

Bill as  
Introduced

HB 362 - AS INTRODUCED

2013 SESSION

13-0650  
08/09

HOUSE BILL

**362**

AN ACT

banning corn-based ethanol as an additive to gasoline sold in New Hampshire.

SPONSORS:

Rep. Campbell, Hills 33; Rep. Pastor, Graf 12; Rep. Gionet, Graf 5; Rep. Chandler, Carr 1; Rep. Pitre, Straf 2; Sen. Cataldo, Dist 6

COMMITTEE:

Science, Technology and Energy

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ANALYSIS

This bill bans manufactured corn-based ethanol for use in gasoline.

This bill also bans the sale of gasoline containing corn-based ethanol as an additive in New Hampshire.

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Explanation:

Matter added to current law appears in ***bold italics***.

Matter removed from current law appears [~~in brackets and struck through.~~]

Matter which is either (a) all new or (b) repealed and reenacted appears in regular type.

STATE OF NEW HAMPSHIRE

*In the Year of Our Lord Two Thousand Thirteen*

AN ACT                    banning corn-based ethanol as an additive to gasoline sold in New Hampshire.

*Be it Enacted by the Senate and House of Representatives in General Court convened:*

1            1 Corn-Based Ethanol Banned. Amend RSA 260:38, III to read as follows:

2            III. Each person manufacturing alcohol, ethanol, methanol, or any other product within the  
3 state of New Hampshire for use in gasohol shall obtain a license and, on or before the twentieth day  
4 of each calendar month, the sole proprietor, president, managing partner, chief executive officer, or  
5 equivalent thereof, of said person shall render a return to the commissioner on forms prescribed and  
6 furnished by the commissioner, and shall certify under the pains and penalties of perjury that the  
7 return is true, accurate, and complete in all material respects. The return shall show the total  
8 number of gallons sold to distributors of gasohol, or to persons purchasing the product for the  
9 purpose of resale to the distributors, together with such other information as the commissioner may  
10 require for the reasonable administration of this subdivision. ***No licensee shall manufacture***  
11 ***corn-based ethanol for use in gasoline in this state.***

12            2 New Section; Corn-Based Ethanol Prohibited. Amend RSA 339-B by inserting after section 8  
13 the following new section:

14            339-B:8-a Corn-Based Ethanol Prohibited. No seller of gasoline shall sell or offer for sale  
15 gasoline that has corn-based ethanol as an additive.

16            3 Contingency. Sections 1 and 2 of this act shall take effect upon certification by the department  
17 of environmental services to the secretary of state and the office of legislative services that at least 2  
18 of the 6 New England states have adopted similar legislation banning corn-based ethanol as an  
19 additive to gasoline.

20            4 Effective Date.

21            I. Sections 1 and 2 of this act shall take effect as provided in section 3 of this act.

22            II. The remainder of this act shall take effect 60 days after its passage.

# Amendments

Rep. Pastor, Graf. 12  
February 5, 2013  
2013-0189h  
08/09

Amendment to HB 362

1 Amend the bill by replacing section 3 with the following:

2

3       3 Contingency. Sections 1 and 2 of this act shall take effect upon the date of certification by the  
4 department of environmental services to the secretary of state and the office of legislative services  
5 that at least 4 of the 6 New England states, including New Hampshire, have adopted similar  
6 legislation banning corn-based ethanol as an additive to gasoline, or upon the date of certification by  
7 the department of environmental services to the secretary of state and the office of legislative  
8 services that an EPA approved biofuel alternative is available, whichever comes first.



Rep. Pastor, Graf. 12  
February 5, 2013  
2013-0189h  
08/09

Amendment to HB 362

1 Amend the bill by replacing section 3 with the following:

2

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4 department of environmental services to the secretary of state and the office of legislative services  
5 that at least 4 of the 6 New England states, including New Hampshire, have adopted similar  
6 legislation banning corn-based ethanol as an additive to gasoline, or upon the date of certification by  
7 the department of environmental services to the secretary of state and the office of legislative  
8 services that an EPA approved biofuel alternative is available, whichever comes first.

*Not Adopted*

Amendment to HB 362

1 Amend the bill by replacing all after section 2 with the following:

2

3 3 Contingency. Sections 1 and 2 of this act shall take effect upon the date certified to the  
4 secretary of state and the office of legislative services of either of the following:

5 I. The air pollution advisory committee, established by RSA 125-J:11, determines, in  
6 consultation with the department of environmental services, that at least 3 other New England  
7 states in addition to New Hampshire have statutorily banned corn-based ethanol as an additive to  
8 gasoline; or

9 II. The air pollution advisory committee determines that a fuel that can be used by a  
10 regulated entity to meet their compliance obligation pursuant to the federal Renewable Fuels  
11 Standard for either advanced biofuel, as defined in the Clean Air Act, 42 U.S.C. 7545(o)(1)(B) or  
12 cellulosic biofuel as defined in the Clean Air Act, 42 U.S.C. 7545 (o)(1)(E) is readily available and in  
13 sufficient quantities to replace corn-based ethanol in New Hampshire's gasoline supply such that it  
14 will not have a significant impact on the price or supply, or both, of gasoline delivered for use in New  
15 Hampshire.

16 4 Report Required. The department of environmental services shall report to the governor, the  
17 speaker of the house, the president of the senate, the science, technology and energy committee, and  
18 the air pollution advisory committee no later than September 1 annually on the consideration or  
19 adoption, or both, of corn-based ethanol bans in other New England states. The report shall also  
20 summarize information available to the department on the potential availability and market for  
21 advanced and cellulosic biofuel that could serve as a replacement to corn-based ethanol in New  
22 Hampshire's gasoline supply.

23 5 Effective Date.

24 I. Sections 1 and 2 of this act shall take effect as provided in section 3 of this act.

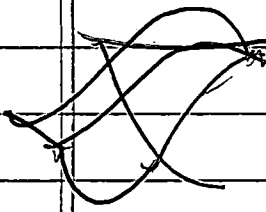
25 II. The remainder of this act shall take effect 60 days after its passage.

# Committee Minutes



Murphy

Thomas

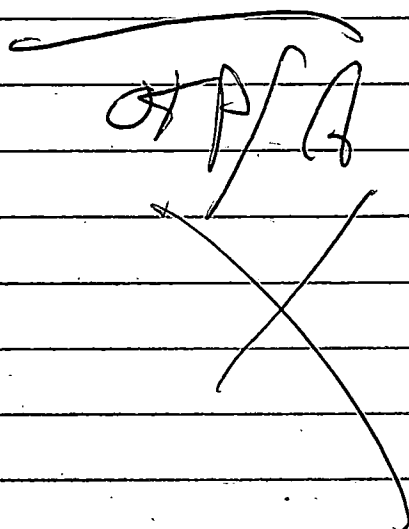


BACKUS  
CALL-10/9/93

JFL LOAN FROM  
VADNEY

ATTO

OTP  
PASTOR  
REALLY



sheep am  
Really

19 FEB 13

NB 362

opened 1130

BACKLASH  
ALLENDALE

Exec Session continued from 2/5/13

Rep Pastor introduced new amendment  
to NB 362 (2013-0350h).

closed 1210

# Speakers



# Hearing Minutes

HOUSE COMMITTEE ON SCIENCE, TECHNOLOGY AND ENERGY

PUBLIC HEARING ON HB 362

**BILL TITLE:** banning corn-based ethanol as an additive to gasoline sold in New Hampshire.

**DATE:** 1-29-13

**LOB ROOM:** 304      **Time Public Hearing Called to Order:** 2:05 pm

**Time Adjourned:** 4 pm

(please circle if present)

**Committee Members:** Reps. Borden, Townsend, Sali-Pitts, Pastor, N. Levasseur, Backus, Grossman, Baber, J. Mann, Shepardson, Raymond, Introne, Yadney, Rappaport, Bradley, Reilly, Murotake, R. LeVasseur, Khan and Devine.

**Bill Sponsors:** Reps. Campbell, Pastor, Gionet, Chandler, Pitre and Cataldo

TESTIMONY

\* Use asterisk if written testimony and/or amendments are submitted.

**Rep. Edward Gionet, co-sponsor** – Introduced the bill and testified in support; see written testimony handout “Ethanol’s Failed Promise”.

**Q: Rep. David Murotake** – Are there other forms of ethanol?

**A:** Yes, there are other forms.

**Q: Rep. John Mann** - I have read that ethanol is more costly?

**A:** Ethanol is not cost effective and is more costly.

\***Rebecca Ohler, NH DES** – Opposes the bill. See handout of testimony. Other forms of ethanol include sugar cane. Does it cost more energy to produce than to use; not known.

\***John Dumais, NH Grocers Assn.** – Opposes the bill. See written testimony.

\***Raffaella Cristanetti and Jason Gonzalez, DuPont** – Testified in opposition to the bill. See handout. DuPont is funding a 2 million dollar R&D project on bio-butynol, a potential ethanol replacement. Ethanol is used as an octane booster. In 2012 production decreased in the United States; US capacity is 14.5 billion gallons.

\***Sarah Coswell, BIO, (the Biotech Industry Organization)** – Opposes the bill; see handout.

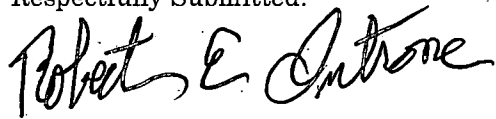
**Floyd Hayes, Independent Oil Marketers Assn.** – Opposed to the bill. My concerns are supply, reliability and price! This bill does not address this.

**Steve Dodge, New England Petroleum Council** – Opposes the bill. No state has banned corn-based ethanol. No gas terminals in New Hampshire; rely on Boston, Portland and Albany. All gasoline in United States is 10% corn-based ethanol. 70% of gas sold in NH is refined by Irving

**Ed Dupont, Alliance of Automobile Manufacturers** – Opposes the bill.

**\*Robert Johnson, NH Farm Bureau** – Opposes bill. Left written testimony in opposition to the bill.

Respectfully Submitted:

A handwritten signature in cursive script that reads "Robert E. Introne". The signature is written in dark ink and is positioned below the typed name.

Robert E. Introne, Clerk

HOUSE COMMITTEE ON SCIENCE, TECHNOLOGY AND ENERGY

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**Bill Sponsors:** Reps. Campbell, Pastor, Gionet, Chandler, Pitre and Cataldo

TESTIMONY

\* Use asterisk if written testimony and/or amendments are submitted.



HB 362

Call to order

2:05 PM

① Rep. Givert, co-sponsor, introduced  
the bill and testified in support of bill  
see handout on ethanol's Fuel  
Promise!

Rep. Dow

Q Rep. Muntake - are there other forms  
of ethanol?

(A) Givert - yes - there are other forms

Q Rep. Mason - I have read that ethanol is more costly.  
(A) Givert - Ethanol is not cost effective - and  
is more costly

② Rebecca Ohler, representing DFE,  
opposes the bill

see handout of testimony

Other forms of ethanol - sugar cane

Does it cost more energy to produce  
than to use - not known

③ John Damais, representing  
NH Growers Assoc, is opposed to the bill.  
See attached testimony.

④ Rebecca Castanetti, representing  
Dupont, testified in opposition  
to the bill.  
See handout of testimony.  
Dupont is funding a 2m R&D  
project on bio-ethanol (BUTYROL)  
a potential ethanol replacement.  
Ethanol is used as an octane booster.  
2012 - production increased - U.S.

U.S. Capacity - 14.5 B gallons

⑤ Sarah Caswell, representing BIO (Biotech  
Industry Organization)  
is opposed to the bill.  
See handout.

⑥ Floyd Hayes, representing Independent Oil  
Marketing Assoc, is opposed to the bill.

My concerns are supply, reliability, & price!  
This bill does not address these.

⑦ Steve Dodge, New England Petroleum Council (NE arm of API) testified in opposition to bill.

No state has banned corn-based ethanol

No gas terminals in NH  
Rely on Boston, Portland, & Albany

All gasoline in US is 10% corn-based ethanol.

70% of gas sold in NH refined by Clarington!

⑧ EB Dupont representing Alliance of automobile manufacturers is opposed to bill.

⑨ Robert Johnson, NH Farm Bureau, left testimony in opposition to bill.

# Sub-Committee Minutes

HOUSE COMMITTEE ON SCIENCE, TECHNOLOGY AND ENERGY

SUBCOMMITTEE WORK SESSION ON HB 362

**BILL TITLE:** banning corn-based ethanol as an additive to gasoline sold in New Hampshire.

**DATE:** 2-5-13

**Subcommittee Members:** Reps. Full committee except Rep. Reilly.

**Comments and Recommendations:** DES, many states now say effective with enactment by other states, i.e. 4 out of 6 NE states/. If all say, never enacted; counteract each other. Straw vote: ITL amendment.

**Amendments:**

Sponsor: Rep. OLS Document #:

Sponsor: Rep. OLS Document #:

Sponsor: Rep. OLS Document #:

**Motions:** OTP, OTP/A, ITL, Retained (Please circle one.)

Moved by Rep.

Seconded by Rep.

Vote:

**Motions:** OTP, OTP/A, ITL, Retained (Please circle one.)

Moved by Rep.

Seconded by Rep.

Vote:

Respectfully submitted,

Rep. Robert E. Introne  
Subcommittee Chairman/Clerk

HOUSE COMMITTEE ON SCIENCE, TECHNOLOGY AND ENERGY

SUBCOMMITTEE WORK SESSION ON HB 362

BILL TITLE: banning corn-based ethanol as an additive to gasoline sold in New Hampshire.

DATE: 2-5-13

Subcommittee Members: Reps. ALL EXCEPT REILLY

Comments and Recommendations:

Amendments:

Sponsor: Rep.	OLS Document #:
Sponsor: Rep.	OLS Document #:
Sponsor: Rep.	OLS Document #:

Motions: OTP, OTP/A, ITL, Retained (Please circle one.)

Moved by Rep.

Seconded by Rep.

Vote:

Motions: OTP, OTP/A, ITL, Retained (Please circle one.)

Moved by Rep.

Seconded by Rep.

Vote:

Respectfully submitted,

Rep. {Type NAME}  
Subcommittee Chairman/Clerk

AB 362 5 FEB 13

OPENED  
10452

DES - many states now say, effective  
with enactment by other states, i.e. 4 out  
of 6 NE states.

If all say, never enacted - count out  
each other.

STRAN CODE -

① ITH 7 <sup>FAMO</sup>

② ITH 12

ADJOURNED - 1125

# Testimony



**Written testimony of Rep. David Campbell (Hills. 33 - Nashua)**  
**Prime sponsor – HB 362 – relative to banning corn-based ethanol**

**Burning food for fuel** is the irrational crux of the ethanol debate.

The History of Ethanol is as follows: Midwestern Agri-Mega-corporations (Monsanto, Archer Midland Daniels) after decades of lobbying Congress for billions of dollars of subsidies and federal mandates that 10 % of gasoline contain Ethanol (over 98% comes for corn ethanol). Public outcry and the budget crisis ended the federal subsidies last year. EPA now wants to mandate the fuel contain 15% ethanol.

Ethanol has been disastrous for the pockets of US taxpayers and drivers, the stomachs of the hungry all over the world and the small engines of consumers.

The Corn Ethanol Lobby continues to convince Congress to defy logic. Sugar cane which has 7 times more sugar content, produces 7 times more alcohol and ethanol, and is therefore 7 times more cost effective. But Congress passed high import tariffs to eliminate sugar cane as a competitor.

There are at least 5 reasons to be against corn ethanol in gasoline

- 1) Economic
- 2) Environmental
- 3) Moral
- 4) Strategic
- 5) Degrades Quality of Fuel and Harms Engines

**1) Economic:**

While the direct subsidies have ended there are still billions available to the farmers growing high density corn for ethanol in marketing loans, and billions more in subsidies for farmers to buy crop insurance against bad growing years, which also drives up premiums. The end of 6 billion dollars in taxpayer subsidies for corn-based ethanol has merely shifted the extra cost (about 8 cents/gal.) to the

pumps. It takes \$1.75 to produce a gallon of Corn Ethanol and .95 cents for a gallon of gas. (a difference of 80 cents/gallon).

Then there is the cost of growing corn. Water, fertilizer, herbicide, pesticides, fuel costs to grow and harvest, about \$1.74 per gallon versus 95 cents for a gallon gasoline. This explains why fossil fuels, not ethanol are used to produce ethanol in ethanol plants

## 2) Environmental:

The supposed reason for ethanol as an additive is that it burns cleaner and reduces air pollution.

The overall environmental damage caused by subsidized ethanol production *far outweighs* the benefit to air quality. There is huge amount of water used to grow corn and to produce ethanol in the plants. If any of you watched the "Dust Bowl" by NH's own Ken Burns and Dayton Duncan, you would have seen the toll corn for fuel is taking on the Great Midwestern aquifer. There is a tremendous amount of fertilizer, herbicides, pesticides and the fossil fuels needed to produce ethanol. So much fossil fuel is needed to produce ethanol that you rarely hear it proponents tout the other reason given for ethanol in gasoline. It is supposed to reduce foreign fuel dependence, but statistics show that to be nonsense.

Professor David Pimental of Cornell Univ. calculated that an average American driving 10,000 miles/year on 100 % ethanol would need 852 gallons of ethanol which takes 11 acres of corn, or enough grain to feed 7 American families for one year.

6.25 billion gallons of corn- based ethanol fuel were produced in 2011. The 2007 law passed by Congress steadily increases that amount to 36 billion gallons (that's 6 fold) by 2022.

Look at the energy costs by a BTU calculation. It takes 131,000 BTU's to produce one gallon of Ethanol, which has an energy value of only 77,000 BTUs.

Therefore, every gallon of ethanol produced has a net energy loss of 54,000 BTU's. Again, inefficient and ludicrous.

### 3) Moral and Humanitarian Reasons:

Since 2004, ethanol mandates have doubled the rate of increase in global demand for grains. It doesn't take a college professor to figure out the market pressure this has put on grains, especially corn, and its impact on food prices and the pressure it puts on poor people all over the world. *Corn ethanol takes a larger share of the U.S. corn crop than all the feed corn for all US cattle, hogs and poultry--combined*

Over 40% of the US corn crop now goes to ethanol. With the EPA allowing an increase to 15% , that number could approach 60%.

We are burning food for fuel. When the oil prices spiked three years ago, and they are rising again...the price of grain graphed the exactly same increases. *Ethanol subsidies and mandates have directly (not indirectly) tied the price of fuel and food together.* This results in hunger and actual starvation in poor countries all over the world. There is an alternative called Cellulosic Ethanol which is produced from non-edible plants. While this is not burning fuel, it is still very expensive to manufacture.

### 4) Strategic:

At the current rate of grains being diverted for fuel, (and sooner if fuel is mandated to be 15% ethanol) it is certain that in the next few years... America (**the former breadbasket to the world**) will be for the first time not an *exporter*, but an *importer* of grain. In 2010 after the third largest corn crop in US history (the unsold corn in the elevators (our corn reserve) was a bare two weeks' worth of grain...the lowest since the 1930's at the height of the DUST BOWL.

One of our strategic advantages over the past century is our ability to "feed ourselves," but no longer. How many empires have fallen thus?

### 5) Degrades gasoline and Harms Engines:

**Lastly, but no less importantly, ethanol is a low grade fuel that degrades gasoline and reeks havoc on small engines in particular.**

Ask anyone who has a lawn mower, leaf blower, antique car, chainsaw, snow mobile, etc. Ethanol in gasoline erodes rubber gaskets and harms engines and their performance.

### **Boutique Gasoline???**

The Ethanol and Oil Industries, who are in partnership in their advocacy of ethanol will tell you that to make "boutique gasoline" will be too expensive for our small state and that it will wreak havoc to our economy. **That is the reason for the effective date language in the bill: This bill only becomes effective when two other New England states also pass a similar ban.** Maine is currently debating a ban on ethanol. Three states will create a large enough market not to increase the price of the fuel, and interestingly enough, the oil industry used to produce both ethanol and non-ethanol gasoline a few years back with no added costs.

### **Conclusion:**

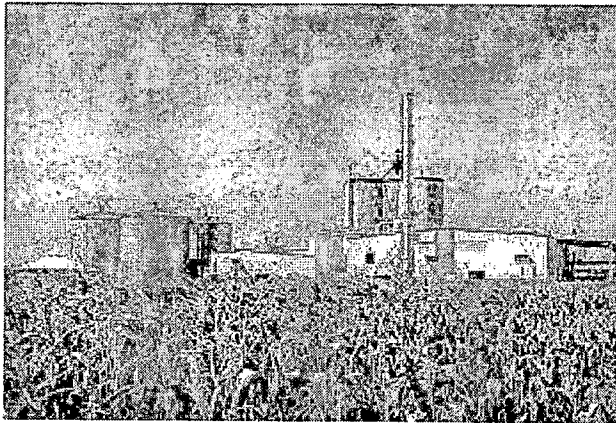
Using heavily subsidized ethanol in gasoline is a bad idea. Burning food for fuel (just using common sense) is a bad idea. It's such a bad idea the editorial boards of both NY times and WSJ are in agreement. Stop the ethanol sham.

To quote the Cornell professor: "Ethanol production is an abuse of our precious croplands to grow corn for an energy-inefficient process that yields low-grade automobile fuel that amounts to unsustainable, subsidized food burning."

The continuing congressional mandate to burn food for fuel is the "perfect storm" of corporate arrogance, congressional greed and bureaucratic stupidity.

We in NH once again have the chance to stand up to lobbyists and the mega-agribusinesses of the Midwest. Please vote to eliminate corn ethanol in NH fuel supply.

## Unusual allies fight renewable fuel standard



2/4/13

An ethanol plant in Missouri (AP file photo/Southeast Missourian, Aaron Eisenhauer)

Humanitarians, environmentalists, farmers' advocates and refiners on Monday came together to demand changes to a renewable fuel mandate they said is wiping out wetlands and driving food costs higher.

The assembled groups are asking Congress to revise — or completely repeal — the eight-year-old renewable fuel standard that requires refiners to blend steadily increasing amounts of ethanol and other alternatives — up to 36 billion gallons in 2022 — into the nation's transportation fuel supply.

"It's pretty emblematic of the problem with this whole renewable fuel standard that you have such a disparate group of people all saying that ... the RFS is unrealistic and impractical to the point that it should be repealed by Congress," said Charlie Drevna, the head of American Fuel and Petrochemicals Manufacturers.

Drevna's refiners group was joined by ActionAid, the Environmental Working Group, FarmEcon, the National Marine Manufacturers Association and Taxpayers for Common Sense in arguing for changes to the renewable fuel standard on Monday. The groups plan to make their pitch to lawmakers and their aides on Capitol Hill on Tuesday.

The groups are part of an increasingly vigorous push against the RFS, led by the oil industry as it hits the so-called "blend wall," the practical ceiling on how much biofuel can be blended into the nation's gasoline, given a 10 percent limit on the amount of ethanol in the most commonly available transportation fuel.

A federal appeals court in Washington, D.C., last month spiked the Environmental Protection Agency's 2010 requirement under the RFS for refiners to blend in 8.65 million gallons of cellulosic biofuels made from grasses, solid waste and other non-edible material, after concluding it was unrealistic. Because virtually no cellulosic biofuels have been available for sale, refiners have had to buy waiver credits from the EPA — at a rate of 78 cents per gallon — to comply with the mandate.

The EPA has since proposed establishing a 14 million gallon target for cellulosic biofuel in 2013.

Biofuels backers say the RFS was always designed to drive investments in ethanol and other renewable fuels. And they say enough cellulosic biofuels are expected to be available this year to meet the 14 million gallon threshold.

But environmentalists argue that the renewable fuel standard has spurred farmers to convert 23 million acres of wetlands and grasslands for the production of corn for ethanol — an area the size of Indiana.

