



ADAPT Council Industry Newsletter



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Ownership Matters: Three Steps to Ensure a Biofuels Industry That Truly Benefits Rural America by David Morris; April 2006

A paper adapted from a speech given at the Minnesota Ag Expo 2006. The paper provides a snapshot of today's biofuels industry and a roadmap to ensure that local farmers see significant benefits from the expanding industry in the future.

Download Full Report: www.newrules.org/agri/ownershipbiofuels.pdf



Putting the Pieces Together: Commercializing Cellulosic Ethanol

by David Morris; September 2006

A report examining federal policies supporting cellulosic ethanol production and advocating that the Federal government adopt strategies that support farmer-owned biorefineries.

Download Full Report: <http://www.newrules.org/agri/celluloseethanol.pdf>

A summary from the report follows.

The report, issued by the Institute for Local Self-Reliance (ILSR), urges commercializing ethanol from cellulose by developing a comprehensive strategy, namely that farmer ownership should be the federal focus in building the cellulosic ethanol industry.

invite the public to comment on how best to combine direct grants, loan guarantees, direct incentives, large federal purchases into an effective program.

mandate 250 million gallons of annual cellulosic ethanol production by 2013.

use incentives primarily to maximize the benefit of cellulosic ethanol production to farmers and rural areas, stimulating a diverse array of feedstocks, processing technologies and geographic locations. If properly designed, these incentives can play a very important -- and perhaps even determining -- role in achieving these objectives.

use seed grants to nurture many geographically dispersed farmer or locally owned pilot plants (500,000 gallons per year capacity) that rely on a variety of feedstocks and technologies.

use direct incentives and/or reverse auction tools to nurture many small commercial scale plants (5-10 million gallon capacity). Here too priority should be given to majority farmer- or locally owned plants and feedstock, technological and geographic diversity.

use loan guarantees to facilitate larger plants (25-35 million gallons per year), again encouraging farmer or locally owned facilities.

David Morris is Vice President of the Institute for Local Self-Reliance, which has worked with citizens, governments and businesses in developing policies that extract the maximum value from local resources since 1974. He was a consultant or advisor to the energy agencies of Presidents Ford, Carter, Clinton and George W. Bush and served from 2000-2005 on the Congressionally- created Biomass Research and Development Technical Advisory Committee to the U.S. Departments of Energy and Agriculture.

Chevron Pursues Next-Generation Biofuels

<http://www.renewableenergyaccess.com/rea/news/story?id=46060>

Chevron Technology Ventures, a subsidiary of Chevron Corp., has committed to invest up to \$25 million in the University of California, Davis (UC Davis) over the next five years to research, develop and advance technology aimed at converting cellulosic biomass into transportation fuel. The multi-million dollar investment is the latest in a string of joint ventures between major corporations, universities and research institutes as the race to find a viable alternative to corn-based ethanol production heats up.

New Corn-to-Ethanol Process Promises Lower Costs, Environmental Benefits

<http://www.renewableenergyaccess.com/rea/news/story?id=46035>

Purdue University scientists have developed an environmentally friendly, cost-effective method

for creating ethanol from corn. Using a machine originally designed to make plastics, the new Chen-Xu Method grinds the corn kernels and then liquefies the starch with high temperatures.

Termites Could Eat into Oil's Bottom Line

Scientists are using termites to advance the development of cellulosic ethanol.

by Bill Baum, Contributing Writer, Renewable Energy Access

<http://www.renewableenergyaccess.com/rea/news/story?id=46014>

Using proprietary DNA extraction and cloning technologies, scientists have isolated the cellulose-degrading enzymes found in termites and created industrial ethanol production enablers.

Photo: University of Toronto

In order to make the economic production of cellulosic ethanol viable and cost-effective, the discovery of new enzymes must be found in order to convert agricultural biomass to clean burning fuel. Surprisingly, one rich source of these enzymes has been found in the digestive tracts of termites.

SolarMount innovations

Cellulosic ethanol has enormous potential for fueling our future. Who would have guessed that the pest eating away at your floor boards may hold the key to solving our nation's gas crisis?

These household pests can convert 95% of what they consume into energy within 24 hours. However, it's not the termites themselves that are doing this remarkable transformation, rather the bacteria and protozoa that inhabit their digestive tracts. These microbes naturally generate a broad range of enzymes that convert the cellulosic materials into fermentable sugars.

In the past, the U.S. has focused primarily on the production of biofuels by relying on the conversion of cornstarch into fuel ethanol. However, there has been a recent dialogue regarding the amount of corn that can be used without creating imbalances with other major industries or impacting food supplies. Additionally, it is estimated that in 2006, the U.S. will only produce between 5 billion and 15 billion gallons of ethanol from corn, which will represent less than 10% of total transportation fuels at that time.

