheduled for May 25th, has been postponed until late June. The legislation, co-sponsored by Senator Dianne Feinstein (D-CA) and Senator Robert Smith (R-NH), would amend the Clean Air Act to permit states to waive the oxygenate requirement for reformulated gasoline (RFG) and encourage development of voluntary standards to prevent and control releases of MTBE from underground storage tanks. The Committee on Environment and Public Works, to which the bill was referred, is suggesting a 4 percent alternative fuels standard by 2010.

The "Clean Air and Water Preservation Act of 2000"

On May 11th, Senator Christopher Bond (R-MO) introduced legislation (S.2546), which would amend the Clean Air Act to prohibit MTBE use, provide flexibility within the oxygenate requirement, and promote use of renewable ethanol. The bill, co-sponsored by Senator Charles Grassley (R-IA), Senator Richard Durbin (R-IL), Senator John Ashcroft (R-MO) and Senator Fitzgerald, would phase out MTBE in three years and provide for MTBE labeling.

Bond's legislation also would maintain the oxygenate requirement, but would allow a state to waive the mandate temporarily if the USDA and the EPA found it to be without a sufficient oxygenate supply. In addition, S.2546 proposes stricter emissions requirements, including a maximum hydrocarbon content of 30 percent, which, according to Senator Durbin's staff, make this legislation stronger on anti-backsliding language than other bills thus far.

Swedish Government Sponsors International Symposium on Alcohol Fuels

The Swedish National Energy Administration is the primary organizer of the thirteenth International Symposium on Alcohol Fuels, ISAF XIII, which will be held in Stockholm, Sweden from July 3-6, 2000. The conference will focus on the implementation of the transition to a sustainable transport system as well as the links that bring alcohol fuels from source to market.

NOTABLE QUOTABLES

"We are now at a critically important time in the debate over energy policy in this country. Congressional committees are moving forward to address the MTBE contamination problem, and members now must decide whether to allow MTBE to be replaced with imported oil, or to enact policies that will ensure that it is replaced with domestic, renewable ethanol. Our legislation makes the right choice for America: more use of ethanol," Senator Thomas Daschle (D-SD), May 8, 2000.

"We're on the threshold of an energy use revolution. And if we're smart, we'll stay a step ahead of the market and provide the clean energy decade with the tools it needs: the solar panels, biomass, wind power, and fuel cells," Washington Governor Gary Locke, March 16, 2000.

"I would like to offer one brief example of global warming's potential harm. According to the United Nation's Environment Program, the global average sea level has risen by 10 to 25 centimeters over the past 100 years.... The impact of such a movement on our coastal communities and businesses, such as fisheries, agriculture, and tourism is unknown, but the consequences could be serious considering that half of the U.S. population lives in the coastal communities," Senator John McCain (R-AZ), May 17, 2000.

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Ethanol Climate Protection Oil Reduction

A Public Forum

Issue X

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*These are regular features in the newsletter

COMMENTARY

Oxygenate Mandate or Renewable Fuels Mandate?

By Doug Howell, Environmental and Energy Study Institute

The Senate Environment and Public Works Committee on July 20th will be voting on legislation affecting the use of MTBE, ethanol, the Clean Air Act oxygenate standard and renewable fuels. There is much at stake for many individuals and organizations, as well as for public health, national security, the environment and economic development. A concern voiced by some in the ethanol industry is this: If a renewable fuels standard is in place, then won't the current federal tax credit for ethanol be at risk? Perhaps.

What is unclear to us is this: Why would one standard – a renewable fuels standard – put the tax credit at risk, and another standard – the oxygenate requirement – not put the tax credit at risk? They are both mandates.

Still other uncertainties underlie this issue. The same members of the ethanol industry want to maintain the oxygenate standard and ban MTBE thereby ensuring a guaranteed market for ethanol expansion. Their support for the oxygenate standard is not just for expanded ethanol use, but also is grounded in their belief of the clean air and public health benefits of oxygenates. However, the environmental and public health community – for the most part – no longer supports the oxygenate standard as the best policy tool to provide these benefits. And the U.S. EPA's Blue Ribbon Commission confirms that the oxygenate standard will become more and more obsolete as the vehicle fleet becomes cleaner.

There may be a choice between two standards: an oxygenate standard or a renewable fuels standard. The former's benefit seems unclear. The latter seems to be clearer – reducing dependence on oil to enhance national security and reducing greenhouse gas emissions to mitigate climate change.

Ethanol and Gasoline Prices

Gasoline price spikes in the Midwest have intensified the debate about the viability of using ethanol as an oxygenate in gasoline, a strategy for reducing emissions that was heavily advocated by the Clinton Administration and legislators from farm states. Prices have long since reached \$2 a gallon in the Chicago area (and have now fallen), and a number of groups – including the oil industry –blamed the high gas prices on EPA rules, in particular, the second phase of the reformulated gasoline (RFG) program, which has been implemented pursuant to the 1990 Clean Air Act Amendments. This program has required refiners to blend conventional gasoline with oxygenates – which basically leaves refiners the choice between ethanol and MTBE.

Because refiners in the Chicago area are using ethanol in their gas to comply with the RFG rules (whereas in most other areas MTBE is used), ethanol is seen by some as the cause of the expensive gasoline. In fact, the issue is even providing fuel for the fall political campaign. Vice President Al Gore called for a federal probe into possible price gouging by the oil companies, and the White House joined the fray saying the oil industry was unfairly blaming the high prices on new regulations for cleaner burning RFG. Basically, the oil industry's blame on RFG (and thus inherently on ethanol as oxygenate) is based on a threefold argument:

- According to the American Petroleum Institute (API), ethanol boosts gasoline volatility. Thus, refiners are forced to make the best Phase II RFG to even tighter specifications so that volatility levels meet EPA standards. These requirements are said to make the process of blending Phase II RFG costlier than blending Phase I RFG.
- Moreover, the API claims that ethanol is inherently more expensive than other fuels. Considering that ethanol contains just about 70 percent of the energy equivalent of gasoline and about 81 percent of the energy of MTBE, even at today's gasoline prices, according to the API, gasoline costs significantly less than an energy-equivalent amount of ethanol.
- High gasoline prices might – at least in part – be also due to a premium motorists have to pay because of a patent dispute. Unocal Corp. holds the patent for a unique method to blend RFG II economically and efficiently. Refineries nationwide may be passing some cost on to consumers in anticipation of having to settle with Unocal in the future.

However, ethanol advocates strongly disagree that the product has been causing gas prices to climb in the Midwest. Eric Vaughn, president of the Renewable Fuels Association (RFA), urged the API to “apologize for ... misleading consumers and blaming ethanol for outrageous gasoline prices ... if, as API claimed, ethanol is so expensive to blend into RFG, why is it cheaper than MTBE blends in St. Louis? Why does ethanol-blended RFG in Chicago cost 30 to 40 cents more wholesale than the same product in St. Louis?” Vaughn concluded that high gasoline prices in Chicago are rather due to the oil industry's own supply mismanagement crises. EPA air chief Robert Perciasepe has taken the same position: “We do not think it's due to RFG ... it is rather related to supply issues.” In the same vein, Stephen Gatto, CEO of BC International suspects that “the price increase is due to people falsely jacking up the price to discourage the use of ethanol.” In light of the current high prices of crude oil, ethanol, according to ethanol producers, is the solution rather than the problem.

Any legislation Congress will pass on RFG in the near future will prove decisive for the future of ethanol as a fuel additive. Because of the dangers MTBE - which has a market share of currently 80 percent as an oxygenate – poses to groundwater, Congress could:

- do nothing and allow states to pursue waivers from the oxygenate requirement;

- ban MTBE and keep the oxygenate requirement thus paving the way for ethanol to replace MTBE (preferred by RFA and many ethanol producers);
- ban MTBE and eliminate the oxygenate requirement (preferred by API and some environmental groups); or
- ban MTBE, eliminate the oxygenate requirement and create a Renewable Fuels Standard (preferred by many ethanol producers and many environmental organizations).

Banning MTBE seems to be the only inevitable outcome whether through Congressional legislation or state action.

As already pointed out, ethanol advocates such as the RFA have argued that "the main cause of the ... problem is with crude oil over \$30 a barrel, the oil refiners have chosen not to build adequate gasoline inventories." Others, such as Jack Huggins (Vice President, Williams Bio-Energy) insist that ethanol could efficiently replace MTBE by 2004 without any price spikes or supply shortages. In the same vein, Stephen Gatto (President and CEO, BC International Corporation) claimed in a Senate hearing that "the use of ethanol in gasoline does not and will not significantly impact the price of gasoline." In contrast, oil industry advocates such as Bob Slaughter of the National Petrochemical & Refiners Association (NPRA) – which is opposed to any fuel mandate – are more careful with their predictions. "An ethanol mandate will make it harder for refiners to provide cleaner fuels to consumers at acceptable prices" because the oil industry will have to heavily invest in ethanol blending technologies. These costs (unspecified by Slaughter) would be inevitably passed on to consumers. What, then, is the true effect of ethanol as an oxygenate on gasoline prices?

- A study by the Energy Information Administration (EIA) has found that the overall cost of replacing MTBE with ethanol would cost approximately the same as replacing MTBE with other petroleum derivatives. The overall cost of creating RFG-compliant ethanol blends, according to the EIA, would still cost less than 1 cent per gallon.
- According to the California Energy Commission, the overall cost of replacing MTBE with ethanol is about two cents per gallon. Thus, using ethanol would cost about the same and potentially less over the long-term as replacing MTBE with alkylates.
- The Getty Petroleum Marketing Company is currently replacing MTBE with ethanol in the Northeast and has arrived at similar conclusions as the California Energy Commission.
- The U.S. Department of Energy has found that through the development of a local biomass ethanol industry, the Northeast will see further reductions in the cost of

producing and transporting ethanol which would additionally minimize the impact of ethanol on gasoline prices.

- A U.S. Department of Agriculture study shows that there will not be any price spikes or supply shortages due to ethanol if MTBE is gradually phased out and replaced by ethanol by 2004.
- Requested to examine the price spikes in the Chicago area, the Congressional Research Service (CRS) has conducted a study taking into account factors as diverse as pipeline disruptions, draining tanks of winter gas, and ethanol supply shortages (among others). In a revised version of the study, the CRS concludes that gasoline supply problems and not costs associated with blending ethanol are the main factor in high Midwest oil prices. "In the current Chicago market situation, prices appear to be mainly driven by supply and demand ... it is unlikely that a manufacturing-related 'cost push' [due to RFG] would be a factor."

EXCERPTS FROM RECENT STUDIES

Outlook for Biomass Ethanol Production and Demand

A recent report from the Energy Information Administration (EIA) points out that the ability to produce ethanol from low-cost biomass – most promisingly, from agricultural residues, in particular corn stover - will be essential for making ethanol competitive with gasoline. Josep DiPardo, in his 2000 study, examines projected ethanol costs and gasoline prices under various technological scenarios for cellulose ethanol conversion, taking simultaneously into account uncertainty of oil prices. DiPardo also gives an overview of cellulose conversion technology and various feedstock options; his projections are developed from the EIA's National Energy Modeling System.

Although DiPardo acknowledges that the cost of producing and transporting ethanol will continue to limit its use as a renewable fuel, he points out that replacing corn with less expensive cellulose-based feedstocks may indeed reduce ethanol production costs substantially. This option would also have tremendous environmental benefits since converting cellulose to ethanol increases the net energy balance of ethanol when compared to converting corn to alcohol. In this vein, it is instructive to note that cellulosic ethanol is preferable to corn-based ethanol especially with respect to greenhouse gas emissions: while corn-based ethanol can reduce GHG emissions by 2 percent per vehicle mile traveled when used in gasohol and by 24 - 26 percent when used in E85, the figures for cellulosic alcohol are 8-10 percent and 68-91 percent, respectively.

The following, then, are excerpts from DiPardo's projection:

"Benefiting from the assumed continuation of the Federal ethanol subsidy, gasoline blending of ethanol is projected to increase by 1.4 percent per year from 2000 to 2020 ... total U.S. cellulose ethanol production is projected to increase by 22 percent per year."

If production technology can be enhanced substantially, "more rapid market penetration of cellulosic ethanol is projected, resulting in 4.0-percent annual growth in gasoline blending ... cellulosic ethanol production grows by 30 percent per year."

"When the Federal ethanol subsidy is assumed to be eliminated in 2008, gasohol and RFG blending with ethanol ceases in all ... technology cases."

"A large part of ethanol's success has been the Federal ethanol subsidy. With the subsidy due to expire in 2008...the future of ethanol may depend on whether it can compete with crude oil on its own merits."

GOVERNMENT ACTIVITY

Senate Environment & Public Works Subcommittee on Clean Air Holds Hearing on Ethanol

On June 14th, the Senate Environment & Public Works Subcommittee on Clean Air held a hearing on ethanol which, according to its chairman, Sen. James M. Inhofe (R-Okla.), was intended to "address the environmental benefits and impacts of ethanol under the Clean Air Act." In a news release on the hearing, Inhofe heavily criticized EPA and the Administration for "playing games" and not seriously addressing the environmental problems related to the fuel additives MTBE and ethanol. Inhofe also announced that he would introduce new legislation on MTBE. The bill, S.2723, would allow states to be waived out of the oxygenate mandate and would phase down MTBE to pre-1990 levels. It also includes an anti-backsliding program for toxics.

Witnesses testifying at the hearing included Dan Greenbaum (President, Health Effects Institute), Blake Early (Environmental Consultant, American Lung Association), Michael Grabosky (Director, Colorado Institute for Fuels and High Altitude Engine Research), Bob Slaughter (Public Policy Director, National Petrochemical & Refiners Association), Jack Huggins (Vice President, Ethanol Operations, Williams Energy Services), Jason S. Grumet (Executive Director, NESCAUM), Stephan Gatto (President and CEO, BC International), and Gordon Proctor (Director, Ohio Department of Transportation). At issue were environmental, technological, economical, and public health impacts of using ethanol as an oxygenate, as well as fiscal consequences (e.g., the Highway Trust Fund) and R&D issues.

In addition, three senators from corn growing states [Senators Charles Grassley (R-IA), Tom Harkin (D-IA) and Richard Durbin (D-IL)] expressed their view that the oxygenate requirement of the 1990 Clean Air Act Amendments should be retained because of the inherent environmental benefits of using oxygenates such as ethanol in gasoline.

NOTABLE QUOTABLES

"Ethanol costs could be reduced dramatically if efforts to produce ethanol from biomass are successful ... biomass feedstocks, including forest residue, agricultural residue, and energy crops ... are expected to lower the cost of producing ethanol and provide stability to supply and price ... [cellulosic] ethanol could compete favorably with other gasoline additives without the benefit of a Federal subsidy"

Energy Information Administration, "Outlook for Biomass Ethanol Production and Demand", June 2000.

"We do have global warming ... agriculture should stop saying, 'Wait a minute, do we have a problem?' ... We've got a heck of a challenge. Let's be part of the answer, no part of the problem."

Senator Pat Roberts (R-KS), The Capital Journal, June 2, 2000.

"In the current Chicago market situation, prices appear to be mainly driven by supply and demand. The price increases - driven by supply-demand pull - are so large and out of proportion to any likely higher manufacturing costs associated with the RFG sol there that it is unlikely that manufacturing-related 'cost push' would be a factor."

Congressional Research Service (CRS), June 16, 2000.

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All comments regarding can be emailed to eco@eesi.org
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Please visit us at www.eesi.org!

Ethanol Climate Protection Oil Reduction

A Public Forum

Issue XI

November 14 2000

Welcome to "ECO." This newsletter, distributed primarily to environmental organizations, will provide the most current information about ethanol and serve as a public forum. The Environmental and Energy Study Institute (EESI) hopes to build consensus within the environmental community regarding the potential benefits of ethanol -- and particularly the expanded opportunities provided by cellulosic ethanol -- with a special focus on climate protection. Ethanol can also be a political bridge to broader alliances in support of climate initiatives.

Many in the environmental community have made strong statements in support of ethanol as a low-carbon fuel with large potential benefits to reduce life-cycle greenhouse gas (GHG) emissions. Ethanol also reduces carbon monoxide emissions and our reliance on oil, contains no sulfur and helps to eliminate smog through its use as an oxygenate for gasoline. Cellulosic ethanol, which is produced from agricultural or wood wastes, provides even greater GHG emission reductions than corn-based ethanol, promotes rural economic revitalization and offers a solution to waste disposal problems.

However, there have been concerns about ethanol ranging from volatile organic compounds (VOCs) to corporate welfare. We will address these and other issues and explore which steps are appropriate to take in support of ethanol. Please tell us your views and we will address them in "ECO."