"Corn ethanol has not only been a disaster for consumers, the hungry and for most farmers, it has also been a disaster for the environment," said Scott Faber, vice president of government affairs for the Environmental Working Group. "We have lost more wetlands and grasslands in the last four years than we have in the last 40 years."

With more land and corn devoted to ethanol, prices have gone up for groceries and corn used for animal feed. Tom Elam, with FarmEcon, noted that since 2008, eight poultry farmers have filed for bankruptcy.

**CELLULOSIC BIOFUELS**  
**INDUSTRY PROGRESS REPORT 2012-2013**

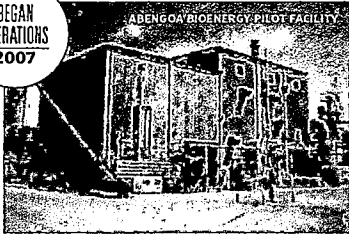


**COMPANY PROFILE**

Abengoa Bioenergy is a worldwide leader in the development of biofuels for transportation, as well as in chemical bioproducts which use biomass as raw material. Abengoa Bioenergy owns and operates 14 bioethanol facilities throughout the United States, Europe and Brazil with a total production capacity of 842 million gallons per year.

**ABENGOA BIOENERGY**

BEGAN OPERATIONS 2007

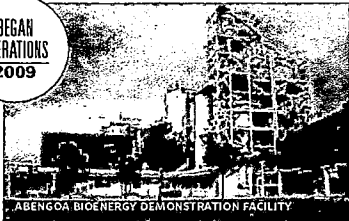


**PILOT FACILITY**

LOCATION: York, NE  
 FEEDSTOCK: Wheat Straw, Corn Stover  
 PRODUCTS: Cellulosic Ethanol  
 CAPACITY: 20,000 GPY  
 PLANT PROFILE: Completed and first cellulosic ethanol produced in September 2007

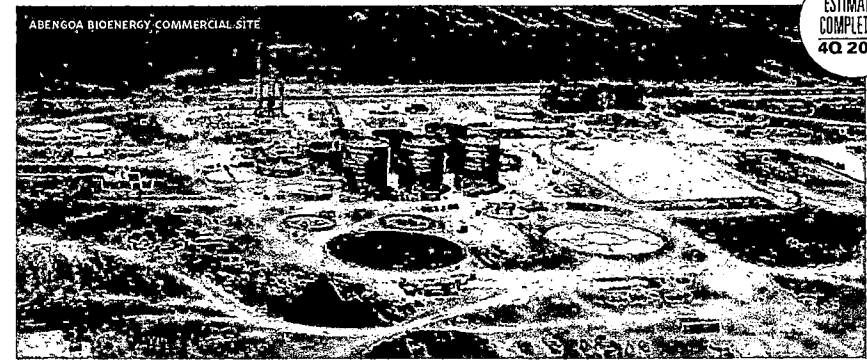
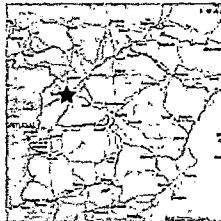


BEGAN OPERATIONS 2009



**DEMONSTRATION FACILITY**

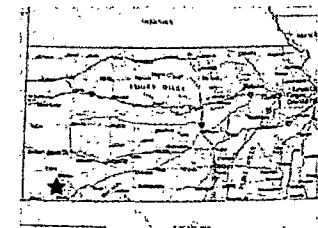
LOCATION: Salamanca, Spain  
 FEEDSTOCK: Wheat and barley straw  
 PRODUCTS: Cellulosic Ethanol  
 CAPACITY: 1.3 MGY  
 PLANT PROFILE: Construction completed and first cellulosic ethanol produced in 2009.



ESTIMATED COMPLETION 4Q 2013

**COMMERCIAL FACILITY**

LOCATION: Hugoton, KS  
 STATUS: Under construction  
 FEEDSTOCK: Agriculture residues, dedicated energy crops, prairie grasses  
 PRODUCTS: Cellulosic ethanol, 20 MW renewable electric power  
 CAPACITY: 25 MGY  
 JOBS: 300 construction; 65 operations; 120 external biomass procurement  
 PROJECT PROFILE: Construction started September 2011; will utilize proprietary enzymatic hydrolysis technology; 1,100 dry tons per day feedstock; construction complete December 2013, feedstock partners secured.

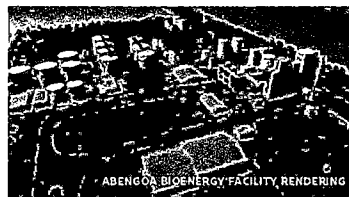


**Abengoa Bioenergy Partners**

**Private Equity:** Abengoa Bioenergy equity

**Strategic:** None; contracted with professional biomass harvesting and removal firms

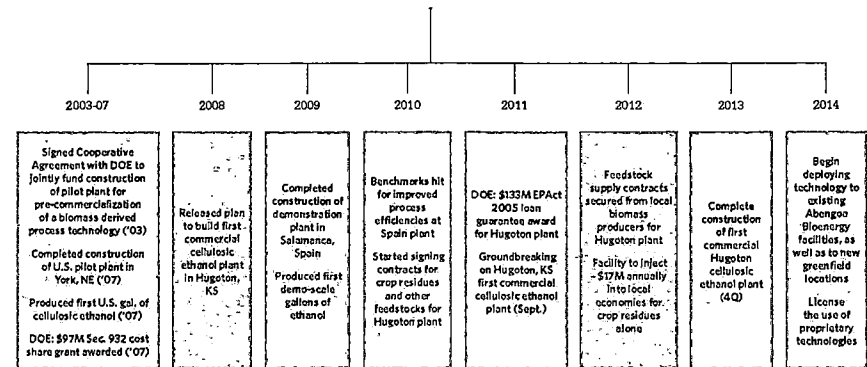
**Public/Government:** Selected for \$97MM Section 932 Cost Share Grant (DOE) in 2007; awarded \$133MM EPAct 2005 loan guarantee in 2011 for development of the Abengoa Bioenergy commercial facility in Hugoton, Kansas



ABENGOA BIOENERGY FACILITY RENDERING

The Abengoa Bioenergy Hugoton Biorefinery will utilize the company's proprietary technology to produce 25 million gallons of cellulosic ethanol per year. The plant will utilize approximately 1,100 dry tons of agricultural waste per day for the ethanol production process. The residue of that process (approximately 300 tons per day of lignin) will be combusted to produce 20 megawatts of electricity. This will allow the facility to be fueled entirely by biomass.

**PATH TO COMMERCIAL DEPLOYMENT**





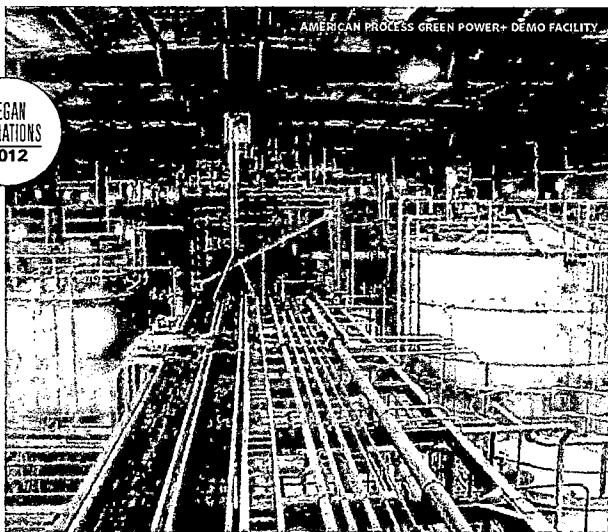


**COMPANY PROFILE**

Based in Atlanta, American Process Inc. was founded in 1994 as a consulting practice serving the forest products industry. Since 2005, the company has been developing technologies for the conversion of biomass into cellulosic sugars to be used in the production of biofuels and bio-based chemicals. American Process now owns two patented cellulosic technologies, Green Power+ and AVAP.

**GREEN POWER+ TECHNOLOGY**

GREEN POWER+ is a cellulosic technology that co-locates with biomass power plants. The hemicelluloses are selectively extracted and hydrolyzed into monomer sugars. The resulting sugars are fermented into cellulosic ethanol. The process configuration enables Green Power+ to convert the hemicelluloses to higher value added products: cellulosic ethanol and renewable chemicals.



**GREEN POWER+ DEMONSTRATION FACILITY**

**LOCATION:** Alpena, MI  
**FEEDSTOCK:** Mixed hardwood  
**PRODUCTS:** Cellulosic ethanol, Potassium acetate  
**CAPACITY:** 700,000 GPY per product  
**JOBS:** ~25 operational, including biomass logistics  
**PLANT PROFILE:** The plant is co-located with the Decorative Panels International (DPI) hardboard manufacturing facility. Plant construction began April 2011; commissioning occurred in June 2012. The plant is in startup mode.

BEGAN OPERATIONS 2012

**American Process & AVAPCO Partners**

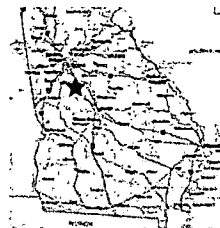
- Green Power+ Strategic:** ArborGen, Decorative Panels International, Green Tech America, Metso
- Green Power+ Public/Government:** U.S. Department of Energy (\$18MM grant to Alpena Biorefinery); Michigan Economic Development Corporation (\$4MM grant for Alpena Biorefinery);
- AVAPCO Strategic:** ArborGen, Green Tech America, Metso, Novozymes
- AVAPCO Public/Government:** Private investment

ESTIMATED STARTUP 1Q 2013



**AVAP TECHNOLOGY**

AVAP is a greenfield technology that fractionates any biomass via the proprietary, patented use of SO<sub>2</sub> and ethanol into cellulose, lignin and hemicelluloses. The cellulose and hemicelluloses are then converted into sugars. Resultant sugars are high purity and low cost, making them an ideal feedstock for downstream conversion into bio-based chemicals and biofuels. The lignin is burned as fuel in the boiler.



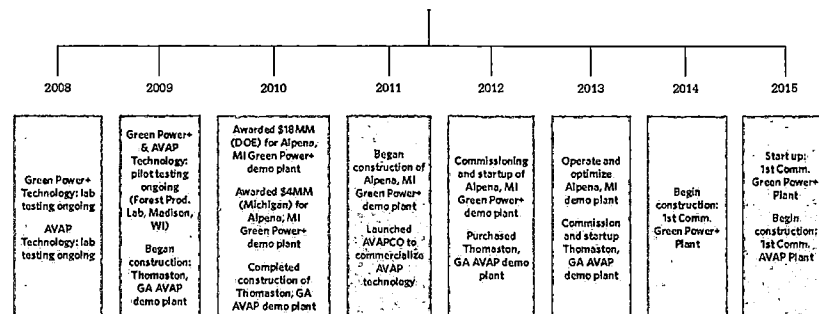
**AVAP DEMONSTRATION FACILITY**

**LOCATION:** Thomaston, GA  
**FEEDSTOCK:** Variety of biomass – up to 10 tons/day  
**PRODUCTS:** Cellulosic sugars, Ethanol, Cellulose  
**CAPACITY:** Up to 300,000 GPY Cellulosic Ethanol  
**JOBS:** ~30 operational, including biomass logistics



**PROJECT PROFILE:** Plant will begin startup in Q1/2013. Thomaston will be the site of AVAPCO's supply chain integrated alliances with downstream sugar converters to chemicals, fuels and materials. AVAPCO is an affiliate of American Process, Incorporated. AVAPCO was created in 2011 in order to commercialize the AVAP technology developed by American Process. AVAPCO owns the Thomaston, GA AVAP Demonstration Facility.

**PATH TO COMMERCIAL DEPLOYMENT**

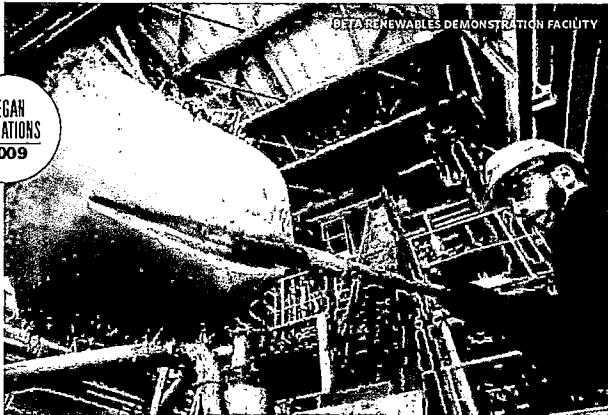




**COMPANY PROFILE**

Beta Renewables is a \$350 million joint venture formed from the Chemtex division of Gruppo Mossi & Ghisolfi and TPG. The M&G Group (~\$3b USD annual revenue) brings over 60 years of success in process development and plant commercialization worldwide. The joint venture has invested over \$200 million in the development of its advanced PROESA™ cellulosic biorefining technology.

BEGAN OPERATIONS 2009



BETA RENEWABLES DEMONSTRATION FACILITY



**DEMONSTRATION FACILITY**

LOCATION: Rivalta, Italy

FEEDSTOCK: Variety of cellulosic, non-food biomass

PRODUCTS: Cellulosic Ethanol, Bio-based Chemicals

CAPACITY: One ton per day

PLANT PROFILE: Continuous operation since 2009.

**Beta Renewables Partners**

**Private Equity:** Over \$200 million invested in PROESA technology development by M&G's Chemtex division. Beta Renewables formed as \$350 million joint venture by Chemtex and TPG.

**Strategic:** GraalBio, Colbioce, Novozymes, Genomatica, Gevo, Codexis, Amyris, Biofuels Center of North Carolina

**Public/Government:** USDA, \$99M loan guarantee for Project Alpha in North Carolina, plus \$4M BCAP award



**U.S. COMMERCIAL FACILITY UNDER DEVELOPMENT: PROJECT ALPHA**

LOCATION: Sampson County, NC

STATUS: \$99M conditional loan guarantee awarded August 2012

FEEDSTOCK: Dedicated energy feedstock crops; \$3.9M BCAP award

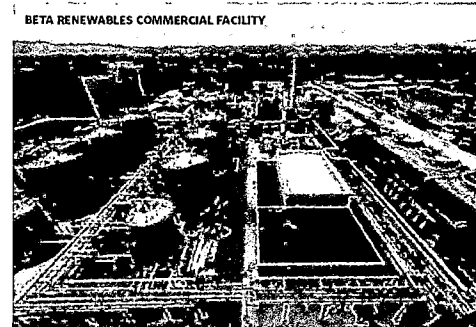
PRODUCTS: Cellulosic Ethanol, Bio-based Chemicals

CAPACITY: 20 MGJ

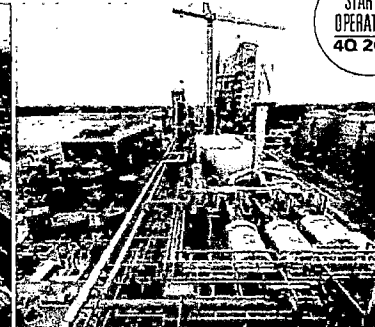
JOBS: 300+ direct and indirect jobs

PROJECT PROFILE: Project Alpha to use Chemtex PROESA technology; \$3.9M Biomass Crop Assistance Program (BCAP) grant to facilitate the establishment of over 4,000 acres of energy crop development across eleven counties in North Carolina, with expected additional revenues to exceed \$4.5M annually for local biomass producers

STARTED OPERATIONS 4Q 2012



BETA RENEWABLES COMMERCIAL FACILITY



**COMMERCIAL FACILITY**

LOCATION: Crescentino, Italy

STATUS: Started operations 4Q 2012

FEEDSTOCK: A Mix of Wheat Straw, Rice Straw, Bagasse, Arundo Donax, Corn Stover and Poplar

PRODUCTS: Cellulosic Ethanol

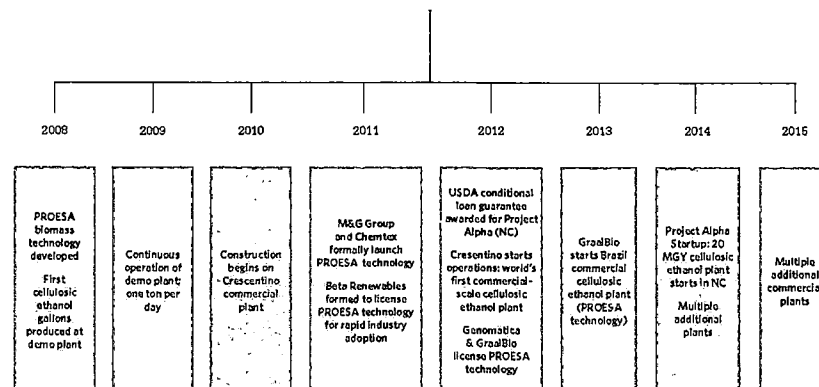
CAPACITY: 20 MGJ

JOBS: 200+ direct and indirect jobs

PROJECT PROFILE: On schedule to be world's first commercial-scale plant; multiple additional plants have licensed PROESA technology; technology to be utilized at Project Alpha in North Carolina.



**PATH TO COMMERCIAL DEPLOYMENT**

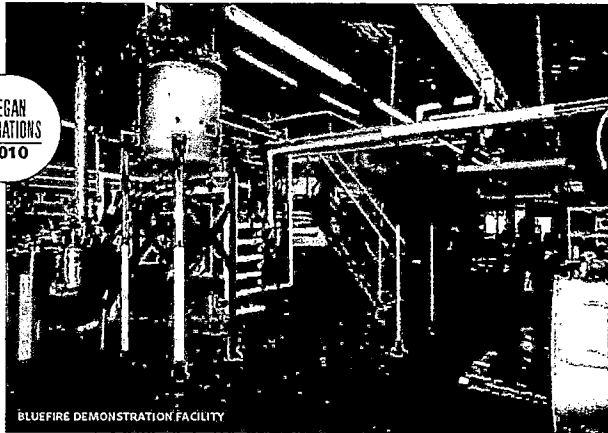




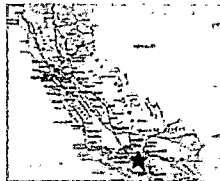
**COMPANY PROFILE**

BlueFire was established to deploy the Arkenol Process Technology for the conversion of cellulosic waste materials into renewable fuels and other products. BlueFire is the exclusive North America licensee of the technology, which converts widely available, inexpensive, organic materials such as agricultural residues, wood residues, municipal solid wastes and purpose grown energy crops into renewable end products. BlueFire also operates SucreSource, which converts cellulose into intermediate sugars for the production of bio-chemicals and other products.

BEGAN OPERATIONS 2010



BLUEFIRE DEMONSTRATION FACILITY



**DEMONSTRATION FACILITY**

**LOCATION:** Anahelm, CA

**FEEDSTOCK:** Various wood and paper wastes, MSW, bagasse

**PRODUCTS:** Cellulosic Sugars

**CAPACITY:** 200 lbs per day

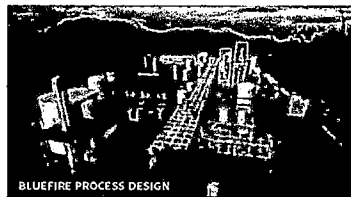
**PLANT PROFILE:** Pilot testing complete; now utilized for production of cellulosic sugars for sale to companies developing processes to convert sugar to bio-products.

**Bluefire Partners**

**Private Equity:** Quercus Trust, Arkenol Inc., ARK Energy Inc.

**Strategic:** Feedstock Contract with Cooper Marine Timberlands, Off-Take Agreement with Tenaska Biofuels. EPC contract with MasTec North America, Applied Power Concepts

**Project Development:** Launched SucreSource, a wholly-owned subsidiary constructing a cellulosic sugar facility in South Korea with GS Caltex for development of sugar to chemicals process. Designing cellulose to fuels plant with China Huadian Engineering Co and Sino Bioway - Both out of Beijing, China



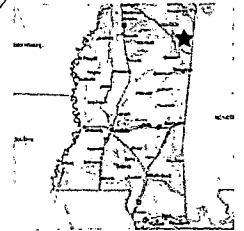
BLUEFIRE PROCESS DESIGN

SucreSource, a wholly owned subsidiary of BlueFire Renewables, signed agreements in 2012 with GS Caltex, a Korean petroleum company, to build a cellulose to sugar plant in Korea. The facility will process 2 tons of construction and demolition debris per day into cellulosic sugar, which will be converted into a high value chemical by GS Caltex. The facility will be owned and operated by GS Caltex with SucreSource providing the process design package, equipment procurement and technical and engineering support.



BLUEFIRE COMMERCIAL SITE

ESTIMATED COMPLETION 2014



**COMMERCIAL FACILITY**

**LOCATION:** Fulton, MS

**STATUS:** Site Preparation Completed. Pending financing for facility construction, recipient of \$87.5MM Dept of Energy grant

**FEEDSTOCK:** Potestry residues and other cellulosic wastes

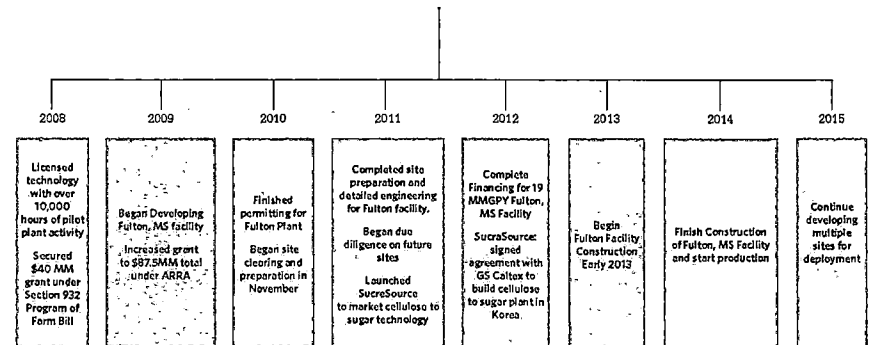
**PRODUCTS:** Cellulosic Ethanol, Gypsum, Lignin and Protein Cream

**CAPACITY:** 19 MGY

**JOBS:** 750 peak construction jobs. Over 100 for plant operation and handling of biomass and products

**PROJECT PROFILE:** All permits for construction obtained, long-term contracts for all of feedstock and products complete. Turn-key EPC contract completed.

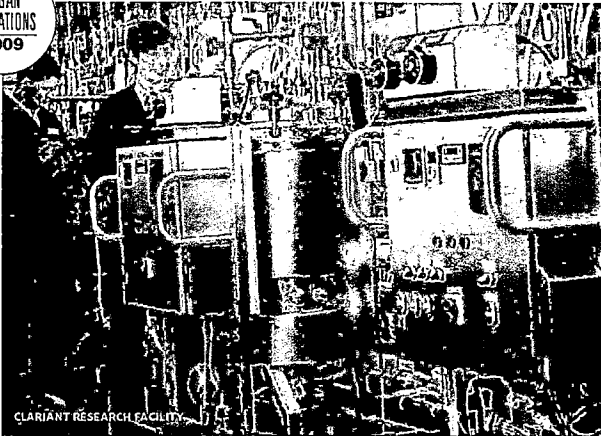
**PATH TO COMMERCIAL DEPLOYMENT**



**COMPANY PROFILE**

Clariant, headquartered in Muttenz near Basel, Switzerland, is an internationally active specialty chemical company with \$8 billion in annual turnover and over 22,000 employees worldwide. Clariant has over 100 group companies and production sites in 44 countries including the United States. The Clariant Biotech and Renewables Center is based in Munich and Straubing, Germany, and is focused exclusively on the development and commercial deployment of renewable technology solutions.