To meet this demand for ethanol, sources other than those also serving as a food supply are needed to produce alternative fuel. The most underutilized energy asset on the planet is cellulosic biomass; cellulose-containing natural waste products are widely abundant and can be sustainably produced.

Still, the technology that works for starch isn't viable for the creation of biomass-based ethanol. Biomass has been a challenge to convert to ethanol with scientists using harsh acids and high temperatures to try to hydrolyze the cellulose molecules.

In order to solve this conversion problem, Diversa Corp., a biotech company based in San Diego, examined how biomass is converted into energy in the natural environment. They found the answer in the digestive tracts of the common termite.

During experiments, scientists dissected hundreds and thousands of individual termite intestines. Using proprietary DNA extraction and cloning technologies, they were able to isolate the cellulose-degrading enzymes. By reenacting this natural process, the company created a "cocktail" of high-performance enzymes for industrial ethanol production enablers. Although still in the early stages of this work, the initial results are promising.

The call to action to pursue a renewable energy source becomes more crucial every day. Cellulosic ethanol has enormous potential for fueling our future. Who would have guessed that the pest eating away at your floorboards may hold the key to solving our nation's gas crisis?

Bill Baum is Executive Vice President, Bioscience products, at Diversa Corporation. Email him at bbaum@diversa.com.

New Fuels From Bacteria

From: http://www.export.gov.il/Eng/_Articles/Article.asp?CategoryID=640&ArticleID=4273

A breakthrough in the production of biofuels has been developed by scientists in Germany. Research published in the September 2006 issue of Microbiology, a Society for General Microbiology journal, describes how specially engineered bacteria could be used to make fuel completely from food crops.

"Biodiesel is an alternative energy source and a substitute for petroleum-based diesel fuel," explains Professor Steinbüchel of the Westfälische Wilhelms-Universität in Münster. "A growing number of countries are already making biodiesel on a large scale, but the current method of production is still costly".

"Biodiesel production depends on plant oils obtained from seeds of oilseed crops like rapeseed or soy", explains Professor Steinbüchel. "However, production of plant oils has a huge demand of acreage which is one of the main factors limiting a more widespread use of biodiesel today. In addition, biodiesel production must compete with the production of food, which also raises some ethical concerns".

Microdiesel, as the scientists have named it, is different from other production methods because it not only uses the same plant oils, but can also use readily available bulk plant materials or even recycled waste paper if engineering of the production strain is more advanced.

Also, it does not rely on the addition of toxic methanol from fossil resources, like many other biodiesels. The bacteria developed for use in the Microdiesel process make their own ethanol instead. This could help to keep the costs of production down and means that the fuel is made from 100% renewable resources.

"Due to the much lower price of the raw materials used in this new process, as well as their great abundance, the Microdiesel process can result in a more widespread production of biofuel at a competitive price in the future", says Professor Steinbüchel.

There is a growing number of fuels used in cars and homes that are produced with the help of

microbes. UK ministers are considering doubling the targets for the amount of biofuels sold in Britain by 2015.

Ethanol from Sugar Beets on P.E.I. by Andy Walker

Agritech Ethanol Corporation is planning to build a \$2-million pilot plant in the eastern P.E.I. community of Georgetown, the first plant in North America able to convert sugar beets into ethanol. If the pilot proves successful, the company plans to build a larger facility capable of producing 40 million litres of ethanol in 2008.

Company president Mark Lowe met with the P.E.I. Department of Agriculture a week before making the announcement. Executive director Mike Nabuurs says the businessman told them the plant would require 6,000 to 7,000 acres of sugar beets.

While he sees the potential for new markets an ethanol plant would bring to P.E.I., Nabuurs admits, "I have more questions than answers at this point."

While there is no government funding in the venture, the provincial government is insisting there be a mechanism to allow farmers to have an ownership stake. However, Nabuurs says there was no indication at the meeting how that would happen.

"Mr. Lowe was certainly sincere in his desire to have farmers have an ownership role and the government is committed to that as well," Nabuurs says. "We certainly welcome that."

Nabuurs says producers also want to know whether the province is prepared to offer an incentive program to help growers increase their sugar beet production. A similar approach has been used in the past to help the blueberry and cranberry industries move into commercial production.

The executive director says farmers realize there is a certain amount of risk associated with the venture. But adds, "they want to make sure the risk is mitigated as much as possible -- they don't want to lose their shirts if they convert to sugar beets and the plant doesn't move into commercial production."

Lowe says in addition to the ethanol, by-products of the production process will include high protein animal feed for the dairy industry and captured carbon dioxide for the beverage industry. The company president expects the demand for ethanol to increase in the next five years due largely to the federal government's plan requiring gasoline and other liquid fuels to contain five per cent renewable fuels by 2010.

The full-scale plant would carry a price tag of approximately \$40 million and would employ 35 people.