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COMMENTARY

Ethanol the Road Ahead: Two Complementary or Divergent Paths?

Two roads diverged in a wood, and I,
I took the one less traveled by,
And that has made all the difference.

-Robert Frost

In this long overdue addition of ECO we would like to pose a topic of discussion to you our readers and invite you to share your thoughts on the subject with us for inclusion in a future edition of ECO. What are the long-term implications of our ethanol infrastructure? If our goal is the widespread expansion of ethanol as a transportation fuel, are we on the right path? Will our current path of development lead to diversified feedstocks from waste and energy crops? What actions are necessary to fully develop the vast resources of waste feedstocks? Do industrial sugars allow for or inhibit the long-term development of cellulosic feedstocks from agriculture, forests, and municipal solid waste as well as from energy crops? What are the most appropriate and effective policies to move cellulosic ethanol forward?

(Comments can be emailed to ECO@eesi.org or faxed to 202-628-1825)

COP6: BUILDING BRIDGES WITH THE AGRICULTURAL SECTOR THROUGH BIOMASS DEVELOPMENT

Representatives from more than 160 countries will meet for the Sixth Conference of Parties (COP6) of the U.N. Framework Convention on Climate Change November 13-24. There exists a general consensus among the participants that any coordinated plan to reduce worldwide greenhouse gas (GHG) emissions must involve the agricultural sector, but what role the world's farmers are to play in that effort has yet to be defined.

Thus far, carbon sequestration proposals have dominated the agriculture discussion. Under the Kyoto Protocol, countries are allowed to implement alternative approaches to meet their emissions targets, including carbon credit trading and carbon sequestration projects. While most of the current sequestration language in the protocol is geared toward forestry practices, much consideration has been given to implementing a carbon credit system aimed at creating agricultural sinks. In essence, farmers would be compensated for implementing farming practices designed to sequester carbon in the soil and in plant biomass.

Though promoting more ecologically sound farming practices is an important goal in and of itself, carbon sequestration as a means of reducing greenhouse gas emissions poses a high level of uncertainty. As reported by the Tellus Institute, the biological processes involved are highly complex, and reliable carbon measurement methods have yet to be developed. "If problems with these mechanisms are not resolved before their large-scale implementation, their use could threaten the environmental integrity of the Protocol."

While the role of carbon sinks in meeting reduction targets is being debated, the development of biomass resources should not be left out of the discussion. Expanded use of bioenergy and bioproducts has the potential to significantly reduce CO₂ emissions in a measurable way, provide new sources of income for the world's farmers, and promote sustainable development. Domestically, such initiatives would coincide well with Executive Order 13134 and Title III of the Agricultural Risk Act, both of which promote biomass development. The Department of Energy (DOE) estimates that if the United States tripled its use of bioenergy and bioproducts by 2010, \$15-20 billion in new income would be created for the nation's farmers. In addition, annual greenhouse gas emissions could drop by as much as 100 million tons, or the equivalent of taking 70 million cars off the road. Potential uses of biomass include: use of gasifiers and cofiring plant matter in traditional coal plants to produce electricity, chemical production, and increased ethanol production. To reach this goal by 2010, our current energy and farming infrastructure must be modified, particularly the proximity of power generation and biomass processing facilities to farms, as well as farming practices.

The growing ethanol industry has already proven its worth to farmers and industry, and serves as a valuable model for further biomass initiatives. A 1997 study by Michael K. Evans, a Professor of Economics at Northwestern University, found that the ethanol industry increases net farm income more than \$4.5 billion. As the transportation sector accounts for nearly a third of total U.S. GHG emissions, and continues to grow as a portion of total emissions, ethanol becomes increasingly important. When corn ethanol is used as fuel it achieves approximately a 20 percent lifecycle reduction of GHGs when compared to gasoline, and cellulosic ethanol a 60-100 percent reduction.

Carbon sequestration may very well have the potential to remove some level of carbon from the atmosphere in the short-term. However, only by transitioning from a non-renewable hydrocarbon energy economy to a renewable carbohydrate energy economy can the nations of the world address global climate change in the long-term. This requires a gradual shift from our dependence on fossil fuels to an expanded use of our biomass resources. Development of these resources, including ethanol, can help the COP6 countries build vital bridges with the agricultural sector while working toward a common goal of reducing worldwide GHG emissions.

ETHANOL SUPPORT GROWS ACROSS THE UNITED STATES, IMPACTS LIKELY ON BANKS AND FEDERAL SUBSIDIES

As ethanol production continues to grow outside the Midwest, there likely will be more support for extending the federal tax incentives. This means that it will be more difficult for groups that oppose the tax incentives to try to eliminate them when they are debated again in 2005. Increased security in the future of these subsidies will in turn reduce the risk of investing in new ethanol facilities for banks and underwriters. Underwriting ethanol projects – especially cellulosic ethanol plants – has often been a barrier to getting new projects off the ground. Listed below are several examples of what states outside the Midwest are doing to encourage the expansion of the ethanol market.

The state of North Carolina and DFI Group, a private company, recently announced their plans to open three ethanol production facilities in the eastern part of the state. The facilities are expected to be fully operational by 2003, and will each produce 60 million gallons of ethanol a

year. Each plant will use 22 million bushels of corn, and eventually may utilize a newly developed type of sweet potato, that scientists have designed specifically for ethanol production, as a feedstock. The facilities are expected to give a boost to local farmers, as sweet potato production is expected to increase five-fold.

Twelve stations selling E85, a fuel blend of 85 percent ethanol and 15 percent gasoline, are being planned for the South Carolina counties of York, Chester, Lancaster, and Union. Ford, General Motors and Daimler-Chrysler manufacture about 250,000 flexible-fuel vehicles (FFVs) a year which can run on E85 or conventional gasoline. The Catawba Council of Governments plans to use its \$440,000 share of an \$11.2 million national fine levied against the paper company Willamette Industries by the EPA to open the stations, which will be available to federal, state and local fleets, private fleets, and individual citizens to use.

Washington Governor Gary Locke recently became the 25th member of the Governors' Ethanol Coalition, further demonstrating that political support for ethanol is no longer confined to the Midwest. "Governor Locke and the State of Washington will be a valuable partner in the Governors' Ethanol Coalition," said Iowa Governor Vilsack, chair of the Coalition. "Their contribution means support for the ethanol industry now spans from coast to coast." Two ethanol facilities already exist in the Washington, and several more are being considered.

Interest in the expansion of the ethanol market may be motivated in part by an expected increase in demand for ethanol as MTBE, a petroleum-based additive found to contaminate groundwater, is phased out nationwide. In the long-term, investing in ethanol production allows states to kill two birds with one stone, reducing greenhouse gas emissions, while creating new markets for farmers.

IPCC REPORT WARNS OF IMPENDING GLOBAL WARMING THREAT

A draft copy of the latest report from the United Nations Intergovernmental Panel on Climate Change (IPCC) was leaked to the press in late October. The report confirms that "there is now strong evidence for a human influence" on climate. Although the IPCC's third assessment report has not yet received final approval by the United Nations, the report was prepared by 2,500 climate scientists throughout the world and reviewed twice, and is expected to be approved in January.

Since their last report in 1995, the IPCC has raised estimates of how much the earth has already warmed, and how much it is expected to warm in the next century. The report estimates that the average global temperature has risen 0.4-0.8 degrees Celsius (C) since 1860, and 0.25-0.4 degrees C in the last 20 years alone. Further, the report estimates that by the end of the century the average global temperature could increase by as much as 6 degrees C (11 degrees Fahrenheit) by the end of the century. Scientists warn that such an increase would result in severe storms, droughts, and floods.

News from the United States is far from encouraging. A report, released in October, by the Energy Information Administration (EIA), an agency within the U.S. Department of Energy, finds that U.S. greenhouse gas (GHG) emissions continue to rise. In total, GHG emissions rose 0.8 percent in 1999. Carbon dioxide emissions, which account for 83 percent of total U.S. GHG emissions, increased 1.3 percent. The report found that the transportation sector, which accounts

for approximately a third of U.S. carbon dioxide emissions from energy consumption, increased carbon dioxide emissions by 2.9 percent, followed by the residential sector at 0.4 percent, and energy-related industrial emissions at 0.2 percent. The Kyoto Protocol, which has not yet been ratified by the Senate, would require the United States to lower its GHG emissions 7 percent from 1990 levels by 2012.

The IPCC report is further evidence that global warming is happening, and will continue to worsen without action by the industrial nations of the world in the near future. As the EIA report confirms, any effort the United States makes to significantly lower its GHG emissions must address the transportation sector. Given the proven GHG reduction benefits of ethanol, policy makers must begin to ask themselves not whether the United States can afford to develop a viable ethanol market, but rather can the nation afford not to?

EXCERPTS FROM RECENT STUDIES

The Other Gasoline Crisis: Speeding Up the Shift From MTBE To Ethanol

A recent report from the Institute for Local Self-Reliance, prepared by David Morris and Jack Brondum, examines the potential advantages and disadvantages of increased use of ethanol as a fuel additive as MTBE use is phased out. The authors argue that the potential advantages of ethanol blends, including reduced carbon monoxide and other toxic emissions, moving us toward a renewable-fueled economy, and opening up new markets for farmers, far outweigh ethanol's single major disadvantage: increasing the volatility of gasoline.

Because ethanol blends increase volatile organic compound emissions (VOCs) which are a component of ground level ozone (smog), and because oil companies are reluctant to produce lower volatility gasoline to compensate for this increase, communities with high ozone concentrations would need a waiver from EPA volatility standards to switch over to ethanol blends. Many in the environmental community oppose such a waiver. The authors maintain that more health benefits would be associated with lower particulate matter emissions that ethanol blends would achieve, than with insignificantly lower ground level ozone concentrations. Moreover, the authors maintain that ethanol's impact on ozone formation is trivial. Their data indicates that the current Reformulated Gasoline (RFG) program results in a 1-3 parts per billion (ppb) reduction in ambient ozone levels. The EPA standard is to reduce ozone concentrations to a maximum of 120 ppb nationwide. If a one-to-one correlation is assumed between increases in VOCs and ground level ozone formation, ethanol would be expected to diminish the RFG programs ozone reductions by 0.15-0.60 percent. In reality, a one-to-one correlation does not exist. Ethanol blends actually achieve reductions in other ozone-forming compounds such as carbon monoxide and the more reactive VOCs. Therefore, the authors conclude that any change in ozone formation is truly insignificant. The study can be found online at <http://www.ilsr.org/volatility.html>.

GAO Finds Oil Beats Out Ethanol for Federal Subsidies

A General Accounting Office (GAO) study released in October found that Federal tax breaks for the oil industry far exceeded those for ethanol. The report was requested by Senator Tom Harkin

(D-IA). Over the last three decades ethanol received \$11.5 billion in subsidies, whereas the oil industry received nearly \$150 billion in tax breaks. Since 1968, the oil industry has received \$82 billion in deductions for the depletion of oil or natural gas reserves, and \$54.5 billion for exploration and development. Since 1979 ethanol has received \$11.1 billion for a partial excise tax exemption for alcohol fuel, and \$478 million from an income tax credit. The report can be found online at <http://www.gao.gov/new.items/rc00301r.pdf>

New Poll Finds Public Support for Ethanol

The Renewable Fuels Association (RFA) released the results of their nationwide poll in October, which showed overall strong public support for a larger role for domestic ethanol in the nation's energy policy. The survey was conducted by International Communications Research Media, Pennsylvania and consisted of 1004 interviews from a random sample of households. They found that 62 percent of those surveyed were familiar with ethanol as a gasoline additive, and of that group 52 percent had a favorable impression of ethanol, while only 15 percent had an unfavorable impression. When asked to choose between a policy focusing ethanol over maintaining our reliance on foreign oil, 78 percent of those surveyed chose ethanol, which was fairly consistent across political party affiliations. Further, 60 percent would support a government requirement that gasoline contain a small percentage of ethanol, with 28 percent favoring leaving the decision to oil companies. Of those surveyed, 57 percent said they are more likely to support a candidate that supports ethanol, while 12 percent said they would be less likely to support the candidate. The results of the survey can be found online at <http://www.ethanolrfa.org/ICRmemo.doc>.

GOVERNMENT ACTIVITY

Federal Reformulated Fuels Act of 2000 Passes Senate Committee

On September 7th, the Federal Reformulated Fuels Act of 2000 (S. 2962) was reported out of the Senate Environment and Public Works Committee by a vote of 11-6. The legislation phases out the use of the fuel additive MTBE over four years, in response to widespread water contamination caused by the additive throughout the country, most notably in California and Northeast. The bill also allows Governors to waive the oxygen requirement for reformulated gasoline (RFG), and caps the amount of aromatic compounds such as benzene and toluene used in RFG. In addition, the bill creates a national Clean Alternative Fuel Program.

"EPA applauds the Senate Environment and Public Works Committee for taking action to phase out the use of the fuel additive MTBE," said EPA Administrator Carol Browner. Under the provisions in the bill, EPA is required to study the air quality impacts of waiving the RFG oxygen requirement, and has the authority to regulate on the basis of those studies to maintain air quality standards.

The national Clean Alternative Fuel Program requires that fuel sold in the United States contain an increasing amount of renewable fuel, starting at 0.6 percent in 2002, and increasing to 1.5 percent by 2011. To encourage increased production of ethanol made from feedstocks such as agricultural wastes, 1.0 gallon of cellulosic ethanol will be considered equivalent to 1.5 gallons

of renewable fuel. The program is expected to triple demand for renewable fuels over the next ten years.

Diverse Groups Urge Passage of S. 2962

Support for passage of the Federal Reformulated Fuels Act of 2000 has come from numerous quarters. In a joint letter to President Clinton, Senate Majority Leader Trent Lott and Senate Minority Leader Thomas Daschle, dated October 5th, the Governors' Ethanol Coalition and the Northeast States for Coordinated Air Use Management (NESCAUM) asked for passage of the Federal Reformulated Fuels Act of 2000 (S. 2962) before Congress adjourns. The text of the letter appears below:

Gentlemen:

We are pleased to learn the Federal Reformulated Fuels Act of 2000 (S. 2962) has been reported out of the Senate Environment and Public Works Committee. We wish to thank Chairman Smith and Ranking Minority Member Baucus, and Senators Lugar and Daschle, for their leadership in crafting landmark legislation that provides our citizens with the clean water and clean air they deserve.

In a July 19, 2000 letter to Chairman Smith, the Governors' Ethanol Coalition and Northeast States for Coordinated Air Use Management urged the Senate Environment and Public Works Committee to advance legislation that eliminates MTBE while maintaining the full air quality benefits of the reformulated gasoline program. In addition, we overcame our historic differences and collectively urged that governors may be authorized to waive the *Clean Air Act's* oxygen requirement in exchange for the adoption of a more flexible and competitive national program to promote renewable and clean alternative fuels. We are very pleased that S. 2962 effectively addresses our collective suggestions.

The bill has forged a remarkable national consensus that may be squandered if action is delayed until next year. More importantly, federal inaction will perpetuate the harm that MTBE imposes on our water resources and will allow an increase in harmful air pollution.

We respectfully request that everything possible is done to ensure S. 2962 is adopted before Congress adjourns this year.

Sincerely,

Governor Thomas Vilsack
State of Iowa and Chair
Governors' Ethanol Coalition

Governor Jeanne Shaheen
State of New Hampshire for
NESCAUM

Letters to President Clinton supporting passage of S. 2962 have also been sent by the Renewable Fuels Association and the National Corn Growers Association, the Bluewater Network, a coalition of 98 environmental and public health groups, and by a coalition including the American Lung Association, Natural Resources Defense Council, Environmental Defense, Physicians for Social Responsibility, Friends of the Earth, and U.S. Public Interest Research Group. In addition, the Sustainable Energy Coalition sent a letter supporting the legislation to the House and Senate leadership.

Tax Incentives to Promote Sustainable Energy Languish in Senate

When the Senate Finance Committee was unable to reach consensus on the Community and Renewal and New Markets Act of 2000, Senator Roth (R-DE) introduced his own version of the

bill (S. 3152). Thus far the bill has gained 27 cosponsors. Similar legislation in the House (H.R. 4923) passed by a vote of 394-27 in July. Among the bill's various tax provisions is a modification of the small ethanol producer credit, which would result in \$308 million in tax incentives by 2010. Modifying the tax credit for electricity produced from biomass and another renewable sources would result in \$400 million in tax incentives by 2010. Although Congress is meeting in a "lame duck" session, these provisions have been dropped from the tax bill still under consideration.