CLARIANT

BEGAN  
OPERATIONS  
2009

CLARIANT RESEARCH FACILITY

**RESEARCH FACILITY**

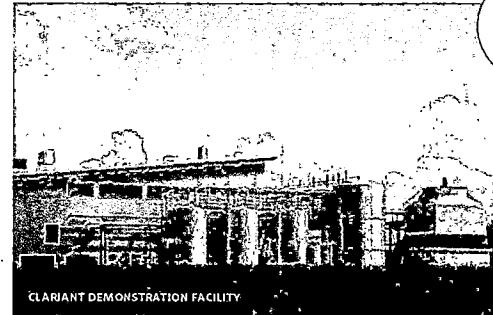
**LOCATION:** Munich, Germany

**FEEDSTOCK:** Various  
ligno-cellulosic feedstocks

**PRODUCTS:** Cellulosic Ethanol,  
Cellulosic Sugars, Biobased  
Chemicals

**CAPACITY:** 2 tons per year

**PLANT PROFILE:** Plant utilized to  
test and improve the sunliquid®  
technology across several  
different cellulosic feedstocks.



CLARIANT DEMONSTRATION FACILITY

BEGAN  
OPERATIONS  
2012**DEMONSTRATION FACILITY**

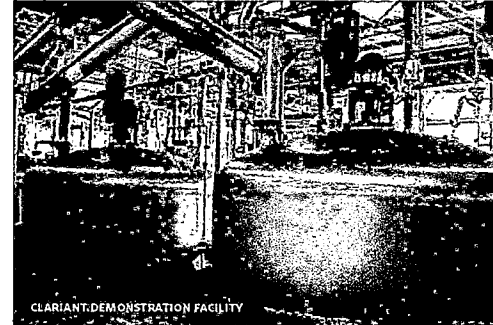
**LOCATION:** Straubing, Germany

**FEEDSTOCK:** Agricultural Residues (Phase 1);  
Dedicated Energy Crops (Phase 2)

**PRODUCTS:** Cellulosic Ethanol, Cellulosic Sugars,  
Biobased Chemicals

**CAPACITY:** 330,000 GPY

**PLANT PROFILE:** The plant produced the first  
volumes of cellulosic ethanol on July 20, 2012.  
The sunliquid® demonstration plant will produce  
cellulosic ethanol from a number of ligno-cellulosic  
feedstocks. The sunliquid® demo plant will  
demonstrate the technical and economic  
advantages of feedstock specific enzyme  
utilization, on-site process integrated enzyme  
production, simultaneous C5 and C6 fermentation  
in a one-pot reaction and an energy saving ethanol  
separation and purification process.



CLARIANT DEMONSTRATION FACILITY

**Clariant Partners**

**Private Equity:** No funding was requested from Private Equity for the demonstration plant. Funding sources for the first commercial plant will be evaluated.

**Strategic:** No funding was requested from Strategic Partners for the demonstration plant. Funding sources for the first commercial plant will be evaluated.

**Public/Government:** The Bavarian State Government and the German Federal Ministry of Education and Research have each funded 5 million euros into the demonstration plant for research relating to the project. Funding sources for the first commercial plant will be evaluated.

**CLARIANT COMMERCIAL STRATEGY**

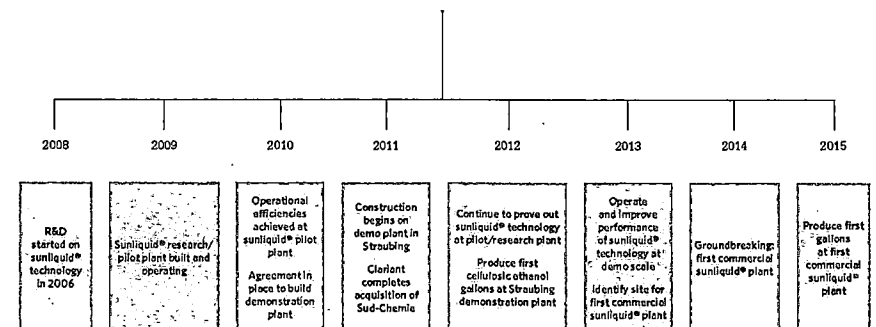
**STATUS:** Clariant is in the process of evaluating site locations for the first commercial sunliquid® production plant in the U.S., EU, Brazil and Canada

**FEEDSTOCK:** Agricultural residues

**PRODUCTS:** Cellulosic Ethanol, Cellulosic Sugars, Bio-based Chemicals

**CAPACITY:** Feedstock dependent; range between 18-60 MGY

**JOBS:** To be determined

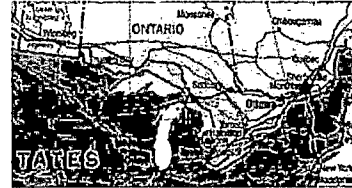
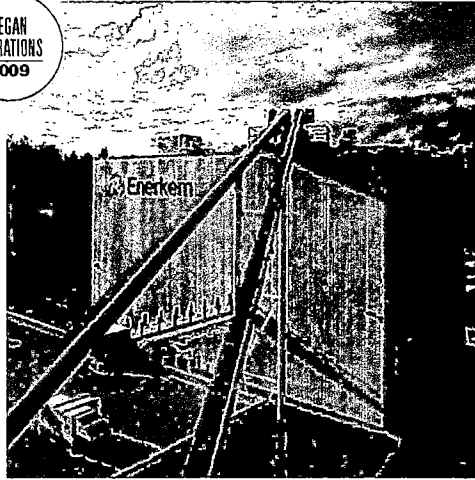
**PATH TO COMMERCIAL DEPLOYMENT**

## COMPANY PROFILE

Headquartered in Montreal, Canada, Enerkem employs 140 employees in the U.S. and Canada. Enerkem builds modular, copy-exact and scalable 10 million gallon per year biorefineries that utilize its proprietary thermochemical conversion technology to produce advanced ethanol and bio-chemicals from municipal solid waste (MSW). Founded in 2000, Enerkem started piloting its technology in 2003.



BEGAN  
OPERATIONS  
2009



### DEMONSTRATION FACILITY

LOCATION: Westbury, QC, Canada

FEEDSTOCK: Used utility/telephone poles, municipal solid waste

PRODUCTS: Syngas, Biomethanol (2011), Cellulosic Ethanol (2012)

CAPACITY: 1.3 MGY

PROJECT PROFILE: Enerkem's Westbury facility is the first plant in the world to utilize used electricity poles (a negative-cost and heterogeneous material) to produce ethanol and methanol. The plant, co-located with a saw mill that recycles wood from utility poles, utilizes the portion of the pole that cannot be reclaimed. The plant began producing conditioned syngas in 2009, methanol in 2011, and cellulosic ethanol in 2012.



### U.S. COMMERCIAL STRATEGY

SUMMARY: Enerkem has identified dozens of potential sites in the United States to deploy its modular, copy-exact 10 MGY biorefineries.

FIRST PROJECT: Pontotoc, MS

FEEDSTOCK: MSW, wood residues

PRODUCTS: Syngas, Biomethanol, Acetates, Cellulosic Ethanol

STATUS: Under development

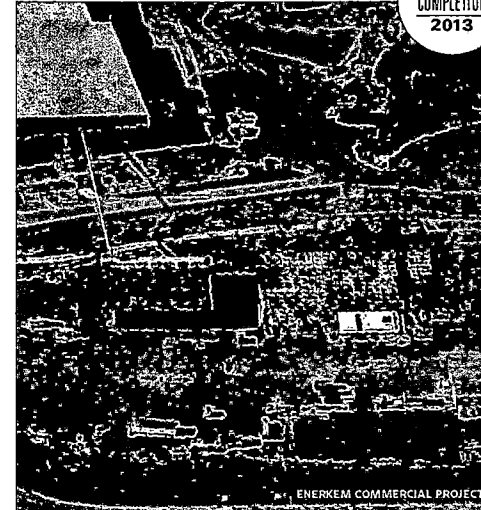
## Enerkem Partners

**Private Equity:** Raised \$136MM in 3 rounds of financing since 2008 (Rho Ventures, Braemar Energy Ventures, Waste Management, Valero, BDR Capital, Cycle Capital, The Westly Group, Fondation CSN and Quince Associates, L.P.)

**Strategic:** Waste Management (upstream: feedstock), Valero (downstream: blending), GreenField Ethanol (distributor: largest traditional ethanol producer in Canada)

**Government/Public:** up to \$50 MM cost-share (DOE) and \$80MM loan guarantee (USDA) to support construction full-scale commercial facility in Pontotoc, MS; \$18MM CAD grant (Québec Ministry of Natural Resources and Wildlife) and \$9 MM loan (Investissement Québec) for commercial facility in Varennes, Québec; \$23MM CAD (Alberta Innovates and Alberta Energy) for full-scale facility in Edmonton, Alberta; Natural Resources Canada, Sustainable Development Technology Canada

ESTIMATED  
COMPLETION  
2013



### COMMERCIAL FACILITY

LOCATION: Edmonton, AB, Canada

STATUS: Phase 1 Completion in 3Q 2013

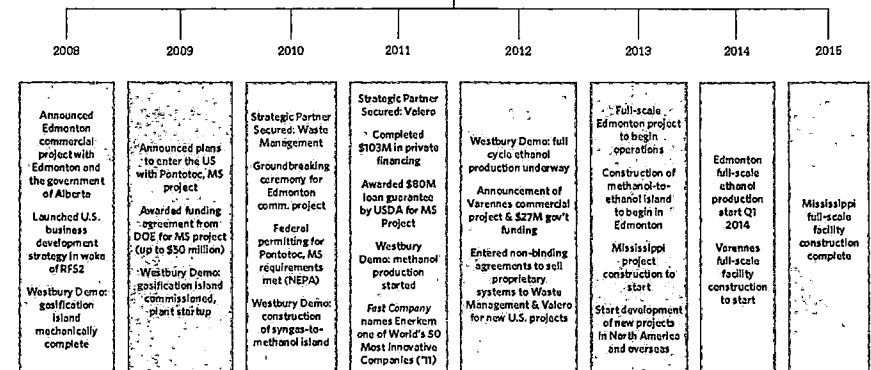
FEEDSTOCK: MSW from the City of Edmonton

PRODUCTS: Syngas, Biomethanol, Acetates, Cellulosic Ethanol

CAPACITY: 10 MGY

PLANT PROFILE: Enerkem has a 25-year agreement with the City of Edmonton to build and operate a plant that will produce next-generation biofuels from non-recyclable, non-compostable municipal solid waste (MSW). It is the world's first major collaboration between a metropolitan centre and a waste-to-biofuels producer to turn MSW into methanol and ethanol. The plant will produce U.S. RFS-eligible cellulosic biofuels and enable Edmonton to increase its residential waste diversion rate to 90 percent.

## PATH TO COMMERCIAL DEPLOYMENT

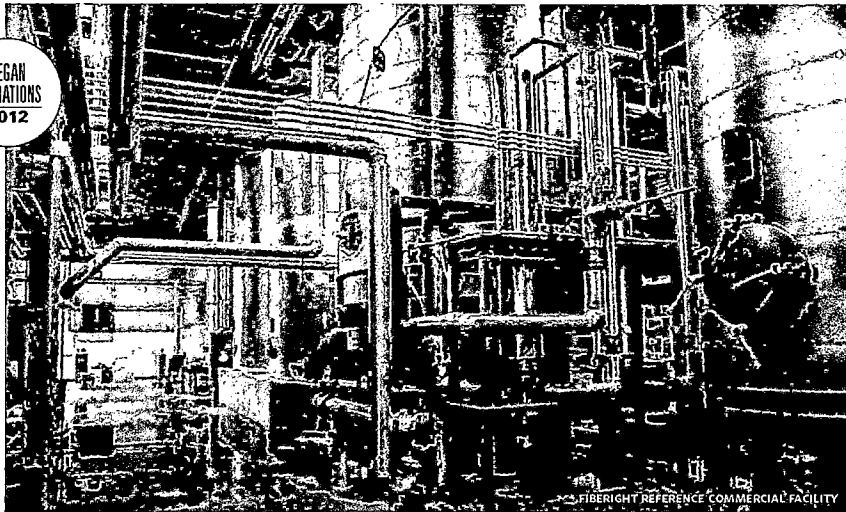


**COMPANY PROFILE**

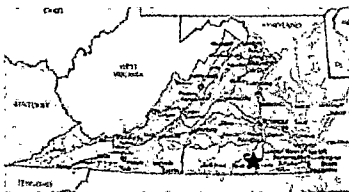
Fiberight is a privately held company founded in 2007 with current operations in Virginia, Maryland and Iowa. Fiberight applies its proprietary technology to refine municipal solid waste (MSW) and waste fiber pulp into cellulosic sugars that can be further processed into cellulosic biofuels. Fiberight demonstrated the ability to produce commercial scale batches of cellulosic ethanol at its Iowa plant in 2010. Fiberight is targeting rapid expansion of its prototype commercial plants in population dense municipalities with high-stranded trash costs or landfill limitations.



BEGAN OPERATIONS 2012



FIBERIGHT REFERENCE COMMERCIAL FACILITY



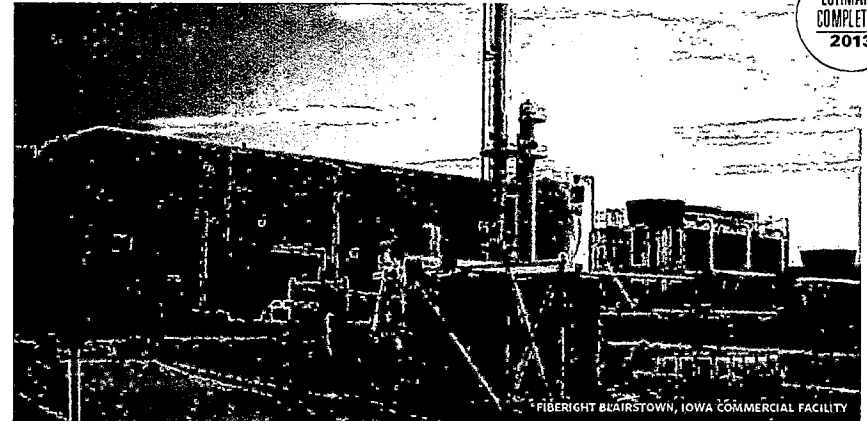
**REFERENCE COMMERCIAL FACILITY**

**LOCATION:** Lawrenceville, VA  
**FEEDSTOCK:** Municipal solid waste, commercial waste, energy crops  
**PRODUCTS:** Cellulosic Ethanol/biofuels, Cellulosic Sugars, Bio-chemicals  
**CAPACITY:** 1 MGY  
**PLANT PROFILE:** Utilized to test core business and technology platforms since 2007; upgraded in 2011 to be fully integrated MSW-to-biofuels reference commercial plant; operations commenced in 2012 with 20+ employees.

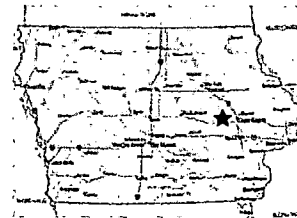
**Fiberight Partners**

**Private Equity:** Confidential Private Equity Fund; SEC Reg. D offering completed in 2012 - \$15M  
**Strategic:** Novozymes  
**Government/Public:** Iowa Power Fund - \$2.9M, USDA Loan Guarantee - \$25M

ESTIMATED COMPLETION 2013



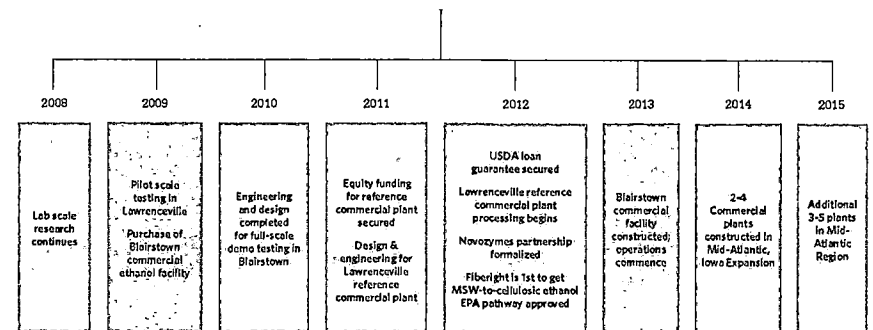
FIBERIGHT BLAIRSTOWN, IOWA COMMERCIAL FACILITY



**COMMERCIAL FACILITY**

**LOCATION:** Blairstown, IA  
**STATUS:** Existing Facility To Be Modified in 2013  
**FEEDSTOCK:** Municipal Solid Waste, Non-Food Wastes  
**PRODUCTS:** Cellulosic Ethanol, Bio-chemicals  
**CAPACITY:** 6 MGY  
**JOBS:** 55 Full-time Operational Positions  
**PROJECT PROFILE:** Facility is a retro-fitted former corn ethanol plant within 30 miles of well over 1,000 tons per day of MSW.

**PATH TO COMMERCIAL DEPLOYMENT**

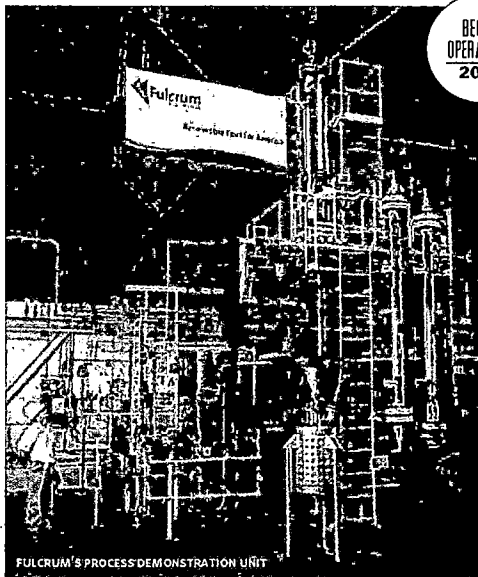




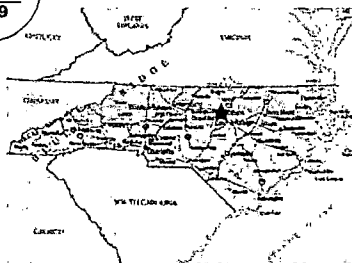
**COMPANY PROFILE**

Founded in 2007, Fulcrum BioEnergy is headquartered in Pleasanton, California. The company operates a process demonstration unit in Durham, North Carolina that converts synthesis gas to ethanol. Fulcrum is ready to begin construction on a commercial-scale advanced biofuels facility, the Sierra BioFuels Plant, that will convert municipal solid waste (MSW) into ethanol. Sierra is located near Reno, Nevada.

**BEGAN OPERATIONS 2009**



FULCRUM'S PROCESS DEMONSTRATION UNIT



**PROCESS DEMONSTRATION FACILITY**

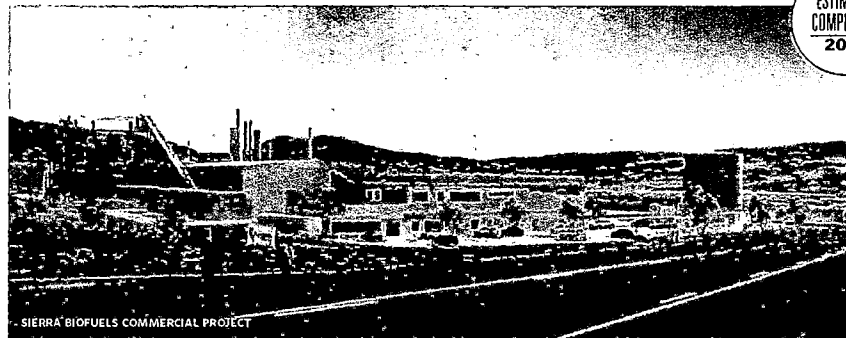
**LOCATION:** Durham, NC

**FEEDSTOCK:** Synthesis Gas

**PRODUCTS:** Ethanol

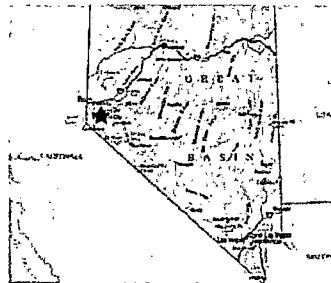
**CAPACITY:** Fulcrum's alcohol synthesis PDU operates with a full-scale tubular reactor packed with catalyst under the same operating parameters that will be used at its commercial-scale plants

**PLANT PROFILE:** The PDU converts synthesis gas to ethanol – the second step in Fulcrum's waste-to-ethanol process. The PDU has operated in excess of 20,000 hours over a period of three and a half years.



SIERRA BIOFUELS COMMERCIAL PROJECT

**ESTIMATED COMPLETION 2014**



**COMMERCIAL FACILITY**

**LOCATION:** McCarran, Storey County, NV

**STATUS:** Initial site preparation work completed. Construction will begin once the USDA loan guarantee is closed

**FEEDSTOCK:** Municipal solid waste contracted with Waste Connections and Waste Management

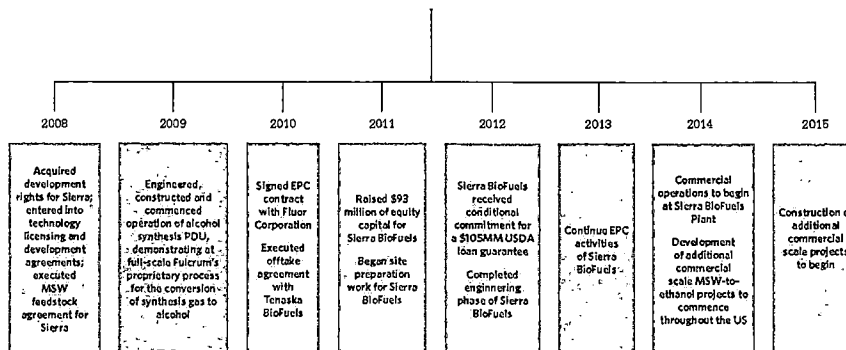
**PRODUCTS:** Advanced Ethanol

**CAPACITY:** 10 MG Y

**JOBS:** 430 engineering and construction jobs; 53 permanent jobs

**PROJECT PROFILE:** Located at the Tahoe-Reno Industrial Center approximately 20 miles east of Reno, Nevada, Sierra will be one of the first projects of its kind to be built in the United States. Designed to produce approximately 10 MG Y of low-carbon, renewable transportation fuel annually, the project will combine new, innovative technology with existing commercial systems.

**PATH TO COMMERCIAL DEPLOYMENT**



**Fulcrum Partners**

**Private Equity:** Raised \$93 million of capital in 2011 from investors such as US Renewables Group, Rustic Canyon and Waste Management.

**Strategic:** Fulcrum has partnered with Waste Connections and Waste Management, two of the nation's largest waste companies, for long-term feedstock supply and joint development activities. These agreements give Fulcrum the ability to produce more than 700 million gallons of ethanol per year throughout the United States.

**Government/Public:** Fulcrum received a \$105 million conditional commitment for a USDA loan guarantee in August 2012. The final terms are currently being negotiated with the USDA.