Nabuurs says he hopes to meet with company representatives and industry in the next few weeks in an effort to have some of the questions answered. He adds, "we want to be in on the planning - farmers need some time to identify fields they might convert to sugar beets and to secure

financing to invest in the plant if that's what they want to do. However, they just don't have enough information to make a decision at this point."

Khosla: Ethanol Not Final Fuel

From Redherring.com; September 26, 2006

<http://www.redherring.com>

See:

(<http://www.redherring.com/Article.aspx?a=18814&hed=Khosla%3A+Ethanol+Not+Final+Fuel§or=Industries&subsector=Energy>)

At the California Clean Tech Open event Tuesday, Khosla Ventures founder Vinod Khosla said the ultimate fuel probably won't be ethanol.

"Contrary to what you might believe, I think it's extremely unlikely that in 20 years we will be using any ethanol in cars," he said.

That's a surprising statement from one of ethanol's most enthusiastic backers. Mr. Khosla has invested millions in ethanol companies such as Altra, Mascoma, and Cilion.

Mr. Khosla said he believes biomass can make a real difference, not only for transportation fuels, but also for making plastics and for bringing more wealth to rural areas.

"Biomass is going to be an important tool in fighting poverty and generating wealth in a meaningful way," he said. "It's not only good for this country, but it's good for the planet."

But corn-based ethanol—and even cellulosic ethanol, made from plant waste—are only steps along a larger trajectory toward other fuels, he said.

After all, BP and DuPont are already working on biobutanol, and other companies Khosla Ventures is investing in have come up with fuels that are better than both ethanol and butanol, he said (see *The Fuel of the Future?*).

Mr. Khosla also said he thinks solar is going in the wrong direction. While everyone seems to be focused on lowering the cost of photovoltaic cells—which convert sunlight into electricity—much of the cost is outside the cells themselves, he said.

"If I were working on solar cells, I wouldn't be working on lower-cost solar cells, but on higher efficiency," he said.

Solar is still uncompetitive with coal, even with subsidies, Mr. Khosla said. "Being a Republican, I don't like subsidies," he said. "I like level, free markets. Without technologies that can be competitive with fossil-fuel alternatives, we are not going to get mass adoption."

Mr. Khosla said the industry should also take a fresh look at thermal solar technologies, which use the sun's heat instead of its light. "To me, solar thermal has much more promise to be

competitive with the fossil-fuel alternative; that is, coal,” he said. “Coal is \$0.04 a kilowatt hour, and I think thermal can get competitive, especially when accounting for the carbon emissions of coal.”

But California Energy Commissioner Art Rosenfeld said solar photovoltaic systems do make sense in remote areas that are not connected to the grid. In his speech at the Clean Tech Open, Mr. Rosenfeld emphasized the importance of energy efficiency.

Energy efficiency improvements in buildings, lighting, and air-conditioning have made a huge difference in the last 30 years, he said. “We are saving \$700 billion a year because our energy policy is smarter than it was in the 1970s,” he said. “I assert if it’s been true the last 30 years, and the world changes slowly, it’s going to be true for the next 30 years.”

Some examples? LED lights, which are 300 times more efficient than kerosene lamps, he said. Replacing kerosene lamps around the world with LED lights would save 1.3 billion gallons of gasoline a day—enough to convert all the SUVs in the United States to regular cars—and would bring a return in a few months, he said.

Both Mr. Khosla and Mr. Rosenfeld also said water is another place where innovation is needed. Water is “a resource even more scarce than oil on this planet,” Mr. Khosla said.

Mr. Rosenfeld said water purification technologies that can reduce the amount of wood people burn to boil water can make a big difference to climate change. He estimated that some villages emit 5 to 10 tons of carbon dioxide per day by burning wood. (A car burns about 5 tons a year, he said.)

All these clean technologies can be spurred on by government policies, said San Francisco Mayor Gavin Newsom. San Francisco has built up the largest alternative municipal fleet of vehicles in the country, and gives payroll tax exemptions and expedited permits to cleantech companies, he said.

The city of San Francisco alone spends \$1 billion a year, giving it some power to encourage the companies it buys from to be greener. “Can you imagine the power if we connected the dots?” he said. The city initiated the Urban Environmental Accords, a “treaty” between more than 50 cities agreeing to take steps to become greener.

“We don’t need to wait for permission from the president of the United States,” he said, to laughter and applause.

Contact the Writer: Jkho@RedHerring.com

Upcoming Workshops and Conferences:

PEI ADAPT Biofuels Forum and Biodiesel Workshop

Bioenergy, led by grain ethanol and oil seed biodiesel, is an emerging market for farm income diversification. Grains, grasses and other fibrous crops can also be used as solid fuels for heat and electrical generation, or converted to fuel ethanol.