Legislation Introduced to Correct Small Producer Tax Credit

Legislation was introduced by Congressman David Minge (D-MN) that would allow farmer-owned cooperatives to take advantage of the ethanol producer income tax credit. The program provides qualifying producers a 10 cents per gallon tax credit for the first 15 million gallons of annual production. The legislation would also change the definition of small ethanol producer from 30 million to 60 million gallons of annual production capacity. Supporters said the cooperatives were meant to be included in the original legislation, and that their exclusion was an accidental oversight. The bill currently has five cosponsors. Senator Rod Grams (R-MN) introduced a companion bill in the Senate. Senator Grams lost his bid for reelection, and Representative Minge's race is still undecided at the time of this writing.

USDA Program to Encourage Expanded Ethanol Production

The U.S. Department of Agriculture has announced a new two-year \$300 million program aimed at increasing the production of ethanol and other biofuels. Small plants and cooperatives that increase their purchases of corn, soybeans, and other commodities to expand the production of ethanol, biodiesel or other biofuels will be provided direct cash payments. "This program will help us tap into a huge domestic energy reserve – our family farms," said Agriculture Secretary Dan Glickman. The new program will be funded from the department's existing commodity credit program.

ETHANOL NEWS BRIEFS

California's MTBE Use Rises Despite Phase Out

Despite an order from California Governor Gray Davis to ban MTBE in the state by 2002, the amount of MTBE blended into gasoline increased 14 percent (15 million gallons) in Northern California and 1.5 percent (371 million gallons) statewide from the first to the second quarter of the year. Environmental groups throughout the state have called for an immediate ban on MTBE, but oil refineries argue that they need time to alter production and will meet the 2002 deadline.

Bioenergy 2000 Conference Meets in Buffalo

On October 15-19, the Northeast Regional Biomass Energy Program hosted the Ninth Biennial Bioenergy Conference in Buffalo, New York. Over 300 participants from all levels of government, non-profit organizations, businesses, and universities attended. The conference

featured a wide variety of presentations, several of which related to ethanol, including: "The Bridge to the Corn Ethanol Industry," "Corn-to-Ethanol: Technical Issues" and "What Can Government Do to Promote Ethanol?" Information about the conference is available online at <http://www.nrbp.org/>.

NOTABLE QUOTABLES

"Our dependence on petroleum cannot sustain us in the next century. We must stop giving the oil industry a helping hand at every turn while ignoring producers of renewable fuels. The potential of renewable fuels to provide us with a clean, efficient source of energy has barely been tapped. Rather than endangering our environment by drilling for oil on some of this country's most fragile lands, we should devote more resources to producing alternative sources of fuel." Senator Richard J. Durbin, October 12, 2000.

"With oil prices at record highs, demand exceeding supply, restricted U.S. refinery capacity, and record low agricultural commodity prices, now is the time to encourage the increased production and use of renewable, domestic fuels." Sustainable Energy Coalition, September 28, 2000.

Writer: Jeremy Ames

Editors: Carol Werner and Doug Howell

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Ethanol Climate Protection Oil Reduction

A Public Forum

Issue XII

January 19, 2001

Welcome to "ECO." This newsletter, distributed primarily to environmental organizations, will provide the most current information about ethanol and serve as a public forum. The Environmental and Energy Study Institute (EESI) hopes to build consensus within the environmental community regarding the potential benefits of ethanol -- and particularly the expanded opportunities provided by cellulosic ethanol -- with a special focus on climate protection. Ethanol can also be a political bridge to broader alliances in support of climate initiatives.

Many in the environmental community have made strong statements in support of ethanol as a low-carbon fuel with large potential benefits to reduce life-cycle greenhouse gas (GHG) emissions. Ethanol also reduces carbon monoxide emissions and our reliance on oil, contains no sulfur and helps to eliminate smog through its use as an oxygenate for gasoline. Cellulosic ethanol, which is produced from agricultural or wood wastes, provides even greater GHG emission reductions than corn-based ethanol, promotes rural economic revitalization and offers a solution to waste disposal problems.

However, there have been concerns about ethanol ranging from volatile organic compounds (VOCs) to corporate welfare. We will address these and other issues and explore which steps are appropriate to take in support of ethanol. Please tell us your views and we will address them in "ECO."

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International Outlook for Ethanol

Early in the 20th century, ethanol was seen by many as the fuel of the future. Henry Ford's "Model-T" was designed to run on both ethanol and gasoline, and ethanol accounted for a major portion of the transportation fuel market. However, with the advent of low oil prices, gasoline came to dominate the transportation fuel market by the 1930's.

In Brazil, ethanol produced from sugarcane had been used in varying amounts as a fuel additive since 1903, primarily to insulate the sugar industry from international market fluctuations. In 1975, motivated by high oil prices, Brazil's government launched its Proálcool program to combat the rising cost of importing oil. The program consisted of a package of incentives for ethanol producers, and subsidies to lower the price of ethanol for consumers. A fuel of 22 percent ethanol blended with gasoline was marketed, followed in 1979 by the addition of pure ethanol onto the market. Today, Brazil is the world's largest ethanol producer, setting a production record of 16 billion liters (4.2 billion gallons) of ethanol in 1997 with 65 percent of the sugarcane grown in Brazil used for ethanol production. Ethanol meets 40 percent of the country's transportation fuel demand. Although all fuel sold in Brazil is now required to contain at least 22 percent ethanol, diminishing government incentives, industry deregulation, and a reluctance of automakers to manufacture automobiles that run on pure ethanol – the sales of which now account for only 3 percent of total sales, down from 96 percent in 1985 – has led to a decline in the ethanol market in recent years. Brazil is responding to the decline by looking for opportunities to export more of its ethanol and market its expertise abroad, reaching an agreement with Thailand to provide technical assistance to help Thailand reach its goal of 2 million liters (520,000 gallons) per day of ethanol by the end of 2002.

In addition, Ford Motor Company and Thailand's National Science and Technology Development Administration have joined forces in a venture to promote ethanol use and production in Thailand. The project will develop educational programs and work with Thailand's government to develop policies to promote the use of ethanol. Recently, Thailand's Science Ministry endorsed ethanol as a means of curbing the nation's reliance on foreign oil, while boosting domestic crop prices. The year-long project will also examine which technologies are most cost-effective and environmentally sound for ethanol production in Thailand.

In North America, Mexico City Mayor Rosario Robles supports replacing MTBE with ethanol as an oxygenate fuel additive, after many of the city's wells were found to be contaminated with MTBE, as in many U.S. states that use the additive. The city of Guadalajara began blending ethanol with gasoline in 1998, although most of the ethanol has to be imported. The federal Government in Canada gave ethanol an exemption from the fuel excise tax in the early 1990s, and production of ethanol has steadily risen since.

In Europe ethanol use as a fuel is not widespread, but the European Union's goal of achieving a 12 percent renewable energy share by 2010 might encourage greater interest in ethanol. In France, a 1996 law required the addition of oxygenate components in fuel

by 2000, and ethanol was given an early exemption from the gasoline excise tax. New production facilities are also being opened in the Netherlands, Sweden, and Spain.

The majority of fuel-ethanol in the world is produced by Brazil and the United States. However, increased interest in ethanol among developing nations has the potential to expand ethanol's market. These nations will depend on countries such as Brazil and the United States to provide them the technology and expertise needed to utilize local feedstocks and develop markets.

GOVERNMENT ACTIVITY

MTBE Legislation Introduced in House

The 106th Congress ended without passing any ethanol-related legislation, but two MTBE related bills have already been introduced in the 107th Congress. H.R. 20, introduced by Rep. James Greenwood (R-PA), directs the Administrator of the Environmental Protection Agency (EPA) to limit or prohibit the use of any oxygenate (including MTBE) as a fuel additive if it is found to pose a public health risk. Further, the legislation directs the EPA to limit the manufacturing and sale of MTBE as a fuel additive to 1986-1991 levels beginning in 2005. The legislation would allow a state's Governor to obtain a waiver from the EPA to the oxygenate requirement for reformulated gasoline (RFG). Greenwood's motivation is MTBE contaminated groundwater in his district, which he calls, "probably the most troublesome local issue at this time."

H.R. 52 was introduced by Rep. Gary Condit (D-CA) and co-sponsored by Rep. Christopher Cox (R-CA). As explained in Condit's press release, the bill would exempt California from the federal oxygenate requirement for RFG, while preserving the emission benefits under the program. RFG is required to be sold in areas that do not meet federal clean air guidelines. "We already have more stringent laws in effect in California," Condit said. "Having to meet a double set of standards – federal and state – is like double jeopardy, and frankly it doesn't make sense. California can surpass the federal standards without the oxygenate requirement." Ethanol would be the likely choice to replace MTBE as an oxygenate in RFG, if the requirement was maintained.

Groups oppose California oxygenate waiver, decision will fall to Bush Administration

Fearing that the Clinton administration would grant the state of California a waiver to the federal 2 percent oxygenate requirement for reformulated gasoline (RFG), several ethanol supporters expressed their concerns to the outgoing administration. California plans to phase out MTBE, a petroleum based oxygenate, because it has been shown to pollute groundwater. The National Corn Growers Association (NCGA) and the American Farm Bureau issued a joint statement to the President asking him not to instruct the Environmental Protection Agency (EPA) to grant the waiver. They argued that adequate supplies of ethanol exist, which could replace MTBE as an oxygenate in California without compromising air quality. In December, the NCGA and the Renewable Fuels

Association sent a joint letter to the EPA urging the agency to deny the waiver on the grounds that it would jeopardize air quality, based on the results of a study they commissioned (see Excerpts from Recent Studies).

Pressure has also come from Capitol Hill. In a letter dated January 12th, several members of the House Alcohol Fuels Caucus asked President Clinton not to grant the controversial waiver. "We are making this request because we do not believe any decision made at this late date will be based on a rational technical analysis of the real effect of this waiver," the letter stated.

The decision will now fall to the Bush administration. On the prospect of the new administration granting the waiver, Senator Grassley (R-IA) commented "I hope early in his administration he will make a clear, definite statement that he's not going to grant California a waiver."

EXCERPTS FROM RECENT STUDIES

Study Finds Aromatics in Gasoline will Increase Pollution

A study commissioned by the Renewable Fuels Association (RFA) and the National Corn Growers Association was conducted by PACE Consultants to examine the potential addition of aromatics (benzene chemical compounds) to produce reformulated gasoline if California was given an oxygenate requirement waiver. The analysis concluded that higher aromatic gasoline would increase both ambient ozone and particulate formation. "Granting the California waiver will simply replace one problem, MTBE, with another, higher aromatic level," said Eric Vaughn, president of the RFA.

ETHANOL NEWS BRIEFS

Harvesting Clean Energy Conference, Spokane, WA

The Harvesting Clean Energy for Rural Development conference will be held January 29-30 in Spokane, WA. The focus of the conference is to discover new economic opportunities for rural Northwest communities, learn how rural landowners are prospering from clean energy systems, and to access technical and financial resources to take action. Featured speakers include: David Lester from the Council of Energy Resource Tribes, US Senator Gordon Smith (D-OR), Dr. David Morris from the Institute for Local Self-Reliance, and Mark Ritchie from the Institute for Agriculture and Trade Policy. Session topics will include: Success Stories, Pathways and Technologies, Growing Demand for Clean Energy, Financing Clean Energy Projects, and Building Partnerships State-by-State. For more information, or to register, go to: <http://capps.wsu.edu/programs/CleanEnergy01.htm>.

AAE Technologies Develops Ethanol-Diesel Blending Additives

AAE Technologies has developed a line of additives that allow for more cost-effective blending of ethanol with diesel fuel. The city of Lincoln, Nebraska has been selected to test a blend made using one of AAE's additives. The one-year trial will involve four buses in the city's municipal bus system, with each bus expected to travel 35,000 miles throughout the year. Testing will be a joint venture between laboratories operated by the University of Nebraska and the U.S. Department of Energy.

Legislation in Wisconsin Encourages Ethanol Production

A new law in Wisconsin will provide an incentive for increased ethanol production. Wisconsin Act 55, signed into law last spring, will give ethanol producers 20 cents per gallon for the first 15 million gallons a year of ethanol produced in the state using Wisconsin feedstock. Companies must produce at least 10 million gallons a year to qualify. The legislation is already generating interest in the business community. Badger State Ethanol is currently in the process of purchasing land to build Wisconsin's first ethanol facility, which would process more than 14 million bushels of corn into 40 million gallons of ethanol a year.

Chicago Bans MTBE

On December 13, the city of Chicago became the first US city to ban MTBE when the city council unanimously voted to ban the petroleum-based oxygenate. The ordinance was passed in response to concerns that MTBE could pollute the city's drinking water. The city already uses ethanol as an oxygenate, and consumes over 400 million gallons annually, making Chicago the largest ethanol market in the United States.

Tosco Making the Switch to Ethanol

Tosco Corporation, the largest independent refiner of petroleum products in the country, has begun to convert its California gasoline terminals to use ethanol instead of MTBE. The conversion should be complete by the end of 2001, a year ahead of the state's deadline to phase out MTBE. Ethanol would be the likely oxygenate to replace MTBE unless California is granted a waiver (see Government Activity).

NOTABLE QUOTABLES

On ethanol: *"It's good for our air, it also reduces our dependency on foreign oil. Who knows? Maybe someday we'll be driving automobiles with 100 percent corn product. And guess what? We can grow it right here in Iowa."* George W. Bush, Des Moines, Iowa, December 14, 1999.

"I hope early in his administration [President Bush] will make a clear, definite statement that he's not going to grant California [an oxygenate] waiver," Senator Charles Grassley (R-Iowa).

Writer: Jeremy Ames

Editor: Carol Werner

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Columbia Paving the Way in Renewable Fuels for Transport

**By Henry Echeverri-Campuzano (corpodib@cable.net.co),
Energy and Environmental Advisor, CORPODIB, Bogotá Colombia S.A.**

Colombia is a nation of 30 million inhabitants and 1.14 million square kilometers, making it the fourth largest country in South America. Much of the country is located in the Torrid Zone, but the mountains of the Andean system criss-cross the country and have created ecological resources that are rich in biodiversity. Colombia's environmental heritage and its geographical proximity to major trading centers make it a strategic country for sustainable economic development through expanded renewable energy sources.

The Corporation for Development of Biotechnology and Clean Technologies (CORPODIB), a governmental/private entity, has developed an ambitious program for renewable transport fuels. The program aims to reduce mobile source emissions and conform to Colombian environmental regulations requiring use of oxygenates in gasoline as of 2001. The Congress recently approved an innovative law requiring use of bio-alcohol in all Colombian gasoline after 2003. The environmental benefits of the program range from local impacts in the form of improved air quality to a global contribution through greenhouse gas (CO₂) reduction.

Ethanol from Sugar Cane

Colombia's refineries do not produce enough gasoline to satisfy domestic demand, and the balance is imported as high octane gasoline, incurring additional transportation costs. Using ethanol as an octane enhancer would meet environmental targets while reducing imports. An immediate goal of the CORPODIB project is therefore to produce sufficient anhydrous ethanol from sugar cane for a 10% blend with gasoline. A 10% ethanol blend would require production of 730 million liters (190 million gallons) a year of ethanol, which is roughly equal to current gasoline imports in Colombia. Currently a half million hectares of sugar cane are cultivated in Colombia, 180 thousand of which lay in the high-yielding Cauca Valley region. The new ethanol industry is estimated to require planting an additional 150 thousand hectares, distributed across different regions of the country. It will also require construction of twelve bio-refineries in the first phase of the project. The agro-industrial complexes will be located close to the more suitable regions for sugar cane and around demand centers for gasoline.

Rural Economic Benefits

It is estimated that the program will generate 150,000 new jobs, mainly in the agricultural sector. Colombian farmers will provide fuel that was previously imported, resulting in foreign exchange savings of \$150 million (U.S.) per year. The precarious position of farmers will be greatly improved through the new economic opportunities available. The rural economy will benefit further through expanded domestic markets for agro-industrial products and services with linkages to cane and ethanol markets. A 10% ethanol fuel does not require any modification in vehicle engines, and the Brazilian experience with ethanol shows that it is possible to go up to a 25% blend. Project planners believe higher ethanol content can be maximized in remote areas, where there are adequate sources of crude oil, by blending ethanol with straight run nafta, a petroleum derived product produced in small refineries.