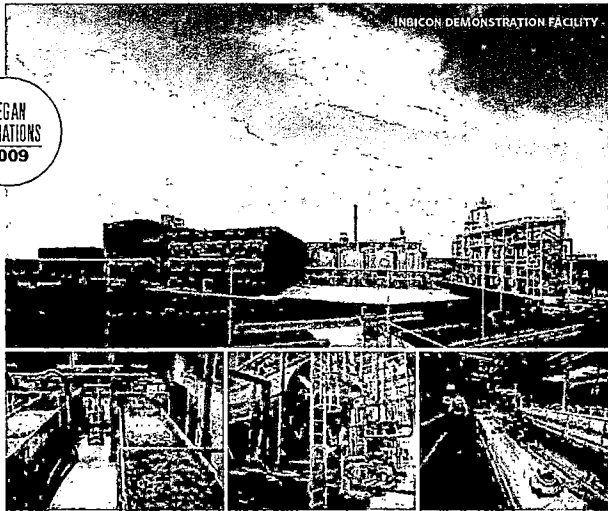
# Inbi con®

Biomass Refinery

## COMPANY PROFILE

Inbicon began pioneering biomass conversion technology in the late 1990s. Using steam, enzymes, and yeast, Inbicon turns soft lignocellulose (e.g. wheat straw, corn stalks, energy grasses) into cellulosic ethanol, as well as renewable lignin and industrial sugar molasses for power and bio-chemicals. Inbicon is a subsidiary of DONG Energy, Denmark's largest energy company with 6,000 employees and \$9.8 billion in revenues (2011). DONG Energy has invested over \$100 million to develop and commercialize inbicon technology, which is licensed worldwide.

BEGAN  
OPERATIONS  
2009



### DEMONSTRATION FACILITY

LOCATION: Kalundborg, Denmark

FEEDSTOCK: Wheat Straw

PRODUCTS: Cellulosic ethanol, renewable electricity

CAPACITY: 1.5 MGY of cellulosic ethanol, 11,400 metric tons of lignin fuel pellets, and 13,900 metric tons of industrial sugar molasses

PLANT PROFILE: Fully operational. Integrated with adjacent power station to utilize excess steam. Cellulosic ethanol sold at 98 Statoil petrol stations (E5 gasoline blends). Lignin co-product replaces coal in Danish power generation. Sugar molasses co-product used for biogas production.

## Inbicon Partners

**Marketing:** Lelfmark, LLC is the independent Inbicon partner authorized to license Inbicon Biomass Refinery technology in North America. Lelfmark has developed a pipeline of U.S. projects, including the Fair Oaks (IN) and Spiritwood (ND) projects.

**U.S. Engineering:** To assure quality control for U.S. projects, Inbicon has certified three American firms to perform engineering for U.S. projects: Harris Group (Seattle, WA); Pöyry (Appleton, WI); and, APS (Richmond, VA).

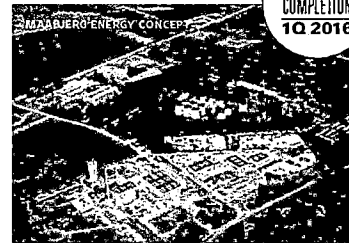
**Enzyme:** Novozymes; DuPont Genencor

**Project Finance:** Inbicon is working with the Danish Export Fund (EKF) to bring loan guarantees to its North American projects.

Cellulosic ethanol produced at the Inbicon Kalundborg plant is currently sold at almost 100 Statoil fueling stations in Denmark in E5 blends (5% cellulosic ethanol, 95% gasoline)



ESTIMATED  
COMPLETION  
1Q 2016



### COMMERCIAL PROJECT

LOCATION: Maabjerg, Denmark

STATUS: Engineering and Permitting

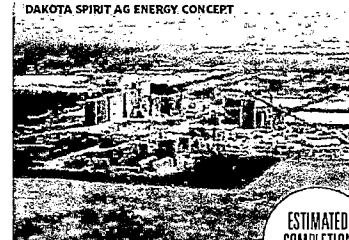
FEEDSTOCK: Wheat Straw (50 Tons per hour)

PRODUCTS: Cellulosic Ethanol, Biogas, Renewable Electricity, Renewable Fertilizer, Solid Biofuel

CAPACITY: 20 MGY (Cellulosic Ethanol); 1.7 Billion Cubic Feet (Biogas), Renewable Electricity for 25,000 households, 565,000 TPY of renewable fertilizer, 56,000 TPY of solid biofuel for power/heat

PROJECT PROFILE: Integrates 6 Danish technologies on a 247-acre site in northwestern Jutland; to utilize 400,000 tons of wheat straw and 770,000 tons of livestock waste annually.

ESTIMATED  
COMPLETION  
3Q 2015



### COMMERCIAL PROJECT

LOCATION: Spiritwood, ND

STATUS: Engineering, Permitting

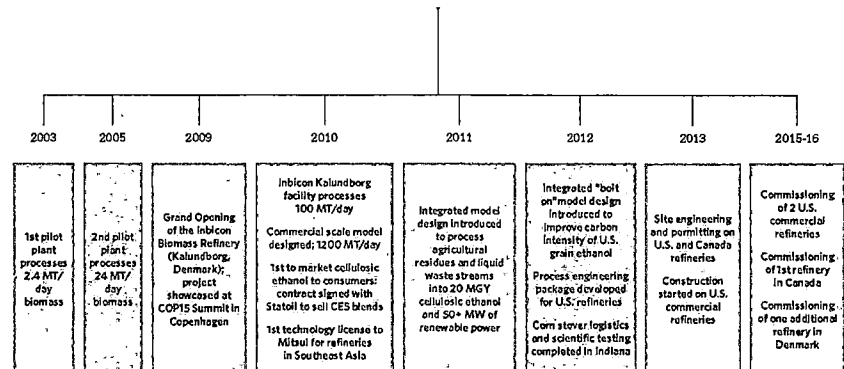
FEEDSTOCK: Wheat Straw (25 TPH)

PRODUCTS: Cellulosic Ethanol; Renewable Power; Industrial Molasses

CAPACITY: 10+ MGY Cellulosic Ethanol; 83,000 TPY Renewable Biofuel Pellets, 94,000 TPY Industrial Molasses

PROJECT PROFILE: Project of Great River Energy; sited adjacent to its Spiritwood Station CHP plant in North Dakota. A conventional dry mill ethanol plant is planned for Phase 1, with cellulosic ethanol production from wheat straw added in Phase 2 (using Inbicon Biomass Refinery technology). Partners include the North Dakota Utilization Commission (APUC) and the North Dakota Industrial Commission-Renewable Energy Council.

## PATH TO COMMERCIAL DEPLOYMENT





# INEOS Bio

## COMPANY PROFILE

INEOS Bio is a BioEnergy company producing advanced biofuels and renewable power from a wide range of low-cost carbon materials. The company's highly innovative technology provides an alternative to waste disposal for communities around the globe. INEOS Bio is one of the global businesses in INEOS.

FEEDSTOCK STORAGE AT INEOS FACILITY



## RESEARCH AND DEVELOPMENT FACILITY

LOCATION: Fayetteville, AR

FEEDSTOCK & PRODUCTS: Synthesis Gas, Ethanol, Other

CAPACITY: 1.5 tons per day

PLANT PROFILE: INEOS Bio utilizes its integrated pilot plant to test, prove and optimize its proprietary technology. INEOS Bio's pilot plant and research and development facility represents a vitally important step on the road to commercialization. The company will continue to operate its pilot plant in parallel with its commercial and licensed facilities. Experience has shown that continued development and research with an integrated pilot plant supports an overall continuous improvement process that benefits our licensees and operating facilities.

OPERATIONAL SINCE 2003

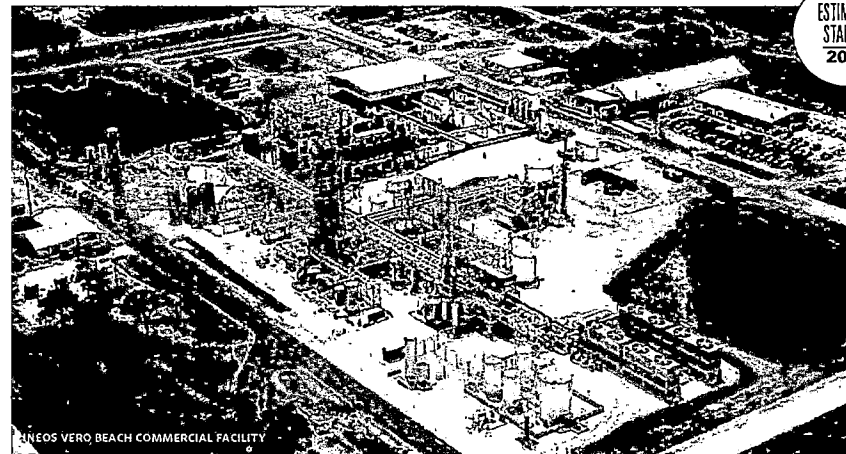
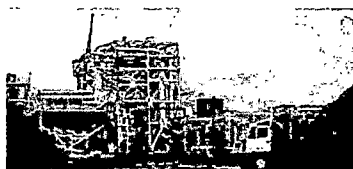
## INEOS Partners

**Marketing:** JV Project between INEOS Bio and New Planet BioEnergy

**Strategic:** (Project) AMEC, Air Products, Vogelbusch, Emerson, CDM-Smith

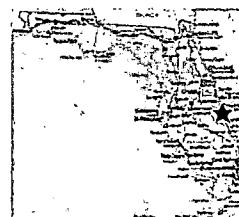
**Public/Government:** \$50MM (DOE) grant, \$75MM (USDA) loan guarantee, \$2.5MM (State of Florida) grant

The INEOS Bio technology is a combined thermo-chemical and bio-chemical process that efficiently converts a wide range of organic materials, including municipal solid waste, yard, forestry and agricultural waste into ethanol and renewable energy. This flexibility allows facilities to be built anywhere in the world, providing jobs and locally sourced renewable energy for urban and rural communities.



INEOS VERO BEACH COMMERCIAL FACILITY

ESTIMATED STARTUP 2012



## COMMERCIAL FACILITY

LOCATION: Vero Beach, FL

STATUS: Commissioning Stage

FEEDSTOCK: Vegetative and Yard waste; MSW

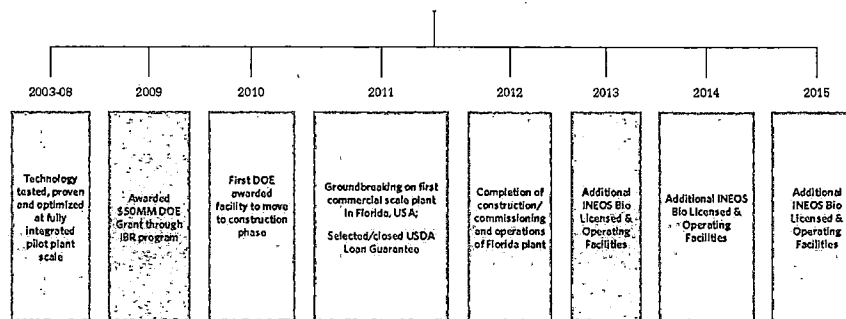
PRODUCTS: Cellulosic ethanol and renewable power

CAPACITY: 8 MGY; 6MW (gross) electricity generation

JOBS: 400 direct and indirect jobs, 60 full time

PLANT PROFILE: The site, adjacent to the Indian River County landfill, ensures flexibility and long-term feedstock availability.

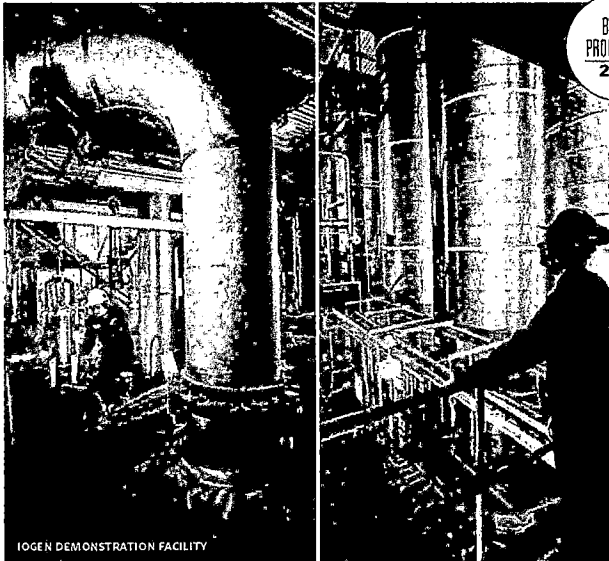
## PATH TO COMMERCIAL DEPLOYMENT





**COMPANY PROFILE**

Since Iogen's founding in the late 1970s, more than \$425 million has been invested in Iogen's cellulosic ethanol technology, including more than \$75 million in the Iogen demonstration plant in Ottawa. Investors include Royal/Dutch Shell, Goldman Sachs, Petro Canada, and Volkswagen. The company, based in Ottawa, has produced more than 550,000 gallons of cellulosic ethanol to date and holds more than 250 patents. Iogen also operates a thriving business making enzymes that digest fiber.



IOGEN DEMONSTRATION FACILITY

BEGAN PRODUCTION 2005



**DEMONSTRATION FACILITY**

LOCATION: Ottawa, ON, Canada

FEEDSTOCK: Cereal Straw, Bagasse, Corn Stover, Grasses

PRODUCTS: Cellulosic Ethanol

CAPACITY: 1 MGJ

PLANT PROFILE: Fully integrated plant with all key unit options; started ethanol production in 2005. Has undergone regular upgrades and improvements resulting from learnings of integrated 24x7 operation and technology improvements from R&D.

**IOGEN DEMO PLANT FUEL PRODUCTION**

Year	Ethanol		Cumulative Production	
	(Liters)	(Gallons)	(Liters)	(Gallons)
2005	129,547	34,223	219,418	57,964
2006	16,811	4,441	236,229	62,405
2007	2,598	686	238,827	63,091
2008	206,525	54,558	445,352	117,650
2009	581,042	153,495	1,026,394	271,145
2010	508,781	134,406	1,535,175	405,550
2011	371,606	98,168	1,906,781	503,718
*2012	219,090	57,877	2,125,871	561,595

(July 31, 2012)

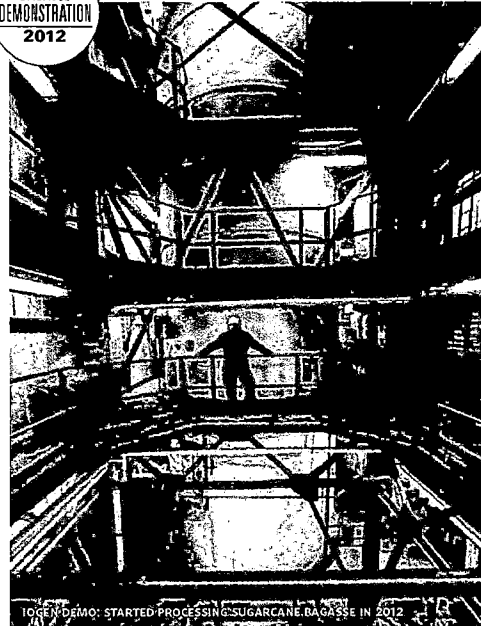
**Iogen Partners**

**Private Equity:** \$425 million aggregate investment through partners including: Royal Dutch/Shell Group, Goldman Sachs & Co., Volkswagen and Petro-Canada.

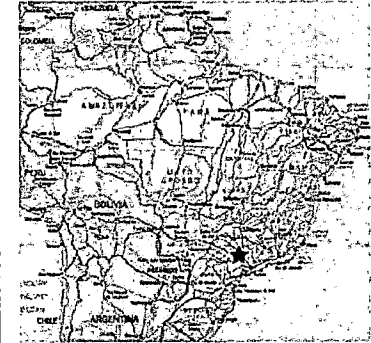
**Strategic:** Iogen is currently working closely with Raizen, Brazil's largest sugar and ethanol producer and a 50:50 JV between Royal/Dutch Shell and Cosan.

**Government/Public:** \$20MM from Government of Canada, of which \$10MM (Technology Partnership Canada) was for Ottawa demonstration facility.

BAGASSE DEMONSTRATION 2012



IOGEN DEMO: STARTED PROCESSING SUGARCANE BAGASSE IN 2012



**COMMERCIAL STRATEGY**

LOCATION: Piracicaba, São Paulo, Brazil

STATUS: Development and Engineering

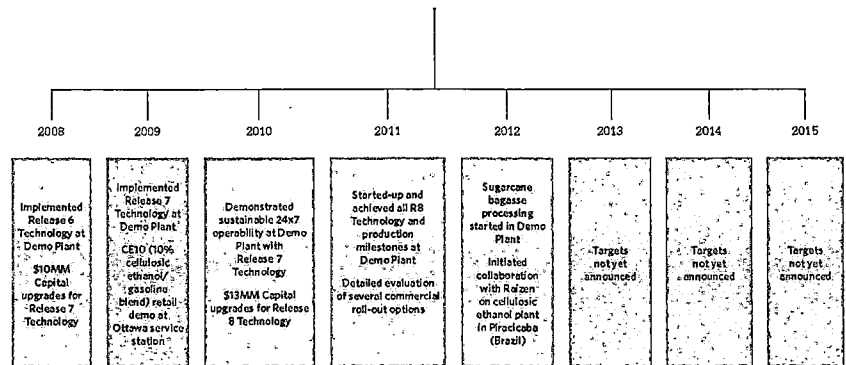
FEEDSTOCK: Bagasse

PRODUCTS: Cellulosic Ethanol

CAPACITY: To Be Determined

PROJECT PROFILE: Raizen Group, the world's largest producer of sugarcane ethanol, has made an initial investment in Iogen Energy to develop a commercial cellulosic ethanol project in Brazil. The investment will cover development and engineering costs associated with the front end design of a bagasse-to-ethanol facility to be co-located with Raizen's Costa Pinto facility in Piracicaba, São Paulo.

**PATH TO COMMERCIAL DEPLOYMENT**

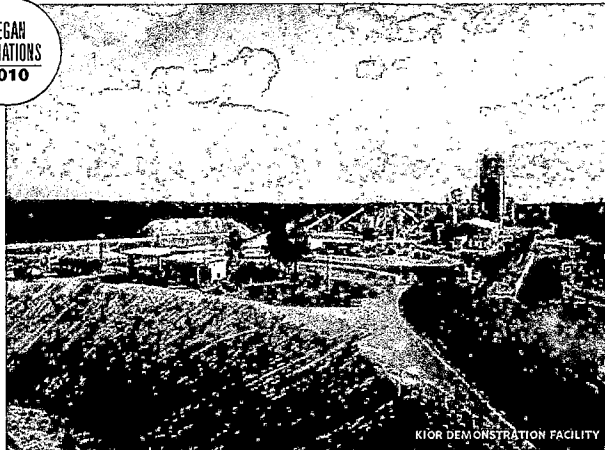




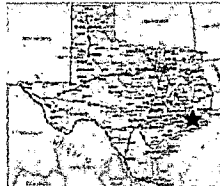
**COMPANY PROFILE**

KIOR is a next-generation renewable fuels company that has developed a unique two-step proprietary technology platform to convert abundant and sustainable biomass resources into cellulosic gasoline, diesel, jet fuel and fuel oil. KIOR's cellulosic biofuels may be transported using existing distribution networks and are suitable for use in vehicles on the road today. KIOR strives to help ease dependence on foreign oil, reduce lifecycle greenhouse gas emissions and create high-quality jobs and economic benefit across rural communities.

BEGAN OPERATIONS 2010



KIOR DEMONSTRATION FACILITY



**DEMONSTRATION FACILITY**

LOCATION: Pasadena, TX

FEEDSTOCK: Forestry Residuals

PRODUCTS: Cellulosic Gasoline, Cellulosic Diesel for R&D and business development purposes

CAPACITY: 15 barrels per day

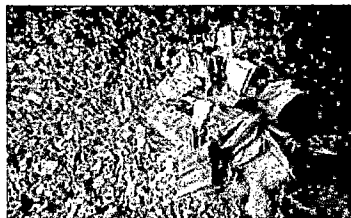
PLANT PROFILE: Produces up to 15 barrels of renewable crude oil per day; facility co-located with R&D operations with approximately 100 employees, 30 of whom are Ph.D.'s.

**KIOR PARTNERS**

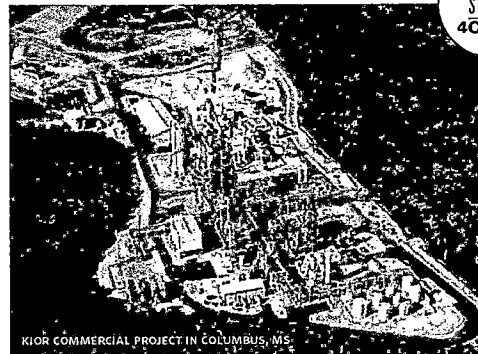
**Private Equity/Investment:** Initial public offering proceeds were approximately \$148.6 million. Major stock ownership: Class A&B shares -57.2 million/Khosla Ventures; 17.5 million/Artis Capital Management; 8.5 million/Alberta Investment Management Corporation. Class C shares 3.0 million - Khosla Ventures.

**Public/Government:** Mississippi Development Authority loan for \$75 million, and significant support from other state departments, as well as local economic development teams.

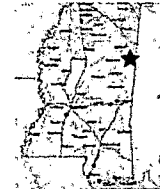
KIOR has developed a proprietary technology platform to convert sustainable, low-cost biomass into a hydrocarbon-based renewable crude oil. The platform combines proprietary catalyst systems with a process based on existing Fluid Catalytic Cracking (FCC) technology, a standard process used for over 60 years in oil refining. KIOR processes its renewable crude oil in a conventional hydrotreater into gasoline and diesel blendstocks that can be combined with existing fossil-based fuels used in vehicles on the road today.



ESTIMATED STARTUP 4Q 2012



KIOR COMMERCIAL PROJECT IN COLUMBUS, MS



**COMMERCIAL FACILITY**

LOCATION: Columbus, MS

STATUS: Operational

FEEDSTOCK: Forestry Residuals

PRODUCTS: Cellulosic Gasoline & Diesel

CAPACITY: 13 MGY

JOBS: ~60 direct; several hundred indirect

PROJECT PROFILE: Facility completed ahead of schedule with a project cost of \$213 million; production fully committed prior to end of construction; will produce enough fuel for 25,000 vehicles when fully lined out.

**2ND COMMERCIAL PROJECT UNDER DEVELOPMENT**

LOCATION: Natchez, MS

FEEDSTOCK: Forestry Residuals

PRODUCTS: Cellulosic Gasoline & Cellulosic Diesel

CAPACITY: 40 MGY

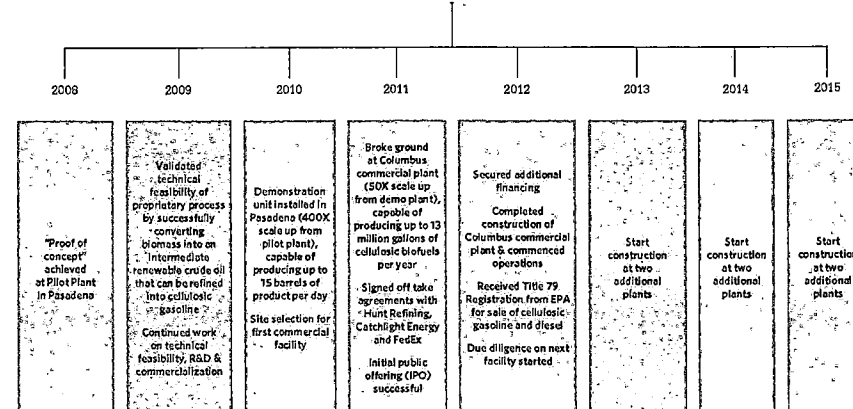
JOBS: 60-70 direct; several hundred indirect

PROJECT PROFILE: \$350 million investment; flagship commercial project serving as logistical hub for production and delivery; construction beginning early 2013 with ~500 construction employees.

