

Ethanol Climate Protection Oil Reduction

A Public Forum

Issue XIII

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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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Columbia Paving the Way in Renewable Fuels for Transport

**By Henry Echeverri-Campuzano (corpodib@cable.net.co),
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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 (N₂O) 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 CO₂, and some parts per million of hydrogen sulfide (H₂S). 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.bb ethanol.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, Governors' Ethanol Coalition Chairman, in his Keynote Address before the Renewable Fuels Association's National Ethanol Conference in Las Vegas, Nevada, February 19, 2001.

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