Energy Efficient Production

Production units will use efficient technologies to optimally extract energy from the waste streams at the factory and distillery. Vinasse from the alcohol plant, which would otherwise pose contamination threats to surface water, will be transformed to biogas and biofertilizers in anaerobic digestors. Along with bagasse, the feedstocks will be employed in a modern cogeneration unit adjacent to the agro-industrial complex. In addition to providing all on-site demands for steam and electricity, an excess of power will be available to sell to the national electric grid. The production cost of ethanol, according to CORPODIB analyses, should be US\$ 1.00/gallon (26 cents/liter). The selling price is estimated at \$1.40 to

\$1.60/gallon (37–42 cents/liter), representing the opportunity cost to substitute a gallon of imported gasoline. The consumer price of gasoline will not increase because taxes from the ethanol portion will be transferred to the alcohol production chain, as compensation for the social benefits of the project and to provide incentives to private investors. Total private investment in the project is expected to reach \$400 million (U.S.). The after-tax rate of return for investors in the bio-refineries has been estimated at 20%.

Environmental Benefits

Fleet and engine tests by CORPODIB in Bogotá (2600 meters above sea level) using different blends of ethanol-gasoline, resulted in a reduction in CO and hydrocarbon emissions of 27% and 20%, respectively. In Bogotá this would mean an emissions reduction of 245 thousand tons per year. Overall, the program would reduce national CO₂ emissions by six million tons, offering an excellent opportunity to obtain financial resources for the project via the Clean Development Mechanisms of the Kyoto Protocol.

Conclusions

Production of biofuels such as ethanol from sugar cane, takes advantage of year-round cultivation potential in a tropical country like Colombia. Benefits extend from local to regional to national to global. Local rural economies benefit through new economic opportunities and employment in the agricultural sector. Urban regions benefit through cleaner air and health improvements. The nation benefits through substituting domestic resources for costly imported gasoline. The world benefits from reduced CO₂ emissions. The project in Colombia could be replicated elsewhere, and CORPODIB looks forward to a regional and global dialogue on expanding use of ethanol and other renewable fuels to promote sustainable development.

Note: this is an adaptation of an article published by Stockholm Environment Institute – Newsletter of the Sustainable Energy Program

New Integrated Ethanol-Feedlot-Methane System Under Development In South Dakota

By Philip D. Lusk, Resource Development Associates

If the results of an ongoing feasibility study turns out as envisioned, corn and beef cows will be converted into value-added products at an innovative agricultural processing complex in South Dakota. The new system, under development by PRIME (Pierre Renewable Integrated Meat & Energy) Technologies, LLC, will integrate an enclosed custom cattle feedlot, an anaerobic digester, and a modified ethanol unit.

The PRIME complex will be a "closed-loop" system that produces beef, fuel ethanol, methane, and biochemical fertilizers. Each of the component technologies proposed for use is well proven on a "stand-alone" basis. However, none have previously been combined to fully capture their economies of scope through process integration. PRIME's first generation complex will consist of an ethanol plant with a capacity of 15 million gallons of ethanol per year, an adjoining feed yard holding 25,000 head of cattle with a closed manure collection system, and an anaerobic digester. The anaerobic digester will produce methane for use by the ethanol plant and biochemical fertilizers for use by farmers. The PRIME complex has the opportunity to substantially reduce energy and material inputs.

The proposed concept is ideal for small rural communities. Using a co-op style management corporation, the complex relies on local crops as the feedstocks for the fuel ethanol plant and local ranchers will provide the feeder cattle. Corn by-products from ethanol production are used as enriched cattle feed in the form of wet distillers grains and solubles (WDGS) that can replace more than 40% of the corn feed presently used. The WDGS will be fed in the adjoining and enclosed cattle feedlot. The WDGS feed

mixture will increase cattle growth rates and reduce the use of hormones and antibiotics in the feed ration, while producing a higher quality beef.

Other system benefits include a reduction in environmental pollutants such as biochemical oxygen demand (BOD), pathogens, methane, ammonia, and nitrous oxide (N_2O) emissions. Nutrient pollution will be decreased because nutrients will be captured for recycling as organic biochemical fertilizers. Preliminary estimates indicate that 16% less corn will be required by the integrated complex, which equivalently increases ethanol conversion efficiency from 2.6 gallons per bushel of corn to 3.1 gallons per bushel.

Despite the efforts of the research community to develop energy crops, corn remains the least-cost source of sugars for ethanol production today. However, the complex allows the use of emerging ethanol production technologies that convert the hemicellulosic fraction of agricultural residues (such as corn stover) into five-carbon sugars that can be fermented and distilled when it makes economic sense. The complex will benefit farmers and ranchers monetarily, as well as mitigate possible pollution problems. Moreover, rural economic development will benefit from the implicit multiplier effect resulting from the jobs directly created by implementing the proposed system.

PRIME officials recently announced that its project consortium is progressing on schedule to complete Phase II—a feasibility study—for the \$50 million project. The agricultural processing complex will be located in Sully County, 15 miles north of Pierre, South Dakota, and will be one of the largest new operations of its kind in the state and nation. Federal and state funding has been confirmed to proceed to the next phase of development.

“This project is a good opportunity for our beef and corn producers in that it allows them to capture almost 100 per cent of the value to their products”, commented Larry Gabriel, South Dakota Secretary of Agriculture.

An important aspect of the technology is the discovery that the high-protein “spent grains” from the ethanol unit, when fed in high concentrations to ruminant animals (both beef and dairy cattle), substantially improve feeding efficiency and beef or milk output. A 10% or more increase in feeding efficiency saves about 16% of the corn used to meet the needs of the system. This is corn that can be used to produce more ethanol in this or another PRIME complex. Incorporating cellulosic biomass represents another potential savings of corn. The marketing of carbon credits potentially provides further protection in times of economic stress.

The elimination of the protein drying section substantially reduces ethanol plant capital, operating, and energy costs. These savings can then be re-invested in the customized, enclosed cattle feedlot and anaerobic digestion plant. These additional components make cattle feeding cost competitive in South Dakota's climate, and virtually eliminate feedlot odors and water and soil contamination.

The anaerobic digester replaces traditional animal waste storage tanks and lagoons, a major cause of pollution and feedlot odor. The digester takes a disposal problem and potential pollution source (manure) and converts it into biogas and a slurry called digestate. The biogas contains approximately 60%-70% methane and is water saturated. The balance of the biogas mixture is CO_2 , and some parts per million of hydrogen sulfide (H_2S). The biogas will be used to meet the majority of the ethanol plant's internal energy requirements.

Digestate contains a recoverable solid fiber that can be treated to produce a farming soil improver. After the fiber is removed, a liquid fraction called “filtrate” is created, which can be spread directly onto farmland for its nutrient value, and has combined nitrogen, potassium, and phosphate (N-P-K) percentages ranging from 3%-4.5% on a dry matter basis.

If warranted, these biofertilizers can also be enriched with minerals and microorganisms and customized to enhance a region's depleted soil. Surface application of the biochemical fertilizer from the PRIME complex also allows the use of low input farming practices, as opposed to the more energy intensive plowing practices. This significantly reduces fossil fuel use, and further augments carbon sequestration, helping to prevent soil erosion.

"In order to take advantage of the powerful synergies of this integrated process, we must combine several different disciplines and types of expertise", noted the PRIME project director, Victor W. Schlesinger, Omaha, Nebraska. "We believe that we have assembled the most experienced, and qualified, firms from these various disciplines, and that this project will substantially benefit from their knowledge."

"This marriage of cattle feeding with ethanol production is long overdue", said Pat Tracy, manager of J.E.S. Farms. "It value-adds South Dakota's two largest industries, and will bring new investment and quality jobs to our rural communities. With projects like this one, South Dakota's farmers and ranchers can break the vicious spiral of lower and lower commodity prices, and participate in a profitable processing venture."

The first PRIME complex is projected to be on-line in early-2003. It will create up to 50 quality direct jobs, process approximately 8 million bushels of corn annually, and will have a feedlot capacity of approximately 25,000 head (over 60,000 head of finished cattle on an annual basis). As the process is successfully demonstrated, project sponsors expect to build more of the integrated complexes throughout South Dakota and other Northern Plains states. PRIME officials say that almost 40 PRIME facilities, each with 15 million gallons of ethanol capacity, would be needed in South Dakota alone to utilize all the corn grain currently shipped from the state.

By capturing and reusing effluents, PRIME officials say it is possible to have their facilities achieve "zero discharge" status. This significantly decreases the harmful environmental impact of some of today's current practices.

For additional information contact Vic Schlesinger, PRIME Project Director, 10906 North 61st Street, Omaha, NE 68152; (402) 572-5649. For information on integrated biorefineries, contact Bill Holmberg, Biorefiner, 7 Rocky Point Road, BOW, NH 03304; (603) 224-0770; biorefiner@aol.com.

GOVERNMENT ACTIVITY

California Oxygenate Waiver to be Decided by Bush Administration

The Clinton Administration left office without granting the state of California a waiver to federal oxygenate requirement for reformulated gasoline. The requirement was part of the 1990 amendments to Clean Air Act. California plans to phase out MTBE, a petroleum based oxygenate, because it has been shown to pollute groundwater. Gov. Gray Davis, as well as several members of California's congressional delegation, had asked the EPA to grant California the waiver. They argued that California produces very little ethanol, and therefore would have to import a vast amount of ethanol from the Midwest to replace MTBE, at great cost to California consumers. Gasoline could be produced without any oxygenate, to achieve the same environmental benefits, they contended.

In opposition, a bipartisan group of 22 members of Congress wrote a letter to the President asking that the EPA not to grant the waiver. Sen. Tom Daschle (D-SD) and Tom Harkin (D-IA) lobbied the White

House to oppose the waiver. Groups such as the National Corn Growers Association, the Renewable Fuels Association, the American Farm Bureau sent letters in opposition to the waiver, as did the Bluewater Network, a grassroots environmental group based in San Francisco.

The request was neither granted nor denied leaving the decision to the new administration. Ethanol supporters in Congress are wasting no time weighing in on the issue. On March 8th, Senators Daschle, Harkin, Kent Conrad (D-ND), and Tim Johnson (D-SD) sent a letter to the President arguing that "Granting such a waiver would be a major setback for the Nation's ethanol fuel industry, our farmers and our clean air and renewable energy policies." President Bush recently told three Iowa congressmen that he is concerned whether an adequate supply of ethanol is available for use in California. Congressmen Greg Ganske, Tom Latham, and Jim Leach assured him there was an adequate supply, and said Bush seemed supportive towards granting the waiver, promising to discuss the issue with Environmental Protection Agency Administrator Christine Todd Whitman.

MTBE Industry Sues in Opposition to California MTBE Phase-Out.

Two lawsuits have been filed in opposition to California's plan to phase out MTBE use by the end of 2002 as ordered by Governor Gray Davis. The Oxygenated Fuels Association has filed a suit in the U.S. District Court in Sacramento, arguing that the order violates the Federal Clean Air Act and should be overturned. The group filed a similar suit last year in New York challenging a state law that would ban MTBE in New York by 2004. The suit contends that the Clean Air Act does not grant states the discretion to ban an allowable oxygenate.

Methanex Corporation, a Canadian company, has a claim against the U.S. Government for \$1 billion (U.S.), arguing the California phase-out violated the North American Free Trade Agreement. Methanex is the world's largest producer of methanol, a component of MTBE. Methanex alleges that Governor Davis's decision to phase out MTBE was motivated by campaign contributions given to him by Archer-Daniels-Midland Co., a major ethanol producer, rather than a concern for public health. Methanex officials argue that leaking gasoline storage tanks, not MTBE, are to blame for groundwater contamination.

Several New MTBE Bills Introduced

Several new pieces of MTBE legislation have been introduced in Congress. Congressmen Jim Greenwood (R-PA) and Gary Condit (D-CA) were the first to introduce MTBE legislation in the 107th Congress (see ECO XII). Sen. Peter Fitzgerald (R-IL) introduced the MTBE Elimination Act (S.265), which would phase out MTBE use in three years, require all gasoline currently mixed with MTBE to be labeled, and fund MTBE research. "We should eliminate MTBE without sacrificing air quality, and I believe we can do that by promoting ethanol as a friendlier substitute in the clean air program." Rep. Tim Johnson (R-IL) introduced a companion bill in the House.

Rep. Lois Capps (D-CA) reintroduced legislation to fund MTBE cleanup. H.R. 532 authorizes Congress to appropriate up to \$200 million from the Leaking Underground Storage Tanks fund for the Environmental Protection Agency (EPA) to enforce the clean up of MTBE-contaminated sites. "MTBE contamination poses a serious risk to our water supplies on the Central Coast," Capps stated in a press release. "My legislation would provide resources to enforce the clean up of contaminated areas to ensure that our drinking water remains pure and healthy."

Rep. Greg Ganske (R-IA) has introduced the Clean Air and Water Preservation Act of 2001 (H.R. 608), which would also phase out MTBE use within three years. The legislation directs the EPA to make the cleanup of areas contaminated by MTBE a top priority, allows for the 2.0 percent oxygenate requirement

for reformulated bills to be averaged on an annual basis, prohibits any backsliding of environmental performance when averaging the oxygenate requirement, and directs the Secretary of Energy and the Administrator of the EPA to investigate acceptable substitutes for MTBE and report to the President and Congress by the end of 2001.

Many members of Congress favor replacing the oxygenate requirement with a Renewable Fuels Standard, which would require an increasing average percentage of alternative fuels (including ethanol) to be used nationwide. In the 106th Congress the Federal Reformulated Fuels Act of 2000, which set up such a standard, was reported out of the Senate Environment and Public Works Committee but never voted on in the full Senate.

EXCERPTS FROM RECENT STUDIES

A new economic analysis prepared by economist John Urbanchuk, President of AUS Consultants, was released in February at the Renewable Fuels Association annual conference in Las Vegas, Nevada. The analysis found that quadrupling the use of ethanol over the next fifteen years would save American consumers \$57.5 billion (1996 dollars), create 156,000 jobs, add \$186 billion to household income, and displace 2.6 billion barrels of imported crude oil which would add \$685 billion to the real Gross Domestic Product. "Relying on ethanol for an increasing share of our transportation fuel requirements means that every acre of land that produces biomass used to make ethanol becomes an oil patch that never runs dry," the report stated.

ETHANOL NEWS BRIEFS

Ethanol Industry Achieves Record Production

The ethanol industry had a record year in 2000, producing 1.63 billion gallons of ethanol, according to the Department of Energy's Energy Information Administration. This was an increase of 160 million gallons over 1999. October initially broke the record for monthly production at 111,000 barrels per day, which was broken again in December at 113,000 and again in January, 2001 at 115,000 barrels per day.

DOE Ethanol Workshop Series

The U.S. Department of Energy's, Office of Fuels Development is sponsoring a series of one-day, state-level workshops through the Regional Biomass Energy Program and state officials to educate key public officials and the general public about ethanol as a transportation fuel. The ultimate goal of the workshops and associated follow-up activities is to pave the way at the state level for producing ethanol from cellulosic feedstocks. The next workshop will be in Oregon on May 8, 2001. We will report on the results of these workshops, and announce future workshops, in ECO. For more information go to: <http://www.bbiethanol.com/doe/>

Controversy Surrounds Proposed Wisconsin Facility

Venture Bio-fuels has presented a proposal to the town board of Elba, Wisconsin to build a 40 million gallon ethanol plant on farmland near the town. The plant would use corn bought from local farmers, and would create 40 to 50 new jobs. However, some residents are organizing in opposition to the plant. They fear the plant will increase traffic, cause an odor problem from fermenting corn, and drop the local water table as the plant would use at least 175 million gallons of water a year. The zoning changes needed have

been approved by the town board, but an environmental assessment still must be conducted before construction can begin.

Golden Cheese to Produce Ethanol

Golden Cheese Company of Corona, California has begun producing ethanol from cheese whey, making it the state's second ethanol producer. The company had previously produced ethanol, but halted production in the mid-1990's due to low demand in California. The decision to resume production was based on a growing market created by California's phase out of MTBE. The company produces enough whey to produce 5 million gallons of ethanol a year.

NOTABLE QUOTABLES

"Rising energy prices - and the need for a national energy policy - is a new farm financial concern. And there is growing viability of agricultural products as a source of energy... In order for the U.S. agricultural economy to remain competitive, we need to accelerate our search for innovative uses for farm products. Energy is a prime example. The nation needs new sources of clean, dependable energy and agriculture needs new markets - a coincidence of needs upon which we should capitalize. Research into biomass technology could develop efficient fuels and other chemicals from virtually any plant or plant product. We should step up development of new technologies for cost-effectively producing important fuels like ethanol, bio-diesel and other bioproducts that not only provide markets for products but have environmental benefits as well." U.S. Agriculture Secretary Ann Veneman said during her remarks at the USDA's Agricultural Outlook Forum, Washington, February 22, 2001.