ESTIMATED COMPLETION 2014



**PATH TO COMMERCIAL DEPLOYMENT**

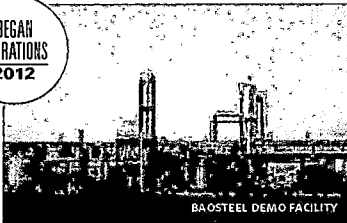


**COMPANY PROFILE**

Founded in 2005 LanzaTech offers a fully integrated sustainable fuels and chemicals platform that uses available waste resources to produce fuels such as ethanol and chemicals such as 2,3Butanediol (2,3BDO) at high selectivity and yield. Since 2008, the company has been operating a 15,000 gallon per year waste-gas to ethanol demo facility in New Zealand and this year scaled its platform to a 100,000 gallons per year demo facility in Shanghai, China. LanzaTech is headquartered in Chicago, IL and has additional offices in New Zealand, China and India.



BEGAN OPERATIONS 2012



BAOSTEEL DEMO FACILITY

**DEMONSTRATION FACILITY**

LOCATION: Shanghai, China

FEEDSTOCK: Waste CO from Baosteel Steel Mill

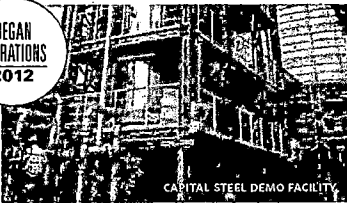
PRODUCTS: Ethanol

CAPACITY: 100,000 GPY

PLANT PROFILE: The demo facility is the pre-cursor to a full commercial facility, planned for 2013, with an estimated capacity of 30 million gallons per year.



BEGAN OPERATIONS 2012



CAPITAL STEEL DEMO FACILITY

**DEMONSTRATION FACILITY**

LOCATION: Gaofeldian, China

FEEDSTOCK: Waste CO from Capital Steel Mill

PRODUCTS: Ethanol

CAPACITY: 100,000 GPY

PLANT PROFILE: Will be a fully integrated demonstration facility. Capital Steel will take LanzaTech's process to commercial scale.

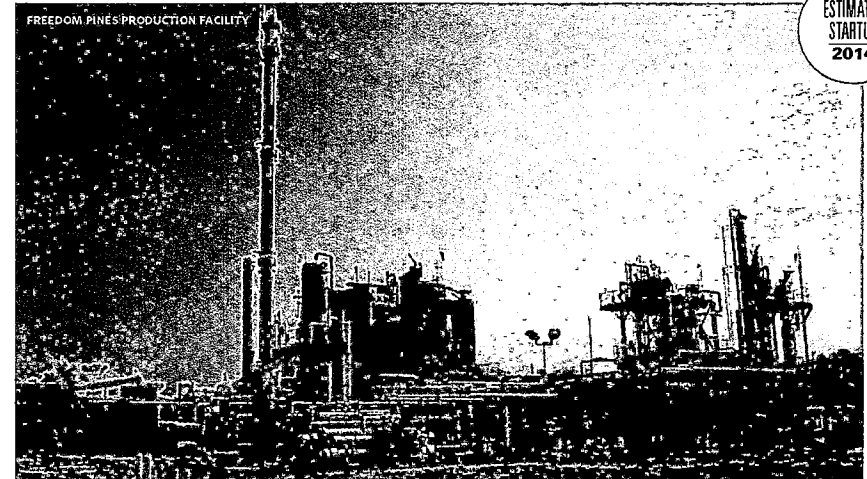


**LANZATECH PARTNERS**

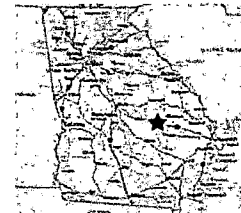
**Private Equity:** LanzaTech has raised more than \$100 million in private equity and debt financing. Investors include Khosla Ventures, Qiming Venture Partners, K1W1, Malaysian Life Sciences Capital Fund, Western Technology Investment, PETRONAS Technology Ventures Sdn Bhd, Dialog Group

**Strategic:** PETRONAS, INVISTA, Baosteel, Capital Steel, Virgin Atlantic

**Public/Government:** Federal Aviation Administration, U.S. Department of Energy, Defense Advanced Research Projects Agency, Pacific Northwest National Laboratory, National Renewable Energy Laboratory, Michigan Technological University



ESTIMATED STARTUP 2014



**COMMERCIAL FACILITY**

LOCATION: Soperton, GA

STATUS: Under Development

FEEDSTOCK: Waste biomass from regional forest operations

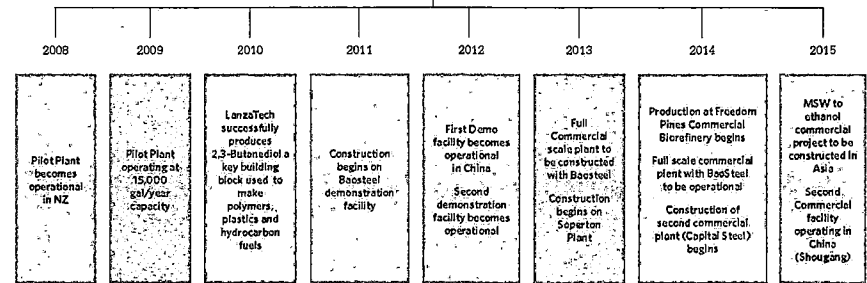
PRODUCTS: Ethanol, chemicals, aviation fuel

CAPACITY: 4 MGY

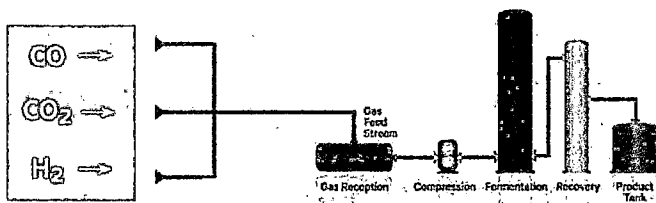
JOBS: Estimated 75 direct jobs in 2014

PLANT PROFILE: Freedom Pines is expected to begin production in 2014.

**PATH TO COMMERCIAL DEPLOYMENT**



LanzaTech's gas fermentation technology converts carbon containing gases produced by industries such as steel manufacturing and oil refining, as well as gases generated from forestry and agricultural residues, municipal waste, and coal, into valuable fuel and chemical products.

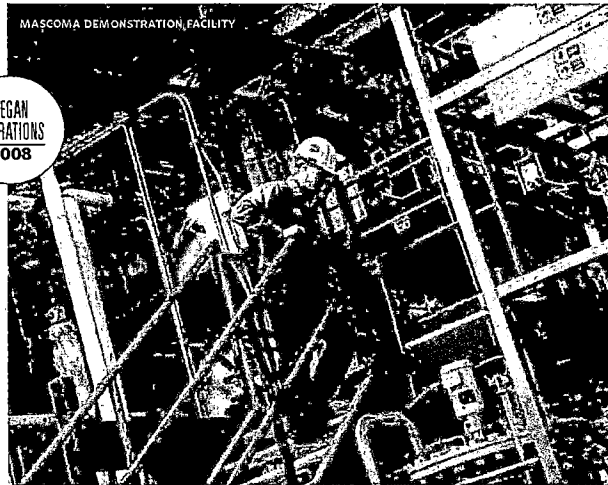


**COMPANY PROFILE**

Mascoma Corporation, founded in 2005, is a renewable fuels company that has developed an innovative, highly adaptable technology for the low-cost conversion of abundant biomass into cellulosic ethanol and renewable chemicals. Using its proprietary consolidated bioprocessing (CBP) technology platform, Mascoma has also developed bioengineered yeasts and other microorganisms to reduce costs and improve yields in the production of renewable fuels and chemicals. The company operates a demonstration facility in Rome, New York to evaluate new technologies and conduct large-scale process demonstration runs. Mascoma also operates a research and development laboratory in Lebanon, New Hampshire and maintains offices in Waltham, Massachusetts and Toronto, Canada.



MASCOMA DEMONSTRATION FACILITY



**DEMONSTRATION FACILITY**

**LOCATION:** Rome, NY

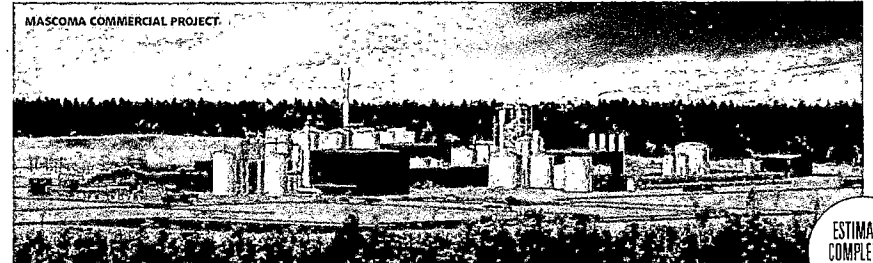
**FEEDSTOCK:** Multiple feedstock (biomass)

**PRODUCTS:** Cellulosic ethanol, biochemicals

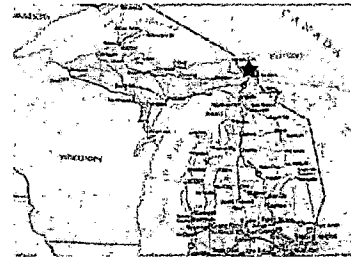
**CAPACITY:** 200,000 GPY

**PLANT PROFILE:** Ground breaking, December 2007; first fermentation, June 2008. Currently employs 15 operations staff. Completed 1,000 hour extended validation run using Mascoma's hardwood CBP microorganisms.

BEGAN OPERATIONS 2008



ESTIMATED COMPLETION 2014/15



**COMMERCIAL PROJECT**

**LOCATION:** Kinross, MI

**STATUS:** Final Engineering, Closing Financing

**FEEDSTOCK:** Wood pulp and chips

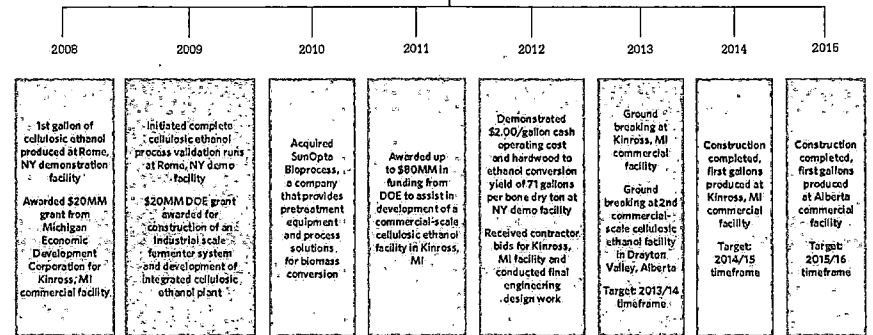
**PRODUCTS:** Cellulosic ethanol

**CAPACITY:** 20 MGY

**JOBS:** 150 construction jobs; 60 permanent operations jobs, up to 500 indirect jobs according to State of Michigan

**PROJECT PROFILE:** First-of-its-kind 20 million gallons per year cellulosic ethanol facility utilizing proprietary CBP technology; agreement in place for hardwood/pulpwood feedstock to be sourced from Michigan counties located within a 150-mile radius area of the site.

**PATH TO COMMERCIAL DEPLOYMENT**



**MASCOMA PARTNERS**

**Private Equity:** Raised \$120MM in four rounds of financing (Khosla Ventures, Flagship Ventures, General Catalyst Partners, Kleiner Perkins Caufield & Byers, Pinnacle Ventures, VantagePoint Partners, Jeremy Grantham, Valero Energy Corporation, Marathon Petroleum Company, General Motors Ventures).

**Commercial:** Lallemand Inc., a global developer, producer and marketer of yeast, bacteria and related products, to commercialize the Transform yeast product, which is the first commercial application of Mascoma's proprietary consolidated bioprocessing (CBP) technology platform.

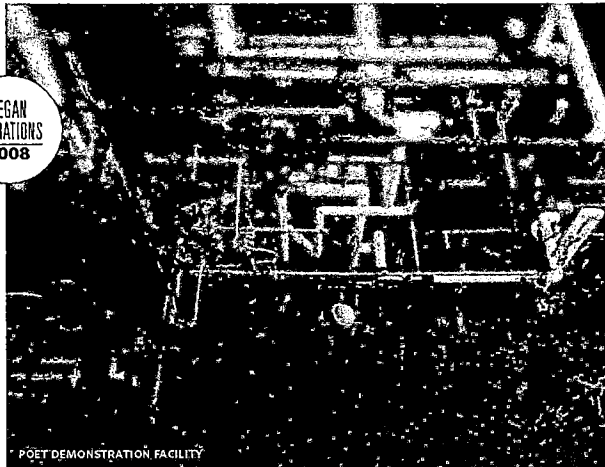
**Public/Government:** Cooperative agreement with DOE for up to \$80MM to assist in the design, construction and operation of commercial-scale hardwood cellulosic ethanol facility in Kinross, Michigan; \$20MM in R&D assistance (DOE) for Kinross, MI project; \$20MM grant agreement with the Michigan Economic Development Corporation for Kinross, MI facility; \$20MM grant agreement with the NY State Energy Research and Development Authority to assist building and operation of demonstration plant in Rome, New York.



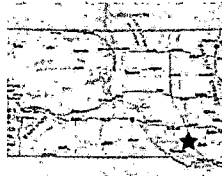
**COMPANY PROFILE**

POET-DSM Advanced Biofuels, LLC is a 50/50 joint venture between Royal DSM and POET, LLC. Based in Sioux Falls, SD, the joint venture utilizes a proprietary technology to convert corn crop residue into cellulosic bio-ethanol. POET-DSM's first commercial-scale plant, dubbed Project LIBERTY, will produce 20 MGY of cellulosic bio-ethanol. Based on this plant the JV plans to license globally an integrated technology package for the conversion of corn crop residue to cellulosic bio-ethanol.

BEGAN OPERATIONS 2008

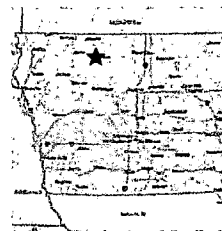
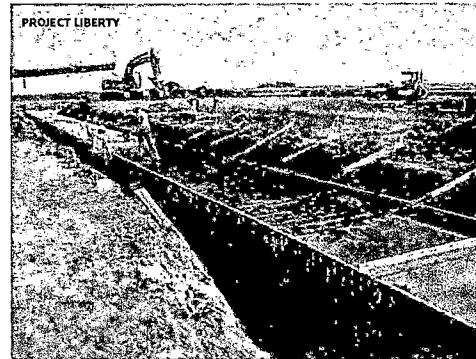


POET DEMONSTRATION FACILITY



**DEMONSTRATION FACILITY**

**LOCATION:** Scotland, SD  
**FEEDSTOCK:** Corn Crop Residue  
**PRODUCTS:** Ethanol, Biogas  
**CAPACITY:** 20,000 GPY  
**PLANT PROFILE:** POET's pilot/demo cellulosic ethanol plant has been crucial to improving the process for commercial-scale production. Preliminary harvests by Iowa farmers are helping solidify the feedstock pipeline for Project LIBERTY.



**COMMERCIAL FACILITY**

**LOCATION:** Emmetsburg, IA  
**STATUS:** Under Construction  
**FEEDSTOCK:** Corn Crop Residue  
**PRODUCTS:** Ethanol, Biogas  
**CAPACITY:** 20 MGY, later growing to 25 MGY  
**JOBS:** 37 biorefinery jobs, 309 direct construction jobs

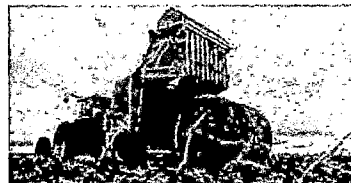
**PROJECT PROFILE:** Located adjacent to current POET grain ethanol plant; 22-acre biomass storage site is complete, biorefinery construction underway with anticipated completion in 4Q 2013; continuing to ramp up farmer contracts for biomass harvesting toward goal of 285,000 tons per year.

ESTIMATED COMPLETION 4Q 2013

**POET-DSM PARTNERS**

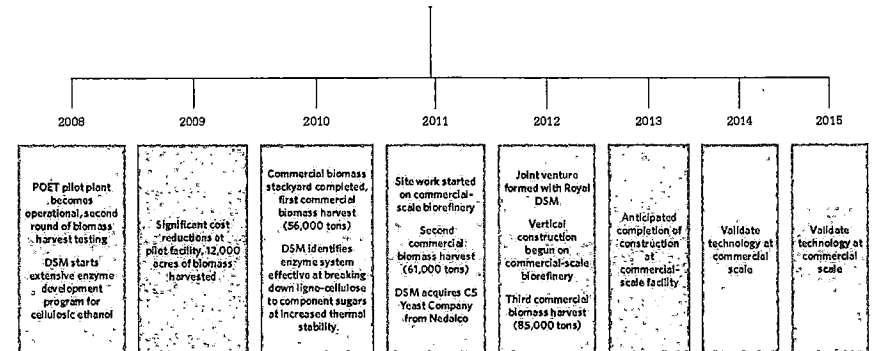
**Strategic:** JV between DSM (enzymes and yeast) POET (process, feedstock procurement). Each party to contribute - 50% of the value to the JV. DSM will contribute \$150MM in equity and debt financing. POET will contribute the existing Project LIBERTY, including secured grants from the U.S. Department of Energy and the State of Iowa.

**Public/Government:** \$100MM in grants from U.S. Department of Energy; \$14.8MM grant from State of Iowa for biorefinery construction, engineering and feedstock acceleration activities; \$5.25MM in credits from State of Iowa for tax and training.



Project LIBERTY will make use of corncobs, leaves, husk, and some stalk that pass through the combine during harvest. The process uses about 25% of the available material, leaving 75% on the ground for erosion control, nutrient replacement and other important farm management practices. The co-product from the cellulosic ethanol process will be energy, enough to power LIBERTY and send excess to the adjacent corn grain-based plant.

**PATH TO COMMERCIAL DEPLOYMENT**

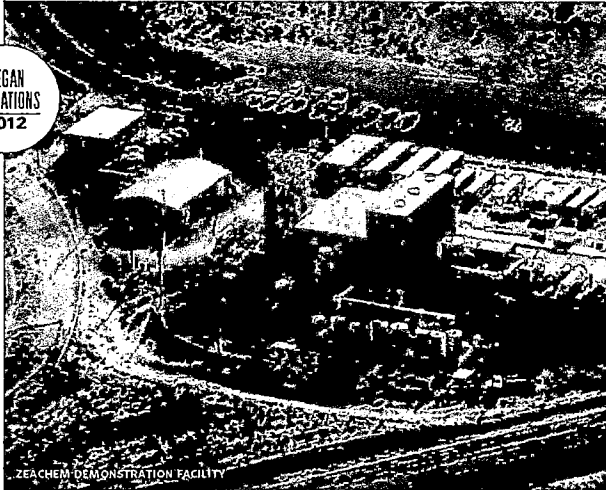


**COMPANY PROFILE**

Incorporated in 2002, ZeaChem Inc. is headquartered in Lakewood, Colorado. The company operates a research and development laboratory facility in Menlo Park, California, and a 250,000 gallon per year demonstration biorefinery in Boardman, Oregon. ZeaChem has developed a cellulose-based biorefinery platform capable of producing advanced biofuels and bio-chemicals.



BEGAN OPERATIONS 2012



**DEMONSTRATION FACILITY**

LOCATION: Boardman, OR

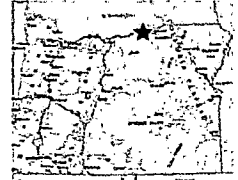
FEEDSTOCK: Poplar Trees, Wheat Straw

PRODUCTS: Cellulosic Ethanol, Bio-Chemicals

CAPACITY: 250,000 GPY

PLANT PROFILE: Construction completed on schedule and significantly under budget; created 50 construction jobs and employs 35 full-time operations staff in the region. Phase 1: high-value bio-chemicals for paints and lacquers  
Phase 2: cellulosic ethanol and bio-chemicals by YE12  
Phase 3: cellulosic jet and diesel ('13)

ESTIMATED COMPLETION 1Q 2015



**COMMERCIAL FACILITY**

LOCATION: Boardman, OR

STATUS: USDA Conditional Loan Guarantee Awarded

FEEDSTOCK: Poplar Trees, Wheat Straw

PRODUCTS: Cellulosic Ethanol, Bio-Chemicals

CAPACITY: 25+ MGY

JOBS: 200 direct construction jobs; 65 full-time operations jobs; 250 indirect jobs for construction and full-time operations

PLANT PROFILE: Located adjacent to ZeaChem's demo plant; agreements in place for 100% of the required feedstock from Greenwood Resources and local agricultural residue processors.

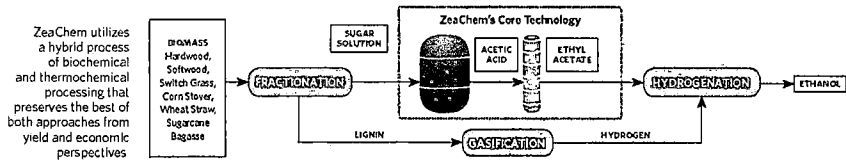
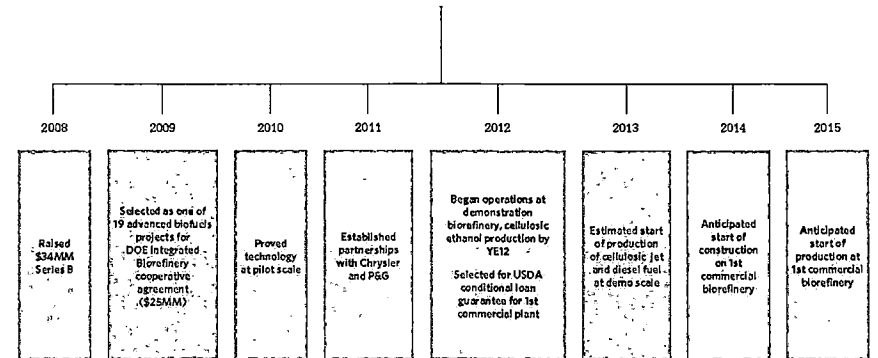
**ZEACHEM PARTNERS**

**Private Equity:** Raised \$65MM in three rounds of financing (Birchmere Ventures, Firelake Capital, Globespan Capital Partners, Mohr Davidow Ventures, PrairieGold Venture Partners, Spring Ventures, Itochu, and Valero Energy Corporation)

**Strategic:** Chrysler Group LLC (fuels); P&G (bio-chemicals)

**Government/Public:** \$25MM (DOE) cooperative agreement to support construction of demonstration facility; \$40MM (USDA) cooperative agreement with Univ. of Washington and others to expand the demo plant for bio-based jet and diesel production; \$17MM Biomass Crop Assistance Program (BCAP) grant from the USDA to Greenwood Resources, ZeaChem's primary feedstock supplier to establish and maintain 7,000 acres of intercropped poplar trees for the demo and 1st commercial facilities; \$232.5MM (USDA) conditional loan guarantee to support the financing of the 1st commercial plant.

**PATH TO COMMERCIAL DEPLOYMENT**







# NEW HAMPSHIRE FARM BUREAU FEDERATION

295 Sheep Davis Road • Concord, New Hampshire 03301-5747 • (603) 224-1934 • Fax (603) 228-8432 • [www.nhfarmbureau.org](http://www.nhfarmbureau.org)

January 29, 2013

House Science, Technology and Energy Committee  
C/o The Honorable David Borden, Chairman  
Legislative Office Building, Room 304  
33 North State Street  
Concord, NH 03301

Re: *HB 362, banning corn-based ethanol as an additive to gasoline sold in New Hampshire.*

Dear Mr. Chairman and Members of the Committee:

The New Hampshire Farm Bureau (NHFB) is a federation, established in 1916, of the ten NH county Farm Bureau organizations and represents over 3,000 Farm Bureau member families statewide. Our mission is to advocate for, and educate the public about agriculture. NHFB opposes *HB 362*. We believe this legislation sends the wrong message. Ethanol use is not without troubles but it is a step towards greater energy independence for our nation and a bridge to the future in biofuels production.