This public forum will explore the current and potential pathways for production of biofuels from Island farms. It will also provide an opportunity to learn about the ADAPT Council's new 'Biofuels Opportunities for Producers Initiative (BOPI),' which provides funds for investigations as well as technical, financial and business planning of liquid biofuel production for transportation purposes.

The Bio-fuels Workshop will be a 2-day, hands-on education and demonstration event where participants will actually use a biodiesel processor to make biodiesel fuel to run diesel cars, tractors, trucks, etc.

Biofuels Forum- Can PEI Agriculture Be a Net Energy Producer?

Date: Thursday November 9

Place: Dutch Inn, Charlottetown, Prince Edward Island

Time: 8:00 a.m. - 3:00 p.m.

Biodiesel Workshop Securing Our Energy Needs

Date: Thursday and Friday November 9 - 10

Time: 4:00 - 8:00 p.m. Thursday and 9:00 a.m. - 1:00 p.m. Friday

Place: Agr. Research Station, Charlottetown, PEI

For more information contact: Phil Ferraro, Executive Director PEI ADAPT Council.

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The Soil Foodweb Workshop: Applying Soil Ecology to Agriculture and Turf Management with guest speaker Dr. Elaine Ingham

9:00 a.m. to 4:30 p.m.

Wednesday, October 18, 2006

St. Mary's Boat Club in Halifax,

Dr. Elaine Ingham, who is from Corvallis, Oregon, is a pioneer in applying soil ecology to agriculture and turf management and shows people how to grow without pesticides and chemical fertilizers. By analyzing the microbiological life in the soil, she and her team of scientists have been able to assist growers and soil managers to improve soils and plant health, increase yield and even improve product quality and shelf-life. This workshop would be of particular interest to gardeners, farmers, livestock farmers, golf course owners, landscapers, turf growers and managers, fruit and vegetable growers, parks and garden workers. Dr. Ingham is passionate about her work, is a dynamic and easy-to-understand speaker. For more information about her work, please visit her website at www.soilfoodweb.com

Cost: \$99 (hst and lunch/snacks included). For more information and pre-registration, please call

902 445-3894 (Monday to Friday).

Interactive Value Chain Workshop for the Agriculture and Agri-Food Value Chain

Friday, December 8, 2006; Rodd Charlottetown Hotel

This workshop is sponsored by the Canadian Farm Business Management Council (CFBMC) and hosted by the PEI ADAPT Council. CFBMC is covering the cost of the workshop and the number of seats is limited. Participants will include farmers, processors, retailers, tourism, restaurants, transportation and more.

The workshop leader is Martin Gooch, Research Associate specializing in agri-food value chain innovation and management. For more information on Martin, check out his bio at http://www.georgemorris.org/User/Doc/CV_MartinGooch.pdf.. To hear an interview with Martin on value chains, go to <http://agvisiontv.farms.com/> .

Details on the workshop will be available by mid-October. To receive more information, or to register, contact:

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Cellulosic Ethanol - Commercial & Financial Viability and Prospects for Growth

This new event from Platts focuses on the commercial viability of cellulosic ethanol. Cellulosic ethanol - derived from fast-growing grasses or agricultural waste - could create enormous new opportunities for the ethanol industry and for investors. Using vast new sources of supply, cellulosic ethanol could overcome the limitations of existing fuel ethanol production, which is limited by the available supply of grains or sugars.

Cellulosic ethanol depends on enzymes to break down the raw material into sugars, which can be converted into ethanol. This is an expensive process, although many promising breakthroughs have taken place in research labs around the world. The big question is, how soon will developers find ways to bring down the cost and ramp up production, in order to make cellulosic ethanol competitive? This conference takes a detailed look at the technical advances and commercial potential, including the perspective of leading developers, producers, and investors. What will it take to “fulfill the promise” of cellulosic ethanol?

Areas to be covered include:

- * The current state of cellulosic ethanol production, both existing and under construction
- * Progress in biochemical conversion processes including pretreatment and enzymes
- * Analysis of the most important feedstocks including switchgrass and corn stover

- * Assessing the capital investment, competitive outlook, risks and opportunities for investors
- * Future evolution of U.S. ethanol production, including possible co-location of cellulosic and grain ethanol plants, multiple feedstocks, and new markets for co-products

Who will attend?

This conference is designed for both developers and investors. Attendees will include senior executives from bioengineering and biotechnology companies, ethanol producers, agricultural banks, institutional investors, private equity, and investment banks with an interest in biofuels and renewable energy.

About the Organizer

The world's largest energy information provider, Platts provides news, prices, data, analysis, analytical tools, geospatial systems, research and consultancy – and outstanding educational and networking events – for the complete spectrum of the energy industry. Platts produces over 50 energy conferences a year, and in fact this event develops out of a series of highly successful Platts conferences covering ethanol, biodiesel, refined petroleum products and energy finance. For details see the Platts conference web site and list of upcoming events at:
www.events.platts.com

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