"Now is the time for action. The dilly-dallying over minor energy policy differences of the past several years must end. With us or without us, national energy policies will be forged this year. Of that we are certain. We must find goals and policies on which we can unite. If we are serious about providing solutions to the nation's energy needs, ethanol supporters must unite behind a single approach." Nebraska Governor Mike Johanns, Chair, Governors' Ethanol Coalition Chairman, in his Keynote Address before the Renewable Fuels Association's National Ethanol Conference in Las Vegas, Nevada, on February 19, 2001.

Writer: Jeremy Ames
Editor: Carol Werner

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Ethanol Climate Protection Oil Reduction

A Public Forum

Issue XIV

August 16, 2001

Welcome to "ECO." This newsletter is written to provide the most current information about ethanol and serve as a public forum. The Environmental and Energy Study Institute (EESI) hopes to build consensus within the environmental community regarding the potential benefits of ethanol — and particularly the expanded opportunities provided by cellulosic ethanol — with a special focus on climate protection. Ethanol can also be a political bridge to broader alliances in support of climate initiatives.

Many in the environmental community have made strong statements in support of ethanol as a low-carbon fuel with large potential benefits to reduce life-cycle greenhouse gas (GHG) emissions. Ethanol also reduces carbon monoxide emissions and our reliance on oil, contains no sulfur and helps to eliminate smog through its use as an oxygenate for gasoline. Cellulosic ethanol, which is produced from agricultural or wood wastes, provides even greater GHG emission reductions than corn-based ethanol, promotes rural economic revitalization and offers a solution to waste disposal problems. However, there have been concerns about ethanol ranging from volatile organic compounds (VOCs) to corporate welfare. We will address these and other issues and explore which steps are appropriate to take in support of ethanol. Please share your views with us and we will address them in "ECO."

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COMMENTARY

Timing Critical for Renewable Fuels

By Elisa Lynch, Bluewater Network

Currently ethanol accounts for approximately one percent of the nation's gasoline market at 1.6 billion gallons of production a year. And at 6.7 million gallons, biodiesel is just beginning to show on the diesel radar screen. But we still have a long way to go before renewable fuels play a significant role in our nation's fuel supply. Today we're at a critical juncture. The future market share of renewable fuels depends in large part on how we respond to the need to replace MTBE.

The Oxygen Debate

Concern for water quality has led to MTBE phase-outs across the country, and to a heated debate about the Clean Air Act's oxygen requirement that encouraged its use. One solution is to simply ban MTBE and maintain the oxygen requirement, which will effectively replace MTBE with ethanol—the only other viable oxygen source. But this idea has sparked controversy as states like California and New York balk at the idea of importing ethanol from the Midwest. As a result, a number of bills have been introduced in Congress to allow states to waive the oxygen requirement.

Efforts are also under way to replace the oxygen requirement with a Renewable Fuels Standard. If coupled with anti-backsliding language to protect air quality, a Renewable Fuels Standard could maintain the benefits of the oxygen requirement while providing flexibility in where and when renewable fuels are used, and providing a boost to biodiesel at the same time. The path we choose will largely determine the role of renewable fuels in the United States and could have serious consequences for air quality, rural economic development, fuel supplies and prices, and global warming.

Global Warming Benefits

Earlier this year the Intergovernmental Panel on Climate Change predicted that the average global temperature will rise between 2.4 and 10.4 degrees Fahrenheit this century—much more than previously expected. This adds new urgency to the need to decrease our use of fossil fuels. Although we did not understand the environmental consequences 100 years ago when we chose energy and transportation technologies that rely on fossil fuels, today we do, and we must make better choices if we want to avert an environmental disaster of planetary proportions.

Increasing the use of renewable fuels would be an important step in the right direction. Data from Argonne National Laboratory indicate that on a lifecycle basis, ethanol made from corn can reduce greenhouse gas emissions by up to 35 percent per gallon compared to gasoline, and over 100 percent when made from cellulosic biomass such as wood, paper or agricultural wastes. Biodiesel, made from vegetable oils or recycled grease, also has dramatic benefits, with carbon dioxide emissions reduced by 78 percent per gallon compared to petroleum diesel, according to a joint study by the Departments of Agriculture and Energy.

Supply and Price Benefits

MTBE currently accounts for approximately three percent of the nation's gasoline content. Eliminating it from our fuel will cause a fuel shortage of over 3.6 billion gallons per year if we do not substitute ethanol. This shortage will step up pressure to exploit domestic oil supplies in sensitive areas such as the Arctic National Wildlife Refuge, our national monuments and our coastlines. It will also lead to fuel price increases, as volume constraints are almost always the cause of significant price increases.

We can help avoid this shortage by increased production and use of ethanol. Any increase in the ethanol market would also help the budding cellulosic biomass ethanol industry. This biomass ethanol production could eventually far surpass that of starch-based ethanol—providing up to 19 percent of our current gasoline needs with ethanol made from urban wood wastes, primary mill wastes and forest and agricultural residues alone. Adding municipal solid waste and energy crops could expand this dramatically. If we choose the path of a national Renewable Fuels Standard, biodiesel, made from vegetable oil or waste grease, could offset up to one billion gallons of petroleum diesel.

Air Quality

The air quality benefits of renewable fuels are becoming clearer all the time. Bluewater Network's assertion that ethanol provides net air quality benefits was recently bolstered by the U.S. EPA's denial of California's request to opt out of the oxygen requirement. The EPA confirmed that California's analysis underestimated the positive effects of oxygen on high emitting vehicles and on reducing carbon monoxide emissions, while overestimating the possibility of refiners producing clean burning gasoline without ethanol.

Biodiesel also provides substantial air quality benefits. According to the National Renewable Energy Laboratory (NREL), use of biodiesel in a 20 percent blend with petroleum diesel substantially reduces air toxics, carbon monoxide, hydrocarbons, particulate matter, and mutagenicity. Biodiesel does not reduce NOx emissions, but with the use of additives under development by the National Renewable Energy Laboratory, NOx emissions can be held at nearly the same levels as those of petroleum diesel.

Local Economic Development

Increased development of fuels from renewable sources provides important support for local agricultural and economic interests. Even in California, where state opposition to ethanol has been strong, a recent California Energy Commission study showed that the statewide economic benefits of developing a 200 million gallon a year biomass ethanol industry could exceed \$1 billion from the creation of new jobs and increased tax revenues over a 20-year period.

A New National Coalition

Bluewater Network recently collaborated with two other environmental leaders in the fields of renewable fuels and climate change—Climate Solutions and the Environmental and Energy Study Institute—to form a new national coalition to promote renewable fuels. The result is Renewable Energy Action Project (REAP)—a coalition of environmental groups, agricultural interests, local governments and renewable fuels producers. The primary goals of the coalition are to support federal, state and local actions that promote renewable fuels, and to refute misinformation about the economic and environmental feasibility of ethanol and biodiesel. To join our effort, please contact REAP director Brooke Coleman at 415-546-0500, ext. 20.

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Bluewater is a national nonprofit environmental organization aggressively confronting the root causes of climate change and fighting environmental damage from the shipping, oil, and motorized recreation industries.

As always, EESI welcomes your comments about the issues raised in this commentary and throughout ECO. Responses, article and commentary submissions, and feedback can be sent to eco@eesi.org

California Oxygenate Waiver Denied by Administration, Debate Continues in Congress

On June 12th, the Bush Administration officially denied the state of California's request for a waiver from federal oxygenate requirements. The Clean Air Act (CAA) requires regions not in compliance with federal ground-level ozone (smog) limits to sell reformulated gasoline, which must contain an oxygenate such as ethanol or the petroleum-based MTBE. However, MTBE, the most widely used oxygenate in California, has been found to contaminate groundwater so California Governor Gray Davis (D) ordered its use to be phased out by 2003. California officials argued that switching to ethanol would be cost prohibitive, since very little is produced in the state, and would have to be imported from the Midwest. About 580 million gallons of ethanol would be needed to meet California's demand.

In their waiver request, which was made in 1999 during the Clinton administration, California officials argued that they could produce a cleaner burning gasoline without using any oxygenates. However, the Environmental Protection Agency (EPA) decided that California had not clearly demonstrated the impact the waiver would have on smog levels. "We cannot grant a waiver for California since there is no clear evidence that a waiver will help California to reduce harmful levels of air pollutants," said EPA Administrator Christie Whitman. On August 10th, the state filed suit in the 9th U.S. Circuit Court, asking that the EPA's decision be overturned. They believe they provided the EPA with adequate scientific justification for the waiver.

Attempts to Grant Waiver in Congress Fail

Many members of California's Congressional delegation expressed disappointment in the decision. "By refusing California's plea to waive the arbitrary Federal mandate for oxygenates in gasoline, President Bush has once again turned a blind eye to California and has doomed the State to choosing between price hikes at the pump and continued pollution of our groundwater," said Senator Feinstein (D) in a

press release. The first legislative response came from Congressman Darrell Issa (R-CA) who introduced H.R. 2270, with the support of all 52 members of California's House delegation, which would amend the CAA to waive the oxygenate requirement for California.

In July, as the House Energy and Commerce Committee debated a comprehensive energy bill, Reps. Henry Waxman (D-CA) and Christopher Cox (R-CA) introduced an amendment that would have allowed any region using reformulated gasoline to obtain an oxygenate waiver, but it was defeated 22-33 in committee. In August, the Energy and Commerce bill was packaged with legislation from other committees for debate on the floor. Waxman and Cox made a reintroduced their amendment, this time applying only to California, but it was again defeated by a vote of 125-300.

Ethanol supporters cheered their victory. "In decisively voting down the Cox/Waxman Amendment to exempt California from the oxygenate requirement, the House of Representatives secured a bright future for the ethanol industry in the United States. 300 Members of Congress from all regions of the country voted in favor of ethanol, agriculture, clean air, and rural America. While there is still work to be done, it is clear that our efforts to educate Members and their staffs about the benefits of ethanol are working," said Rep. Lane Evans (D-IL), co-chair of the House Alcohol Fuels Caucus.

The issue may come up again when the Senate returns from the August recess. The Energy and Natural Resources Committee is working to produce its own national energy legislation.

Sens. Hagel and Johnson and Reps. Thune and Gutknecht Introduce Renewable Fuels Standard Legislation

In June, Sens. Chuck Hagel (R-NE) and Tim Johnson (D-SD) introduced the **Renewable Fuels For Energy Security Act of 2001** (S. 1006), which was introduced in the House (H.R. 2423) later that month by Reps. John Thune (R-SD) and Gil Gutknecht (R-MN). The legislation would create a national Renewable Fuels Standard, but unlike other bills introduced (see table pg. 9), it is a stand alone energy bill and does not modify the Clean Air Act.

The bills would require an average renewable content of 0.8 percent, starting in 2002, in all motor vehicle fuel sold, increasing every year until reaching 5.0 percent by 2016. This could include liquid fuels such as ethanol and biodiesel, or biogas. It would also establish a credit trading program allowing refiners, blenders, and importers who exceed their targets to sell credits which can be bought by other participants to meet their targets. The Department of Energy would regulate the program, and could impose up to \$25,000 in fines a day to violators. "By establishing a Renewable Fuels Standard, we can improve our air quality, strengthen our national security, reduce our trade deficit, decrease dependency on foreign oil, and create an expanded market for

America's farmers," said Sen. Hagel in a press release.

On July 6th, the Senate Energy and Natural Resources Committee held a field hearing in Sioux Falls, SD, to hear testimony about S. 1006. Representatives from several commodity organizations argued that the legislation could give much needed support to farmers. "We believe that fully half of the ethanol needed to meet the requirements of S. 1006 will come from cellulose. Some of that cellulose will come from agricultural wastes like rice straw in California, or sugar bagasse in Florida or Louisiana. Some of the cellulose will also come from dedicated energy crops like hybrid poplars or switchgrass. All of these feedstocks will be produced by farmers or associated with agricultural production. A major advantage of S. 1006 as a policy instrument is the vision of a growing and diverse ethanol industry with a broad-based constituency that will bring agricultural producers from across the nation together in a common cause," said Darrin Ihnen of the South Dakota Corn Growers in his testimony. Doug Durante of the Clean Fuels Development Coalition testified that the bill could give a boost to the development of emerging technologies and fuels, such as ethanol-based fuel cells, oxy-diesel, and ETBE (an ethanol-derived oxygenate), as well as grow the E85 market.

LEGISLATIVE UPDATES

House Passes Energy Legislation

On August 2nd, the House of Representatives passed its comprehensive energy package, the **Securing America's Future Energy Act of 2001** (H.R. 4). The legislation includes a provision that directs the Environmental Protection Agency (EPA) and the Department of Energy (DOE) to undertake a joint study on the feasibility of implementing a Renewable Fuels Standard. The study would assume an increasing amount of motor fuel sold would contain a renewable content, increasing over 15 years, with a trading system in place. The DOE is directed to study the feasibility of providing federal loans for conversion of municipal solid wastes and sewage into ethanol and other byproducts. The legislation also sets a goal for DOE to accelerate research and development to make cellulosic ethanol cost competitive with gasoline by 2010 to 2015. The DOE's Biofuels Energy Systems program is authorized at \$53.5 million in 2002, increasing annually until reaching \$93.2 million in 2006.

Blue Dogs Call for a Renewable Fuels Standard

The House Blue Dog Coalition, comprised of 32 moderate and conservative Democrats, released their energy plan in July. The plan called for the adoption of a Renewable Fuels Standard as a means of meeting the goal of tripling the use of biofuels and bioproducts by 2010, set in Executive Order 13134 and the Agricultural Risk Protection Act of 2000. "Ethanol has the potential to reduce our dependence on foreign sources of crude oil by acting as an extender in gasoline. Additionally, the use of ethanol can contribute to the reduction of air pollution," the report said.

House and Senate Pass Energy Appropriations Bills

The House passed the Energy and Water Development Appropriations Act for 2002 (H.R. 2311) on June 28th, with the Senate passing its version (S. 1171) on July 12th. The Department of Energy's biofuel research program received \$47.95 million in the House bill, and \$50 million in the Senate bill. The program was appropriated at \$46.6 million in 2001. A conference committee will meet to resolve the differences in the two bills when Congress returns from the August recess. The next issue of ECO will contain a more detailed appropriations summary.

House Small Business Committee Holds Hearing on Renewable Energy

On July 24th, the Subcommittee on Rural Enterprises, Agriculture and Technology of the House Small Business Committee held a hearing on renewable energy. Megan Smith, co-director of the American Bioenergy Association, testified that ethanol derived from cellulosic biomass could compete effectively with the cost of gasoline, without the ethanol incentive, by 2010. Currently there are four cellulosic ethanol facilities under development, she reported, including a plant in Jennings, Louisiana, expected to open in 2002, which will use sugar cane bagasse as a feedstock. Guy Donaldson of the Pennsylvania Farm Bureau argued that developing renewable fuels would lessen our dependence on foreign oil, and therefore lessen military expenditures in the Middle East. Bob Dinneen of the Renewable Fuels Association argued that the federal ethanol tax incentive had been a success for farmers and consumers, and assured the committee that adequate supplies and transportation systems exist to meet the demand expected in California as the state phases out MTBE.

Summary of New Legislation in the House and Senate

- **The Ethanol Energy Promotion Act of 2001 (H.R. 1999)** introduced on May 24th by Rep. Jim Nussle (R-IA) would require the use of ethanol in all federally-owned vehicles wherever economically feasible, immediately ban the use of MTBE as a fuel additive, and amend the small ethanol producer tax credit. The definition of a small producer, which is currently a producer with an annual production capacity of 30 million gallons or less, would be increased to 60 million gallons of capacity and include cooperatives. Nussle also introduced the **Renewable Energy from Agricultural Products Act (H.R. 2000)**, which would provide incentives for producing electricity from biomass, require the federal government to use more biodiesel, and allow switchgrass harvesting for energy production on federal conservation reserve program lands. "In my opinion, ethanol and biodiesel both have unlimited untapped potential. While providing a solution to our energy needs, they can also provide income to farm families... I believe we could kill two birds with one stone by expanding our use of these two fuels," said Nussle in testimony before the House Committee on Way and Means on June 12th.
- **The Biofuels Air Quality Act (S. 1071/H.R. 2088)** introduced in June by Sen. Kit Bond (R-MO) and Rep. John Shimkus (R-IL), would make biofuel projects eligible to compete for funds in the Department of Transportation's Congestion Mitigation Air Quality Improvement (CMAQ) program.