We believe the benefits of ethanol production outweigh the negatives. We believe this despite the fact that our dairy farmers, poultry growers and other livestock farmers have experienced sharp increases in recent years in their cost of production, some of which can be attributed to the increased demand for corn going to the production of ethanol. Though there are currently no New Hampshire farmers growing corn for ethanol production, we do have farmers growing other food crops for biofuel production in the state. This legislation singles out one crop as a prohibited fuel source. We believe this sets an odd and troubling precedent.

In closing, we are also very much concerned with the effect on fuel prices, fuel availability, and the competitiveness of New Hampshire businesses if this legislation were to pass.

We urge you to recommend *HB 362* as Inexpedient-to-Legislate. We thank you for your time and consideration.

Respectfully submitted,



Robert Johnson, II, Policy Director



**Testimony of the  
Biotechnology Industry Organization (BIO)**

Hearing of the House Science, Technology & Energy Committee  
*January 29, 2013*

**Regarding New Hampshire House Bill 1214:**

**“AN ACT BANNING CORN-BASED ETHANOL AS AN ADDITIVE  
TO GASOLINE SOLD IN NEW HAMPSHIRE”**

The Honorable David Borden, Committee Chair  
The Honorable Charles Townsend, Committee Vice-Chair  
And the Members of the Science, Technology & Energy Committee:

Chairman Borden and Members of the Committee, the Biotechnology Industry Organization (“BIO”) appreciates this opportunity to provide comments on HB 362, legislation to ban corn-based ethanol as an additive to gasoline sold in New Hampshire. It is of significant concern to BIO and its members in the State of New Hampshire and throughout the country.

BIO is the world’s largest biotechnology organization with more than 1,100 member companies worldwide. BIO represents leading technology companies in the production of conventional and advanced biofuels and other sustainable solutions to energy and climate change challenges. BIO also represents the leaders in developing new crop technologies for food, feed, fiber, and fuel.

BIO opposes HB 362 at its core because of the impact such legislation would have on energy security, on research and development of cellulosic and advanced biofuels underway in New Hampshire, on the commercialization of such technologies throughout the country, and on the price of gasoline for New Hampshire consumers.

The national adoption of ethanol and other conventional biofuels has played an important role in reducing U.S. dependence on foreign sources of petroleum, in reducing transportation fuel costs to the consumer, and in beginning to reduce the carbon intensity of the nation’s transportation fuels. It has also paved the way for promising next generation cellulosic and advanced biofuels being developed in the State of New Hampshire and throughout the country.

Cellulosic and advanced biofuels, which can be produced from forest residues, algae, municipal solid waste, or other renewable sources of biomass, offer some of the most promising solutions to high gas prices, U.S. dependence on foreign petroleum, and job losses



in resource-dependent regions of the country, such as New Hampshire. Innovative advanced biofuels developers – including Mascoma Corporation, one of the country’s leading cellulosic biofuels developers, based right here in New Hampshire – already face a very challenging environment trying to secure private capital to commercialize their technologies. Actions by the State of New Hampshire and other states to ban conventional ethanol as a gasoline additive only exacerbate the financing challenge by destabilizing the policy environment for all biofuels.

Conventional ethanol continues to play an important role in the development of these new technologies by supporting the growth of the infrastructure for commercial levels of advanced and cellulosic biofuels to be developed, produced and distributed. Passing HB 362 would send the industry and its investors negative messages and would chill investment in research and development for advanced and cellulosic biofuels – as well as other promising biobased technologies, such as renewable chemicals and plastics produced from wood – and possibly send the unintended signal to investors that New Hampshire is hostile to all biofuels.

Prohibiting corn ethanol blends in gasoline sold in New Hampshire would also drive up the cost of gasoline for consumers in the State. New Hampshire imports all of its motor gasoline from other states, so refiners would have to supply special fuel to the State at an added cost. Additionally, the presence of an alternative in any market helps drive down price. Economists have estimated that gasoline prices could be \$0.20-0.50 per gallon higher if not for the incremental supply provided by ethanol.<sup>i</sup> The RFS opens the market to renewable fuels and, importantly, sets price targets and supports for advanced biofuels through its compliance mechanisms. These price targets and supports will ensure that new fuels will also present significant value to consumers.

By comparison, current studies show that production of biofuel has a relatively small affect on corn and food prices – “the contribution of ethanol subsidies to food inflation is largely imperceptible in the United States”<sup>ii</sup> – while it saved approximately \$34 billion in oil import in 2010 alone.<sup>iii</sup> Indeed, the U.S. Environmental Protection Agency (EPA) issued the decision recently to deny requests to waive the volume requirements for the coming year of the Federal Renewable Fuel Standard, correctly concluding that the RFS program itself is not having an impact on grain prices.

Companies like Mascoma and the more than 80 BIO members developing next generation biofuels and biobased products are looking to revitalize communities suffering from loss of jobs in industries like forestry and paper. A recent report, *U.S. Economic Impact of Advanced Biofuels Production: Perspectives to 2030*, the executive summary of which we append to this testimony, indicates that cellulosic and advanced biofuels production under the RFS could create over half a million jobs in the U.S., many of which would be tied to sustainable sources of renewable biomass like wood.<sup>iv</sup>



BIO urges the New Hampshire State House, and its Committee on Science, Technology, and Energy, to oppose HB 362. The proposed ban of corn-based ethanol as a gasoline blend in the State would hurt consumers at the pump and would undermine investment in the continued research, development and production of advanced and cellulosic biofuels.

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<sup>i</sup> P. Barta, "As Biofuels Catch On, Next Task Is to Deal with Environmental, Economic Impact" Wall Street Journal, March 24, 2008, page A2.

<sup>ii</sup> Babcock, B.A. and Fabiosa, J.F. "The Impact of Ethanol and Ethanol Subsidies on Corn Prices: Revisiting History." CARD Policy Briefs, Center for Agricultural and Rural Development, Iowa State University, April 2011.

<sup>iii</sup> See Urbanchuk, J.M. "Contribution of the Ethanol Industry to the Economy of the United States," Renewable Fuels Association, February 2011.

<sup>iv</sup> <http://bio.org/ind/advbio/EconomicImpactAdvancedBiofuels.pdf>

**Statement of Raffaella Cristanetti**  
**Strategic Marketing Manager**  
**DuPont Industrial Biosciences**  
**E.I. du Pont de Nemours and Company, Inc.**  
**Before the New Hampshire House**  
**Science, Technology and Energy Committee**  
**January 29, 2013**

Good morning. My name is Raffaella Cristanetti, and I am with the DuPont Industrial Biosciences business. We provide products and technologies for food, animal feed, biofuels, and biomaterials.

DuPont brings a uniquely broad perspective to bear on biofuels issues. Our seed company, Pioneer Hi-Bred, provides farmers with high-yielding seeds that allow them to serve both biofuels and grain markets. We offer specialized solutions for food and livestock, and we are commercializing technologies for the production of both cellulosic ethanol and biobutanol [a gasoline-like biofuel].

We believe the proposed legislation [HB 362] is both unnecessary and counter-productive. It would harm, rather than help, New Hampshire consumers.

1. It is unnecessary, because there is no prohibition today impeding those who wish to from providing a fuel that contains no ethanol. If sufficient demand for 100% gasoline exists in New Hampshire, then the market is free to respond by making it available.
2. The proposal is counter-productive. By mandating the use of only 100% gasoline, this legislation would in fact reduce consumer choice and force New Hampshire families and businesses to bear higher costs. Not only is ethanol cheaper than gasoline, but by limiting fuel options, New Hampshire would increase its reliance on a limited number of outside suppliers. The logistical and economic costs of a segregated fuel supply would likely put independent New Hampshire fuel distributors out of business, increase imports, and raise the cost of gasoline in the state by 15-20 cents / gallon, or more.

By making New Hampshire, and therefore the US, more dependent on oil, this legislation would reduce our economic security. Ten of the 11 US recessions since World War II have been preceded by significant oil price spikes. Ethanol has helped permanently reduce our reliance on imported oil – in 2011 alone, domestic ethanol displaced 485 million barrels, at a value of almost \$50 billion.

Today's grain ethanol has also built the foundation for the next generation of advanced biofuels, an area in which the US has a global competitive advantage. Future growth in biofuels supply will come largely from non-food related feedstocks, such as agricultural residues, wood fiber, and purpose-grown energy crops, expanding the opportunities for farmers and communities across the United States. For example, DuPont is currently building a commercial plant in Iowa to make ethanol from corn stalks, and our pilot facility in Tennessee is running switchgrass; other companies are making fuel from wood fiber in Mississippi, and from municipal solid waste in Florida.

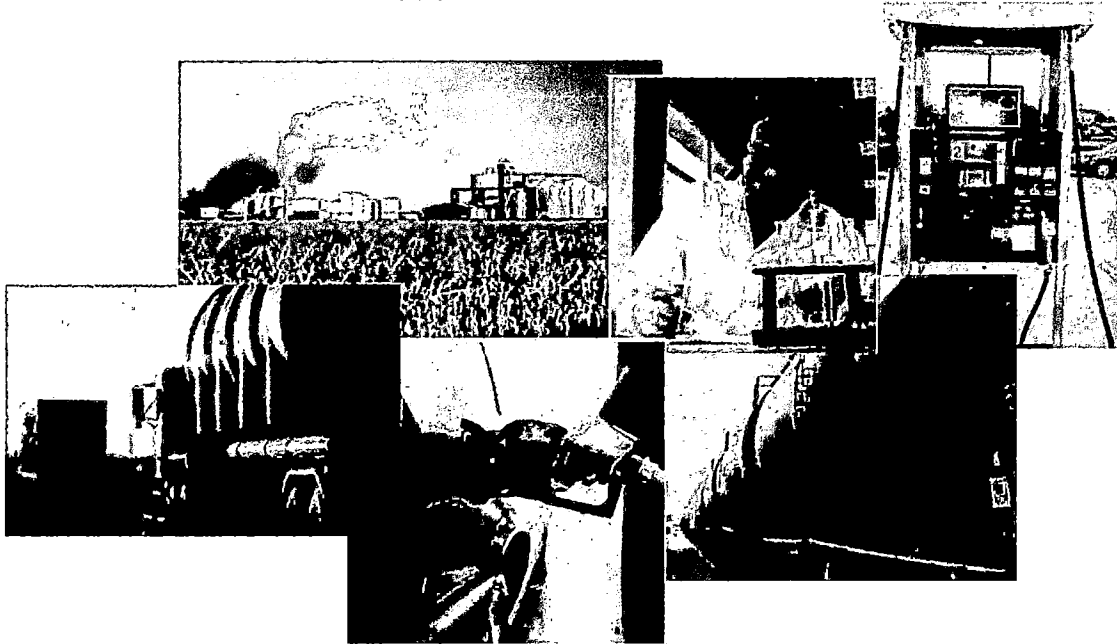
As a company with a 211-year history of technical innovation and manufacturing expertise, DuPont has invested hundreds of millions of dollars to develop technologies that will deliver additional home-grown energy, along with abundant food, feed, and materials globally. We urge you to oppose House Bill 362, which would impose additional economic burdens on New Hampshire families and businesses, while denying access to renewable fuels' present and future benefits.

Thank you for the opportunity to speak with you today.

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## **The Use of Ethanol Blended Fuels in Non-Road Engines**

**March 2011**

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## Appendix

### Useful Websites

#### **Information Resources**

Renewable Fuels Association  
[www.EthanolRFA.org/](http://www.EthanolRFA.org/)

National Renewable Energy Laboratory  
[www.nrel.gov](http://www.nrel.gov)

ASTM International  
[www.astm.org](http://www.astm.org)

Outdoor Power Equipment Institute  
<http://www.opei.org/>

U.S. Environmental Protection Agency Non Road Engines, Equipment and Vehicles  
<http://www.epa.gov/nonroad/>

#### **Other Important RFA Documents**

RFA Update for Boat Owners: Ethanol Blended Fuels for Use in Marine Equipment

E10 and Winterization

Ethanol and Marine Use: Frequently Asked Questions

Changes in Gasoline Manual: Fourth Edition

All these documents can be found at [www.EthanolRFA.org](http://www.EthanolRFA.org).

August 3, 1992

## It Burns More Cleanly, but Ethanol Still Raises Air-Quality Concerns

By MATTHEW L. WALD

Ethanol, an alternative fuel made from farm products like corn, is closely linked with the national effort to clean up the air. But a fierce battle is under way in Washington over whether it is a cure for pollution or a cause.

Late last week, after days of maneuvering by supporters of the fuel, the Senate majority leader, George J. Mitchell of Maine, and the minority leader, Bob Dole of Kansas, sent a letter to the administrator of the Environmental Protection Agency arguing that the intent of Congress was to allow ethanol in the new, cleaner gasoline required in the nine dirtiest cities by 1995 under the Clean Air Act amendments adopted two years ago.

The scientific validity of such an argument is unclear, however, because adding ethanol to gasoline makes the fuel more prone to evaporation, and the evaporation of chemicals is a major step in the formation of smog. It is for that reason that the E.P.A. had been preparing to issue regulations under the act that would have penalized the fuel, but the White House blocked the agency earlier this year. Yeutter's 'Good Payoff'

Blocking those regulations was a defeat for the states, which face penalties if they fail to meet the Clean Air Act standards. And the White House action prolonged the uncertainty for the oil companies, which need to know what they can sell, since some regulations take effect in November. But the ethanol lobby -- mostly farm-state senators including Mr. Dole, and an Illinois company that produces most of the nation's supply -- see the White House decision as a victory.

Clayton K. Yeutter, the former Secretary of Agriculture who is President Bush's chief domestic adviser, said the delay represented "one of the times when the agriculture industry got good payoff from my being in the White House." Mr. Yeutter made the comment before the National Cattlemen's Association in March.

Among the opponents of widespread ethanol use is Thomas Jorling, the New York State Commissioner of Environmental Conservation, who said, "there is a use for alcohol fuels; but I suspect they are limited to areas that don't have air pollution problems."

The state Attorney General apparently agrees. After one New York retailer, Northville Industries, started mixing ethanol with its gasoline and advertising "the clean air gasoline," it was challenged by the Attorney General and agreed to drop the claims and pay \$20,000 in costs. Cleaner, but Not Perfect

Proponents argue that ethanol is an American-made replacement for imported oil, created from

renewable resources. They push ethanol as the ingredient needed to produce the "oxygenated" gasoline that the Clean Air Act requires, incorporating oxygen molecules into the fuel to reduce the carbon monoxide emissions from tailpipes.

Some of this is true. Ethanol does come from agricultural products, although most farmers use diesel fuel to plant and harvest them. And ethanol does, in fact, burn cleanly. But it also increases "evaporative emissions" of smog-causing chemicals by about 25 percent, compared with gasoline that contains no ethanol. The Clean Air Act requires, in a different section, that emissions of those chemicals, called volatile organic compounds, be cut by 15 percent.

Opponents of ethanol point out that the fuel is roughly twice as expensive as unleaded gasoline, and they say that it would have disappeared from the marketplace entirely but for a subsidy of about \$19 a barrel from the Federal Government, in the form of an exemption from a 5.4-cent-a-gallon gasoline excise tax if the fuel is 10 percent ethanol. Some states add to the subsidy by giving breaks on their taxes, too. The Powerful Ethanol Lobby

To the extent that ethanol has been adopted, its opponents complain, the blame should go to what they see as greedy and politically influential producers.

Those producers had agreed to the regulations for new fuel, after laborious negotiations with environmentalists, refiners and the staff of the E.P.A. The rules set limits on a characteristic of gasoline called vapor pressure, which measures the fuel's tendency to evaporate.

But the ethanol lobby is now seeking an amendment to allow ethanol even though it increases the vapor pressure. Such a waiver exists in other parts of the Clean Air Act, and ethanol backers say they assumed, wrongly, that it carried over into the rules for gasoline that will take full effect in 1995. Their fuel is so clean-burning, they say, that the extra volatility will not hurt the air.

"They've got a sob story based on a lie," David Doniger, an air pollution expert at the Natural Resources Defense Council, said of the ethanol lobby. "Their fix is based on a fraud, that there are these wonderful qualities of ethanol that offset this extra volatility."

The E.P.A., despite the regulations it had formerly planned to issue, is currently considering a waiver for ethanol. A Summertime Problem

The debate centers on regulations for gasoline sold during the summer, the worst time of year for some types of air pollution.

Regardless of the outcome, ethanol will continue to have a role in reducing carbon monoxide concentrations in winter, when evaporation and ozone formation are less of a problem. Some cities' biggest air pollution problems are caused by wintertime carbon monoxide.

From a public policy standpoint, the debate over summertime use would be more clear cut if the interests of those involved were a little less commercial.

The main opponents to using ethanol are the oil companies, which have demonstrated a willingness to say almost anything to stop government tinkering with fuel regulations, and have predicted doom at even simple changes. The main proponent is the Archer-Daniels-Midland Company, of Decatur, Ill., which produces 700 million to 750 million gallons of ethanol a year, about two-thirds of the national supply. The State and Local View

The company now makes \$50 million to \$65 million a year on ethanol, about a tenth of its total earnings, said John M. McMillin, an analyst at Prudential Securities. If the company gets the rule change it is seeking, it could earn substantially more, he said.

Mr. Yeutter, the President's adviser, in a telephone interview, explained the "payoff" comment he had made earlier this year: "It's a payoff in the sense of me making sure that ethanol was treated fairly rather than unfairly. We're not asking for any special privilege, we're trying to make sure that ethanol doesn't get zapped in this process."

Scientific evidence on the question of smog, he said, is still developing.

But the evidence is already sufficient in the view of many state and local air pollution officials, like Mr. Jorling of New York State. "Every time a state comes in with a strategy and attempts to reduce ozone precursors, and that provision runs afoul of one of political constituencies of the Administration," he complained, "the Administration comes down on the side of industry, and tries to repeal what the state is adopting."

A recent study by Common Cause, the Washington-based government watchdog group, found that the Archer-Daniels-Midland chairman, Wayne O. Andreas, his family and the company's political action committee have given nearly \$2.8 million in political contributions in the last decade. A Proponent of Ethanol

At the Renewable Fuels Association, a trade group in Washington to which Archer-Daniels refers all comment on ethanol, Kim R. Pearson, the general counsel, said hostility by the states to ethanol was "residual resentment over our ability to get the excise-tax exemption extended two years ago." The big oil companies do not like ethanol, he said, because it replaces crude oil that would otherwise go through their refineries.

Mr. Pearson said ethanol would not make the air worse, even if it increased evaporative emissions of volatile organic chemicals, because it improves engine burning so much that emissions of volatile organics through the tailpipe are reduced.

And carbon monoxide, along with being a regulated pollutant and a direct hazard, also contributes to smog formation, Mr. Pearson said; so cutting the carbon monoxide output helps hold down smog.

A study paid for by the oil companies and the car manufacturers, released earlier this year, said ethanol would make smog worse. A study sponsored by the ethanol producers found the opposite, but the American Petroleum Institute, the oil industry's main trade association, picked it apart and Mr. Pearson later acknowledged that some of the study's assumptions were faulty.



June 25, 2006

## A Range of Estimates on Ethanol's Benefits

By ALEXEI BARRIONUEVO

Would using ethanol save energy?

That question, it turns out, is not easy to answer. Ethanol's enthusiasts point to the potential benefits of replacing gasoline with a renewable energy source that they contend will reduce America's reliance on foreign oil and cut greenhouse gases produced by fossil fuels. But the benefits of ethanol, particularly when it is produced from corn, are not so clear cut.

A number of researchers who have looked at the issue have concluded that more energy now goes into making a gallon of ethanol than is contained in that gallon. Others, however, find a net benefit, though most see it as relatively modest.

Those who question whether ethanol is as "green" as advertised say that supporters ignore or downplay the large quantities of natural gas used to produce ethanol, as well as the diesel fuel used to transport it from plants to markets. Moreover, growing corn requires heavy use of nitrogen fertilizers, made from natural gas, and requires extensive use of farm machinery, which burns fuel refined from crude oil.

Given the complexities of the calculations, there is a wide range of estimates of the benefits of ethanol.

On the positive side, analysts at the Agriculture Department concluded in their most recent assessment that ethanol offered a substantial gain, producing a positive output 67 percent greater than the energy inputs. But others who view ethanol favorably are more conservative, with several estimating the net energy benefit at about 20 percent.

David Pimentel, a professor of agriculture and life sciences at Cornell University, is one of several researchers who has challenged the Agriculture Department's conclusion. He has estimated that ethanol requires 29 percent more energy from fossil fuels than it delivers in savings from not using gasoline.

Dr. Pimentel, along with Tadeusz W. Patzek, a civil and environmental engineer from the

University of California at Berkeley, published research finding that the Agriculture Department's analysis excluded the energy required to produce or repair farm machinery, as well as the steel and cement used to build the plants.

The Agriculture Department counters by noting that the professors failed to consider the energy benefit of certain ethanol byproducts, including corn oil and corn gluten, and said they were using old farm machinery data.

"They put all the energy on the ethanol," said Roger Conway, director of the department's office of energy policy and new uses.

The Agriculture Department also points to increases in corn yields, and efficiency improvements in the fertilizer and ethanol industries, which add to ethanol's energy benefit.

Dr. Pimentel acknowledged the omissions of some byproducts, saying they might have boosted the energy balance to as much as break even. But he said that even a best-case scenario, using his calculations, did not justify a heavy investment in ethanol. He called the push into ethanol a "boondoggle" motivated by farm-state politics and big profits.

Dr. Pimentel, who first began criticizing ethanol as an energy alternative about 25 years ago, said that he has never been supported by the oil industry. Dr. Patzek has worked as a researcher for an oil company in the past but said that his biofuels research had received no support from the industry.

Several environmental groups that support ethanol concede that the energy savings from corn-based ethanol may be limited, but they say it will serve as a crucial bridge to more efficient sources like switchgrass, a type of prairie grass that could potentially be used to produce ethanol.

The choice of what fuel to use to run an ethanol plant will also play a role in determining its ultimate energy efficiency. In Hereford, Tex., White Energy expects to use natural gas to power its ethanol plant, while another Dallas-based company, Panda Energy International, plans to use Hereford's ample supplies of cow manure as fuel.

Driven by the high cost of natural gas, about 10 of 39 ethanol plants under construction are being designed to run on coal, according to Robert McIlvaine, who runs a market research firm in Northfield, Ill.

Mr. Conway of the Agriculture Department called the move to cheaper and more abundant coal

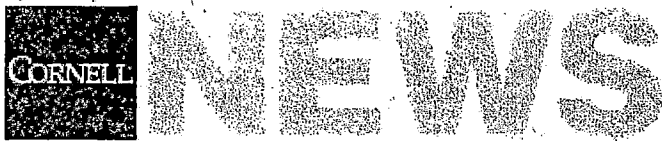
to run ethanol plants "preferable."

But Nathanael Greene, senior policy analyst at the Natural Resources Defense Council, which has supported ethanol's use, disagreed, pointing out that burning coal normally produces twice as much greenhouse gas as natural gas.

"This is going to significantly increase the local air pollution," Mr. Greene said, "and diminish the benefits of using ethanol."

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## Ethanol fuel from corn faulted as 'unsustainable subsidized food burning' in analysis by Cornell scientist

FOR RELEASE: Aug. 6, 2001

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ITHACA, N.Y. -- Neither increases in government subsidies to corn-based ethanol fuel nor hikes in the price of petroleum can overcome what one Cornell University agricultural scientist calls a fundamental input-yield problem: It takes more energy to make ethanol from grain than the combustion of ethanol produces.

At a time when ethanol-gasoline mixtures (gasohol) are touted as the American answer to fossil fuel shortages by corn producers, food processors and some lawmakers, Cornell's David Pimentel takes a longer range view.

"Abusing our precious croplands to grow corn for an energy-inefficient process that yields low-grade automobile fuel amounts to unsustainable, subsidized food burning," says the Cornell professor in the College of Agriculture and Life Sciences. Pimentel, who chaired a U.S. Department of Energy panel that investigated the energetics, economics and environmental aspects of ethanol production several years ago, subsequently conducted a detailed analysis of the corn-to-car fuel process. His findings will be published in September, 2001 in the forthcoming *Encyclopedia of Physical Sciences and Technology*.

Among his findings are:

- o An acre of U.S. corn yields about 7,110 pounds of corn for processing into 328 gallons of ethanol. But planting, growing and harvesting that much corn requires about 140 gallons of fossil fuels and costs \$347 per acre, according to Pimentel's analysis. Thus, even before corn is converted to ethanol, the feedstock costs \$1.05 per gallon of ethanol.

- o The energy economics get worse at the processing plants, where the grain is crushed and fermented. As many as three distillation steps are needed to separate the 8 percent ethanol from the 92 percent water. Additional treatment and energy are required to produce the 99.8 percent pure ethanol for mixing with gasoline.
  - o Adding up the energy costs of corn production and its conversion to ethanol, 131,000 BTUs are needed to make 1 gallon of ethanol. One gallon of ethanol has an energy value of only 77,000 BTU. "Put another way," Pimentel says, "about 70 percent more energy is required to produce ethanol than the energy that actually is in ethanol. Every time you make 1 gallon of ethanol, there is a net energy loss of 54,000 BTU."

- o Ethanol from corn costs about \$1.74 per gallon to produce, compared with about 95 cents to produce a gallon of gasoline. "That helps explain why fossil fuels -- not ethanol -- are used to produce ethanol," Pimentel says. "The growers and processors can't afford to burn ethanol to make ethanol. U.S. drivers couldn't afford it, either, if it weren't for government subsidies to artificially lower the price."



o Most economic analyses of corn-to-ethanol production overlook the costs of environmental damages, which Pimentel says should add another 23 cents per gallon. "Corn production in the U.S. erodes soil about 12 times faster than the soil can be reformed, and irrigating corn mines groundwater 25 percent faster than the natural recharge rate of ground water. The environmental system in which corn is being produced is being rapidly degraded. Corn should not be considered a renewable resource for ethanol energy production, especially when human food is being converted into ethanol."

o The approximately \$1 billion a year in current federal and state subsidies (mainly to large corporations) for ethanol production are not the only costs to consumers, the Cornell scientist observes. Subsidized corn results in higher prices for meat, milk and eggs because about 70 percent of corn grain is fed to livestock and poultry in the United States. Increasing ethanol production would further inflate corn prices, Pimentel says, noting: "In addition to paying tax dollars for ethanol subsidies, consumers would be paying significantly higher food prices in the marketplace."

Nickels and dimes aside, some drivers still would rather see their cars fueled by farms in the Midwest than by oil wells in the Middle East, Pimentel acknowledges, so he calculated the amount of corn needed to power an automobile:

o The average U.S. automobile, traveling 10,000 miles a year on pure ethanol (not a gasoline-ethanol mix) would need about 852 gallons of the corn-based fuel. This would take 11 acres to grow, based on net ethanol production. This is the same amount of cropland required to feed seven Americans.

o If all the automobiles in the United States were fueled with 100 percent ethanol, a total of about 97 percent of U.S. land area would be needed to grow the corn feedstock. Corn would cover nearly the total land area of the United States.

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washingtonpost.com

## Corn Can't Solve Our Problem

Advertisement

By David Tilman and Jason Hill  
Sunday, March 25, 2007; B01

The world has come full circle. A century ago our first transportation biofuels -- the hay and oats fed to our horses -- were replaced by gasoline. Today, ethanol from corn and biodiesel from soybeans have begun edging out gasoline and diesel.

This has been hailed as an overwhelmingly positive development that will help us reduce the threat of climate change and ease our dependence on foreign oil. In political circles, ethanol is the flavor of the day, and presidential candidates have been cycling through Iowa extolling its benefits. Lost in the ethanol-induced euphoria, however, is the fact that three of our most fundamental needs -- food, energy, and a livable and sustainable environment -- are now in direct conflict. Moreover, our recent analyses of the full costs and benefits of various biofuels, performed at the University of Minnesota, present a markedly different and more nuanced picture than has been heard on the campaign trail.

Some biofuels, if properly produced, do have the potential to provide climate-friendly energy, but where and how can we grow them? Our most fertile lands are already dedicated to food production. As demand for both food and energy increases, competition for fertile lands could raise food prices enough to drive the poorer third of the globe into malnourishment. The destruction of rainforests and other ecosystems to make new farmland would threaten the continued existence of countless animal and plant species and would increase the amount of climate-changing carbon dioxide in the atmosphere.

Finding and implementing solutions to the food, fuel and environment conflict is one of the greatest challenges facing humanity. But solutions will be neither adopted nor sought until we understand the interlinked problems we face.

Fossil fuel use has pushed atmospheric carbon dioxide higher than at any time during the past half-million years. The global population has increased threefold in the past century and will increase by half again, to 9 billion people, by 2050. Global food and fossil energy consumption are on trajectories to double by 2050.

Biofuels, such as ethanol made from corn, have the potential to provide us with cleaner energy. But because of how corn ethanol currently is made, only about 20 percent of each gallon is "new" energy. That is because it takes a lot of "old" fossil energy to make it: diesel to run tractors, natural gas to make fertilizer and, of course, fuel to run the refineries that convert corn to ethanol.

If every one of the 70 million acres on which corn was grown in 2006 was used for ethanol, the amount produced would displace only 12 percent of the U.S. gasoline market. Moreover, the "new" (non-fossil) energy gained would be very small -- just 2.4 percent of the market. Car tune-ups and proper tire air pressure would save more energy.

There is another problem with relying on a food-based biofuel, such as corn ethanol, as the poor of Mexico can attest. In recent months, soaring corn prices, sparked by demand from ethanol plants, have doubled the price of tortillas, a staple food. Tens of thousands of Mexico City's poor recently protested this "ethanol tax" in the streets.

In the United States, the protests have also begun -- in Congress. Representatives of the dairy, poultry and livestock industries, which rely on corn as a principal animal feed, are seeking an end to subsidies for corn ethanol in the hope of stabilizing corn prices. (It takes about three pounds of corn to produce a pound of chicken, and seven or eight pounds to grow a pound of beef.) Profit margins are being squeezed, and meat prices are rising.

U.S. soybeans, which are used to make biodiesel, may be about to follow corn's trajectory, escalating the food vs. fuel conflict. The National Biodiesel Board recently reported that 77 biodiesel production plants are under construction and that eight established plants are expanding capacity.

In terms of environmental impact, all biofuels are not created equal. Ethanol is the same chemical product no matter what its source. But ethanol made from prairie grasses, from corn grown in Illinois and from sugar cane grown on newly cleared land in Brazil have radically different impacts on greenhouse gases.

Corn, like all plants, is a natural part of the global carbon cycle. The growing crop absorbs carbon dioxide from the atmosphere, so burning corn ethanol does not directly create any additional carbon. But that is only part of the story. All of the fossil fuels used to grow corn and change it into ethanol release new carbon dioxide and other greenhouse gases. The net effect is that ethanol from corn grown in the Corn Belt does increase atmospheric greenhouse gases, and this increase is only about 15 percent less than the increase caused by an equivalent amount of gasoline. Soybean biodiesel does better, causing a greenhouse gas increase that is about 40 percent less than that from petroleum diesel.

In Brazil, ethanol made from sugar cane produces about twice as much ethanol per acre as corn. Brazilian ethanol refineries get much of their power from burning cane residue, in effect recycling carbon from the atmosphere. The environmental benefit is large. Sugar-cane ethanol grown on established soils releases 80 percent less greenhouse gases than gasoline.

But that isn't the case for sugar-cane ethanol or soybean biodiesel from Brazil's newly cleared lands, including tropical forests and savannas. Clearing land releases immense amounts of greenhouse gases into the air, because much of the material in the plants and soil is broken down into carbon dioxide.

Plants and soil contain three times more carbon than the atmosphere. The trees and soil of an acre of rainforest -- which, once cleared, is suitable for growing soybeans -- contain about 120 tons of organic carbon. An acre of tropical woodland or savanna, suitable for sugar cane, contains about half this amount. About a fourth of the carbon in an ecosystem is released to the atmosphere as carbon dioxide when trees are clear-cut, brush and branches are burned or rot, and roots decay. Even more is lost during the first 20 to 50 years of farming, as soil carbon decomposes into carbon dioxide and as wood products are burned or decay.

This means that when tropical woodland is cleared to produce sugar cane for ethanol, the greenhouse gas released is about 50 percent greater than what occurs from the production and use of the same amount of gasoline. And that statistic holds for at least two decades.

Simply being "renewable" does not automatically make a fuel better for the atmosphere than the fossil fuel it replaces, nor guarantee that society gains any new energy by its production. The European Union was recently shocked to learn that some of its imported biodiesel, derived from palm trees planted on rain-forest lands, was more than twice as bad for climate warming as petroleum diesel. So much for the "benefits" of that form of biodiesel.

Although current Brazilian ethanol is environmentally friendly, the long-term environmental implications of buying more ethanol and biodiesel from Brazil, a possibility raised recently during President Bush's trip to that country, are cloudy. It could be harmful to both the climate and the preservation of tropical plant and animal species if it involved, directly or indirectly, additional clearing of native ecosystems.

Concerns about the environmental effects of ethanol production are starting to be felt in the United States as well. It appears that American farmers may add 10 million acres of corn this year to meet booming demand for ethanol. Some of this land could come from millions of acres now set aside nationwide for conservation under a government-subsidized program. Those uncultivated acres absorb atmospheric carbon, so farming them and converting the corn into ethanol could release more carbon dioxide into the air than would burning gasoline.

There *are* biofuel crops that can be grown with much less energy and chemicals than the food crops we currently use for biofuels. And they can be grown on our less fertile land, especially land that has been degraded by farming. This would decrease competition between food and biofuel. The United States has about 60 million acres of such land -- in the Conservation Reserve Program, road edge rights-of-way and abandoned farmlands.

In a 10-year experiment reported in *Science* magazine in December, we explored how much bioenergy could be produced by 18 different native prairie plant species grown on highly degraded and infertile soil. We planted 172 plots in central Minnesota with various combinations of these species, randomly chosen. We found, on this highly degraded land, that the plots planted with mixtures of many native prairie perennial species yielded 238 percent more bioenergy than those planted with single species. High plant diversity led to high productivity, and little fertilizer or chemical weed or pest killers was required.

The prairie "hay" harvested from these plots can be used to create high-value energy sources. For instance, it can be mixed with coal and burned for electricity generation. It can be "gasified," then chemically combined to make ethanol or synthetic gasoline. Or it can be burned in a turbine engine to make electricity. A technique that is undergoing rapid development involves bioengineering enzymes that digest parts of plants (the cellulose) into sugars that are then fermented into ethanol.

Whether converted into electricity, ethanol or synthetic gasoline, the high-diversity hay from infertile land produced as much or more new usable energy per acre as corn for ethanol on fertile land. And it could be harvested year after year.

Even more surprising were the greenhouse gas benefits. When high-diversity mixtures of native plants are grown on degraded soils, they remove carbon dioxide from the air. Much of this carbon ends up stored in the soil. In essence, mixtures of native plants gradually restore the carbon levels that degraded soils had before being cleared and farmed. This benefit lasts for about a century.

Across the full process of growing high-diversity prairie hay, converting it into an energy source and using that energy, we found a net removal and storage of about a ton and a half of atmospheric carbon dioxide per acre. The net effect is that ethanol or synthetic gasoline produced from this grass on degraded land can provide energy that actually reduces atmospheric levels of carbon dioxide.

When one of these carbon-negative biofuels is mixed with gasoline, the resulting blend releases less carbon dioxide than traditional gasoline.

Biofuels, if used properly, can help us balance our need for food, energy and a habitable and sustainable environment. To help this happen, though, we need a national biofuels policy that favors our best options. We must determine the carbon impacts of each method of making these fuels, then mandate fuel blending that achieves a prescribed greenhouse gas reduction. We have the knowledge and technology to start solving these problems.

[tilman@umn.edu](mailto:tilman@umn.edu); [hill0408@umn.edu](mailto:hill0408@umn.edu)

*David Tilman is an ecologist at the University of Minnesota and a member of the National Academy of Sciences. Jason Hill is a research associate in the Department of Applied Economics at the University of Minnesota.*

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## Study: Ethanol won't solve energy problems

Posted 7/10/2006 5:20 PM ET

By H. Josef Hebert, Associated Press

WASHINGTON — Ethanol is far from a cure-all for the nation's energy problems. It's not as environmentally friendly as some supporters claim and would supply only 12% of U.S. motoring fuel — even if every acre of corn were used.

A number of researchers, the latest in a report Monday, are warning about exaggerated expectations that ethanol could dramatically change America's dependence on foreign oil by shifting motorists away from gasoline.

As far as alternative fuels are concerned, biodiesel from soybeans is the better choice compared with corn-produced ethanol, University of Minnesota researchers concluded in an analysis Monday.

But "neither can replace much petroleum without impacting food supplies," the researchers concluded in the paper published in the Proceedings of the National Academy of Sciences.

The paper said development of non-food materials such as switchgrass, prairie grasses and woody plants to produce cellulosic ethanol would be a major improvement with greater energy output and lower environmental impacts.

But creation of cellulosic ethanol remains in the laboratory research stage. And even non-food sources of ethanol would fall far short of replacing gasoline, most researchers agree.

Biofuels such as ethanol are "not a practical long-term solution," and their widespread use — even from non-food crop sources — could have a "devastating" impact on agriculture, two researchers at the Maglev Research Center of the Polytechnic University of New York, argued recently.

"Ethanol from 300 million acres of switchgrass still could not supply our present gasoline and diesel consumption, which is projected to double by 2025," the researchers, James Jordan and James Powell, wrote in an op-ed article in the Washington Post. "The agricultural effects of such a large-scale program would be devastating."

In addition to a reduction in soil fertility by not plowing wastes back into the ground, there is concern that using corn and soybeans for ethanol would create competition for food crops.

But Geoff Cooper, a spokesman for the National Corn Growers Association, calls suggestions that the growth of ethanol will jeopardize food supplies as "fear mongering."

"There's absolutely no shortage of corn," said Cooper. He said demand for corn for livestock feed has been flat and that increased production and expected higher yields per acre will provide plenty of corn to meet all needs.

In a frenzy to respond to public outcries about high gasoline and crude oil prices, members of Congress as well as the Bush administration have embraced ethanol as the alternative to gasoline to help move the country closer to energy independence.

Ethanol, virtually all of it made from corn in this country, also has been touted as the "green" alternative motor fuel with a push to make it more widely available not only as a 10% additive but with an 85% blend with gasoline.

"We definitely believe that biofuels (such as ethanol) have a significant potential," said Jason Hill, lead author of the University of Minnesota study. But he added that ethanol should not be viewed as "a savior" to our energy problems and its

rapid expansion as a motor fuel has its drawbacks, especially if it is dependent on food crops such as corn and soybeans as feedstock.

If every acre of corn were used for ethanol, it would replace only 12.3% of the gasoline used in this country, Hill's study said, adding that the energy gains of corn-produced ethanol are only modest and the environmental impacts significant.

As a motor fuel, ethanol from corn produces a modest 25% more energy than is consumed — including from fossil fuels — in growing the corn, converting it into ethanol and shipping it for use in gasoline.

While often touted as a "green" environmentally friendly fuel, corn-based ethanol's life cycle environmental impacts are mixed as best, the researchers said.

Compared with gasoline, it produces 12% less "greenhouse" gasses linked to global warming, according to the study. But the researchers also said it has environmental drawbacks, including "markedly greater" releases of nitrogen, phosphorous and pesticides into waterways as runoff from corn fields. Ethanol, especially at higher concentrations in gasoline, also produce more smog-causing pollutants than gasoline per unit of energy burned, the researchers said.

"There's a lot of green in the money that's going into ethanol, but perhaps not so much green is coming out as far as the environment," said Hill, the lead author, in a telephone interview.

The ethanol industry says there's little new in the University of Minnesota study.

"Everyone in the industry recognizes that there is a limit on how much ethanol you can produce from corn," said Matt Hartwig, a spokesman for the Renewable Fuels Association, which represents ethanol producers.

"Nobody is saying that ethanol is the silver bullet that is going to solve all our energy problems. It's going to take a whole host of technologies. ... But ethanol and other biofuels play a very critical role."

He said the University of Minnesota study is only the latest to conclude that ethanol produces more energy than it consumes. "More importantly, there is a significant reduction in petroleum use with ethanol," he added.

Last year about 14% of the corn crop went to ethanol, compared with 11% four years ago. This year the amount of corn for ethanol could be nearly one in every five bushels grown, or 19%, according to Agriculture Department estimates.

The Corn Growers Association says that by 2015 a third of all the corn grown — or 5.5 billion bushels — likely will be for ethanol. The Energy Department says it has a goal of 30% of the fuel used by motorists to be ethanol — both corn-based and cellulosic — by 2030.

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**Find this article at:**

[http://www.usatoday.com/tech/news/2006-07-10-ethanol-study\\_x.htm](http://www.usatoday.com/tech/news/2006-07-10-ethanol-study_x.htm)

Check the box to include the list of links referenced in the article.

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# The Washington Post

## Ethanol's Failed Promise

By Lester Brown and Jonathan Lewis  
Tuesday, April 22, 2008

The willingness to try, fail and try again is the essence of scientific progress. The same sometimes holds true for public policy. It is in this spirit that today, Earth Day, we call upon Congress to revisit recently enacted federal mandates requiring the diversion of foodstuffs for production of biofuels. These "food-to-fuel" mandates were meant to move America toward energy independence and mitigate global climate change. But the evidence irrefutably demonstrates that this policy is not delivering on either goal. In fact, it is causing environmental harm and contributing to a growing global food crisis.

Food-to-fuel mandates were created for the right reasons. The hope of using American-grown crops to fuel our cars seemed like a win-win-win scenario: Our farmers would enjoy the benefit of crop-price stability. Our national security would be enhanced by having a new domestic energy source. Our environment would be protected by a cleaner fuel. But the likelihood of these outcomes was never seriously tested, and new evidence has shown that the justifications for these mandates were inaccurate.

It is now abundantly clear that food-to-fuel mandates are leading to increased environmental damage. First, producing ethanol requires huge amounts of energy -- most of which comes from coal. Second, the production process creates a number of hazardous byproducts, and some production facilities are reportedly dumping these in local water sources.

Third, food-to-fuel mandates are helping drive up the price of agricultural staples, leading to significant changes in land use with major environmental harm. Here in the United States, farmers are pulling land out of the federal conservation program, threatening fragile habitats. Increased agricultural production also means increased fertilizer use. The National Academy of Sciences reported last month that meeting the congressional food-to-fuel mandate by 2022 would lead to a 10 to 19 percent increase in the size of the Gulf of Mexico's "dead zone" -- an area so polluted by fertilizer runoff that no aquatic life can survive there.

Most troubling, though, is that the higher food prices caused in large part by food-to-fuel mandates create incentives for global deforestation, including in the Amazon basin. As *Time* magazine reported this month, huge swaths of forest are being cleared for agricultural development. The result is devastating: We lose an ecological treasure and critical habitat for endangered species, as well as the world's largest "carbon sink." And when the forests are cleared and the land plowed for farming, the carbon that had been sequestered in the plants and soil is released. Princeton scholar Tim Searchinger has modeled this impact and reports in *Science* magazine that the net impact of the food-to-fuel push will be an increase in global carbon emissions -- and thus a catalyst for climate change.

Meanwhile, the mandates are not reducing our dependence on foreign oil. Last year, the United States burned about a quarter of its national corn supply as fuel -- and this led to only a 1 percent reduction in the country's oil consumption.

Advertisement

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SmarterFuelFuture.org

Did You Know Biofuels Can  
Increase GHG Emissions?





Turning one-fourth of our corn into fuel is affecting global food prices. U.S. food prices are rising at twice the rate of inflation, hitting the pocketbooks of lower-income Americans and people living on fixed incomes. Globally, the United Nations and other relief organizations are facing gaping shortfalls as the cost of food outpaces their ability to provide aid for the 800 million people who lack food security. Deadly food riots have broken out in dozens of nations in the past few months, most recently in Haiti and Egypt. World Bank President Robert Zoellick warns of a global food emergency. The immediate necessary step is a major increase in global food aid. But beyond that, America must stop contributing to food price inflation through mandates that force us to use food to feed our cars instead of to feed people.

Taking these together -- the environmental damage, the human pain of food price inflation, the failure to reduce our dependence on oil -- it is impossible to avoid the conclusion that food-to-fuel mandates have failed. Congress took a big chance on biofuels that, unfortunately, has not worked out. Now, in the spirit of progress, let us learn the appropriate lessons from this setback, and let us act quickly to mitigate the damage and set upon a new course that holds greater promise for meeting the challenges ahead.

*Lester Brown is founder and president of the Earth Policy Institute. Jonathan Lewis is a climate specialist and lawyer with the Clean Air Task Force.*

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# State of New Hampshire

HOUSE OF REPRESENTATIVES

CONCORD

Testimony of Rep. Edmond Gionet. Grafton 3, to the Science, Technology and Energy  
Committee on HB 362  
January 29, 2013

Results of extensive research coupled with the actual use of ethanol blends, I submit the following testimony against the use of it.

Starting with the willingness to try, fail and try again is the essence of scientific progress. The same sometimes is true for public policy. It is in this spirit that today we call upon Congress to revisit and reconsider the enacted federal mandates requiring the diversion of food stuffs for production of bio fuels. These "food-to-fuel" mandates were meant to move America toward energy independence and mitigate global climate change. But the evidence irrefutably demonstrates that this policy is not delivering on either goal. It is causing environmental harm and contributing to a growing global food crisis.

Food-to-fuel mandates were created for the right reasons. The hopes of using American grown corn for our cars seemed like a win-win-win scenario. Our farmers would enjoy the benefits of crop-price stabilization. Our national security would be enhanced by having a new domestic energy source. Our environment would be protected by cleaner fuel. But the likelihood of these outcomes were never seriously tested. New evidence has shown that the justification of these mandates were inaccurate.

It is now abundantly clear that the food-to-fuel mandates are leading to increased environmental danger. First, producing ethanol requires huge amounts of energy—most of which comes from coal. Second, production process creates a number of hazardous by-products and some production facilities are reportedly dumping these in local water sources. Third, food-to-fuel mandates are helping drive up the price of agricultural staples leading to significant changes in land use with major environmental harm. Here in the United States, farmers are pulling out of the federal conservation program, threatening fragile habitats. Increased agriculture also means increased fertilizer use. The National Academy of Science reported that more of the Congressional food-to-fuel mandates by 2022 would lead to a 10-19 percent increase in the Gulf of Mexico "dead zone," an area so polluted by fertilizer runoff that no aquatic life can survive there.

Most troubling though is that the higher food prices caused in large part by food-to-fuel mandated incentives for forest deforestation, including in the Amazon Basin. *Time Magazine* reported that huge swaths of forest are being cleared for agricultural development. The results are devastating. With an ecological treasure and critical

habitat for endangered as well as the world's largest "carbon sink" and when the forests are cleared and the land plowed for farming, the carbon that has been sequestered in the plants and soil is released. This event has been modeled and science magazines report that the net impact of the food-to-fuel push will be an increase in carbon emissions, and thus a catalyst for climate change.