CMAQ provides about \$1.5 billion annually to fund projects to improve air quality, such as the purchase of alternative fuel vehicles and refueling infrastructure.

- **H.R. 2230** was introduced on June 19th by Rep. Peter King (R-NY) to ban MTBE as a fuel additive within six months from enactment.
- **The Gasoline Access and Stabilization Act of 2001 (H.R. 2249)** was introduced on June 20th by Rep. Roy Blunt (R-MO) to address the "boutique" fuels concern, where different blends of reformulated gasoline can not readily be transported into other regions because of differing regional specifications. The bill, cosponsored by 15 Members including House Speaker Dennis Hastert (R-IL), would give states three options for blending gasoline: a conventional gasoline, a reformulated gasoline (containing an oxygenate), or a California reformulated gasoline.
- **The Ethanol and Biodiesel Promotion Act of 2001 (H.R. 2303)** was introduced on June 25th by Rep. Ron Lewis (R-KY), and would provide tax credits to retailers selling a blend of 85 percent ethanol and 15 percent gasoline (E85) as well as biodiesel, and would expand the small producer tax credit to include cooperatives and producers with up to 60 million gallons of annual capacity.
- **Alternative Fuel Vehicle Acceleration Act of 2001 (H.R. 2326)** was introduced on June 27th by Rep. Sherwood L. Boehlert (R-NY), Chairman of the House Science Committee, to provide grants to state and local governments for the purchase of alternative fuel vehicles. While vehicles that run on E85 were originally excluded from the bill, Boehlert recently introduced a "Chairman's Amendment" to the bill making E85 vehicles eligible..
- **The Bioenergy Act of 2001 (H.R. 2358)** was introduced on June 28th by Rep. Roscoe Bartlett (R-MD), Chairman of the Energy subcommittee of the House Science Committee, and would authorize appropriations of \$912.2 million over five years for bioenergy and biofuels research and development. Biofuels energy systems would be authorized at \$53.5 million in 2002 increasing yearly to \$93.2 million by 2006. These were the amounts included in the House passed energy legislation H.R. 4. "It's imperative to ensure our continued economic prosperity and national security that we develop domestic alternatives to oil," Bartlett said in a press release.

RECENT STUDIES

NAS Recommends Eliminating Dual-Fuel Vehicle CAFE Credits

On July 31st, a National Academy of Sciences panel released their report "Effectiveness and Impact of Corporate Average Fuel Economy Standards," which was done at the request of Congress. The panel concluded that the Corporate Average Fuel Economy (CAFE) standards program, which requires automakers to meet fuel-efficiency goals set by Congress, has been an effective tool for improving fuel efficiency, but recommended several reforms to improve the program. The panel recommended eliminating the credits automakers receive toward meeting their CAFE goals by producing

dual-fuel vehicles, which can run on either gasoline or blends of ethanol up to 85 percent, because "These vehicles seldom use any fuel other than gasoline, yet enable automakers to increase their production of less fuel-efficient vehicles."

ETHANOL NEWS BRIEFS

Ethanol May Soon Power Your Laptop

Medis Technologies Ltd. introduced new ethanol fuel cell technology in July at the Fuel Cell 2001 Asian Conference in Tokyo, Japan that they claim will revolutionize consumer electronics. The new technology allows them to

create smaller fuel cells, which can boost the average talking time on a cell phone from about three hours to 20 hours, and boost a notebook computer's time between recharges to approximately 12 to 15 hours. "Ultimately, every cell phone and every laptop will use fuel cells," said Robert K. Lifton, Chairman and CEO of Medis.

USDA Grants to Fund Ethanol Facilities

The U.S. Department of Agriculture has approved \$2.4 million in value-added agricultural product market development grants. Several of the grants will support the opening of new ethanol facilities, including a 15-million gallon per year plant in Eldora, IA, a 14-million gallon plant in Sioux Center, IA, a 40 million gallon plant in Lennox, SD, and a 40-million gallon plant in Ritzville, WA. In addition, the USDA has approved a \$12.5 million loan guarantee for the construction of an 18-million gallon facility in Galva, IA.

USDA to Begin Using Biofuels

The Department of Agriculture announced on August 7th that it will begin using ethanol and biodiesel in its vehicle fleets where "practicable and reasonable in cost." USDA owns over 700 E85 flex-fuel vehicles, and plans to increase that number in areas where E85 refueling stations are available. E10 will be used in the Department's other gasoline vehicles where it is cost-competitive.

Caterpillar to Develop Commercial Ethanol Fuel Cell

President Bush announced in July that Caterpillar Inc. has been awarded a \$2.5 million grant from the U.S. Department of Energy for the development and demonstration of a commercial ethanol fuel cell. Caterpillar will collaborate with Nuvera Fuel Cells and Williams Bio-Energy to develop a 13-kilowatt ethanol-fueled Proton Exchange Membrane (PEM) stationary fuel cell system. The fuel cell will be the nation's first commercial ethanol fuel cell, and will power the Williams Visitors Center in Pekin, Illinois.

UPCOMING EVENTS

Department of Energy Ethanol Workshops

Each workshop is an interactive discussion among local experts about the opportunities and barriers for developing an ethanol industry at the state level. Future workshop dates can be found online at: www.bbiethanol.com/doe/.

August:	25	Puerto Rico
	28	Pennsylvania – Sheraton Inn, Mars
	29	Iowa – Farm Bureau Auditorium, Des Moines
	30	Pennsylvania – Holiday Inn, Grantville
September:	13	Maryland – BWI Airport Marriott, Baltimore
	26	Michigan - Radisson Hotel, Lansing

For registration information contact: Sue Conroe, BBI International, sue@bbiethanol.com

World Fuel Ethanol Congress – October 28-31 Beijing, China

More information can be found online at www.fuelethanolcongress.com.

NOTABLE QUOTABLES

"Agriculture can help us solve our energy problems through the production of domestic liquid fuels, such as ethanol and biodiesel. Renewable energy is good for independence, good for farmers, and good for the environment."

Ann Veneman, Secretary of Agriculture, August 7, 2001.

"Currently, there are 26 different feedstocks used in this country to produce ethanol. With the exponential growth in technology in the ethanol industry, we can anticipate the increased use of those feedstocks and the use of cellulose feedstocks, such as corn stover, rice straw and waste from processing of agricultural products. We all gain when we better utilize all of the production from our farms and ranches."

Guy Donaldson, President of the Pennsylvania Farm Bureau, in testimony before the House Committee on Small Business, July 24, 2001.

Writer: Jeremy Ames

Editor: Carol Werner

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Comparison of Renewable Fuels Standard Proposals, 107th Congress

	S. 670	S. 892	S. 1006/H.R. 2423
Legislative Vehicle	Amends CAA ¹	Amends CAA	Stand Alone Bill
Ethanol Content	1.5% by 2011	3.3% by 2011	5.0% by 2016
Bans MTBE	Yes	Yes	No
Cellulose Incentive	Yes ²	No	No
Managing Agency	EPA	EPA	DOE
CO Volatility Allowance	Yes	Yes	No
Aromatics Capped	Yes	Yes	No
Trading Allowed	Yes	Yes	Yes
Enforcement	CAA	CAA	Civil fine up to \$25k/day

1. CAA = The Federal Clean Air Act

2. One gallon of ethanol derived from cellulosic biomass would count as 1.5 gallons of renewable fuel

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A Public Forum

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Currently ethanol accounts for approximately one percent of the nation's gasoline market at 1.6 billion gallons of production a year. And at 6.7 million gallons, biodiesel is just beginning to show on the diesel radar screen. But we still have a long way to go before renewable fuels play a significant role in our nation's fuel supply. Today we're at a critical juncture. The future market share of renewable fuels depends in large part on how we respond to the need to replace MTBE.

The Oxygen Debate

Concern for water quality has led to MTBE phase-outs across the country, and to a heated debate about the Clean Air Act's oxygen requirement that encouraged its use. One solution is to simply ban MTBE and maintain the oxygen requirement, which will effectively replace MTBE with ethanol—the only other viable oxygen source. But this idea has sparked controversy as states like California and New York balk at the idea of importing ethanol from the Midwest. As a result, a number of bills have been introduced in Congress to allow states to waive the oxygen requirement.

Efforts are also under way to replace the oxygen requirement with a Renewable Fuels Standard. If coupled with anti-backsliding language to protect air quality, a Renewable Fuels Standard could maintain the benefits of the oxygen requirement while providing flexibility in where and when renewable fuels are used, and providing a boost to biodiesel at the same time. The path we choose will largely determine the role of renewable fuels in the United States and could have serious consequences for air quality, rural economic development, fuel supplies and prices, and global warming.

Global Warming Benefits

Earlier this year the Intergovernmental Panel on Climate Change predicted that the average global temperature will rise between 2.4 and 10.4 degrees Fahrenheit this century—much more than previously expected. This adds new urgency to the need to decrease our use of fossil fuels. Although we did not understand the environmental consequences 100 years ago when we chose energy and transportation technologies that rely on fossil fuels, today we do, and we must make better choices if we want to avert an environmental disaster of planetary proportions.

Increasing the use of renewable fuels would be an important step in the right direction. Data from Argonne National Laboratory indicate that on a lifecycle basis, ethanol made from corn can reduce greenhouse gas emissions by up to 35 percent per gallon compared to gasoline, and over 100 percent when made from cellulosic biomass such as wood, paper or agricultural wastes. Biodiesel, made from vegetable oils or recycled grease, also has dramatic benefits, with carbon dioxide emissions reduced by 78 percent per gallon compared to petroleum diesel, according to a joint study by the Departments of Agriculture and Energy.

Supply and Price Benefits

MTBE currently accounts for approximately three percent of the nation's gasoline content. Eliminating it from our fuel will cause a fuel shortage of over 3.6 billion gallons per year if we do not substitute ethanol. This shortage will step up pressure to exploit domestic oil supplies in sensitive areas such as the Arctic National Wildlife Refuge, our national monuments and our coastlines. It will also lead to fuel price increases, as volume constraints are almost always the cause of significant price increases.

We can help avoid this shortage by increased production and use of ethanol. Any increase in the ethanol market would also help the budding cellulosic biomass ethanol industry. This biomass ethanol production could eventually far surpass that of starch-based ethanol—providing up to 19 percent of our current gasoline needs with ethanol made from urban wood wastes, primary mill wastes and forest and agricultural residues alone. Adding municipal solid waste and energy crops could expand this dramatically. If we choose the path of a national Renewable Fuels Standard, biodiesel, made from vegetable oil or waste grease, could offset up to one billion gallons of petroleum diesel.

Air Quality

The air quality benefits of renewable fuels are becoming clearer all the time. Bluewater Network's assertion that ethanol provides net air quality benefits was recently bolstered by the U.S. EPA's denial of California's request to opt out of the oxygen requirement. The EPA confirmed that California's analysis underestimated the positive effects of oxygen on high emitting vehicles and on reducing carbon monoxide emissions, while overestimating the possibility of refiners producing clean burning gasoline without ethanol.

Biodiesel also provides substantial air quality benefits. According to the National Renewable Energy Laboratory (NREL), use of biodiesel in a 20 percent blend with petroleum diesel substantially reduces air toxics, carbon monoxide, hydrocarbons, particulate matter, and mutagenicity. Biodiesel does not reduce NOx emissions, but with the use of additives under development by the National Renewable Energy Laboratory, NOx emissions can be held at nearly the same levels as those of petroleum diesel.

Local Economic Development

Increased development of fuels from renewable sources provides important support for local agricultural and economic interests. Even in California, where state opposition to ethanol has been strong, a recent California Energy Commission study showed that the statewide economic benefits of developing a 200 million gallon a year biomass ethanol industry could exceed \$1 billion from the creation of new jobs and increased tax revenues over a 20-year period.

A New National Coalition

Bluewater Network recently collaborated with two other environmental leaders in the fields of renewable fuels and climate change—Climate Solutions and the Environmental and Energy Study Institute—to form a new national coalition to promote renewable fuels. The result is Renewable Energy Action Project (REAP)—a coalition of environmental groups, agricultural interests, local governments and renewable fuels producers. The primary goals of the coalition are to support federal, state and local actions that promote renewable fuels, and to refute misinformation about the economic and environmental feasibility of ethanol and biodiesel. To join our effort, please contact REAP director Brooke Coleman at 415-546-0500, ext. 20.

Elisa Lynch, Campaign Director

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Bluewater is a national nonprofit environmental organization aggressively confronting the root causes of climate change and fighting environmental damage from the shipping, oil, and motorized recreation industries.

As always, EESI welcomes your comments about the issues raised in this commentary and throughout ECO. Responses, article and commentary submissions, and feedback can be sent to eco@eesi.org

California Oxygenate Waiver Denied by Administration, Debate Continues in Congress

On June 12th, the Bush Administration officially denied the state of California's request for a waiver from federal oxygenate requirements. The Clean Air Act (CAA) requires regions not in compliance with federal ground-level ozone (smog) limits to sell reformulated gasoline, which must contain an oxygenate such as ethanol or the petroleum-based MTBE. However, MTBE, the most widely used oxygenate in California, has been found to contaminate groundwater so California Governor Gray Davis (D) ordered its use to be phased out by 2003. California officials argued that switching to ethanol would be cost prohibitive, since very little is produced in the state, and would have to be imported from the Midwest. About 580 million gallons of ethanol would be needed to meet California's demand.

In their waiver request, which was made in 1999 during the Clinton administration, California officials argued that they could produce a cleaner burning gasoline without using any oxygenates. However, the Environmental Protection Agency (EPA) decided that California had not clearly demonstrated the impact the waiver would have on smog levels. "We cannot grant a waiver for California since there is no clear evidence that a waiver will help California to reduce harmful levels of air pollutants," said EPA Administrator Christie Whitman. On August 10th, the state filed suit in the 9th U.S. Circuit Court, asking that the EPA's decision be overturned. They believe they provided the EPA with adequate scientific justification for the waiver.

Attempts to Grant Waiver in Congress Fail

Many members of California's Congressional delegation expressed disappointment in the decision. "By refusing California's plea to waive the arbitrary Federal mandate for oxygenates in gasoline, President Bush has once again turned a blind eye to California and has doomed the State to choosing between price hikes at the pump and continued pollution of our groundwater," said Senator Feinstein (D) in a

press release. The first legislative response came from Congressman Darrell Issa (R-CA) who introduced H.R. 2270, with the support of all 52 members of California's House delegation, which would amend the CAA to waive the oxygenate requirement for California.

In July, as the House Energy and Commerce Committee debated a comprehensive energy bill, Reps. Henry Waxman (D-CA) and Christopher Cox (R-CA) introduced an amendment that would have allowed any region using reformulated gasoline to obtain an oxygenate waiver, but it was defeated 22-33 in committee. In August, the Energy and Commerce bill was packaged with legislation from other committees for debate on the floor. Waxman and Cox made a reintroduced their amendment, this time applying only to California, but it was again defeated by a vote of 125-300.

Ethanol supporters cheered their victory. "In decisively voting down the Cox/Waxman Amendment to exempt California from the oxygenate requirement, the House of Representatives secured a bright future for the ethanol industry in the United States. 300 Members of Congress from all regions of the country voted in favor of ethanol, agriculture, clean air, and rural America. While there is still work to be done, it is clear that our efforts to educate Members and their staffs about the benefits of ethanol are working," said Rep. Lane Evans (D-IL), co-chair of the House Alcohol Fuels Caucus.

The issue may come up again when the Senate returns from the August recess. The Energy and Natural Resources Committee is working to produce its own national energy legislation.

Sens. Hagel and Johnson and Reps. Thune and Gutknecht Introduce Renewable Fuels Standard Legislation

In June, Sens. Chuck Hagel (R-NE) and Tim Johnson (D-SD) introduced the **Renewable Fuels For Energy Security Act of 2001** (S. 1006), which was introduced in the House (H.R. 2423) later that month by Reps. John Thune (R-SD) and Gil Gutknecht (R-MN). The legislation would create a national Renewable Fuels Standard, but unlike other bills introduced (see table pg. 9), it is a stand alone energy bill and does not modify the Clean Air Act.

The bills would require an average renewable content of 0.8 percent, starting in 2002, in all motor vehicle fuel sold, increasing every year until reaching 5.0 percent by 2016. This could include liquid fuels such as ethanol and biodiesel, or biogas. It would also establish a credit trading program allowing refiners, blenders, and importers who exceed their targets to sell credits which can be bought by other participants to meet their targets. The Department of Energy would regulate the program, and could impose up to \$25,000 in fines a day to violators. "By establishing a Renewable Fuels Standard, we can improve our air quality, strengthen our national security, reduce our trade deficit, decrease dependency on foreign oil, and create an expanded market for

America's farmers," said Sen. Hagel in a press release.