Meanwhile, the mandates are not reducing our dependence on foreign oil. The United States in 2008 burned about a quarter of its national corn supply as fuel and this led to only 1% reduction in the country's oil consumption.

Turning one fourth of our corn into fuel is affecting global food prices. U.S. food prices are rising at an alarming rate with inflation, hitting the pocketbooks of lower-income Americans and people living on fixed incomes. Globally, the United Nations and other relief organizations are facing gaping shortfalls. A shortage of food outpaces their ability to provide food for over 800 million people who lack food security. Deaths and riots have broken out in dozens of nations in the past few months--warnings of a global food emergency. The immediate necessary step for major increase in global food aid. But beyond that, America must stop contributing to food price increases through mandates that force us to use food to feed cars instead of to feed people.

Taking these together -- the environmental damage, the human pain of food price inflations, the failure to reduce our dependence on oil -- it is impossible to avoid the conclusion that food-to-fuel mandate failed. Congress took a big chance on bio fuels. That, unfortunately, "has not worked." Now in the name of progress, let us learn the appropriate lessons from this setback, and let us act quickly to mitigate the damages and set upon a new course that holds greater promise ahead.

In closing, it is a known fact that the use of ethanol is more costly and less efficient and is corrosive. It's time to move on.



The State of New Hampshire  
**DEPARTMENT OF ENVIRONMENTAL SERVICES**



**Thomas S. Burack, Commissioner**

January 29, 2013

The Honorable David Borden, Chairman  
N.H. House of Representatives  
Science, Technology, and Energy Committee  
Legislative Office Building, Room 304  
Concord, New Hampshire 03301

**Re: House Bill 362, banning corn-based ethanol as an additive to gasoline sold in New Hampshire.**

Dear Chairman Borden and Members of the Committee:

Thank you for the opportunity to comment on behalf of the Department of Environmental Services (DES) regarding House Bill 362, which seeks to ban the manufacture of corn-based ethanol intended for use in New Hampshire, and to ban the sale of gasoline containing corn-based ethanol in New Hampshire. While DES understands the concerns relative to increasing use of corn to produce ethanol, the department is opposed to this bill due to potential conflict with federal law and potential for this action to result in supply disruption and/or price volatility in the state.

Motor vehicle fuel is subject to federal regulatory requirements of the Renewable Fuels Standard (RFS), established by the 2005 Energy Policy Act and modified (RFS2) by the 2007 Energy Independence and Security Act (EISA). The RFS mandated inclusion of a certain annual volume of renewable fuel in gasoline. RFS2, adopted in response to concerns related to the sustainability of crop-based fuels including greenhouse gas (GHG) emissions and food shortages, made two very significant changes to the original standard. First, it differentiated between categories of renewable fuel, including cellulosic and advanced biofuels, and set separate volume requirements for each. RFS2 also required EPA to apply lifecycle GHG performance threshold standards to ensure that each category of renewable fuel emits fewer greenhouse gases than the petroleum fuel it replaces. The lifecycle analysis is inclusive of energy and emissions inputs for fuel and feedstock production, indirect land use impacts, distribution and use. It also includes results of economic modeling that predicts changes in agricultural markets. Through this mechanism RFS2 creates a limited market incentive for conventional corn ethanol and a significant market incentive for cellulosic and advanced biofuels.

The nation's fuel supply is also regulated under the Clean Air Act Amendments of 1990 (CAA) which, in Section 211(c)(4), place certain limitations on a state's legal authority to control the composition of fuel offered for sale in a state. Specifically, Section 211(c)(4) states:

*“Except as otherwise provided in subparagraph (B) or (C), no State (or political subdivision thereof) may prescribe or attempt to enforce, for purposes of motor vehicle emission control, any control or prohibition respecting any characteristic or component of a fuel or fuel additive in a motor vehicle or motor vehicle engine”*

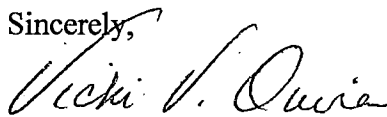
The potential conflict of a NH corn-ethanol ban with federal CAA requirements could put NH petroleum suppliers in a difficult position, forcing them to choose between complying with federal law or with state law. In addition to fuel supply disruptions and price volatility, this could also result in costly and protracted litigation brought by either the industry or the federal government, or both, to resolve the conflict.

A ban on corn ethanol in New Hampshire would also likely result in litigation on another front. California's efforts to implement a regulation that would discourage use of some sources of corn-based ethanol were met with a vigorous lawsuit from mid-west farming interests. A December 2011 Federal District Court issued an injunction against implementation of the rule while the courts determine whether the program violates the US Constitution's Commerce Clause by seeking to control conduct beyond the boundary of the state and thus violated the Commerce Clause's "strict scrutiny" test because it "directly regulates or discriminates against" interstate commerce. While the injunction was stayed in April 2012 a final ruling has not yet been issued. It is anticipated this case will be appealed all the way to the U.S. Supreme Court, and it can be assumed that a targeted ban such as that proposed by HB 362 would face similar challenges.

In past testimony on similar bills the department has noted the potential for supply or price disruptions to New Hampshire motorists from a ban on corn ethanol due to lack of a gasoline terminal in the state and the relatively low volume of fuel used here. HB 362 seeks to address this issue by including a contingency clause whereby the ban would only take effect if two other New England states were to also adopt similar legislation. Given the above noted court ruling it appears very unlikely that such a contingency would be met until such time as there has been a final ruling by the U.S. Supreme Court, an action that is probably several years in the future.

Thank you for the opportunity to provide testimony on this bill. Should you have further questions or need additional information please feel free to contact Craig Wright, Acting Director, Air Resources Division (271-1088, [craig.wright@des.nh.gov](mailto:craig.wright@des.nh.gov)) or Rebecca Ohler, Transportation and Energy Programs Manager (271-6749, [rebecca.ohler@des.nh.gov](mailto:rebecca.ohler@des.nh.gov)).

Sincerely,

  
Thomas S. Burack  
Commissioner

cc: HB 362 sponsors



Communicate ~ Educate ~ Legislate

110 Stark Street, Manchester, NH 03101-1977

Tel.: (603) 669-9333, Fax: (603) 623-1137

E-mail: [advocacy@grocers.org](mailto:advocacy@grocers.org)

Web Site: [www.grocers.org](http://www.grocers.org)

**Testimony of NH Grocers Association  
Regarding  
House Bill # 362  
Banning the Sale of Gasoline Containing Corn-Based Ethanol  
Tuesday, January 29, 2013**

Good morning Mr. Chairman and members of the Committee. Again, for the record, my name is John Dumais and I am the President of the New Hampshire Grocers Association (NHGA). We appear in opposition to this Bill.

I understand that some of you may think that it is odd for grocers to support using corn crops to make Ethanol for gasoline. After all, by diverting corn crops, many items from animal feed to cooking oils and a primary ingredient in many food items is making consumable products more expensive. It would be great to return corn and its by-products to its traditional role.

However, eliminating ethanol from gasoline is not a viable option for a small state like New Hampshire; and perhaps not even for the whole Northeast region. First there are not enough refineries to make a special 'batch' of fuel just for our state. If there was it would drive up the cost by at least 10 cents more per gallon.

Our food stores have to truck in over 85% of all of our food supplies. Annually that would mean an additional \$9,000 to \$10,000 for every tractor trailer delivering groceries and think what that would do to your wallet at the checkout!

And what about our stores that sell gasoline? With such a limited supply of product very few stores (some estimate 2 or 3 in the entire state) would be able to sell gas without corn-based ethanol. If that were the case, everyone would be forced to find available gas outside the borders of our state.

This Bill, while it has good intentions carries with it dire consequences. Even if one other New England state were to implement this first, New Hampshire would still be left with a huge disadvantage to our own residents and dramatically impact tourism.

This is one Bill we cannot initiate alone. Even on a region-wide level it would have similar penalties. It is our opinion that the only resolution to this must come with implementation at the federal level, where all states would have to eliminate corn-based ethanol form gasoline, all at the same time.

For these reasons, we ask you to find this Bill, **INEXPEDIENT TO LEGISLATE**>

# Voting Sheets

HOUSE COMMITTEE ON SCIENCE, TECHNOLOGY AND ENERGY

EXECUTIVE SESSION on HB 362

**BILL TITLE:** banning corn-based ethanol as an additive to gasoline sold in New Hampshire.

**DATE:** 2-5-13

**LOB ROOM:** 304

**Amendments:**

Sponsor: Rep. Pastor	OLS Document #:	2013	0184h
Sponsor: Rep.	OLS Document #:		
Sponsor: Rep.	OLS Document #:		

**Motions:** OTP, OTP/A, ITL, Retained (Please circle one.)

Moved by Rep. Pastor

Seconded by Rep. Reilly

Vote: 12-8 (Please attach record of roll call vote.)

**Motions:** OTP, OTP/A, ITL, Retained (Please circle one.)

Moved by Rep.

Seconded by Rep.

Vote: Final vote not taken; continue Exec Session (Please attach record of roll call vote.)

**CONSENT CALENDAR VOTE:** {Type VOTE}

(Vote to place on Consent Calendar must be unanimous.)

**Statement of Intent:** Refer to Committee Report

Respectfully submitted,

Rep. Jane E. Beaulieu, Clerk



HOUSE COMMITTEE ON SCIENCE, TECHNOLOGY AND ENERGY

EXECUTIVE SESSION on HB 362

*continued to ?*

BILL TITLE: banning corn-based ethanol as an additive to gasoline sold in New Hampshire.

DATE: 2-5-13

LOB ROOM: 302

Amendments:

Sponsor: Rep.	<i>PASTOR</i>	OLS Document #:	<i>2013-0189H</i>
Sponsor: Rep.		OLS Document #:	
Sponsor: Rep.		OLS Document #:	

Motions: *AMENDS* OTP (OTP/A, ITL, Retained (Please circle one.))  
 Moved by Rep. *PASTOR*  
 Seconded by Rep. *REILLY* } ACCEPT AMEND  
 Vote: (Please attach record of roll call vote.)

Motions: ~~OTP (OTP/A) ITL, Retained (Please circle one.)~~  
 Moved by Rep. ~~*SHEPARDSON*~~  
 Seconded by Rep. ~~*REILLY*~~  
 Vote: (Please attach record of roll call vote.)

CONSENT CALENDAR VOTE: Consent or Regular (Circle One)  
 (Vote to place on Consent Calendar must be unanimous.)

Statement of Intent: Refer to Committee Report

Respectfully submitted,  
 Rep. Robert E. Introne, Clerk



STATE OF NEW HAMPSHIRE  
OFFICE OF THE HOUSE CLERK

1/10/2013 11:27:09 AM  
Roll Call Committee Registers  
Report

2013 SESSION

SCIENCE, TECHNOLOGY AND ENERGY

Bill #: HB 362 Title: Banning compressed ethanol...

PH Date: 1/29/13 Exec Session Date: 2/5/13

Motion: OTF - ACCEPT AND Amendment #: 2013-0189H

MEMBER	YEAS	NAYS
Borden, David A, Chairman	X	
Townsend, Charles L, V Chairman	X	
Cali-Pitts, Jacqueline A	X	
Levasseur, Nickolas J		X
Pastor, Beatriz	X	
Baber, William S	X	
Backus, Robert A	X	
Grossman, Kenneth	X	
Mann, John E	X	
Raymond, Ian P	X	
Shepardson, Marjorie J	X	
Introne, Robert E, Clerk		X
Devine, James E		X
Rappaport, Laurence M	X	
Bradley, Lester W	X	X
Reilly, Harold T	X	
Khan, Aboul B		X
LeVasseur, Richard D		X
Murotake, David K		X
Vadney, Herbert R		X
TOTAL VOTE:		

12 / 8



STATE OF NEW HAMPSHIRE  
OFFICE OF THE HOUSE CLERK

1/10/2013 11:27:09 AM  
Roll Call Committee Registers  
Report

2013 SESSION

SCIENCE, TECHNOLOGY AND ENERGY

Bill #: 362 Title: BANNING CORN BASED ETHANOL  
PH Date: 1, 29, 13 Exec Session Date: 2, 15, 13  
Motion: ~~DEFER~~ RECONSIDER Amendment #: 2013-0189  
AMEND

MEMBER

YEAS

NAYS

Borden, David A, Chairman		
Townsend, Charles L, V Chairman		
Cali-Pitts, Jacqueline A		
Levasseur, Nickolas J		
Pastor, Beatriz		
Baber, William S		
Backus, Robert A		
Grossman, Kenneth		
Mann, John E		
Raymond, Ian P		
Shepardson, Marjorie J		
Introne, Robert E, Clerk		
Devine, James E		
Rappaport, Laurence M		
Bradley, Lester W		
Reilly, Harold T		
Khan, Aboul B		
LeVasseur, Richard D		
Murotake, David K		
Vadney, Herbert R		
<b>TOTAL VOTE:</b>		

*voice votes - passed*

HOUSE COMMITTEE ON SCIENCE, TECHNOLOGY AND ENERGY

EXECUTIVE SESSION on HB 362 (Continued)

**BILL TITLE:** banning corn-based ethanol as an additive to gasoline sold in New Hampshire.

**DATE:** 2-19-13

**LOB ROOM:** 302

Amendments:

Sponsor: Rep. Pastor OLS Document #: 2013 0350h

Sponsor: Rep. OLS Document #:

Sponsor: Rep. OLS Document #:

Motions: OTP, OTP/A, ITL, Retained (Please circle one.)

Moved by Rep. Backus

Seconded by Rep. Khan

Vote: 11-6 (Please attach record of roll call vote.)

Motions: OTP, OTP/A, ITL, Retained (Please circle one.)

Moved by Rep. Backus

Seconded by Rep. Khan

Vote: 11-6 (Please attach record of roll call vote.)

CONSENT CALENDAR VOTE: Consent or Regular (Circle One)

(Vote to place on Consent Calendar must be unanimous.)

Statement of Intent: Refer to Committee Report

Respectfully submitted,

Rep. Robert E. Introne, Clerk

HOUSE COMMITTEE ON SCIENCE, TECHNOLOGY AND ENERGY

EXECUTIVE SESSION on HB 362

BILL TITLE: banning corn-based ethanol as an additive to gasoline sold in New Hampshire.

DATE: 02/19/2013

LOB ROOM: 302

Amendments:

Sponsor: Rep. PASTOR

OLS Document #: 2013-0350h

Sponsor: Rep.

OLS Document #:

Sponsor: Rep.

OLS Document #:

ACCEPTED  
11/6

Motions: OTP, OTP/A, ITL, Retained (Please circle one.)

Moved by Rep. BACKUS

Seconded by Rep. KHAN

Vote: (Please attach record of roll call vote.)

Motions: OTP, OTPA, ITL, Retained (Please circle one.)

Moved by Rep. BACKUS

Seconded by Rep. KHAN

Vote: (Please attach record of roll call vote.)

11/6

CONSENT CALENDAR VOTE: Consent or Regular (Circle One)

(Vote to place on Consent Calendar must be unanimous.)

Statement of Intent: Refer to Committee Report

Respectfully submitted,

Rep. Robert E. Introne, Clerk



STATE OF NEW HAMPSHIRE  
OFFICE OF THE HOUSE CLERK

1/10/2013 11:27:09 AM  
Roll Call Committee Registers  
Report

2013 SESSION

SCIENCE, TECHNOLOGY AND ENERGY

Bill #: HB 362 Title: BANNING CORN BASED ETHANOL

PH Date: 1, 29, 2013 Exec Session Date: 2, 19, 2013

Motion: \_\_\_\_\_ Amendment #: 2013-0350H

MEMBER	YEAS	NAYS
Borden, David A, Chairman	X	
Townsend, Charles L, V Chairman	X	
Cali-Pitts, Jacqueline A <u>ABSENT</u>		
Levasseur, Nickolas J		X
Pastor, Beatriz	X	
Baber, William S		X
Backus, Robert A	X	
Grossman, Kenneth	X	
Mann, John E	X	
Raymond, Ian P	X	
Shepardson, Marjorie J	X	
Introne, Robert E, Clerk		X
Devine, James E	X	
Rappaport, Laurence M	X	
Bradley, Lester W <u>ABSENT</u>		
Reilly, Harold T <u>ABSENT</u>		
Khan, Aboul B	X	
LeVasseur, Richard D	X	X
Murotake, David K	X	X
Vadney, Herbert R		X
<b>TOTAL VOTE:</b>		

H  
6  
AMENDMENT



STATE OF NEW HAMPSHIRE  
OFFICE OF THE HOUSE CLERK

1/10/2013 11:27:09 AM  
Roll Call Committee Registers  
Report

2013 SESSION

SCIENCE, TECHNOLOGY AND ENERGY

Bill #: 362 Title: BANKING CARD BASED ETXNNTX  
PH Date: 1, 29, 2013 Exec Session Date: 2, 19, 2013  
Motion: OTR/A Amendment #: 2013-0350H

MEMBER

YEAS

NAYS

MEMBER	YEAS	NAYS
Borden, David A, Chairman	X	
Townsend, Charles L, V Chairman	X	
Cali-Pitts, Jacqueline A		
Levasseur, Nickolas J		X
Pastor, Beatriz	X	
Baber, William S		X
Backus, Robert A	X	
Grossman, Kenneth	X	
Mann, John E	X	
Raymond, Ian P	X	
Shepardson, Marjorie J	X	
Introne, Robert E, Clerk		X
Devine, James E	X	X
Rappaport, Laurence M	X	
Bradley, Lester W		
Reilly, Harold T	X	
Khan, Aboul B	X	X
LeVasseur, Richard D		X
Murotake, David K	X	X
Vadney, Herbert R		X
TOTAL VOTE:		

11 / 6

# Committee Report



**REGULAR CALENDAR**

**February 27, 2013**

**HOUSE OF REPRESENTATIVES**

**REPORT OF COMMITTEE**

The Committee on SCIENCE, TECHNOLOGY AND ENERGY to which was referred HB362,

AN ACT banning corn-based ethanol as an additive to gasoline sold in New Hampshire. Having considered the same, report the same with the following amendment, and the recommendation that the bill OUGHT TO PASS WITH AMENDMENT.

**Rep. Robert A Backus**

**FOR THE COMMITTEE**

## COMMITTEE REPORT

Committee:	<b>SCIENCE, TECHNOLOGY AND ENERGY</b>
Bill Number:	<b>HB362</b>
Title:	<b>banning corn-based ethanol as an additive to gasoline sold in New Hampshire.</b>
Date:	<b>February 20, 2013</b>
Consent Calendar:	<b>NO</b>
Recommendation:	<b>OUGHT TO PASS WITH AMENDMENT</b>

### STATEMENT OF INTENT

All members of the Committee expressly endorsed the goal of moving New Hampshire away from using corn based ethanol as a component of gasoline in New Hampshire and agreed that using a food crop for transportation fuel is not good public policy. The majority further believes that, as amended, the bill contains sufficient protection against the possibility that New Hampshire, standing alone in this position, might require its own "boutique" gasoline and lack sufficient market power to cause suppliers to offer gasoline which does not include corn-based ethanol at a reasonable price. Ample assurance against this concern is provided by the amendment which conditions any New Hampshire ban on three other New England states (or four out of the six states) joining in the ban or by the Air Pollution Advisory Committee certifying the ready availability of a non corn based ethanol gasoline blend in New Hampshire at a reasonable price.

Vote 11-6.

Rep. Robert A Backus  
FOR THE COMMITTEE

Original: House Clerk  
Cc: Committee Bill File

## REGULAR CALENDAR

### SCIENCE, TECHNOLOGY AND ENERGY

**HB362**, banning corn-based ethanol as an additive to gasoline sold in New Hampshire. **OUGHT TO PASS WITH AMENDMENT.**

Rep. Robert A Backus for SCIENCE, TECHNOLOGY AND ENERGY. All members of the Committee expressly endorsed the goal of moving New Hampshire away from using corn based ethanol as a component of gasoline in New Hampshire and agreed that using a food crop for transportation fuel is not good public policy. The majority further believes that, as amended, the bill contains sufficient protection against the possibility that New Hampshire, standing alone in this position, might require its own "boutique" gasoline and lack sufficient market power to cause suppliers to offer gasoline which does not include corn-based ethanol at a reasonable price. Ample assurance against this concern is provided by the amendment which conditions any New Hampshire ban on three other New England states (or four out of the six states) joining in the ban or by the Air Pollution Advisory Committee certifying the ready availability of a non corn based ethanol gasoline blend in New Hampshire at a reasonable price. **Vote 11-6.**

Original: House Clerk  
Cc: Committee Bill File

From Joel  
To: Rep Borden

Stapler, Carol

From: David Borden [david@oursustainablenh.com]  
Sent: Wednesday, February 20, 2013 6:33 AM  
To: Stapler, Carol  
Cc: Nick Levasseur; Beatriz Pastor  
Subject: HB 362 Blurb

Dear Carol:

Here is the blurb from Bob Backus

Nick Levassuer will send one this morning:

HB 362; prohibiting use of corn based ethanol in gasoline. MAJORITY :OUGHT TO PASS WITH AMENDMENT

Representative Robert Backus for the Majority of Science, Technology and Energy:  
All members of the Committee expressly endorsed the goal of moving New Hampshire away from using corn based ethanol as a component of gasoline in New Hampshire and agreed that using a food crop for transportation fuel is not good public policy. The majority further believes that, as amended, the bill contains sufficient protection against the possibility that New Hampshire, standing alone in this position, might require its own "boutique" gasoline and lack sufficient market power to cause suppliers to offer ~~non-ethanol~~ gasoline at a reasonable price. Ample assurance against this concern is provided by the amendment which conditions any New Hampshire ban on three other New England states (or four out of the six states) joining in the ban or by the Air Pollution Advisory Committee certifying the availability of a non-ethanol based gasoline blend in New Hampshire.

VOTE: 11-6.

*price comparable to ethanol*

*ready*

*corn-based*

*that will at a reasonable price.*

*which does not include corn based ethanol*

David Borden  
PO Box 167  
40 Walbach St.  
New Castle, NH 03854  
603-436-4132  
Mobile 603-848-0463

**Stapler, Carol**

---

**From:** David Borden [david@oursustainablenh.com]

**Sent:** Wednesday, February 20, 2013 7:30 AM

**To:** Backus, Bob

**Cc:** Stapler, Carol; Cltownsend

**Subject:** Re: Blurb for HB 362

Eloquent. Thanks

On Wed, Feb 20, 2013 at 6:27 AM, Backus, Bob <[Bob.Backus@leg.state.nh.us](mailto:Bob.Backus@leg.state.nh.us)> wrote:

HB 362, prohibiting use of corn based ethanol in gasoline. MAJORITY :OUGHT TO PASS WITH AMENDMENT

Representative Robert Backus for the Majority of Science, Technology and Energy:

All members of the Committee expressly endorsed the goal of moving New Hampshire away from using corn based ethanol as a component of gasoline in New Hampshire and agreed that using a food crop for transportation fuel is not good public policy. The majority further believes that, as amended, the bill contains sufficient protection against the possibility that New Hampshire, standing alone in this position, might require its own "boutique" gasoline and lack sufficient market power to cause suppliers to offer non ethanol gasoline at a reasonable price.

Ample assurance against this concern is provided by the amendment which conditions any New Hampshire ban on three other New England states (or four out of the six states) joining in the ban or by the Air Pollution Advisory Committee certifying the availability of a non ethanol based gasoline blend in New Hampshire.

VOTE: 11-6.

--  
David Borden  
PO Box 167  
40 Walbach St.  
New Castle, NH 03854  
603-436-4132  
Mobile 603-848-0463