On July 6th, the Senate Energy and Natural Resources Committee held a field hearing in Sioux Falls, SD, to hear testimony about S. 1006. Representatives from several commodity organizations argued that the legislation could give much needed support to farmers. "We believe that fully half of the ethanol needed to meet the requirements of S. 1006 will come from cellulose. Some of that cellulose will come from agricultural wastes like rice straw in California, or sugar bagasse in Florida or Louisiana. Some of the cellulose will also come from dedicated energy crops like hybrid poplars or switchgrass. All of these feedstocks will be produced by farmers or associated with agricultural production. A major advantage of S. 1006 as a policy instrument is the vision of a growing and diverse ethanol industry with a broad-based constituency that will bring agricultural producers from across the nation together in a common cause," said Darrin Ihnen of the South Dakota Corn Growers in his testimony. Doug Durante of the Clean Fuels Development Coalition testified that the bill could give a boost to the development of emerging technologies and fuels, such as ethanol-based fuel cells, oxy-diesel, and ETBE (an ethanol-derived oxygenate), as well as grow the E85 market.

LEGISLATIVE UPDATES

House Passes Energy Legislation

On August 2nd, the House of Representatives passed its comprehensive energy package, the **Securing America's Future Energy Act of 2001** (H.R. 4). The legislation includes a provision that directs the Environmental Protection Agency (EPA) and the Department of Energy (DOE) to undertake a joint study on the feasibility of implementing a Renewable Fuels Standard. The study would assume an increasing amount of motor fuel sold would contain a renewable content, increasing over 15 years, with a trading system in place. The DOE is directed to study the feasibility of providing federal loans for conversion of municipal solid wastes and sewage into ethanol and other byproducts. The legislation also sets a goal for DOE to accelerate research and development to make cellulosic ethanol cost competitive with gasoline by 2010 to 2015. The DOE's Biofuels Energy Systems program is authorized at \$53.5 million in 2002, increasing annually until reaching \$93.2 million in 2006.

Blue Dogs Call for a Renewable Fuels Standard

The House Blue Dog Coalition, comprised of 32 moderate and conservative Democrats, released their energy plan in July. The plan called for the adoption of a Renewable Fuels Standard as a means of meeting the goal of tripling the use of biofuels and bioproducts by 2010, set in Executive Order 13134 and the Agricultural Risk Protection Act of 2000. "Ethanol has the potential to reduce our dependence on foreign sources of crude oil by acting as an extender in gasoline. Additionally, the use of ethanol can contribute to the reduction of air pollution," the report said.

House and Senate Pass Energy Appropriations Bills

The House passed the Energy and Water Development Appropriations Act for 2002 (H.R. 2311) on June 28th, with the Senate passing its version (S. 1171) on July 12th. The Department of Energy's biofuel research program received \$47.95 million in the House bill, and \$50 million in the Senate bill. The program was appropriated at \$46.6 million in 2001. A conference committee will meet to resolve the differences in the two bills when Congress returns from the August recess. The next issue of ECO will contain a more detailed appropriations summary.

House Small Business Committee Holds Hearing on Renewable Energy

On July 24th, the Subcommittee on Rural Enterprises, Agriculture and Technology of the House Small Business Committee held a hearing on renewable energy. Megan Smith, co-director of the American Bioenergy Association, testified that ethanol derived from cellulosic biomass could compete effectively with the cost of gasoline, without the ethanol incentive, by 2010. Currently there are four cellulosic ethanol facilities under development, she reported, including a plant in Jennings, Louisiana, expected to open in 2002, which will use sugar cane bagasse as a feedstock. Guy Donaldson of the Pennsylvania Farm Bureau argued that developing renewable fuels would lessen our dependence on foreign oil, and therefore lessen military expenditures in the Middle East. Bob Dinneen of the Renewable Fuels Association argued that the federal ethanol tax incentive had been a success for farmers and consumers, and assured the committee that adequate supplies and transportation systems exist to meet the demand expected in California as the state phases out MTBE.

Summary of New Legislation in the House and Senate

- **The Ethanol Energy Promotion Act of 2001 (H.R. 1999)** introduced on May 24th by Rep. Jim Nussle (R-IA) would require the use of ethanol in all federally-owned vehicles wherever economically feasible, immediately ban the use of MTBE as a fuel additive, and amend the small ethanol producer tax credit. The definition of a small producer, which is currently a producer with an annual production capacity of 30 million gallons or less, would be increased to 60 million gallons of capacity and include cooperatives. Nussle also introduced the **Renewable Energy from Agricultural Products Act (H.R. 2000)**, which would provide incentives for producing electricity from biomass, require the federal government to use more biodiesel, and allow switchgrass harvesting for energy production on federal conservation reserve program lands. "In my opinion, ethanol and biodiesel both have unlimited untapped potential. While providing a solution to our energy needs, they can also provide income to farm families... I believe we could kill two birds with one stone by expanding our use of these two fuels," said Nussle in testimony before the House Committee on Way and Means on June 12th.
- **The Biofuels Air Quality Act (S. 1071/H.R. 2088)** introduced in June by Sen. Kit Bond (R-MO) and Rep. John Shimkus (R-IL), would make biofuel projects eligible to compete for funds in the Department of Transportation's Congestion Mitigation Air Quality Improvement (CMAQ) program.

CMAQ provides about \$1.5 billion annually to fund projects to improve air quality, such as the purchase of alternative fuel vehicles and refueling infrastructure.

- **H.R. 2230** was introduced on June 19th by Rep. Peter King (R-NY) to ban MTBE as a fuel additive within six months from enactment.
- **The Gasoline Access and Stabilization Act of 2001 (H.R. 2249)** was introduced on June 20th by Rep. Roy Blunt (R-MO) to address the "boutique" fuels concern, where different blends of reformulated gasoline can not readily be transported into other regions because of differing regional specifications. The bill, cosponsored by 15 Members including House Speaker Dennis Hastert (R-IL), would give states three options for blending gasoline: a conventional gasoline, a reformulated gasoline (containing an oxygenate), or a California reformulated gasoline.
- **The Ethanol and Biodiesel Promotion Act of 2001 (H.R. 2303)** was introduced on June 25th by Rep. Ron Lewis (R-KY), and would provide tax credits to retailers selling a blend of 85 percent ethanol and 15 percent gasoline (E85) as well as biodiesel, and would expand the small producer tax credit to include cooperatives and producers with up to 60 million gallons of annual capacity.
- **Alternative Fuel Vehicle Acceleration Act of 2001 (H.R. 2326)** was introduced on June 27th by Rep. Sherwood L. Boehlert (R-NY), Chairman of the House Science Committee, to provide grants to state and local governments for the purchase of alternative fuel vehicles. While vehicles that run on E85 were originally excluded from the bill, Boehlert recently introduced a "Chairman's Amendment" to the bill making E85 vehicles eligible..
- **The Bioenergy Act of 2001 (H.R. 2358)** was introduced on June 28th by Rep. Roscoe Bartlett (R-MD), Chairman of the Energy subcommittee of the House Science Committee, and would authorize appropriations of \$912.2 million over five years for bioenergy and biofuels research and development. Biofuels energy systems would be authorized at \$53.5 million in 2002 increasing yearly to \$93.2 million by 2006. These were the amounts included in the House passed energy legislation H.R. 4. "It's imperative to ensure our continued economic prosperity and national security that we develop domestic alternatives to oil," Bartlett said in a press release.

RECENT STUDIES

NAS Recommends Eliminating Dual-Fuel Vehicle CAFE Credits

On July 31st, a National Academy of Sciences panel released their report "Effectiveness and Impact of Corporate Average Fuel Economy Standards," which was done at the request of Congress. The panel concluded that the Corporate Average Fuel Economy (CAFE) standards program, which requires automakers to meet fuel-efficiency goals set by Congress, has been an effective tool for improving fuel efficiency, but recommended several reforms to improve the program. The panel recommended eliminating the credits automakers receive toward meeting their CAFE goals by producing

dual-fuel vehicles, which can run on either gasoline or blends of ethanol up to 85 percent, because "These vehicles seldom use any fuel other than gasoline, yet enable automakers to increase their production of less fuel-efficient vehicles."

ETHANOL NEWS BRIEFS

Ethanol May Soon Power Your Laptop

Medis Technologies Ltd. introduced new ethanol fuel cell technology in July at the Fuel Cell 2001 Asian Conference in Tokyo, Japan that they claim will revolutionize consumer electronics. The new technology allows them to

create smaller fuel cells, which can boost the average talking time on a cell phone from about three hours to 20 hours, and boost a notebook computer's time between recharges to approximately 12 to 15 hours. "Ultimately, every cell phone and every laptop will use fuel cells," said Robert K. Lifton, Chairman and CEO of Medis.

USDA Grants to Fund Ethanol Facilities

The U.S. Department of Agriculture has approved \$2.4 million in value-added agricultural product market development grants. Several of the grants will support the opening of new ethanol facilities, including a 15-million gallon per year plant in Eldora, IA, a 14-million gallon plant in Sioux Center, IA, a 40 million gallon plant in Lennox, SD, and a 40-million gallon plant in Ritzville, WA. In addition, the USDA has approved a \$12.5 million loan guarantee for the construction of an 18-million gallon facility in Galva, IA.

USDA to Begin Using Biofuels

The Department of Agriculture announced on August 7th that it will begin using ethanol and biodiesel in its vehicle fleets where "practicable and reasonable in cost." USDA owns over 700 E85 flex-fuel vehicles, and plans to increase that number in areas where E85 refueling stations are available. E10 will be used in the Department's other gasoline vehicles where it is cost-competitive.

Caterpillar to Develop Commercial Ethanol Fuel Cell

President Bush announced in July that Caterpillar Inc. has been awarded a \$2.5 million grant from the U.S. Department of Energy for the development and demonstration of a commercial ethanol fuel cell. Caterpillar will collaborate with Nuvera Fuel Cells and Williams Bio-Energy to develop a 13-kilowatt ethanol-fueled Proton Exchange Membrane (PEM) stationary fuel cell system. The fuel cell will be the nation's first commercial ethanol fuel cell, and will power the Williams Visitors Center in Pekin, Illinois.

UPCOMING EVENTS

Department of Energy Ethanol Workshops

Each workshop is an interactive discussion among local experts about the opportunities and barriers for developing an ethanol industry at the state level. Future workshop dates can be found online at: www.bbiethanol.com/doe/.

August:	25	Puerto Rico
	28	Pennsylvania – Sheraton Inn, Mars
	29	Iowa – Farm Bureau Auditorium, Des Moines
	30	Pennsylvania – Holiday Inn, Grantville
September:	13	Maryland – BWI Airport Marriott, Baltimore
	26	Michigan - Radisson Hotel, Lansing

For registration information contact: Sue Conroe, BBI International, sue@bbiethanol.com

World Fuel Ethanol Congress – October 28-31 Beijing, China

More information can be found online at www.fuelethanolcongress.com.

NOTABLE QUOTABLES

"Agriculture can help us solve our energy problems through the production of domestic liquid fuels, such as ethanol and biodiesel. Renewable energy is good for independence, good for farmers, and good for the environment."

Ann Veneman, Secretary of Agriculture, August 7, 2001.

"Currently, there are 26 different feedstocks used in this country to produce ethanol. With the exponential growth in technology in the ethanol industry, we can anticipate the increased use of those feedstocks and the use of cellulose feedstocks, such as corn stover, rice straw and waste from processing of agricultural products. We all gain when we better utilize all of the production from our farms and ranches."

Guy Donaldson, President of the Pennsylvania Farm Bureau, in testimony before the House Committee on Small Business, July 24, 2001.

Writer: Jeremy Ames

Editor: Carol Werner

Please distribute ECO to your colleagues, or send us their email addresses and we will add them to our distribution list. Article and Commentary submissions are encouraged, and should be sent via email.

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We welcome your suggestions, comments, and questions.

Comparison of Renewable Fuels Standard Proposals, 107th Congress

	S. 670	S. 892	S. 1006/H.R. 2423
Legislative Vehicle	Amends CAA ¹	Amends CAA	Stand Alone Bill
Ethanol Content	1.5% by 2011	3.3% by 2011	5.0% by 2016
Bans MTBE	Yes	Yes	No
Cellulose Incentive	Yes ²	No	No
Managing Agency	EPA	EPA	DOE
CO Volatility Allowance	Yes	Yes	No
Aromatics Capped	Yes	Yes	No
Trading Allowed	Yes	Yes	Yes
Enforcement	CAA	CAA	Civil fine up to \$25k/day

1. CAA = The Federal Clean Air Act

2. One gallon of ethanol derived from cellulosic biomass would count as 1.5 gallons of renewable fuel

Ethanol Climate Protection Oil Reduction

A Public Forum

Issue XVI

December 20, 2001

Welcome to "ECO." This newsletter is written to provide the most current information about ethanol and serve as a public forum. The Environmental and Energy Study Institute (EESI) hopes to build consensus within the environmental community regarding the potential benefits of ethanol – and particularly the expanded opportunities provided by cellulosic ethanol – with a special focus on climate protection. Ethanol can also be a political bridge to broader alliances in support of climate initiatives.

Many in the environmental community have made strong statements in support of ethanol as a low-carbon fuel with large potential benefits to reduce life-cycle greenhouse gas (GHG) emissions. Ethanol also reduces carbon monoxide emissions and our reliance on oil, contains no sulfur and helps to eliminate smog through its use as an oxygenate for gasoline. Cellulosic ethanol, which is produced from agricultural or wood wastes, provides even greater GHG emission reductions than corn-based ethanol, promotes rural economic revitalization and offers a solution to waste disposal problems. However, there have been concerns about ethanol ranging from volatile organic compounds (VOCs) to corporate welfare. We will address these and other issues and explore which steps are appropriate to take in support of ethanol. Please share your views with us and we will address them in "ECO."

EESI

*A PUBLICATION OF THE ENVIRONMENTAL
AND ENERGY STUDY INSTITUTE*

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COMMENTARY

A Matter of National Security

The following letter was sent to the Senate Majority and Minority Leaders, as well as the chairmen and ranking Republican members of the Agriculture, Nutrition and Forestry; Appropriations; Armed Services; Energy and Natural Resource; Environmental and Public Works; Finance; and Foreign Relations Committees. The title was added by the staff of ECO.

September 19, 2001

Dear Senators:

Americans are aware of the enormous and complicated tasks ahead in dealing with the consequences of the unprecedented September 11th attack against our nation.

There are many corrective actions that require lead-times that could be months or even years. But, there are actions that can and must be taken now. One of those critical actions is to advance America's energy security. The Congress will soon act on that issue.

It is not enough just to ensure uninterrupted supplies of transportation fuels and electricity. We must also act to advance the security of those supplies, and the nation's ability to meet its needs in all corners of the country at all times. Our refineries, pipelines and electrical grid are highly vulnerable to conventional military, nuclear and terrorist attacks.

Disbursed, renewable and domestic supplies of fuels and electricity, such as energy produced naturally from wind, solar, geothermal, incremental hydro, and agricultural biomass, address those challenges. Fortunately, technologies to deliver these supplies have been advancing steadily since the Middle East fired its first warning shot over our bow in 1973. They are now ready to be brought, full force, into service.

But, while the U.S. Government has committed intellectual and monetary resources to developing these technologies, the status quo marketplace is unwilling to accommodate these new supplies of disbursed and renewable fuels and electricity. Speedy action by the Administration and the Congress is critical to establish the regulatory and tax conditions for these renewable resources to rapidly reach their potential.

Fortunately, such actions are under consideration by the Energy, Environment, and Finance Committees. We urge the Energy Committee to immediately adopt the Renewable Portfolio Standard (for electricity) as well as provisions to ensure ready interconnection access to the electric grid, and cost-shared funds to the state public benefit funds to continue essential support for emerging technologies and the provision of electricity to the truly needy. We urge the Environment Committee to immediately adopt the Renewable Fuels Standard in conjunction with measures to deal with environmental issues. Finally, we urge the Finance Committee to immediately adopt residential solar credits and renewable energy production tax credits, including a provision for fuels (liquid, gaseous and solid fuels), or their Btu equivalent, similar to the fuel provision tax credit made available in Section 29 of the Internal Revenue Code.

These actions will also develop new industries and jobs, strengthen communities, enhance the environment, and assist in the stabilization of greenhouse gases. On the transportation fuels issue, ethanol, biodiesel and other biofuels will slow the flow of dollars to the Middle East, where too many of those dollars have been used to buy weapons and fund terrorist activities.

Consequently, we also recommend a major and concerted effort to assemble the talent and resources needed to launch a "Liberty Ship" type program to convert agricultural wastes and cellulosic biomass into biofuels, biochemicals and bioelectricity. The technology to do so is in place; all that is lacking is the political will to deploy it.

Sincerely yours,

R. James Woolsey
Former Director of Central Intelligence

Admiral Thomas H. Moorer USN (Ret)
Former Chairman, Joint Chiefs of Staff

Robert C. McFarlane
Former National Security Advisor to
President Reagan

Renewable Fuels Standard and MTBE Ban Included in Democratic Energy Bill

On December 5, 2001, Senate Majority Leader Tom Daschle (D-SD) and Energy and Natural Resources Committee Chairman Jeff Bingaman (D-NM) unveiled the details of the Senate Democratic Energy Bill. The Energy Policy Act of 2002 (S. 1766) would establish a national Renewable Fuels Standard (RFS), requiring that an increasing amount of renewable fuel (including ethanol and biodiesel) be blended into conventional motor fuels starting at 2.0 billion gallons in 2003, and increasing to 5.0 billion gallons by 2012. The percentage of renewable fuels in use by 2012 would need to be maintained thereafter. Current production is 1.8 billion gallons.

As an incentive to spur the development of ethanol from cellulosic feedstocks, the legislation allows a gallon of cellulosic ethanol to be counted as 1.5 gallons of renewable fuel. The legislation also establishes a credit trading system that would allow refiners, blenders, and importers who exceed the required targets to sell their excess content as credits.

"The enactment of Renewable Fuel Standards would greatly increase the nation's energy security. Greater usage of renewable fuels would displace the level of foreign oil that we currently use. During these difficult times it is imperative that we find ways to improve our nation's energy

security and reduce our overwhelming dependence on foreign oil. A Renewable Fuels Standard would go a long way toward achieving this critically important goal," said Senator Tim Johnson (D-SD), a co-sponsor of an earlier RFS proposal.

On the issue of the oxygenate MTBE, the legislation would ban the use of the gasoline additive within four years after enactment, and allow a state's Governor to waive the Clean Air Act's oxygenate requirement. S. 1766 would also allow states to use the federal Leaking Underground Storage Tank (LUST) funds for the remediation of MTBE groundwater contamination. To assist producers of MTBE in converting their facilities over to the production of other chemicals, the legislation would allow up to \$250,000,000 in grants to be appropriated from 2002-2004. Finally, S. 1766 would require the Environmental Protection Agency (EPA) to study the ethanol derived oxygenate ETBE, for its public health and environmental effects.

Support for enacting a RFS has been growing in Congress. In the 106th Congress, Sens. Daschle and Richard Lugar (R-IN) introduced legislation that would have established a RFS, banned MTBE, and eliminated the oxygenate requirement. The legislation was passed by the Environmental and Public Works Committee, but never voted on by the Senate. With growing pressure to ban MTBE, but solid support for ethanol from farm-state members, the idea of replacing the oxygenate requirement with a RFS gained momentum in the 107th Congress. Sens. Daschle and Lugar introduced a RFS bill (S.

670), as did Sen. Tom Harkin (D-IA) (S. 892), and Sens. Chuck Hagel (R-NE) and Johnson along with Reps. John Thune (R-SD) and Gil Gutnecht (R-M) in the House (S. 1006/H.R. 2423, see ECO XV). In July, the Senate Energy and Natural Resources Committee held hearings on S. 1006, and in October, ranking Republican member and former committee chairman Frank Murkowski (R-AK) signaled his support for including an RFS in the Senate's energy legislation.

Other provisions contained in the Energy Policy Act of 2002 include requiring all federal vehicle fleets that own alternative fueled vehicles to use 50 percent volume of renewable fuels in those vehicles by 2003, and 70 percent by 2005. The legislation also requires the Energy Information Administration within the Department of Energy (DOE) to collect data on the production and consumption of renewable fuels. None of these provisions were included in the House energy bill (H.R. 4) passed in August, and if passed by the Senate will have to survive conference. The House bill did however require the EPA and DOE to conduct a study on the feasibility of implementing a RFS, suggesting the idea has some support in the House.

Ethanol as a Replacement for Gasoline Lead Additives in Developing Countries

By Valerie Thomas, Princeton University
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Gasoline lead additives have been used worldwide since the 1930s and 1940s to prevent knock by increasing the octane rating of gasoline. Ethanol has a high octane value, and therefore is an excellent substitute for lead as a gasoline additive. Especially in regions where ethanol can be produced from sugar cane, ethanol provides a low-cost route to the elimination of lead in gasoline.

Lead's adverse neurological effects, especially on children, are now well established, and there is virtually universal acceptance of the need to eliminate lead from gasoline. Both the World

Bank and the US Environmental Protection Agency have been supporting worldwide efforts to end the use of lead in gasoline. Even the sole remaining global manufacturer of lead additives, Octel Ltd., agrees that its product should be phased out. Most of North and South America have eliminated or nearly eliminated leaded gasoline, as have much of Europe and East Asia. However, in most of Africa and the Middle East, there has been almost no progress in phasing out leaded gasoline.

Sugarcane is abundant in many of the countries that are still using leaded gasoline; some of these countries already produce ethanol for other purposes. Use of sugar-cane-derived ethanol to replace lead in gasoline could simultaneously eliminate a significant public health risk, help stabilize sugar markets, and provide a foundation for development and expansion of a biomass-derived fuel system.

The rising cost of lead additives and the falling cost of ethanol have created favorable economic conditions for fuel-ethanol production. In Africa, more than enough sugarcane is produced to replace all the lead used in African gasoline; this would require Africa to produce about 2.4 billion liters/year (634 million gallons) – 20% of the amount of ethanol currently produced in Brazil – and would require the shift of some sugar production to ethanol production. At a more modest scale, African countries that could replace lead with ethanol using primarily their by-product molasses production include Zimbabwe, Kenya, Egypt, Zaire, Zambia, Sudan, Swaziland, and Mauritius.

The fact that ethanol is both a low-carbon fuel and a lead replacement creates the potential to simultaneously address local and global environmental problems. Development of fuel ethanol could be an opportunity for African nations to meaningfully participate in global efforts to reduce greenhouse gas emissions. International support of fuel ethanol development in Africa, for example through the Clean Development Mechanism of the Kyoto Protocol, could simultaneously reduce the public health threat from lead exposure in African cities, stabilize sugar markets in Africa, and

promote the development of renewable energy sources.

Reference: V. Thomas and A. Kwong. Ethanol as a lead replacement: phasing out leaded gasoline in Africa. *Energy Policy* 29(2001):1133-1143.

Proposed Senate Farm Bill Contains New Energy Title

In early November, Senator Tom Harkin (D-IA), Chairman of the Agriculture, Nutrition, and Forestry Committee, unveiled his proposal 2002 Farm Bill proposal, the **Agriculture, Conservation, and Rural Enhancement Act of 2001 (S. 1731)**, which included a new Energy Title. Earlier this year, Sens. Harkin and Richard Lugar (R-IN) (the ranking Republican committee member) had signaled their support for including incentives in the Farm Bill to help farmers develop their renewable energy resources. The Energy Title was approved by the full committee in November without any major amendments.

"This has never been in the farm bill before... We create a number of initiatives to develop new uses and markets for agricultural products and renewable energy, including biofuels such as ethanol and biodiesel, biomass, wind, and solar energy," said Harkin. The title includes several incentives for spurring the development of biofuels, including:

- A biobased product purchasing requirement for federal agencies.
- Grants and technical assistance to farmers, ranchers and rural small businesses to do renewable energy projects.
- Grants for the commercialization of cellulosic ethanol and the establishment of biorefineries for the production of transportation fuels and a variety of marketable chemicals and biobased products.
- An extension of the Biomass Research and Development Act through 2006, with mandatory funding.

- A biodiesel fuel education program to educate the public on the benefits of using biodiesel.

Out of \$171 billion set aside for the Farm Bill over a ten year period, the Energy Title would cost \$550 million in non-discretionary funds over five years, with an additional \$200 million in discretionary funds authorized. Sens. Thad Cochran (R-MS) and Pat Roberts (R-KS) offered an amendment on the floor of the Senate which would have made all the title's funding discretionary, and thus subject to annual appropriation, but the amendment was tabled. No other amendments addressing the Energy Title had been offered at time of print, however after nearly three weeks of debate on the floor and three failed votes to evoke cloture to limit further debate, Majority Leader Tom Daschle (D-SD) announced his intention to complete the Farm Bill when the Senate returns from the Holiday Recess in January.

The House Farm Bill (H.R. 2646), which passed the House in October, does not contain any of the energy provisions in S. 1731. However, unlike the Senate bill, H.R. 2646 does allow limited biomass harvesting for energy production on Conservation Reserve Program, the largest of the Farm Bill's programs with a current enrollment cap of 36.4 million acres. The differences will need to be worked out in conference when the Senate completes work on its bill. The Bush Administration, which has not taken a stance on any of the energy provisions in the Senate bill, has expressed reservations about both the House and Senate proposals.

Deadline for CA MTBE Ban May Be Extended, MTBE Cleanup Settlement Reached

California Governor Gray Davis (D) may be considering extending the deadline for the ordered statewide ban on the gasoline additive MTBE, the Sacramento Bee newspaper reports. In March 1999, Davis ordered that the sale of MTBE in the state be phased out by December 31, 2002, because MTBE was found to

contaminate groundwater. However, California officials and refiners are now questioning whether the needed infrastructure and transportation upgrades needed to blend ethanol, the only economical alternative to MTBE, can be made in time to meet the 2002 deadline. California had asked for a waiver from the oxygenate requirement, as required in the Clean Air Act, but the Environmental Protection Agency (EPA) denied the waiver earlier this year. The state is still fighting that decision in federal court.

In August, the California Energy Commission (CEC) released the results of its survey of the ethanol industry. The CEC surveyed 84 ethanol producers, and concluded that the ethanol industry will double its current capacity in four years, reaching 4.4 billion gallons by the end of 2005. The survey also indicated that most of the expansion would occur in the Midwest, with corn the most widely used feedstock.

Pending legislation in the Senate could give California some flexibility in making the

transition, by replacing the oxygenate requirement with a renewable fuels standard. Davis will likely decide soon on whether or not to extend the deadline.

California's MTBE ban survived a challenge from MTBE producers in federal court this September. Determining who will pay the costs of cleaning up existing MTBE contamination will also likely be decided by the courts. Communities for a Better Environment, an Oakland group, sued several major oil companies in state court in 1998, alleging that the EPA and the oil industry had evidence as early as 1981 that MTBE could cause groundwater contamination. The group reached a settlement with four of the oil companies this August, which made the companies subject to fines for failure to meet compliance orders issued by the state or local agencies. The cost of cleaning up the contamination statewide could run as high as \$29 billion, according to a preliminary study done by Komex H2O Science, an environmental consulting firm.

OTHER LEGISLATIVE UPDATES

Energy and Water Appropriations Bill Signed

In November, President Bush signed into law the Energy and Water Appropriations Act of 2002. The House-Senate conference report combined the biomass power and biomass transportation fuels subprograms into a single "biomass/biofuels" line item totaling \$93 million. In fiscal year 2001, the biopower program was appropriated \$41 million, and the biofuel program \$46 million, for a total of \$87 million. Congressional earmarks, totaling nearly \$40 million, included \$3 million for the Prime LLC of South Dakota integrated ethanol complex, and \$2 million to continue the Sealaska ethanol project.

RECENT STUDIES

EPA Provides Boutique Fuels Study to President Bush

In October, the U.S. Environmental Protection Agency (EPA) released its report on state and local "boutique" clean fuel programs as requested in the President's National Energy Policy report issued in May. Boutique fuels are transportation fuels blended to reduce air pollution as required by the federal reformulated gasoline (RFG) program and several state and local programs. Concern has been raised that the number of unique fuel blends required throughout the country makes it difficult to transport fuels to meet supply shortfalls. The EPA report identified two major issues that needed to be addressed to ensure adequate fuel supplies. The first being the need for greater flexibility in transitioning from winter to summer grade RFG blends for fuel marketers; to provide this flexibility EPA will propose new regulations to allow a more gradual transition period and to simplify RFG accounting and reporting requirements. The second issue identified was the growing number of unique state and local fuel blends.

Although EPA found that the current production and distribution system does provide adequate quantities of boutique fuels, EPA also prepared a staff white paper exploring possible approaches for reducing the number of fuel blends in the long term. The report and staff paper can be found online at: <http://www.epa.gov/otaq/fuels.htm>.

Economic Analysis Examines Impacts of Implementing a Renewable Fuels Standard
In December, the Renewable Fuels Association, the National Corn Growers Association, and the National Biodiesel Board jointly released the results of a new economic analysis they commissioned, which examines the economic and energy impacts of implementing a national Renewable Fuels Standard (RFS). The analysis was conducted by John Urbanek of AUS Consults, and was based on implementing a RFS requiring a four percent market share of motor vehicle fuels by 2016, requiring 8.8 billion gallons of biofuels based on current projections. The analysis concluded that such a policy would displace 2.9 billion barrels of oil by 2016 (302 million annually) and decrease the U.S. trade deficit by \$63.4 billion over the same period. The analysis also predicted that 300,000 jobs would be created, and the commodity prices for corn and soybeans would rise, increasing farm income and thus decreasing the need for federal agricultural subsidies. The report can be found online at: <http://www.ethanolrfa.org/combined%20AUS%20report.PDF>.

ETHANOL NEWS BRIEFS

EU Adopts Plan to Promote the Use of Biofuels

The European Commission has approved a strategic plan to reduce by 20 percent the European Union's (EU) diesel and gasoline use by 2020 through the use of alternative fuels. The plan identifies increased use of biofuels as the best way to displace petroleum fuels in the medium term, with natural gas and fuel cells playing a role in the medium to long term. Two accompanying proposed directives for achieving the 2020 goal were also approved. The first would create a renewable fuels standard, requiring that biofuels, such as ethanol and biodiesel, account for 2.0 percent of transportation fuels sold by 2005, increasing to 5.75 percent by 2010. The second proposal would allow EU members to reduce fuel excise taxes on transportation fuels based on their renewable content. The proposals now must be approved by the Council of Ministers and the EU Parliament to become EU policy.

North Dakota University to Develop Ethanol for Aviation Use

The University of North Dakota (UND) has been awarded a \$765,000 contract from the Federal Aviation Administration to refine and certify aviation grade ethanol fuel (AGE). UND's

Energy & Environmental Research Center will work to optimize the fuel formulation and develop its specifications, and UND Aerospace will conduct test flights. Although leaded motor vehicle fuels were banned due to public health concerns, leaded aviation fuels are still widely used. AGE is lead free and has a high octane rating.

John Deere Approves Biodiesel For Its Products

John Deere announced in December that it has approved biodiesel for use in all of its diesel-powered products. "We're excited to be able to support the use of biodiesel in our products," noted Ted Breidenbach, manager of Worldwide Engine Engineering for John Deere Power Systems. "Biodiesel is a valuable tool for helping reduce engine emissions. It also stands as one of the linchpins in the movement to develop alternative uses for commodity products that can ultimately deliver more value to our producer customers." Biodiesel is made from soy-oil, other oilseed oils, or waste oils and can be used as a stand-alone fuel or blended with conventional diesel. John Deere is also doing research on the use of OxyDiesel, a blend of ethanol and conventional diesel, in its equipment.

Iowa and Pennsylvania Conferences

Examine Biofuels Development

In October, BioCycle magazine hosted a conference in Des Moines, Iowa entitled "Renewable Energy From Organics Recycling." Several presenters addressed the potential for converting municipal organic wastes to biofuels, including Robert Harris of the Public Power Institute, Phil Lusk of Prime Technologies LLC, and Phil Badger of General Bioenergy, Inc. For more information, contact biocycle@jgpress.com.

In November, the West Penn Power Sustainable Energy Fund hosted a conference on Agri-Energy in State College, Pennsylvania. Several speakers addressed progress toward converting cellulosic biomass to ethanol, and proposed state and federal incentives that could help development of a PA biofuels industry. More information can be found online at: <http://www.wppsef.org/agri-energy.shtml>.

NOTABLE QUOTABLES

"I want to thank the Farm Journal Forum for emphasizing the importance of ethanol and biofuels. These fuels are gentle on the environment. They are fuels that can be renewed year after year, and fuels that can expand our farm economy. These fuels are made right here in America, so they can't be threatened by any foreign power."

President George W. Bush, addressing the Farmers Journal Corporation Convention, November 28, 2001.

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